

Final Report  
GSA Contract No. GS-OOF-00071

**YEAR ONE PRE-CONSTRUCTION  
ENVIRONMENTAL MONITORING  
FOR THE DARE COUNTY BEACH  
SHORELINE PROTECTION PROJECT,  
DARE COUNTY, NORTH CAROLINA**

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## **EXECUTIVE SUMMARY**

Erosion along the Outer Banks has degraded public beaches and significantly damaged or destroyed both public and private properties. In particular, several beaches in Dare County, including the beaches of Nags Head, Kill Devil Hills, and Kitty Hawk have been severely eroded and are still rapidly eroding, raising concerns by the Dare County local government. To address this problem the Wilmington District of the U. S. Army Corps of Engineers (USACE) conducted an investigation reviewing several alternative protection measures for Dare County Beaches and property. Findings from that study concluded that the most practical plan of protection in the primary study area was a beach and shoreline protection project that would construct a primary sand dune and extend the beach seaward 15 m using sand from several offshore borrow sites located within three miles of the beach. However, the processes associated with beach nourishment can have negative impacts to biological communities. To address this concern, a five-year monitoring plan was designed to assess any impacts associated with the beach nourishment process. The biological monitoring plan recommends two years of pre-construction monitoring of biological resources. This report presents the first year of pre-construction monitoring.

Beginning in the spring of 2004, the fish, benthic, bird, and ghost crab communities at two beaches, and the fish and benthic communities at two offshore ocean sites, were monitored seasonally for one year. In addition, a roving creel survey was also implemented to monitor recreational fisherman activity at the beaches. Beach nourishment processes will impact one of the beaches and one of the ocean sites and the other sites are used as reference sites. The first year of pre-construction monitoring indicates significant temporal and spatial scale fluctuations in many of the biological resources monitored. The beaches were characterized with low benthic diversity and high fish diversity. In contrast, the borrow site and borrow reference site exhibited high benthic community diversity and very low fish diversity and abundance. Bird use between the beaches was similar and bird diversity was low. Recreational fishing activity along the beaches was highest in the summer and fall and lowest in winter. The most commonly caught species were spot, bluefish, spotted sea trout, kingfish, and flounder. These results are consistent with other studies reported within the region.

The program is now three seasons into the second year of pre-construction monitoring in a continuing effort to characterize temporal and spatial baseline conditions at the project site. These data will be used to assess beach replenishment impacts and recovery as the program moves into construction and post-construction monitoring periods.



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## **1.0 INTRODUCTION**

The Outer Banks of North Carolina are just some of the nearly 300 barrier island systems along the East and Gulf Coasts of the United States that are experiencing long-term erosion due to sea level rise, increasing frequency and intensity of coastal storms, and other natural processes. Erosion along the Outer Banks has degraded public beaches and significantly damaged or destroyed both public and private properties. In particular, several beaches in Dare County, including the beaches of Nags Head, Kill Devil Hills, and Kitty Hawk have been severely eroded and are still rapidly eroding. Because of concerns raised by the Dare County local government, the United States House of Representatives adopted a resolution in 1990 requesting the Secretary of the Army to investigate hurricane and shore erosion protection measures for a portion of Dare County beaches. The Wilmington District of the U. S. Army Corps of Engineers (USACE) conducted the investigation and based upon an evaluation of several alternative protection measures, concluded that the most practical plan of protection in the primary study area was a beach and shoreline protection project (USACE 2000).

Beach and shoreline protection projects, also known as beach nourishment projects, generally build a beach seaward by pumping sand onto the beach from offshore sand resources. The recommended plan of improvement on the Dare County beaches is to construct a primary sand dune and extend the beach seaward 15 m using sand from several offshore borrow sites located within three miles of the beach. Based on the recommendation of the Feasibility Report (1999), two stretches of beach were identified as candidates for beach nourishment in Dare County, one in the Southern extent of the project limits and one to the North. Initial construction will entail placement of approximately 8,000,000 cubic yards of sand in the South Project Area, and 4,300,000 cubic yards in the North Project Area, for a total volume of 12,300,000 cubic yards. The construction phase is scheduled to begin in early 2007 for both the North Project Area, and the middle segment of the South Project Area.

The nourishment of these beaches is expected to protect and reduce damages associated with hurricane and storm events and beach erosion. Nourishment is also expected to enhance the overall value of the beaches by increasing the area available for recreation. However, the processes associated with beach nourishment can have negative impacts to biological communities and concerns were raised regarding to what extent the nourishment process may impact local biological resources.

In September 2000 the Final Impact Statement (FEIS) for the proposed beach nourishment project was completed. The findings of that document suggest that the project areas may provide high quality habitat to number of marine and terrestrial organisms and therefore impacts from long-term sand placement and sand dredging offshore could be detrimental to those resources. In recognition of this, the USACE made a commitment to develop an integrated pre and post monitoring plan designed to “*demonstrate reasonable indication of expected recovery of benthic food sources in the borrow area and to identify any unforeseen significant impacts to biological resources residing in the borrow and beach placement areas.*” The USACE also

recognized the value of several years of pre and post monitoring and committed to a 5-year study. In addition, because the Northern Project is the first beach scheduled for nourishment, this site was chosen as the monitoring site to ensure that two years of pre-monitoring data could be completed before impacts occurred over the entire project area.

To assist in the development of a comprehensive monitoring plan, the Wilmington District of the USACE contracted Versar, Inc in July 2003. Based upon previous experience and rigorous scientific protocol, a comprehensive monitoring plan was developed encompassing the following four major monitoring elements outlined below:

- Biological monitoring of the North Project Beach and reference beach, inclusive of fisheries, benthic, and ghost crab surveys
- Biological monitoring of the N1/N2 borrow site, inclusive of fisheries, benthic, and underwater video surveys
- Shorebird monitoring on the subject and reference beach
- Recreational fishing surveys on the subject and reference beach

After the monitoring plan was completed and accepted, Versar, Inc was also contracted to implement the monitoring plan. This report summarizes the first full year of pre-construction biological monitoring of the beach and borrow sites scheduled for beach nourishment in the Northern Project area of Dare County, North Carolina.

## 2.0 MATERIALS AND METHODS

### 2.1 STUDY DESIGN

Beginning in the spring of 2004 we sampled two beaches and two offshore ocean sites seasonally for one year (Figure 2-1). Seasonal sampling was conducted during the spring (May-June), summer (July-September), fall (October-December), and winter (January-April). The sampling design consists of monitoring a beach, hereafter referred to as the “Impact Beach”, and borrow site scheduled to be impacted by beach nourishment. In addition, a reference site of similar habitat was also chosen and monitored for the impact beach and borrow site. Monitoring will be conducted two years prior to beach nourishment, during the nourishment process, and two years post nourishment for a total of five years of monitoring. The monitoring program consists of sampling the densities of fish, benthos, ghost crabs, and birds at the beaches. Only fish and benthos densities are monitored at the ocean sites. In addition, a creel survey was conducted at the beaches to monitor fisherman activity and fishing effort. A detailed description of the entire monitoring plan can be viewed at the following internet link: [http://www.saw.usace.army.mil/Dare%20County/Finalmonitoringplan2\\_03.pdf](http://www.saw.usace.army.mil/Dare%20County/Finalmonitoringplan2_03.pdf).

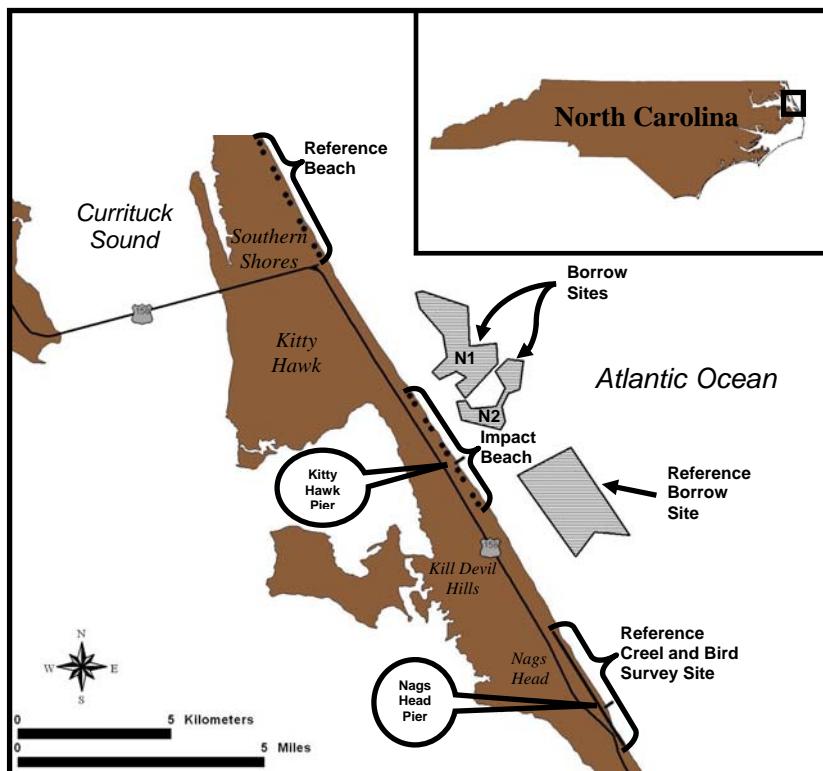


Figure 2-1. Map of several beaches and offshore sand borrow sites located in Dare County, NC that were sampled seasonally for one year as part of a biological monitoring project for the U.S. Army Corps of Engineers, Wilmington District.

## **2.2 BEACH SITES**

The beach sites were located in Dare County, NC, and consisted of one stretch of beach scheduled for beach nourishment and a reference stretch of beach sampled for data comparison. The impact beach is located in Kill Devil Hills, NC and is the Northern part of the Shoreline Protection Project scheduled for Dare County Beaches (Figure 2-1). This stretch of beach is approximately 4.8 km in length, and is an area that has been significantly eroded in recent years.

To compare temporal differences in bird, fish and benthos abundances before, during, and after beach nourishment, we chose a reference site of similar length located approximately 4.8 km north of the impact beach in Southern Shores (Figure 2-1). This site was chosen as the reference beach because it was located far enough away so that it would not be affected during the re-nourishment processes, but was close enough to assume it exhibited similar habitat characteristics as the impact beach.

Because the impact beach has an active fishing pier and the reference site does not, a separate 4.8 km stretch of beach in Nags Head was chosen as the reference site for monitoring fisherman activity and fishing effort (Figure 2-1). Although there are several fishing piers in the area, none were situated on beaches far enough away from the influence of the nourishment project to justify having the biological monitoring and the creel reference at the same beach. Rather than disregard the pier, because pier's represents an important resource to recreational fisherman, we chose a separate reference beach for the creel survey that had an active fishing pier.

## **2.3 OCEAN BORROW SITES**

The two ocean sites consist of a combination of two sand borrow sites and a reference site used for comparison. The two borrow sites are located between 0.8 and 3.2 km offshore of the impact beach and are known as N1 and N2 (Figure 2-1). Several past geological investigations have identified these sites as having good quality sand for beach nourishment and therefore sand from these sites is scheduled to be used to nourish the Northern Project Beach in early 2007.

For comparison we also chose an ocean borrow reference site. This site was chosen based on video imagery collected from an underwater video mapping survey conducted prior to biological sampling. The objective of this survey was to provide data to select a reference site for benthic and fisheries monitoring that had similar surface sediment features as the borrow site. By selecting a reference site with similar physical features we can assume that differences in biological responses observed during borrow site impact and post impact years will be attributed to the dredging activity not inherent differences due to bottom type (e.g., sand, gravel, shell, rock).

Using existing bathymetry data and several summary reports describing bottom habitat near the borrow sites (Boss and Hoffman 2001), several potential reference areas to the south of the borrow sites were delineated prior to conducting the video survey (Figure 2-2). After these areas were identified, Dial Cordy and Associates Inc. from Jacksonville Beach Florida were subcontracted to conduct this initial video survey. A towed video camera in conjunction with a Differential Global Positioning System (DGPS) and navigation software was used to image bottom features at the borrow sites and the potential reference sites. Transects were established within the survey area to best represent the habitats within the timeframe allotted for the survey. Transects were spaced at 150 to 300 m intervals, because this spacing was determined to provide adequate coverage to characterize the sediment composition within the proposed borrow sites.

During the survey, a video sled was towed along each transect in the borrow sites to document physical habitat features. Once the borrow sites were mapped with the video, both potential reference areas were investigated in efforts to locate habitat types similar to those encountered within the borrow sites. All video images were then post processed and physical features noted and categorized. A total of 66 km of video transects were recorded during this survey (Figure 2-2). Within the borrow areas, 35 km of video were recorded and analyzed. Investigations to identify a suitable reference area included over 31 km of video transect. The final borrow reference site was chosen based upon the best combination of similar habitat features seen in the video from both potential reference sites (Figure 2-1).

## **2.4 SAMPLING METHODS**

### **2.4.1 Benthic Sampling**

#### **2.4.1.1 Beach Sites**

Benthic invertebrate species composition, abundance, and biomass was collected using a Ponar Grab sampler in the swash zone and shallow sub-tidal habitats at a series of 10 fixed sites along the impact beach and at 10 sites along the reference beach (Figure 2-1). Fixed sites at both beaches were chosen to coincide with physical habitat survey transects previously established by researchers from the Army Corps of Engineers Field Research Facility in Duck, NC. A total of 15 USACE physical transect stations are located within the subject beach and 15 at the reference beach. To ensure that the entire beach is characterized and that all stations had an equal probability of being selected for sampling, we separated the physical transect stations into five groups of three per beach. Within those groups two stations out of the three were selected at random. We then selected those station positions for all subsequent groups within that beach for a total of 10 sampling sites per beach (Table 2-1 and 2-2).

During each seasonal sampling event, one sample per habitat (swash and shallow sub-tidal) is taken at each of the sites along a beach. All sampling is conducted during daylight hours as close to low tide as possible. Grab samples are preserved in the field and transported back to Versar, Inc for processing.

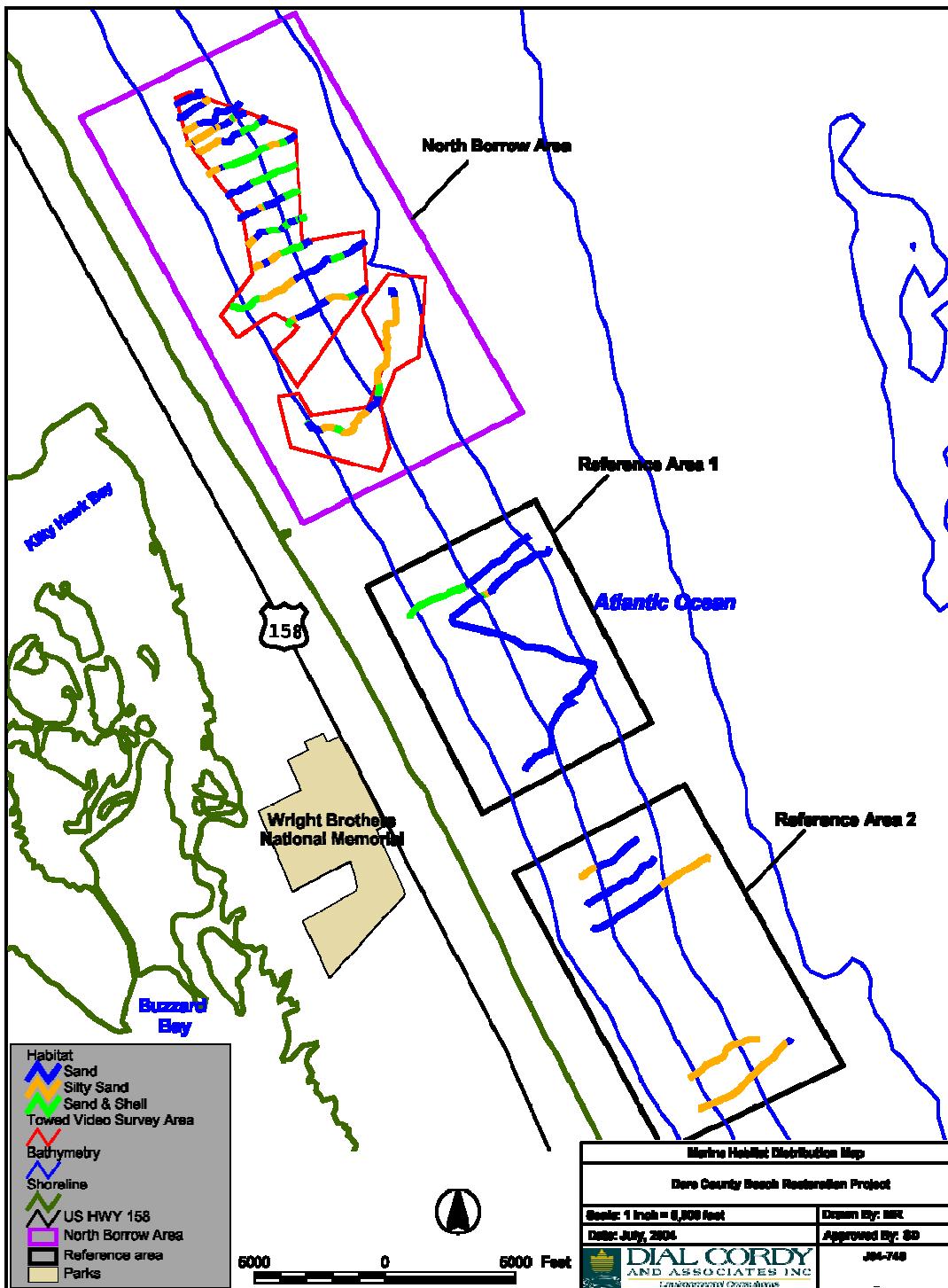


Figure 2-2. Map of two ocean borrow sites and two potential reference sites surveyed with an underwater video sled to identify a suitable reference borrow site for the biological monitoring project in Dare County, NC. Lines show actual video transects and substrate type.

Table 2-1. Impact beach benthic stations. Bolded physical station numbers were selected for benthic sampling and physical monitoring.

<b>USACE Physical Station #'s</b>	<b>Group</b>	<b>Sediment</b>	<b>Benthic</b>
<b>289</b>	1	X	X
<b>279</b>		X	X
269			
<b>260</b>	2	X	X
<b>249</b>		X	X
240			
<b>229</b>	3	X	X
<b>219</b>		X	X
209			
<b>199</b>	4	X	X
<b>189</b>		X	X
179			
<b>169</b>	5	X	X
<b>159</b>		X	X
149			

Table 2-2. Reference beach benthic stations. Bolded physical station numbers were randomly selected for benthic sampling and physical monitoring.

<b>USACE Physical Station #'s</b>	<b>Group</b>	<b>Sediment</b>	<b>Benthic</b>
<b>-10</b>	1	X	X
<b>-20</b>		X	X
-30			
<b>-40</b>	2	X	X
<b>-50</b>		X	X
-60			
<b>-70</b>	3	X	X
<b>-80</b>		X	X
-90			
<b>-100</b>	4	X	X
<b>-110</b>		X	X
-120			
<b>-130</b>	5	X	X
<b>-140</b>		X	X
-150			

In the laboratory, the samples were re-sieved and processed to identify all organisms present in the sample. Under a dissecting microscope, all macroinvertebrate organisms were removed from the debris, enumerated, and identified to lowest practical taxon (species in most

cases). The laboratory followed a strict 10% QA/QC protocol to assure accuracy in both the sorting and identification procedures (Versar 1999). After identification and enumeration, ash-free dry weight (AFDW) biomass was measured for each taxon. AFDW biomass was determined by (1) drying and weighing each taxonomic group to a constant weight at 60 °C, (2) ashing in a muffle furnace at 500 °C for 5 hours, and (3) weighing the remains.

#### **2.4.1.2 Borrow Sites**

Benthic invertebrate species composition, abundance, and biomass was collected from a research vessel using a Young Grab at the borrow sites and borrow site reference during each seasonal sampling event (Figure 2-1). Using a random point generator in a GIS, a total of 10 randomly chosen sites were generated and sampled in each season within the borrow (7 sites in N1 and 3 in N2) and reference sites (Figure 2-3). At each sample site the exact latitude and longitude were documented, and bottom water quality readings (dissolve oxygen, pH, temperature, and salinity) were also taken. Benthic samples are sieved through a 0.5 mm screen in the field and all organisms present on the screen are preserved and transported back to Versar, Inc. for processing. Benthic samples are processed in the laboratory in same manner as the beach benthic samples.

#### **2.4.2 Sediment Grain Size**

Sediment grain size samples were collected concurrent with benthic samples during each seasonal sampling event. For the beaches, one composite sample from all 10 sites was collected for each habitat zone (swash and sub-tidal) at each beach. At the borrow sites, grain size was collected at each station for a total ten individual grain size samples per site.

Grain-size analysis was performed according to ASTM Method D422-63. Sieve sizes ranged from 4.75 mm (U.S. Standard Sieve No. 4) to 63 µm (U.S. Standard Sieve No. 230). Sediments were categorized by Wentworth's classifications (Table 2-3). Total organic content (TOC) was measured by weight loss upon ignition at 500 °C for 4 hours.

Table 2-3. Sieve sizes used for sediment particle distribution and the Wentworth sediment size categories (Buchanan 1984)

<b>Sieve Number</b>	<b>Sieve Size</b>	<b>Wentworth Size Category</b>
4	4.75-mm	Pebble
10	2.00-mm	Granule
20	850-µm	Very Coarse Sand
40	425-µm	Coarse Sand
60	250-µm	Medium Sand
140	106-µm	Fine Sand
200	75-µm	Undefined
230	63-µm	Very Fine Sand
	< 63-µm	Silt-Clay

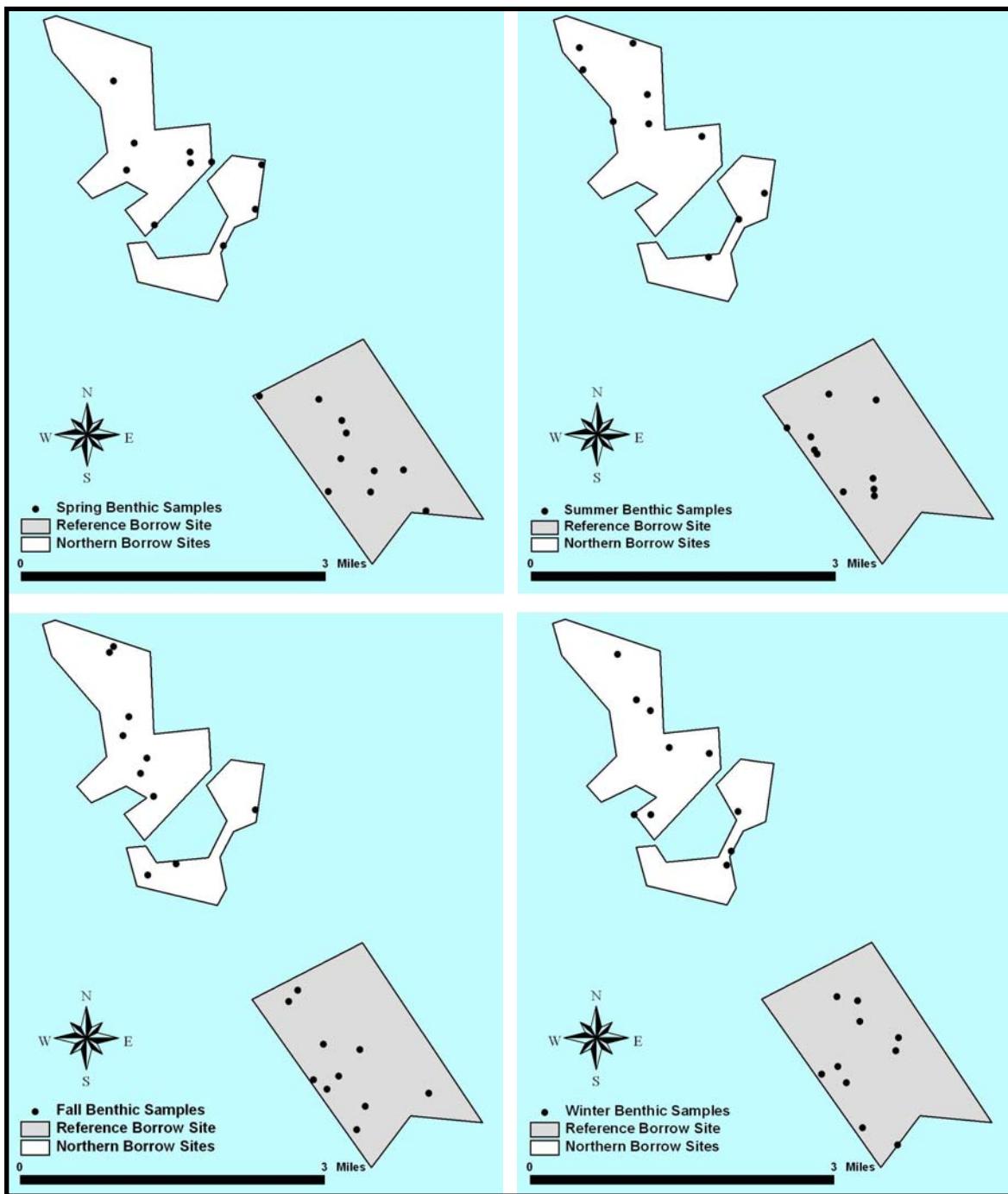


Figure 2-3. Maps showing the locations of seasonal benthic samples collected in an ocean borrow site and a reference borrow site located offshore of Kitty Hawk, NC. Spring, summer, and fall sampling was conducted in 2004 and winter sampling occurred in 2005.

### **2.4.3 Fish Collections**

#### **2.4.3.1 Haul Seines (Beach Sites)**

A 183 m modified commercial beach seine was used to target large fish and invertebrates inhabiting the surf zone. The seine consists of a 146 m x 3 m monofilament “wing”, made of 8 cm mesh transitioning into a 37 m x 4 m nylon “bunt” end of similar mesh size. Seines are deployed into the surf zone out of a 6 m seining skiff provided by Oregon Inlet Sea Tow. A total of 10 seines are conducted during each season at both the impact and reference beaches. However, because of weather conditions only seven seines were conducted at each beach in the summer 2004 season. Attempts are also made to conduct seining over the entire length of each beach, but since the boat must be transported by a vehicle, seines are restricted to certain portions of the beaches (Figure 2-4), because of localized beach replenishment efforts and significant storm and erosion damage which has restricted vehicle traffic.

Seines are deployed from the stern of the skiff by anchoring the bunt end of the seine to the beach and driving the skiff from the beach into and around the surf zone. The net is then brought to shore farther down the beach, generally in a North to South direction, and then retrieved by hand. All organisms brought to the beach in the net were identified to species level, enumerated, and a sub-set of up to 25 specimens were measured for each species.

#### **2.4.3.2 Trawls (Ocean Borrow Sites)**

Large benthic and pelagic fish and invertebrate sampling was conducted at the borrow and reference sites using semi-balloon otter trawls with 8 cm mesh webbing. Due to logistical constraints, a 9.7 m trawl with 1.2 m x 0.6 m wooden doors was used during the first (spring of 2004) seasonal sampling event. All subsequent sampling was conducted using a 12.7 m trawl with 1.5 m X 0.8 m aluminum doors. The use of two separate trawls will not impact this analysis, because trawl samples are presented as the square area covered by the trawl and the relative densities of organisms collected are reported to a standardized catch value, in this case 10,000 m<sup>2</sup>. Therefore, even though the smaller trawl may have covered less square area, that area would be negligible and is scaled to the equivalent of 10,000 m<sup>2</sup>.

During each seasonal sampling event a total of 12 daytime trawls were conducted at the combined N1 (9) and N2 (3) borrow sites and 12 at the reference borrow site. However, during the first event, only ten trawls were conducted between the two borrow sites and ten trawls in the reference site (Figure 2-5). Each trawl is generally towed for 10-minutes and the starting and ending latitude and longitude coordinates are documented to determine the length of the trawl. All fish and invertebrate species collected in the trawls were identified to species level, 25 representatives of each species were measured to total length and all species were enumerated.

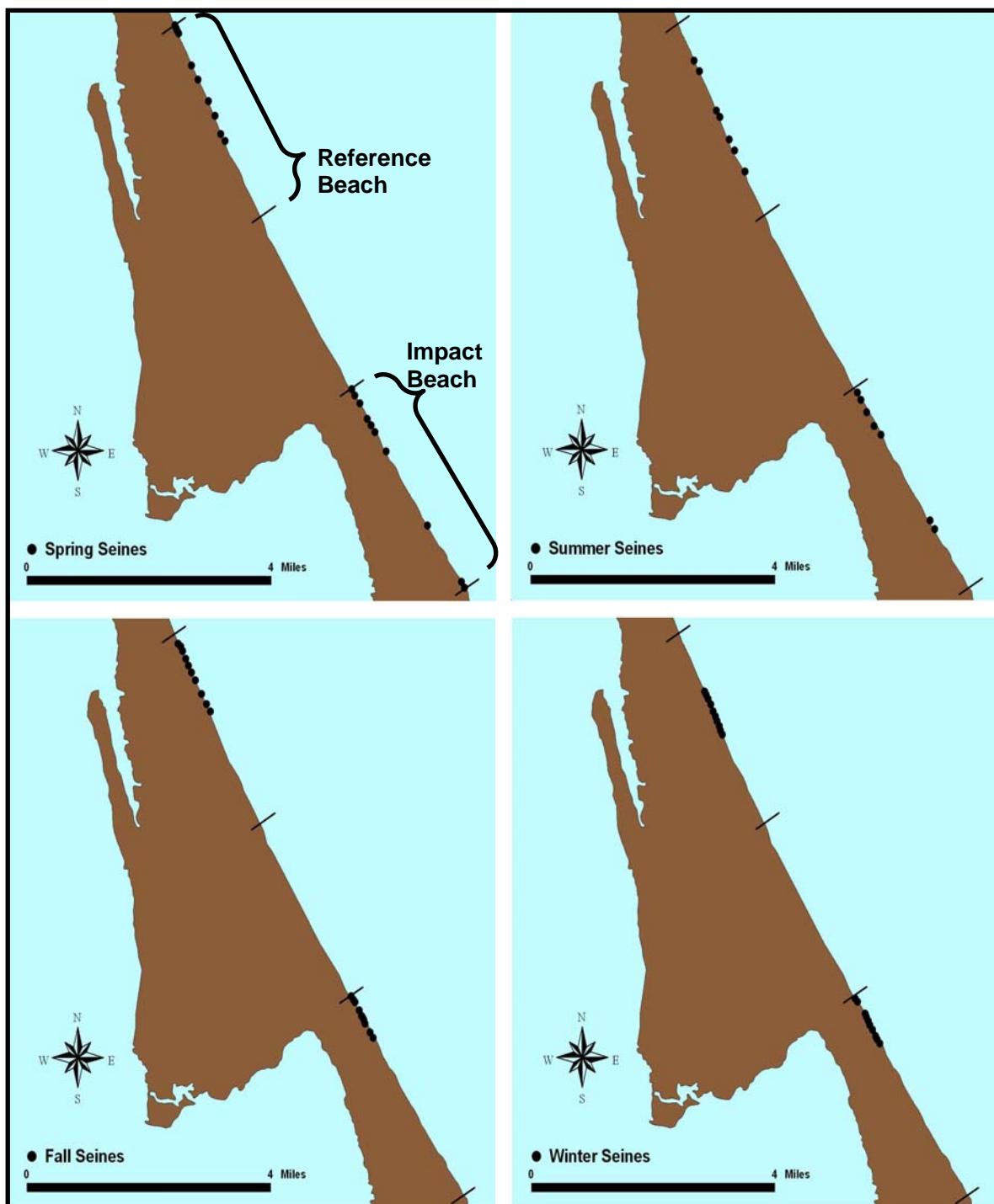


Figure 2-4. Maps showing the locations of seasonal beach seines pulled in the surf zone at the impact beach and reference beach located in Kill Devil Hills and Southern Shores, NC. Spring, summer, and fall sampling was conducted in 2004 and winter sampling occurred in 2005.

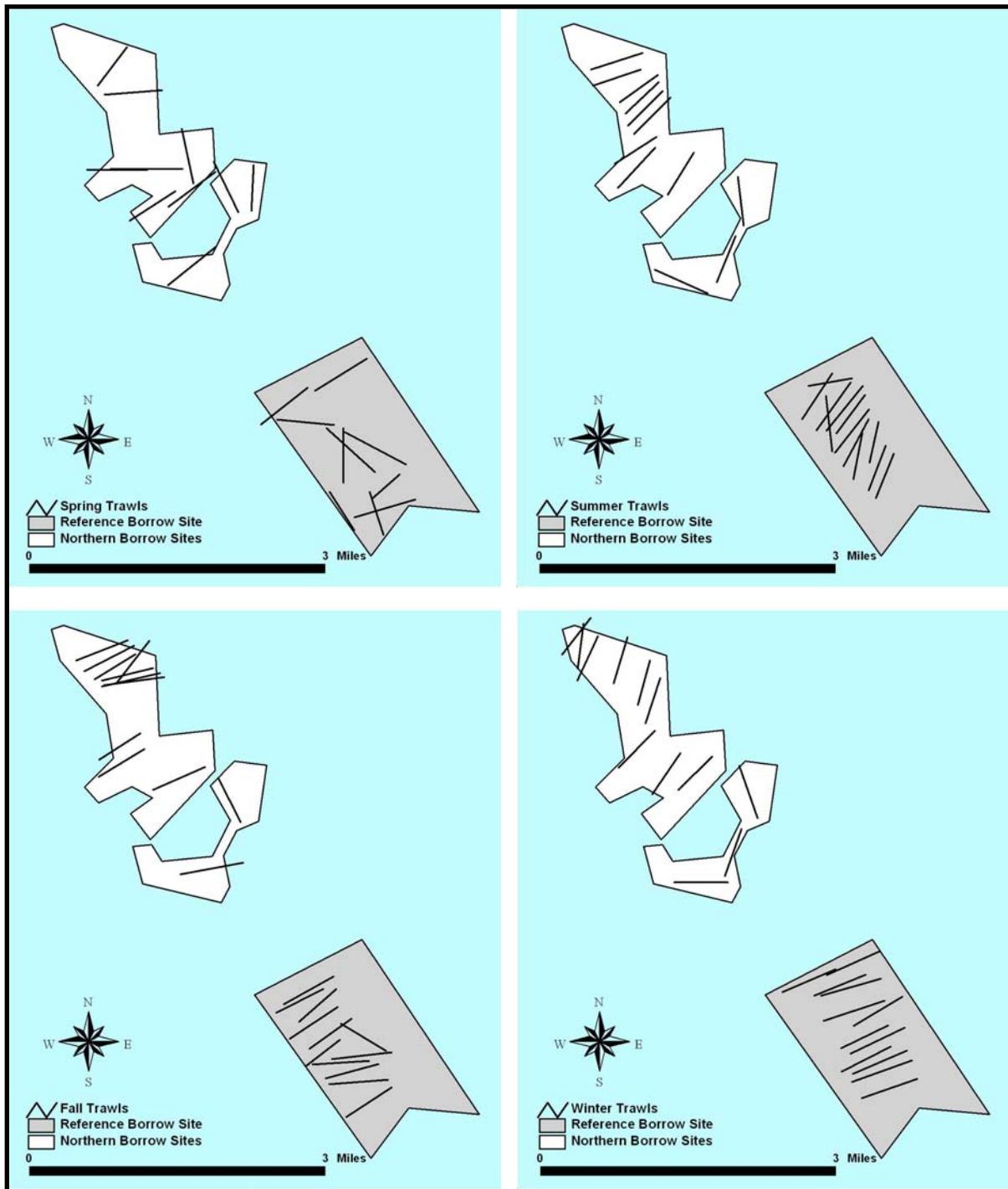


Figure 2-5. Maps showing the locations of seasonal trawls conducted in an ocean borrow site and a reference borrow site located offshore of Kitty Hawk, NC. Spring, summer, and fall sampling was conducted in 2004 and winter sampling occurred in 2005.

#### **2.4.3.3 Stomach Contents**

To obtain baseline diet information for fish residing at the beaches and the borrow sites, up to five individuals of several select (benthic feeders) fish species were preserved from each seine ( $n=10$ ) and trawl ( $n=12$ ) conducted during each seasonal sampling event. Initial samples were preserved on ice in the field and later frozen until dissection. However, some of those samples did not preserve well and later samples were preserved in the field using 10% formalin. Fish collected in the field are euthanized on ice, and either preserved whole after injecting formaldehyde solution into the gut, or for larger individuals (e.g. red drum), the stomach is removed and preserved. Fish that have stomachs removed are measured to total length and weighed to the nearest 0.1 grams on hanging scales before stomachs are removed.

After the field collections, whole fish are measured, weighed and the stomachs are extracted. All stomachs are then dissected and the contents are flushed from the stomach and collected through filtration on a 63 micron nytex filter. The filter is allowed to air dry for a short period and then the total contents are weighed collectively to the nearest  $\pm 0.001$  g. Contents are then sorted to the lowest practical taxon, counted, oven-dried separately by taxon at 60 °C, and then weighed to the nearest  $\pm 0.001$  g.

#### **2.4.4 Ghost Crab Survey**

The densities of ghost crabs were sampled by counting ghost crab holes at the impact and reference beach benthic stations during each sampling event. Area counts of ghost crab holes were conducted between the beach wrack line and the toe of the primary dune. Counts were taken along a series of 10 transects spaced apart such that the total covered distance between the first and last transect was 18.2 m (Figure 2-6). The distance between the wrack line and the toe of the dune was also noted so the total square area that was sampled could be calculated. Ghost crab holes were counted by walking along each transect and documenting all the holes directly on either side.

#### **2.4.5 Creel and Bird Survey**

##### **2.4.5.1 Creel Survey**

A recreational creel survey was conducted to obtain baseline fishing effort and catch information at the impact beach and the designated reference creel survey beach (Figure 2-1). A description of why the creel survey reference beach was different from the benthic survey reference beach is presented in section 2.2. A roving creel survey with a progressive count of anglers was conducted during the day (8 am to 5 pm) throughout the first year of monitoring. The sampling schedule was set so that each beach was sampled separately over two consecutive days and the start day of the next weekly sample progressed one to three days ahead each week (Figure 2-7). In the spring of 2004 the initial sampling day was chosen randomly and the survey progressed systematically throughout the year from that point on. This allowed each day within a season to have the best chance of being surveyed throughout each season.

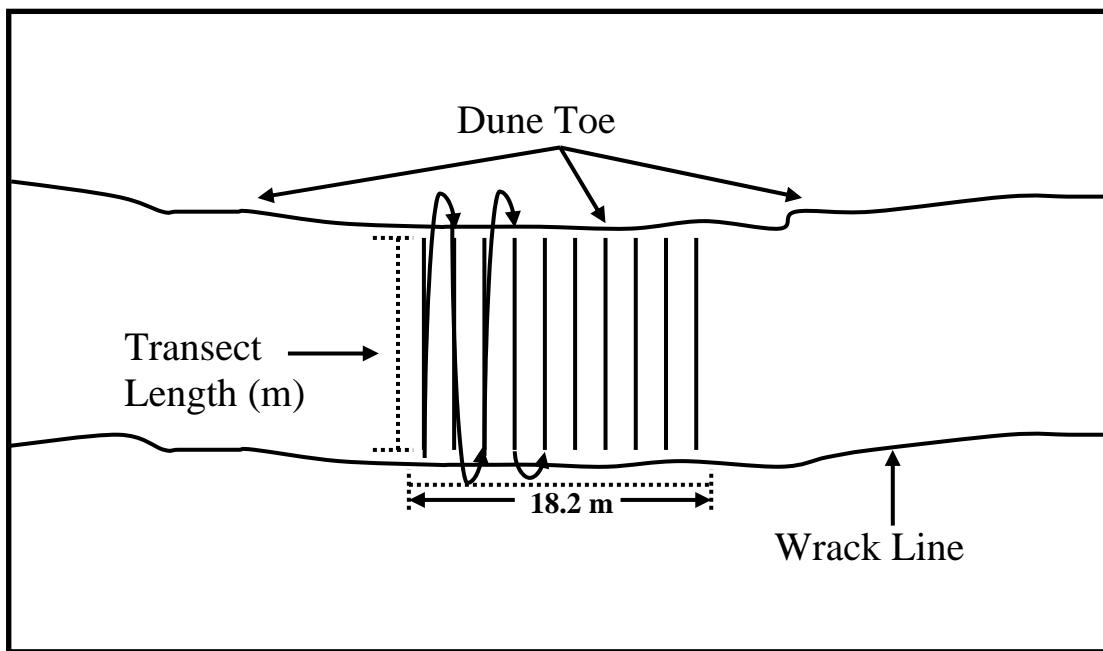


Figure 2-6. Diagram of ghost crab hole transect counts which were conducted at 10 stations at the impact beach (Kitty Hawk) and 10 stations at the reference beach (Southern Shores).

	Weeks	Days of the Week						
		1	2	3	4	5	6	7
Season	1	Bird	Creel	Creel				
	2			Creel	Creel	Bird		
	3					Bird	Creel	Creel
	4							Creel
	5	Creel	Bird					
	6		Bird	Creel	Creel			
	7				Creel	Creel	Bird	
	8						Bird	Creel
	9	Creel						
	10	Creel	Creel	Bird				
	11			Bird	Creel	Creel		
	12					Creel	Creel	Bird

Figure 2-7. Progressive sampling schedule for the creel and bird surveys being conducted at the impact beach and two reference beaches located at Kill Devil Hills, Southern Shores and Nags Head, NC.

Two strata were sampled at each of the beaches; a pier and the beach. Beaches were surveyed throughout the year and the piers were surveyed during the time they were open, from March to November. The first beach to be surveyed in the two day weekly survey window was chosen randomly and the beach that was not chosen was surveyed the following day. Both the beach and pier strata are surveyed at the beach during each daily survey. The survey begins at one randomly chosen stratum (beach or pier) in the morning and the second stratum for that beach is surveyed in the afternoon. The daily survey start time was chosen at random from a choice of times between 8 am to 12 pm. The second daily survey time is dependent upon the initial time choice by adding approximately four hours to the initial start time (Figure 2-8). For example, if 8 am was chosen as the start on the pier, then the beach was surveyed beginning at noon on that day. This technique allowed the beach and pier to have the same probability of being chosen for surveys either in the morning or the afternoon (Figure 2-8). Angler interviews were conducted either before or after instantaneous counts were performed.

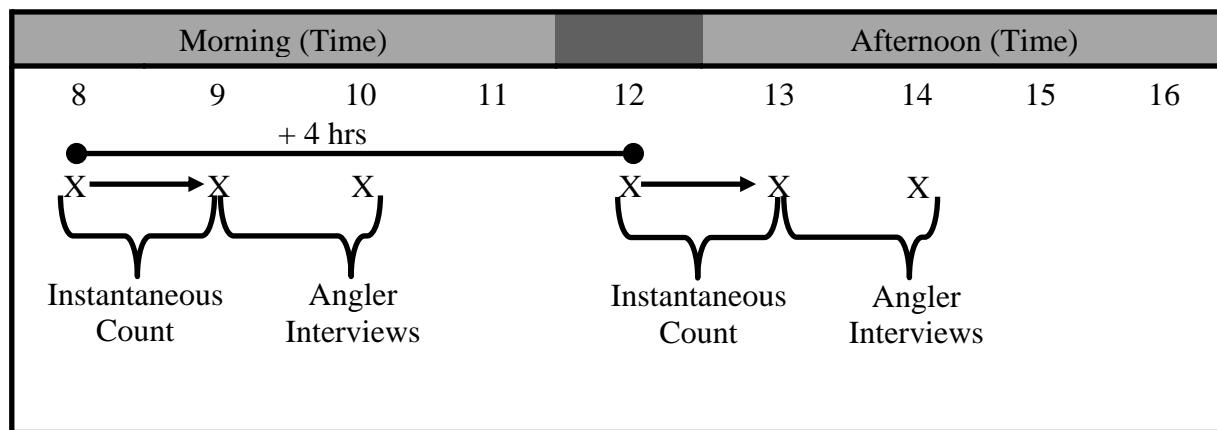


Figure 2-8. Diagram describing the schedule and timing of daily angler counts and interviews conducted at the impact (Kitty Hawk) and reference creel (Nags Head) survey beaches.

During each daily survey, an instantaneous count of anglers was conducted by walking the length of the beach and pier counting the number of anglers (and poles per person) actively fishing. Instantaneous counts on the beaches generally took ~ 1 hour and pier instantaneous counts took ~ 0.5 hours. Before or after completing the initial count of anglers, the field technician interviewed actively fishing recreational fishermen. Because it was not possible to interview fishermen at the end of their fishing day, fisherman were approached while they were fishing and asked when they began fishing and when they expected to complete their fishing day. The mean catch per hour for each season could then be combined with the independent effort estimate to obtain an estimate of total catch, following methods described in Pollock et al. (1994). Fishermen were also asked what they were targeting and what species and how many were caught and discarded. All angler caught fish were identified to species level when possible, but for discarded fish and other infrequent species, fish were sometimes grouped to family level. In addition to angler and catch effort, demographic information such as state and county of

residence, and age and gender were also documented to provide information on angler characteristics.

#### **2.4.5.2 Bird Survey**

Shore and water bird counts were conducted throughout the year at the impact and reference beaches (Figure 2-1). The methods were similar to those used in CZR (2003). The sampling schedule followed the same rotation as the creel survey, but the bird surveys were conducted on one day which alternated to begin before and after the creel surveys every other week (Figure 2-8). This was done because one day of the week would not have the chance of being surveyed if the bird survey day remained fixed, either in front or behind the creel days throughout the year. Both beaches were surveyed on the same day beginning in the morning. Once the morning survey was complete, generally 2 to 3 hours, the second beach was then surveyed. Every week the morning survey beach was alternated to get a representative sample of all times for both beaches during the seasons. Surveys were conducted throughout the year; however the amount of winter surveys was reduced because of reduced bird use on the beaches.

Bird counts were conducted by walking the entire length of each beach in a linear or zigzag fashion (depending on the width of the beach). Beaches were divided into 10 equal transect lengths and three separate microhabitat zones defined as: 1) the beach (the physical habitat residing between the dune and present swash/intertidal zone), 2) the dune (the part of the dune that is facing the ocean and is observed from walking the beach), and 3) the intertidal zone (the area within the present swash zone out to 10 meters). During a survey, bird species, total numbers, bird activity (i.e., feeding, resting, flying, or breeding), and bird location of birds within a habitat (beach, surf, and intertidal zone) was documented within each of the 10 transects. Additional information on the number people using the beach area, whether any local beach construction activities was occurring (e.g., dune building) and other pertinent information such as tide state, wind speed and direction, air temperature was also noted.

#### **2.4.6 Underwater Video Survey**

An under water video survey was conducted between the 8<sup>th</sup> and 9<sup>th</sup> of December to gather baseline information on the physical and biological features residing on the substrate at the borrow and reference sites. During the survey, a benthic video sled provided by the Virginia Institute of Marine Science was towed at all the sites following a transect survey design outlined by Versar. The sled was towed off the stern of the 12 m Oregon Inlet sea tow vessel moving at speed of 1.5 to 2.8 knots. Approximately 48 km of bottom habitat was covered during the survey (Figure 2-9). During the two day field effort 24 km of transects were covered in the N1 & N2 borrow site and 24 km at the reference site.

The video sled was equipped with three video cameras mounted in three different configurations to provide: 1) a broad overview of the bottom, 2) near bottom horizontal view to

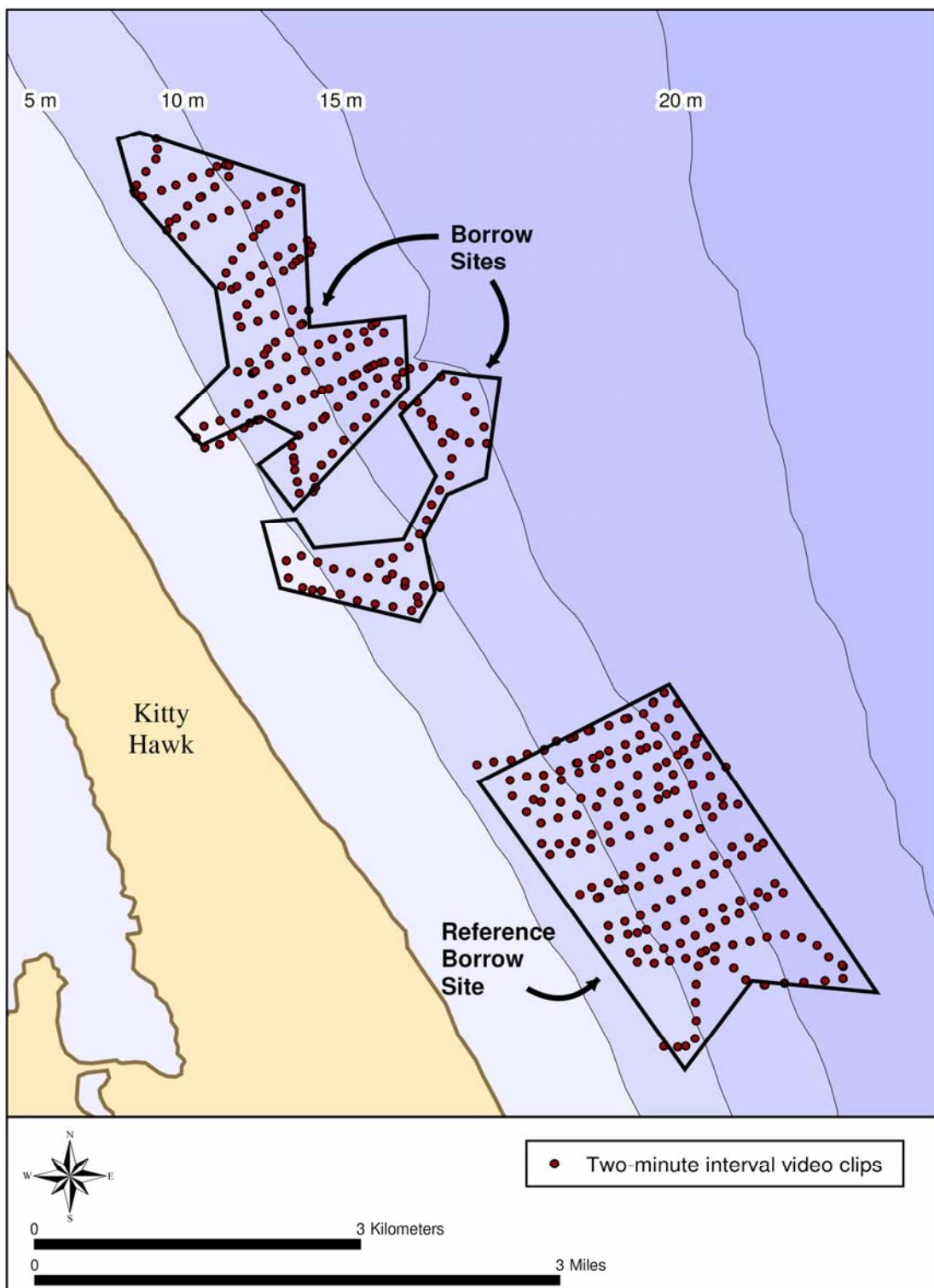


Figure 2-9. Video sled transect lines covered during the December 2004 bottom survey of the Dare County beach replenishment borrow sites N1 and N2 and a nearby reference area. Points represent locations of 2-minute video clips analyzed from the video.

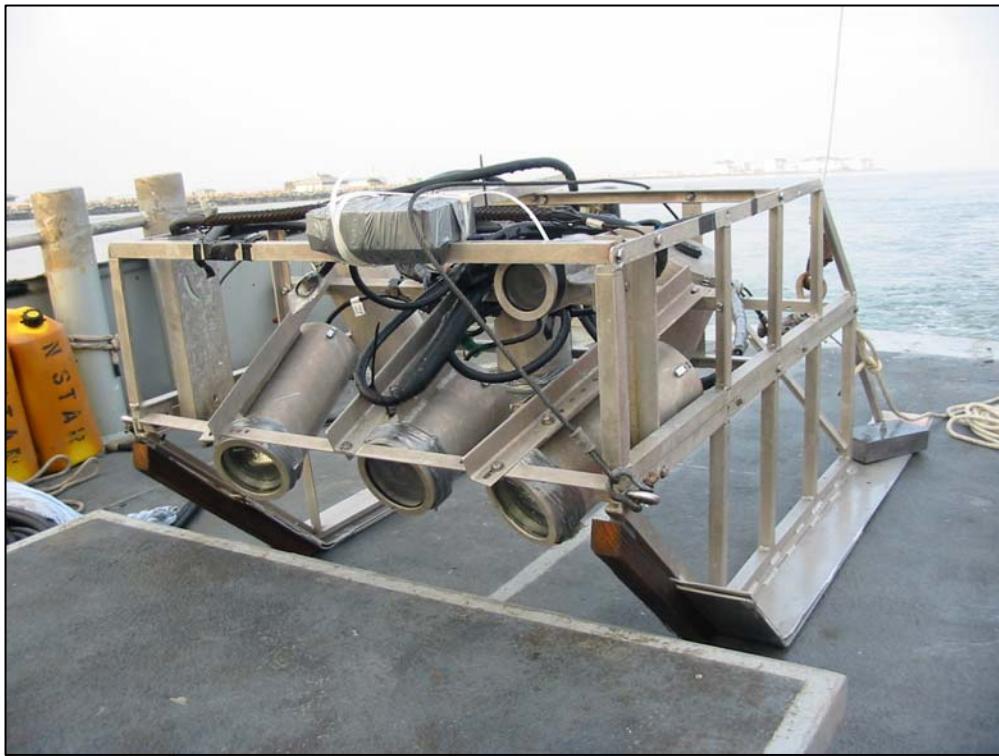


Figure 2-10. Video sled used to characterize benthic habitats. In the picture the video sled is facing forward. The overview camera is at the top right corner of the sled, horizontal camera is in the front center and flanked by two electronic video strobes, close-up vertical camera is in the center of the sled, behind the horizontal camera. Sled runners are 0.8 m apart.

see fish over the bottom and bed form types, and 3) a vertical high resolution view for sediment type and biogenic features (Figure 2-10). The broad overview camera was mounted about 0.5 m off the bottom and angled to view the bottom out in front of the sled from 2 to 10 m. The near bottom horizontal camera was mounted 0.2 m off the bottom at an oblique angle of 20° to provide a close-up view of bottom morphology and the presence of juvenile fish and other mobile fauna from 0.2 to 1.0 m in front of the sled. Its field of view was a trapezoid with an area of approximately 0.9 to 1.0 m<sup>2</sup> being about 0.25 m near the sled and about 1.5 m at a distance of about 1.0 m from the sled. The vertical camera was mounted perpendicular to the bottom at a distance of 0.3 m from the sediment surface and had a field of view of 28 cm x 21 cm or 588 cm<sup>2</sup> (0.06 m<sup>2</sup>). Illumination for the vertical and horizontal cameras was provided by electronic video strobes.

The video sled was linked to the surface via two cables that provided power to the cameras and strobes. The video signals were transmitted to the surface where sled performance and bottom features could be viewed in real-time. All the bottom video footage was recorded on Sony 8mm video cassettes and DGPS data was collected simultaneously so each video frame

could be georeferenced. Video signals from the horizontal and vertical cameras were also recorded on higher resolution digital recorders for later analysis.

## **2.5 DATA ANALYSIS**

### **2.5.1 Benthic**

Counts of benthic invertebrates were expressed in numbers per square meter of bottom area for all subsequent data analyses. When completing taxonomic identifications, some organisms cannot be completely identified to the species level, particularly if they are immature/juveniles or in poor condition. The taxonomist made a note in the database when it was the opinion of the taxonomist that such an organism should not be considered a separate taxon when tallying total number of taxa. All the statistical analyses and calculation of diversity indices accounted for these taxonomic identification notations. Summaries of community composition, mean total abundance of infaunal and epifaunal organisms, and the mean number of species were calculated and presented. Total community diversity was also calculated on the CPUE data using the Shannon-Wiener Index of diversity, which is calculated using the following equation:

$$H = -\sum_{i=1}^s (p_i)(\log_2 p_i)$$

where

- $H$  = index of species diversity  
 $S$  = number of species  
 $p_i$  = proportion of total sample belonging to  $i$ th species

### **2.5.2 Fish**

#### **2.5.2.1 Fish Collections**

Fisheries catch data were standardized to catch per unit effort (CPUE) for analysis. Units are the number of organisms collected per square meter for seines and trawls. The total swept area of a typical seine is approximately 5,330 m<sup>2</sup> and seine data was standardized to catch per 10,000 m<sup>2</sup> swept area. The CPUE for the trawls was calculated as the linear distance a trawl traveled multiplied by the trawl mouth opening, which was then standardized to 10,000 m<sup>2</sup>. The first year of data was summarized by season and site (impact and reference beach, and northern borrow and reference borrow site). Summaries of community composition, mean total CPUE, and the mean number of species were calculated and presented. Total community diversity was also calculated on the CPUE data using the Shannon-Wiener Index of diversity.

### 2.5.2.2 Stomach Contents

Stomach content data was summarized by fish species and analysis was performed separately for each site and each season. Stomach contents were categorized by determining the frequency of occurrence (%F), the percent composition by number (%N), and the percent composition by dry weight biomass (%W) for each major prey item. Since these methods contain biases that limit the usefulness of any one method (Hyslop 1980), these data were combined in a modified index of relative importance (IRI) (Pinkas et al. 1971). IRI determines the quantitative importance of a particular prey group  $i$  ( $IRI_i$ ) and is expressed as:

$$IRI_i = (\%N + \%W) \times \%F ,$$

where:

$\%N$  = frequency of mean abundance of prey item,

$\%W$  = frequency of mean dry weight of prey item, and

$\%F$  = frequency of occurrence of the prey item.

Because the IRI are not expressed as a percentage, comparisons between prey types can be difficult, therefore IRI were calculated as percent IRI (Cortes 1997). The percent IRI is expressed as:

$$\%IRI_i = \left( \frac{IRI_i}{\sum_{i=1}^n IRI_i} \right) \times 100$$

where:

$n$  = total number of prey groups considered.

### 2.5.3 Ghost Crab Survey

To evaluate seasonal trends in ghost crab abundance (inferred from ghost crab hole counts), ghost crab hole counts conducted at beach station transects were summarized and the seasonal mean abundances was calculated for each beach. Mean abundance of ghost crabs per square meter was calculated using the following equation:

$$Abundance\ m^2 = \frac{Count}{\left( Length \times \left( \frac{9.144}{5} \right) \right)}$$

where:

*Abundance m<sup>2</sup>* = ghost crab abundance per square meter,  
*Count* = number of ghost crabs per transect, and  
*Length* = length of each transect (meters).

#### 2.5.4 Creel Survey

Catch rates were calculated for the total number of fish of any species, and for the five most commonly captured species or more general taxonomic group – spot *Leiostomus xanthurus*, bluefish *Pomatomus saltatrix*, kingfish *Menticirrhus spp.*, spotted seatrout *Cynoscion nebulosus*, and flounder *Pleuronectiform spp.*

Total fishing effort (hours/season), catch (fish/hour), and catch per unit of effort (CPUE; fish/hour) were estimated for beach or pier, type of treatment (impact or reference), and season, for Spring 2004 (incomplete) through Winter 2005. Estimates were made using procedures similar to those described by Pollock et al. (1994) for roving creel surveys from incomplete fishing trips, when the probability of being selected was independent of trip length. We modified the procedure slightly by weighting the catch per hour estimate ( $\hat{R}$ ) by angler effort to better represent catch rates that fluctuated greatly within a season. The mean and variance of  $\hat{R}$  were calculated using the jackknife procedure (Efron 1982). Estimators are described below.

Effort for day  $i$  was calculated as:

$$e_i = I_i \times 9 \text{ hours},$$

where  $I_i$  = the number of anglers observed on day  $i$

Mean daily effort was calculated as:

$$\bar{e} = \sum_{i=1}^n e_i,$$

$$\text{with variance } \text{var}(\bar{e}) = \frac{\sum_{i=1}^n (e_i - \bar{e})^2}{n-1} \left( \frac{1}{n} - \frac{1}{N} \right)$$

where  $n$  = the number of days sampled and  $N$  = the number of days in the season.

Total effort for a season,  $\hat{E}$ , was calculated as:

$$\hat{E} = N\bar{e},$$

with variance  $N^2 \text{var}(\bar{e})$ ,

The mean daily catch per hour of fishing was calculated as:

$$r_i = \sum_{j=1}^m \frac{c_j}{L_j},$$

where  $c_j$  is the catch for angler  $j$ , and  $L_j$  is the length of angler  $j$ 's fishing trip at the time of the interview, and  $m$  is the number of anglers interviewed on day  $i$ .

The seasonal catch per hour of fishing  $\hat{R}$  was calculated as:

$$\hat{R} = \frac{\sum_{k=1}^n \left( \hat{R}_k - \bar{\hat{R}} \right)^2}{n},$$

$$k = (1, 2, \dots, n)$$

where  $\hat{R}_k = \frac{r_i m_i}{\sum_{i=1}^n m_i}$ , with one observation  $i$  omitted from each  $k$ ,

$$\text{and variance } \text{var}(\hat{R}) = \frac{n-1}{n} \sum_{k=1}^n \left( \hat{R}_k - \hat{R} \right)^2$$

Total catch per season was estimated as:

$$\hat{C} = \hat{R}\hat{E},$$

with variance  $\text{var}(\hat{C}) = \hat{E}^2 \text{var}(\hat{R}) + \hat{R}^2 \text{var}(\hat{E}) - \text{var}(\hat{E}) \text{var}(\hat{R})$

All standard errors (SE) were calculated as the square root of the variance of a given variable, and approximate 95% confidence intervals were calculated as variable means  $\pm 1.96 * \text{SE}$ .

### 2.5.5 Bird Survey

Daily bird counts from beach transects were summarized and averaged to calculate the mean abundance of each species per sampling day at each beach. The mean total abundance,

mean number of species, and the mean community diversity were calculated to examine seasonal trends at the beaches. Community diversity was calculated using the Shannon-Wiener diversity index.

Shore and waterbird species were also grouped to examine the seasonal trends for those two bird groupings. The mean total abundance, mean number of species, and group diversity were calculate for each beach and season.

### 2.5.6 Underwater Video Survey

The video imagery was analyzed by documenting physical and biological features in the video. Initially, the video data was decimated by taking video clips at 2.0-minute intervals and at locations where fish were seen in the recorded videotape. If video images were not visible because of poor near-bottom visibility at the 2.0-minute interval, than the last instance the bottom was visible and the first moment the bottom reappeared was analyzed. All fish visible from the forward or downward cameras were identified to the lowest possible taxon and physical and biological features of the benthic habitats at that instance was also noted and recorded. Data on bed roughness, sediment type, shell hash, biogenic structures, epifaunal and infaunal organisms, and fishes and rays were collected and entered into an excel spreadsheet.

Bottom habitats were classified based on both physical and biological characteristics. Physical characteristics included variables for bedforms type and size, which were primarily wavelength and form, and sediment grain size. Biological characteristics included variables for shell fragment cover, mobile fauna, sedentary fauna, and other biogenic structures (Table 2-4). These analyses were conducted using a Sony editing deck and high-resolution video monitor.

Table 2-4. Physical and biological features characterized from horizontal camera videotapes

Physical	Biological
Silt & Clay: 0 = absent 1 = present	Count of: Sessile epifauna
Fine-Medium Sand: 0 = absent 1 = present	Count of: Fishes
Coarse Sand & Gravel: 0 = absent 1 = present	Count of: Skates/Rays
Bedforms: 0 = absent 1 = present	Count of: Burrow opening
Size of bedforms 0 = <30 cm wavelength 1 = >30 cm wavelength	Count of: Biogenic mounds or pits
Waveform of bedforms 0 = smooth rounded crest 1 = sharp peaked crest	Count of: Tubes
Shape of bedforms 0 = straight 1 = asymmetric	Count of: Mobile epifauna
Secondary ripples: 0 = absent 1 = present	
Shell fragments 0 = 0-5% coverage of bottom 1 = 5-10% coverage of bottom 2 = 10-25% coverage of bottom 3 = >25% coverage of bottom	
Whole shell: 0 = absent 1 = present	



## **3.0 RESULTS**

### **3.1 GENERAL OVERVIEW**

The following summaries are provided to describe the general trends in species distributions at the impact beach, borrow sites, and associated reference sites. Although some differences were observed between the sites, those differences were not highlighted, as the purpose of this report was to describe the living resources that may be impacted by beach replenishment activities. As the dredging and shoreline development advances in the upcoming years, differences displayed between the sites will be used to help determine potential loss of living resources as a result of beach replenishment activities and subsequent recovery of the communities.

### **3.2 BENTHIC**

#### **3.2.1 Swash Area**

Only 20 infauna and epifauna macrobenthic taxa were collected from the swash beach area from both the impact and reference beach (Table 3-1). Seasonal differences in the benthic community composition were apparent (Figure 3-1). In general, however, differences in community composition between the study and reference beaches within seasons were minimal (Figure 3-1). Most of the differences between the two beaches were in the counts or biomass of specific taxa (Figures 3-2 and 3-3). Both measures of diversity were very similar between the reference and impact beaches in all seasons sampled (Figures 3-4 and 3-5).

Some of the taxa collected within the swash area were extremely abundant but contributed little biomass. For example, oligochaete worms were overall the most abundant taxa collected within the swash area, sometimes with a mean in excess of over 1,000 organisms/m<sup>2</sup> (Table 3-1). The mean biomass contribution of oligochaetes, however, was less than a mean of 1 g/m<sup>2</sup> (Table 3-2). Nemertina worms were also highly abundant in all seasons but again contributed little to biomass within the swash zone (Tables 3-1 and 3-2). Oligochaete worms appeared to have an abundance pattern of extremely high numbers in spring and summer with a decline in the fall to a very low number in winter. Nemertina worm abundances in the swash zone did not appear to follow a pattern, as they were numerous, but small in all seasons (Table 3-1).

Overall, more infauna organisms were collected in spring and mean infauna abundance declined through the summer into the fall and winter (Figure 3-2). Mean infauna biomass did not follow the same pattern as abundance. Biomass was highest in both spring and fall, and lowest in summer and winter (Figure 3-3). Mean number of infauna taxa collected within the seasons was low and ranged from a mean of about 3/station in spring and summer, to a low of

about 1.25/station in winter (Figure 3-4). The Shannon Weiner diversity index ( $H'$ ) was very low in all seasons but was lowest in winter (Figure 3-5).

Some taxa considered key prey items to shorebirds, fish, and large benthic species were collected from the swash zone and contributed to both abundance and biomass. The mole crab, *Emerita talpoida*, was numerically dominant in the summer compared to the other seasons. This species contributed the most biomass of any taxa within the swash zone (Table 3-1). *Emerita* showed a clear pattern of high abundance in the summer decreasing to no individuals collected in the winter. Biomass of this species was highest in spring and fall, however, indicating that although numerically abundant in summer, larger individuals were collected in spring and fall (Table 3-2). The amphipod, *Amphiporeia virginiana*, was abundant in the spring and decreased in abundance throughout the summer and fall to no individuals collected in the winter. The bean clam, *Donax variabilis*, typically a dominant in shore zone habitats along the Atlantic coast, was not abundant in the swash area at either the impact or reference beach (Table 3-1).

### **3.2.2 Shallow Area**

Thirty-six distinct infauna and epifauna macrobenthic taxa were collected from the shallow beach area from both the impact and reference beach. Although the number of taxa collected from within the shallow beach area was greater than at the swash habitat, abundance of infauna organisms in the shallow habitat was lower than in the swash habitat (Figures 3-2 and 3-7). Many of the dominant taxa were abundant overall all seasons, such as nemertean and oligochaete worms, and the amphipod, *Amphiporeia virginiana* (Table 3-3). Other dominant taxa had very patchy abundance (i.e., amphipods *Atylus* cf. *minikoi* and *Haustorius candensis*). Table 3-4 provides the list of dominant taxa by weight. Most of the taxa dominant by count were also dominant by weight with a few exceptions.

In contrast to the swash habitat, differences in community composition between the impact and reference beaches within seasons were apparent and will need to be taken into account when assessing beach replenishment impacts (Figure 3-6). During the spring, the impact beach had a greater number polychaetes and miscellaneous organisms, whereas the reference beach had a greater number of crustacean organisms. In the summer, the impact beach had higher numbers of crustaceans and molluscs and the reference beach had higher numbers of miscellaneous species. In the fall, all of the major taxonomic groups were different in terms of counts and composition (Figure 3-6). As a consequence of the overall low abundance in the fall, minor differences in counts related to big differences in community composition (Figure 3-7). During the winter sampling period, more polychaetes were present at the impact beach than at the reference beach (Figure 3-6).

Table 3-1. Mean abundance (#/m<sup>2</sup>) of macrobenthic taxa collected in the swash area of the impact and reference beach in Dare County, NC.

Taxonomic Group	Taxonomic Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
Nemertina	Nemertina	2312	2516	220	1648	816	764	5176	1204
Annelida : Oligochaeta	Oligochaeta	16464	12124	812	4924	712	364	4	4
Annelida : Polychaeta	<i>Amastigus caperatus</i>			28			312		
	<i>Microphtalmus aberrans</i>					4			
	<i>Parapriionospio pinnata</i>		4						
	<i>Polydora</i> spp.			4		20		4	
	<i>Polygordius</i> spp.			4			4		
	<i>Scolelepis squamata</i>								4
	<i>Tharyx</i> sp. A Morris			28			312		
Arthropoda : Amphipoda	<i>Ampelisca abdita</i>		4						
	<i>Amphiporeia virginiana</i>	592	4	24	4		12		
	<i>Atylus</i> cf. <i>minikoi</i>			8					
	<i>Haustorius canadensis</i>	4							
	<i>Phoxocephalidae</i>						4		
Arthropoda : Decapoda	<i>Emerita talpoida</i>	44	36	1520	936	72	88		
	<i>Pagurus</i> spp.								4
Mollusca : Bivalvia	<i>Donax variabilis</i>		4		20				
	<i>Mytilus edulis</i>	4	4						
Mollusca : Gastropoda	<i>Acteocina canaliculata</i>							4	
	<i>Crepidula</i> spp.			4					

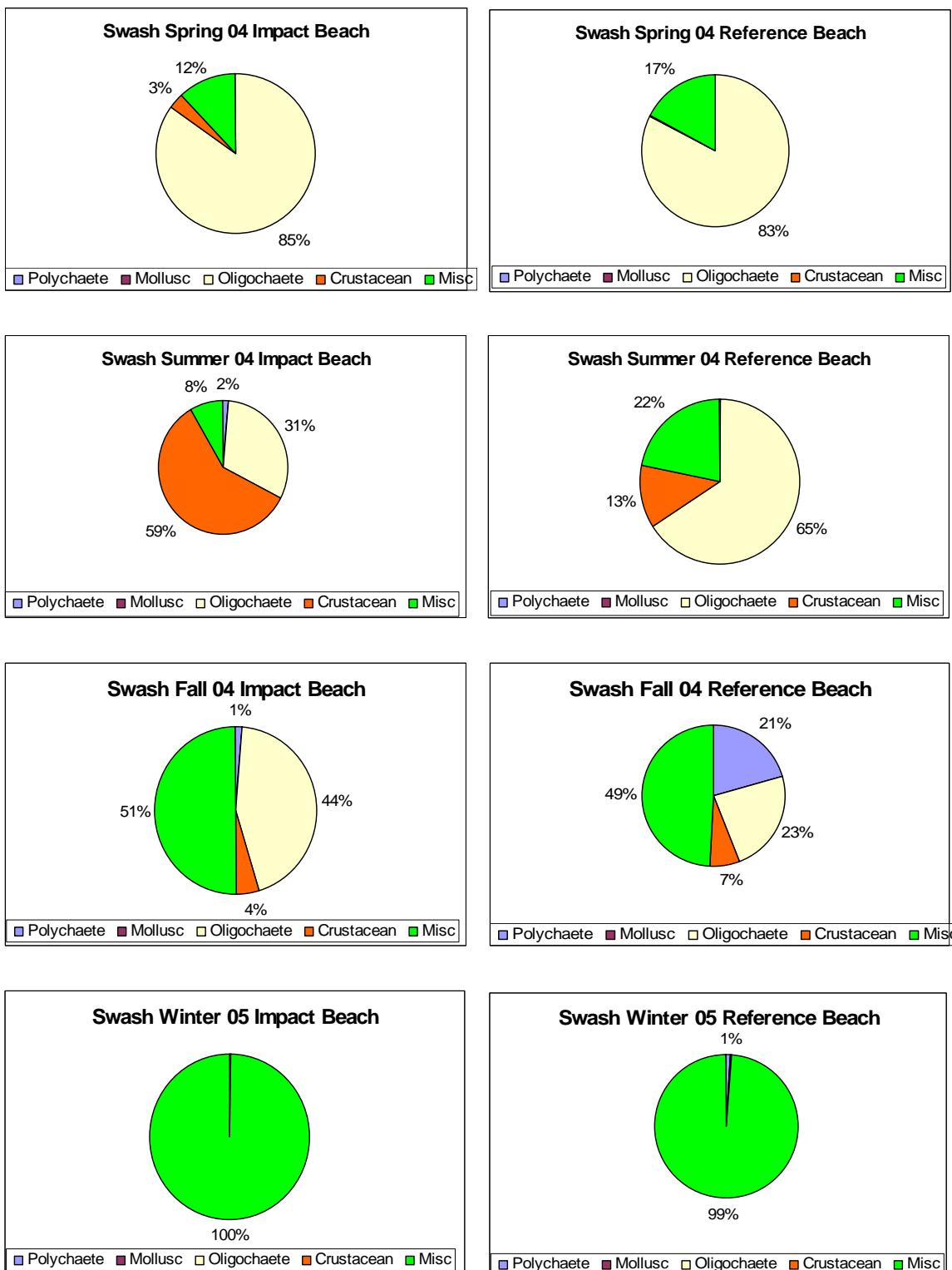


Figure 3-1. Community composition of benthic organisms collected in the swash habitat of the impact and reference beaches in Dare County, NC.

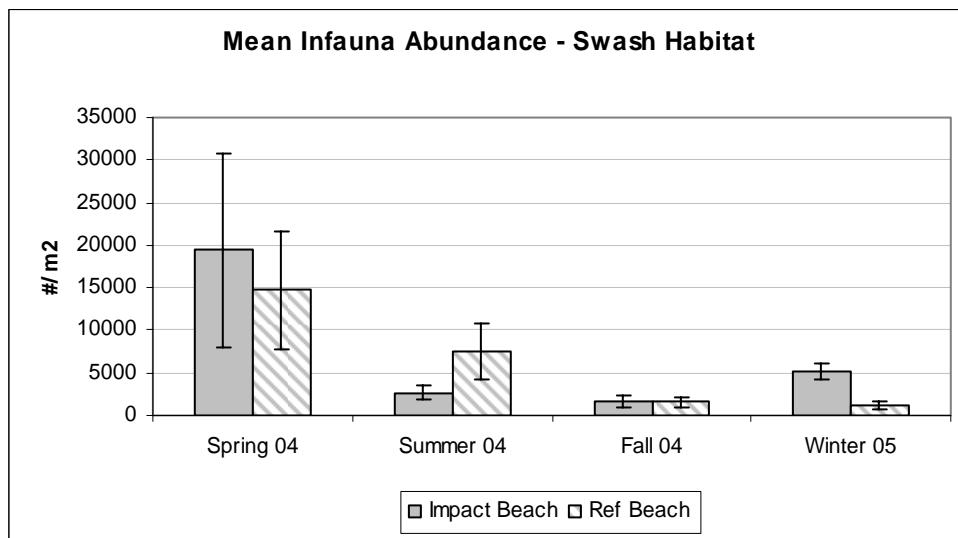


Figure 3-2. Mean total infauna abundance collected from the swash habitat at the impact and reference beaches in Dare County, NC.

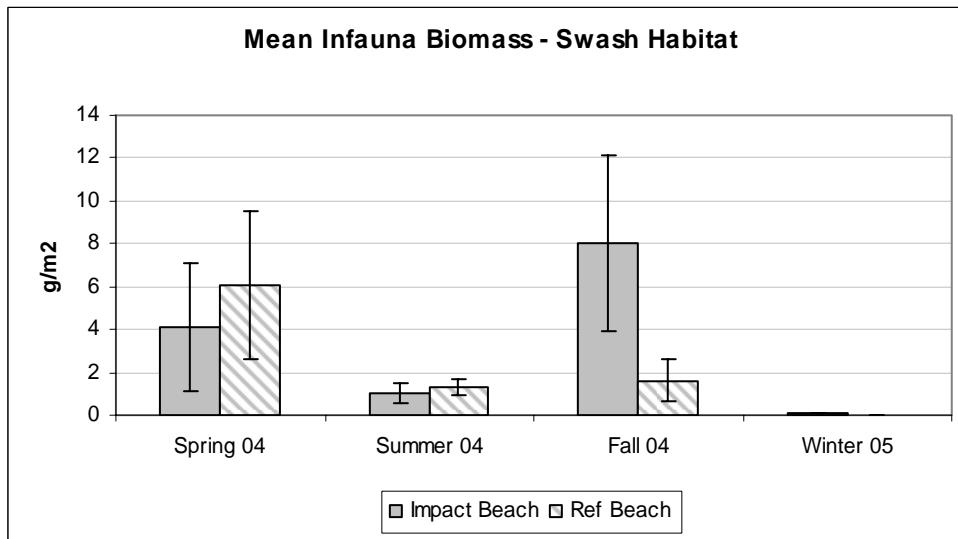


Figure 3-3. Mean total infauna biomass collected from the swash habitat at the impact and reference beaches in Dare County, NC.

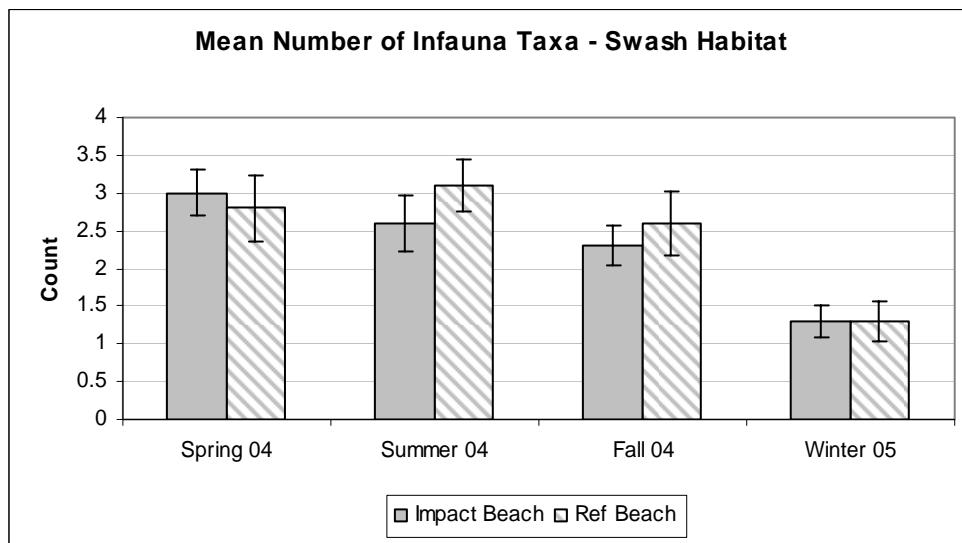


Figure 3-4. Mean number of infauna taxa collected from the swash habitat at the impact and reference beaches in Dare County, NC.

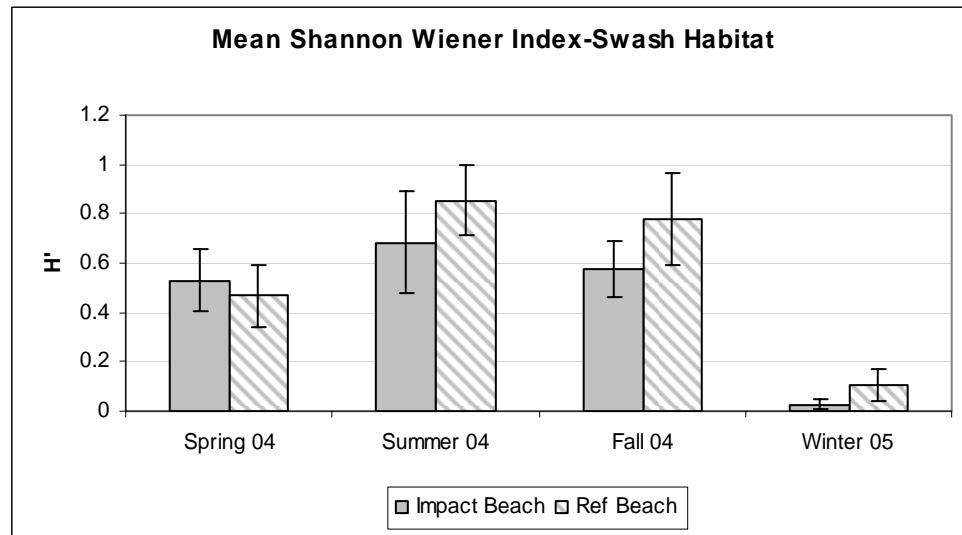


Figure 3-5. Mean Shannon Wiener Diversity Index measured from the swash habitat at the impact and reference beaches in Dare County, NC.

Table 3-2. Mean biomass ( $\text{g}/\text{m}^2$ ) of macrobenthic taxa collected in the swash area of the impact and reference beaches in Dare County, NC.

<b>Taxonomic Group</b>	<b>Taxonomic Name</b>	<b>Spring 04</b>		<b>Summer 04</b>		<b>Fall 04</b>		<b>Winter 05</b>	
		<b>Impact</b>	<b>Ref.</b>	<b>Impact</b>	<b>Ref.</b>	<b>Impact</b>	<b>Ref.</b>	<b>Impact</b>	<b>Ref.</b>
Nemertina	<i>Nemertina</i>	0.0286	0.0356	0.0040	0.0142	0.0126	0.0150	0.0884	0.0176
Annelida : Oligochaeta	<i>Oligochaeta</i>	0.0512	0.0508	0.1310	0.0134	0.0024	0.0034	0.0002	0.0002
Annelida : Polychaeta	<i>Amastigos caperatus</i>			0.0002			0.0002		0.0010
	<i>Microphthalmus aberrans</i>			0.0004			0.0032		
	<i>Paraprionospio pinnata</i>					0.0002			
	<i>Polydora</i> spp.		0.0002						
	<i>Polygordius</i> spp.			0.0002		0.0004		0.0002	
	<i>Scolelepis squamata</i>			0.0004			0.0032		
	<i>Tharyx</i> sp. A Morris								0.0008
	<i>Ampelisca abdita</i>		0.0002						
Arthropoda : Amphipoda	<i>Amphiporeia virginiana</i>	0.1412	0.0020	0.0016	0.0004		0.0036		
	<i>Atylus cf. minikoi</i>			0.0004					
	<i>Haustorius canadensis</i>	0.0272							
	<i>Phoxocephalidae</i>						0.0002		
	<i>Emerita talpoida</i>	3.8728	5.9876	0.8852	1.1084	8.0024	1.5680		
Arthropoda : Decapoda	<i>Pagurus</i> spp.								0.0008
	<i>Donax variabilis</i>		0.0002		0.1708				
Mollusca : Bivalvia	<i>Mytilus edulis</i>	0.0004	0.0002						
	<i>Acteocina canaliculata</i>							0.0002	
Mollusca : Gastropoda	<i>Crepidula</i> spp.			0.0002					

Table 3-3. Mean abundance (#/m<sup>2</sup>) of the top ten macrobenthic taxa collected in the shallow area of the impact and reference beaches in Dare County, NC.

Taxonomic Group	Taxonomic Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
Nemertina	Nemertina	112	32	196	492	68	16	152	464
Annelida : Oligochaeta	Oligochaeta		28	28	4	80	8	8	4
Annelida : Polychaeta	<i>Microphthalmus aberrans</i>	228	32	8	8		32		
	<i>Scolelepis squamata</i>		8	80	144		4		
Arthropoda : Amphipoda	<i>Amphiporeia virginiana</i>	112	32	196	492	68	16	152	464
	<i>Atylus cf. minikoi</i>			100					
	<i>Haustorius canadensis</i>		40	12			24		
Arthropoda : Decapoda	<i>Emerita talpoida</i>	4		76	40	20	52		
Arthropoda : Mysidacea	<i>Neomysis americana</i>	4		84	20	8			
Mollusca : Bivalvia	<i>Donax variabilis</i>	80	116	120	28		4		

3-8

Table 3-4. Mean biomass (g/m<sup>2</sup>) of the top ten macrobenthic taxa (based on biomass) collected in the shallow area of the impact and reference beaches in Dare County, NC.

Taxonomic Group	Taxonomic Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
Nemertina	Nemertina	0.0036	0.0030	0.0046	0.0102	0.0008	0.0006	0.0028	0.0060
Annelida : Polychaeta	<i>Microphthalmus aberrans</i>	0.0100	0.0012	0.0002	0.0006		0.0004		
	<i>Scolelepis squamata</i>		0.0184	0.0500	0.1236		0.0328		
Arthropoda : Amphipoda	<i>Amphiporeia virginiana</i>	0.0226	0.0336	0.0006	0.0016				
	<i>Bathyporeia parkeri</i>	0.0048	0.0010						
	<i>Haustorius canadensis</i>		0.2284	0.0204			0.0208		
Arthropoda : Decapoda	<i>Emerita talpoida</i>	1.8376		0.0580	0.0148	0.3992	2.7856		1.8376
	<i>Ovalipes stephensi</i>	0.5916	2.8216						0.5916
Arthropoda : Mysidacea	<i>Neomysis americana</i>	0.0002		0.0140	0.0024	0.0024			
Mollusca : Bivalvia	<i>Donax variabilis</i>	0.0096	0.0196	0.0660	0.0318		0.0024		

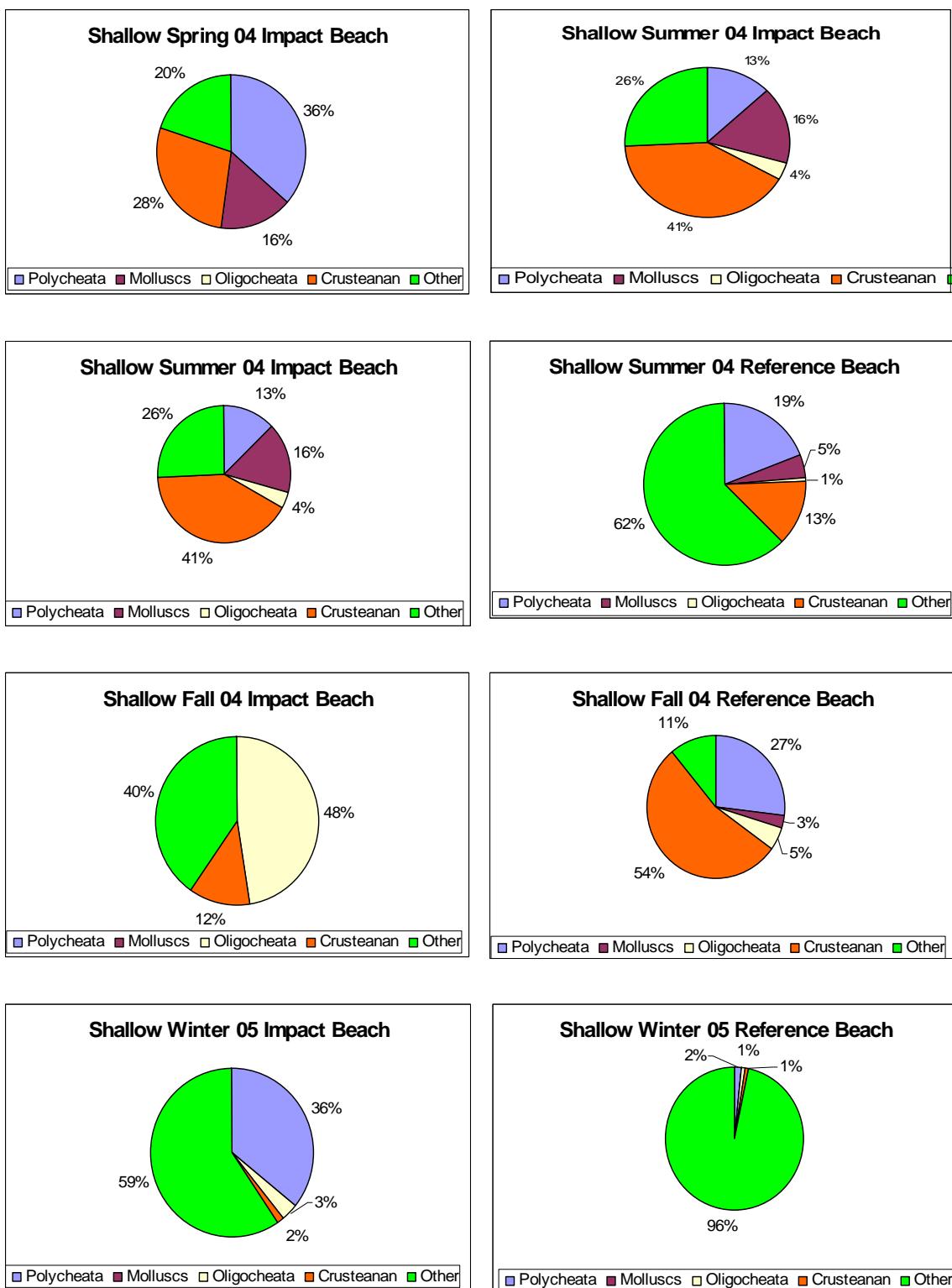


Figure 3-6. Community composition of benthic organisms collected in the shallow habitat of the impact and reference beaches in Dare County, NC.

In the shallow beach habitat, although differences in abundances of major taxonomic groups between the two beaches were apparent, overall total infauna abundance was similar between the two beaches in all seasons (Figure 3-7). Mean infauna abundance was highest in the spring and summer, fell to a low in fall, and increased somewhat during the winter sampling period (Figure 3-7). Although differences in mean infauna biomass was detected between the beaches, in general, biomass was lowest during the summer and winter sampling periods, as was the case in the swash habitat (Figure 3-8). Both measures of diversity were very similar between the reference and impact beaches in all seasons sampled (Figures 3-9 and 3-10). As in the swash habitat, the mean number of infauna taxa collected from each station in the shallow area was low, less than 4 taxa per station (Figure 3-9).

### 3.2.3 Borrow Area

A total of 168 distinct infauna and epifauna taxa were collected from both the borrow and reference site. Of the 168 total taxa collected, 39 taxa were unique to the borrow site only and 31 taxa were unique to the reference site only. Only one species, the polychaete worm, *Parougia caeca*, was collected frequently in the borrow site but was not collected in the reference site (mean of 457/m<sup>2</sup>). All of the other taxa unique to either sampling site were only collected in low numbers in the other sampling site. In general, the top ten taxa collected overall were dominant in both sampling sites (Table 3-5). The dominant taxa collected from both sites were all worms, nine taxa of which were polychaetes (Table 3-5). The top ten dominant taxa by weight also consisted of six polychaete worm species but also included some large species of snails, clams, and sand dollars (Table 3-6).

The macrobenthic community was similar between the borrow and reference site. Community composition of the borrow and reference sites in all seasons, except the borrow site in winter, was dominated by polychaete worms (Figure 3-11). In the borrow site during the winter sampling site, a high number of nemertean worms were collected leading to higher proportion of miscellaneous taxa (Table 3-5).

Mean benthic infauna abundance was highest in summer, averaging over 10,000 individuals/m<sup>2</sup> at both sampling sites and was generally lowest in the fall (Figure 3-12). The borrow site consistently had fewer organisms than the reference site in all sampling seasons (Figure 3-12). Mean total biomass was also highest in summer and low in fall and winter (Figure 3-13). Biomass was also lower in the borrow site than the reference site, however, the difference in biomass was not as great as with abundance (Figure 3-13). The mean number of taxa collected from each offshore sampling station followed the same pattern of high numbers of taxa collected in the summer (over 30 infauna taxa) to a low in the fall and winter (less than 25 in the reference site and less than 15 in the borrow, Figure 3-14). Again the borrow site had fewer mean number of infauna taxa collected in all seasons but the difference between the sampling sites was not as apparent in the Shannon Weiner Diversity Index (Figure 3-15).

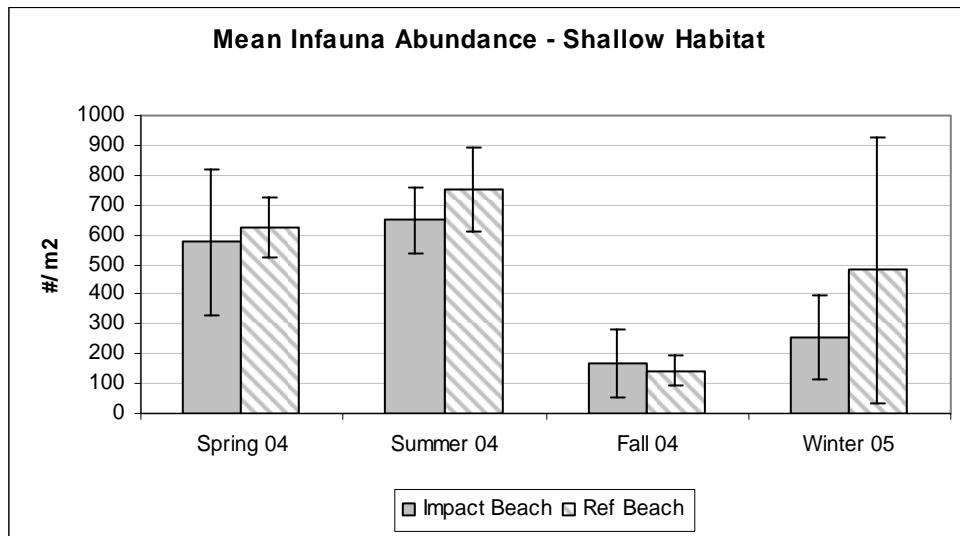


Figure 3-7. Mean total infauna abundance collected from the shallow habitat at the impact and reference beaches in Dare County, NC.

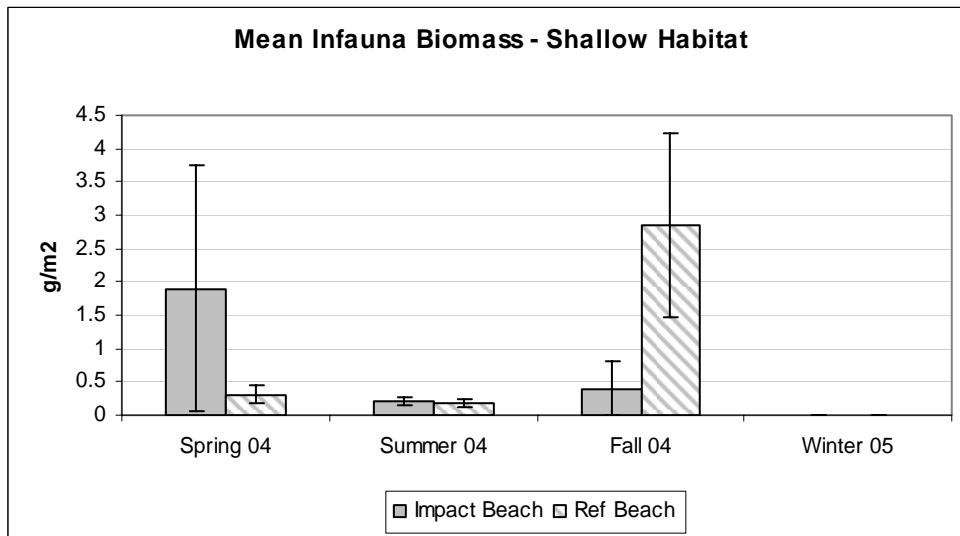


Figure 3-8. Mean total infauna biomass collected from the shallow habitat at the impact and reference beaches in Dare County, NC.

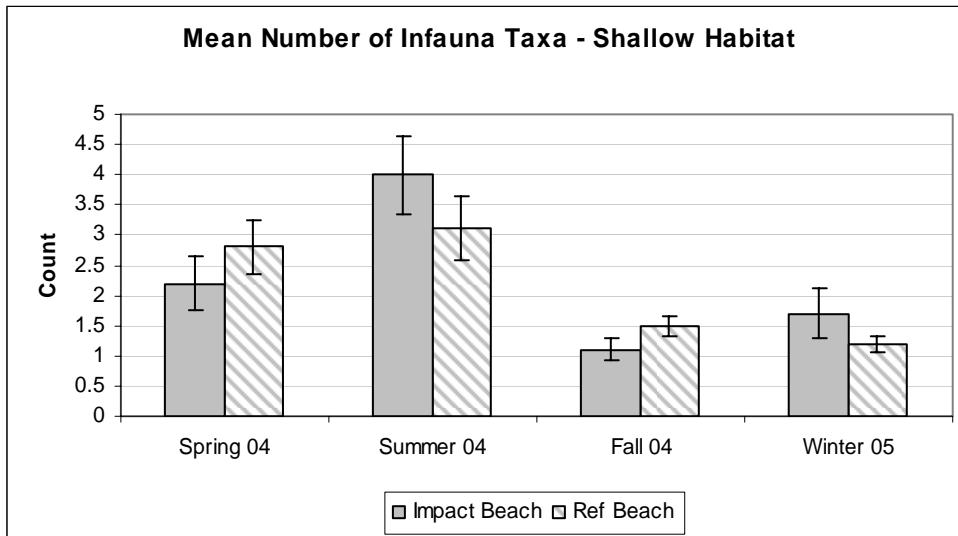


Figure 3-9. Mean number of infauna taxa collected from the shallow habitat at the impact and reference beaches in Dare County, NC.

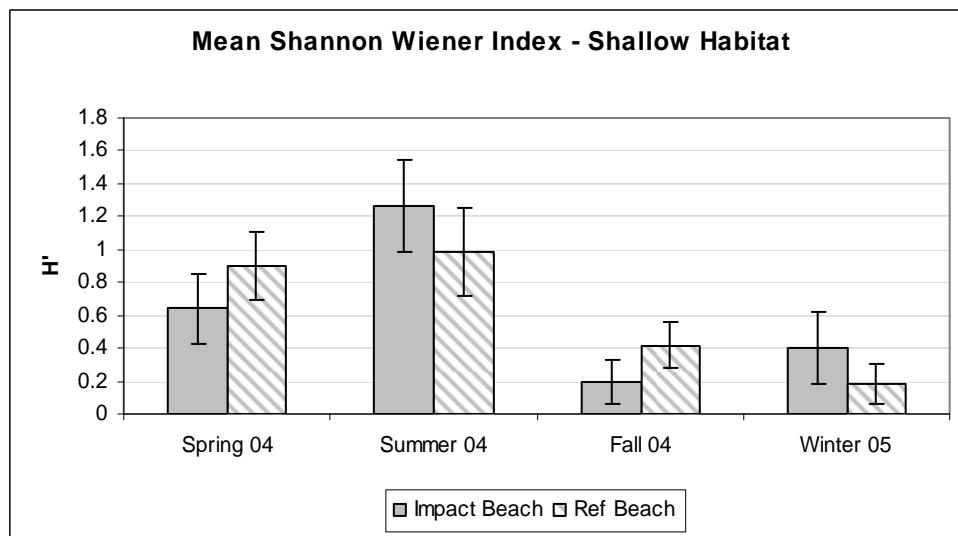


Figure 3-10. Mean Shannon Wiener Diversity Index measured from the shallow habitat at the impact and reference beaches in Dare County, NC.

Table 3-5. Mean abundance (#/m<sup>2</sup>) of the top ten macrobenthic taxa collected in the borrow and reference borrow sites offshore of Dare County, NC.

<b>Taxonomic Group</b>	<b>Taxonomic Name</b>	<b>Spring 04</b>		<b>Summer 04</b>		<b>Fall 04</b>		<b>Winter 05</b>	
		Borrow	Ref.	Borrow	Ref.	Borrow	Ref.	Borrow	Ref.
Nemertina	Nemertina	100.00	4.55	247.73	56.82	77.27	22.73	918.18	18.18
Annelida : Polychaeta	<i>Amastigos caperatus</i>	202.27	2270.45	647.73	2552.26	120.45	2118.18	29.55	4074.99
	<i>Apoprionospio pygmaea</i>	604.54	886.36	277.27	1840.90	18.18	1747.72		772.72
	<i>Aricidea catherinae</i>	211.36	202.27	11.36	54.55	84.09	163.64		581.82
	<i>Caulieriella</i> sp. B (Blake)	118.18	381.82	22.73	400.00	31.82	125.00	2.27	286.36
	<i>Mediomastus ambiseta</i>	343.18	897.72	822.72	161.36	184.09	113.64		6.82
	<i>Owenia fusiformis</i>	579.54	79.55	3899.99	604.54	215.91	513.63	25.00	713.63
	<i>Polygordius</i> spp.	54.55	215.91	70.45	90.91	22.73	329.54	4.55	772.72
	<i>Spiophanes bombyx</i>	511.36	2120.45	2184.08	8979.52	145.45	1706.81	11.36	1899.99
	<i>Tharyx</i> sp. A Morris	579.54	79.55	3899.99	604.54	215.91	513.63	25.00	713.63

Table 3-6. Mean biomass (g/m<sup>2</sup>) of the top ten macrobenthic taxa (based on biomass) collected in the borrow and reference borrow sites offshore of Dare County, NC.

<b>Taxonomic Group</b>	<b>Taxonomic Name</b>	<b>Spring 04</b>		<b>Summer 04</b>		<b>Fall 04</b>		<b>Winter 05</b>	
		Borrow	Ref.	Borrow	Ref.	Borrow	Ref.	Borrow	Ref.
Annelida : Polychaeta	<i>Amastigos caperatus</i>	0.0764	0.1382	0.0256	0.0655	0.0077	0.0710	0.0005	0.1182
	<i>Apoprionospio pygmaea</i>	0.0907	0.1377	0.0215	0.1339	0.0020	0.2068		0.0891
	<i>Glycera dibranchiata</i>	0.1961	0.2392	0.0315	0.0041		0.2936	0.0018	0.0559
	<i>Nephtys picta</i>	0.0833	0.1143	0.0618	0.1825	0.0389	0.2425	0.0132	0.2718
	<i>Owenia fusiformis</i>	0.0236	0.0777	0.0452	0.4220	0.0015	0.6477		0.5400
	<i>Tharyx</i> sp. A Morris	0.1040	0.4489	0.1382	0.7477	0.0232	0.2159	0.0018	0.2667
Mollusca : Gastropoda	<i>Nassarius trivittatus</i>		0.1857	0.2661	0.8376	0.0530	0.1601	0.0077	0.1218
	<i>Polinices duplicatus</i>			1.1525					
Mollusca : Bivalvia	<i>Ensis directus</i>	0.2127	0.0047	0.3518	0.5348	0.0005	0.0002		0.0001
Echinodermata : Echinoidea	<i>Mellita quinquiesperforata</i>		0.0077	1.5423	2.6027		0.0001		

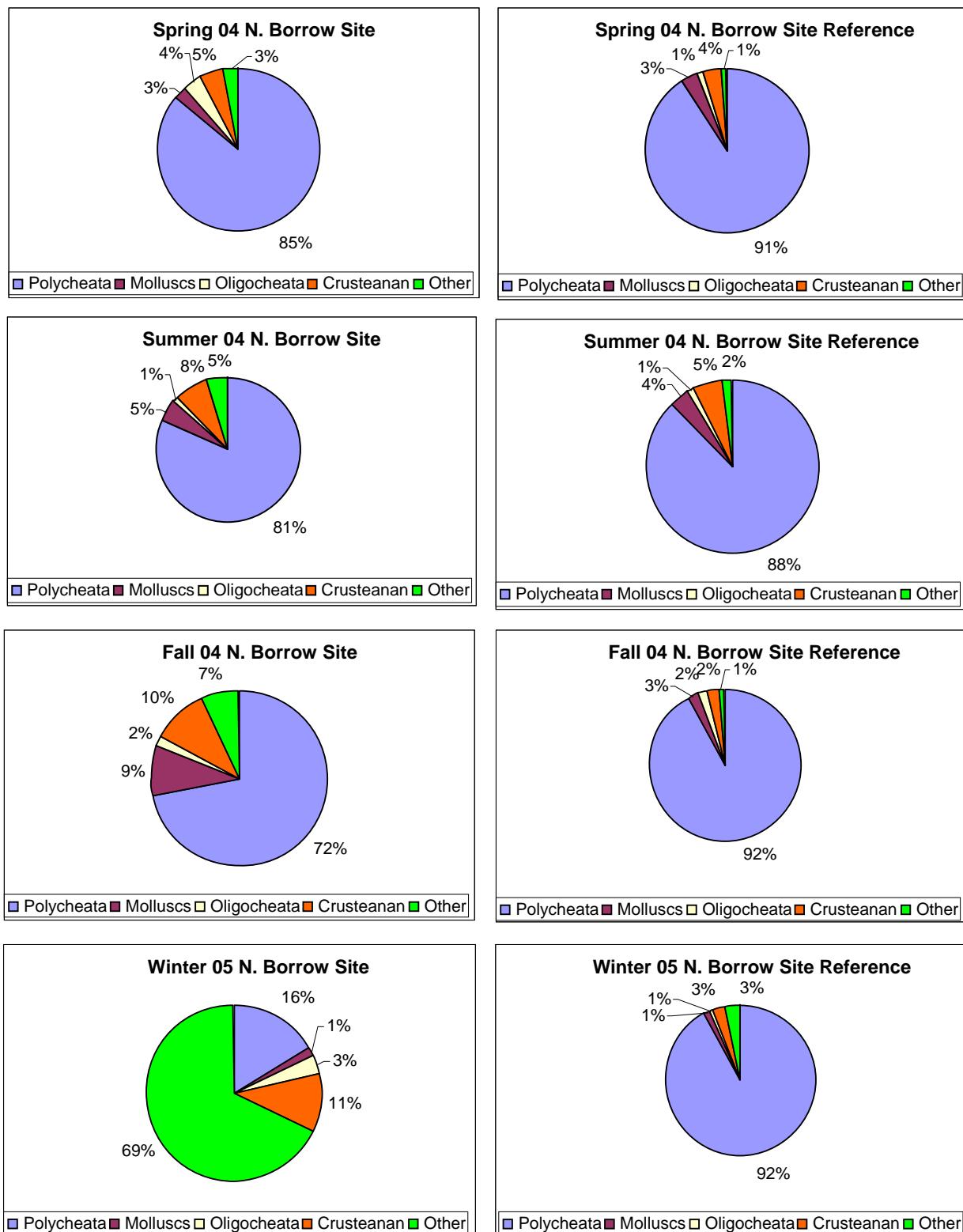


Figure 3-11. Community composition of benthic organisms collected at the borrow and reference borrow sites offshore of Dare County, NC.

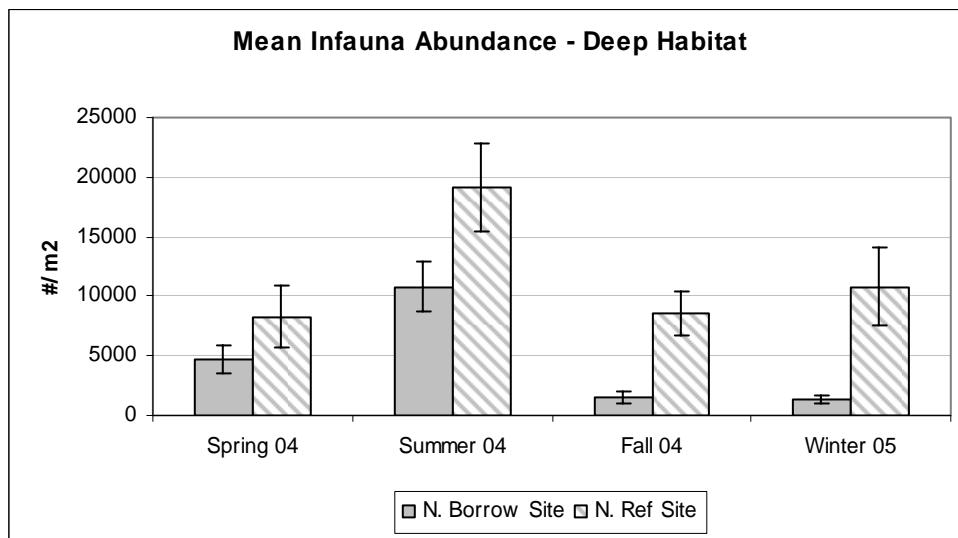


Figure 3-12. Mean total infauna abundance collected from the borrow and reference sites.

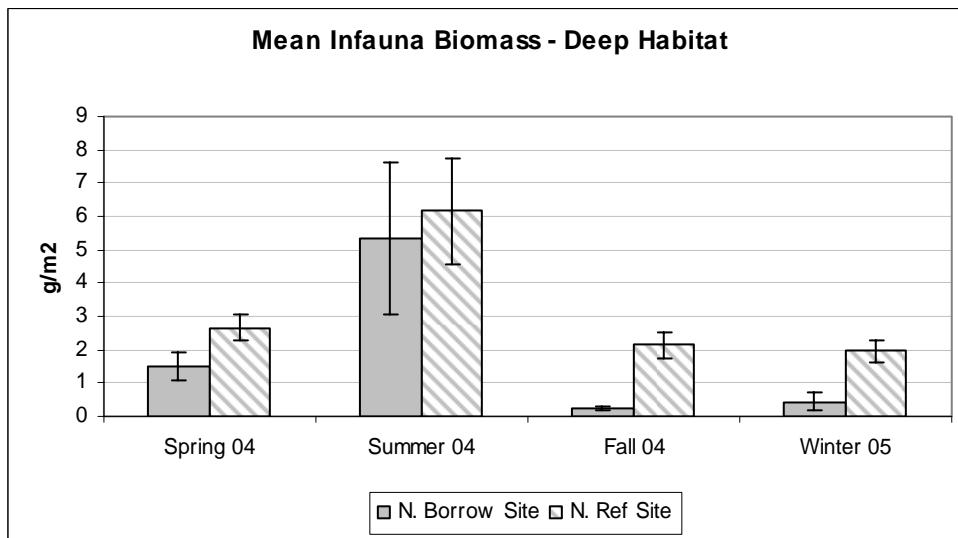


Figure 3-13. Mean total infauna biomass collected from the borrow and reference borrow sites offshore of Dare County, NC.

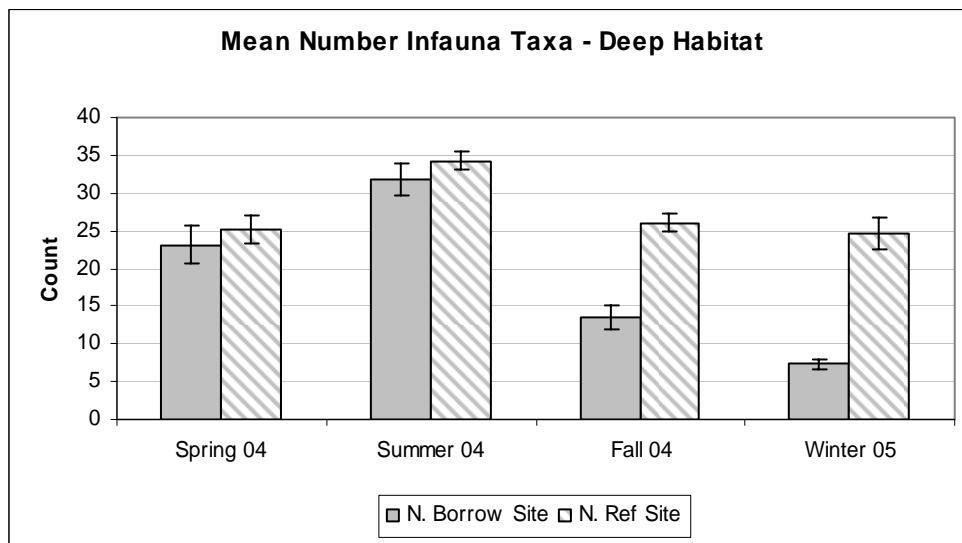


Figure 3-14. Mean total number of infauna taxa collected from the borrow and reference borrow sites offshore of Dare County, NC.

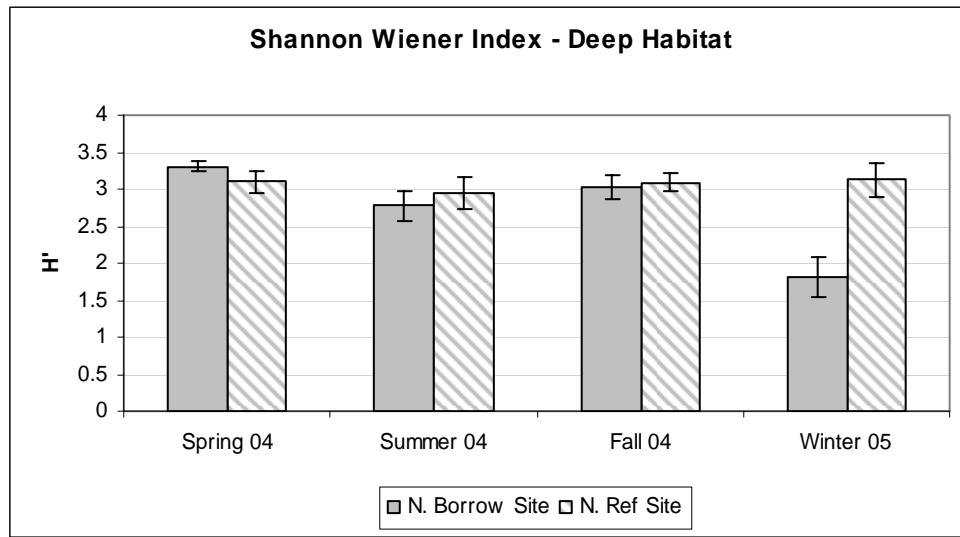


Figure 3-15. Mean Shannon Wiener Diversity Index measured from the northern borrow and reference borrow sites offshore of Dare County, NC.

Water quality collected during benthic sampling does not show any differences between the borrow sites or the reference (Table 3-7). All measurements varied seasonally, but values were typical of oceanic conditions in all seasons. Temperature ranged from a low of 6.3 °C in the winter to a high of 18.8 °C in the summer and differences between the sites did not vary more than 0.1 °C during any season. Seasonal salinities fluctuated from over 40 ppt in the summer to lower than 30 ppt at both sites in the winter (Table 3-7). Dissolved oxygen (DO) values were good at both sites and remained constant from spring through fall sampling, with a rise of nearly 2 ppt at both sites in the winter. DO was slightly higher at the reference site during all seasonal sampling. Values of pH at the borrow site and reference borrow site were nearly neutral (pH 7) in spring, summer, and winter, and slightly basic in the fall sampling (Table 3-7).

Table 3-7. Summary of water quality values collected in the spring, summer, fall and winter on the bottom at the northern borrow and borrow reference sites offshore of Dare County, NC.								
Season	Temperature (c)		Salinity (ppt)		DO (mg/l)		pH	
	Borrow	Reference	Borrow	Reference	Borrow	Reference	Borrow	Reference
Spring	9.3	9.3	34.0	35.0	7.5	7.6	7.6	7.6
Summer	18.8	18.8	40.6	41.4	7.2	7.8	7.5	7.6
Fall	14.8	14.7	30.8	30.4	7.8	8.6	8.2	8.2
Winter	6.3	6.4	28.9	29.5	10.0	11.6	7.6	7.6

### 3.3 FISH

#### 3.3.1 Impact Beach and Reference Site

Seining was conducted at the beach sites to characterize seasonal densities and community differences of large fish and invertebrate species residing in the surf zone. Overall, a total of 4,863 individuals were collected from a combination of 37 seines at the impact beach site and 37 seines at the reference beach. In the collections there were a total of 42 species of fish including 7 species of sharks, skates, and rays (Table 3-8). In addition, there were 7 invertebrate species, represented by 6 decapod crustaceans and the horseshoe crab.

The seasonal catches at both beaches exhibited similar trends of total species relative abundance (CPUE), mean numbers of species, and community diversity (Figure 3-16). For both beaches, the mean CPUE varied greatly between seasons and was highest in the spring. Summer had the second highest mean total CPUE and winter had the lowest mean total CPUE. The mean number of species and mean diversity were both highest in the summer for both reference and impact beaches. Spring had the second highest number of species and diversity while winter had the lowest mean number of species and mean diversity (Figure 3-16). In general, differences in measured values between beaches were minimal in all seasons except the total abundance in the summer. This is primarily due to large catches of the schooling fish Atlantic menhaden at the impact beach (Table 3-8). The abundance of all other fish collected between the beaches during that season is comparable.

Table 3-8. Mean seasonal catch per unit effort (CPUE) of fish and mobile benthos collected in the haul seines at the impact and reference beaches in Dare County, NC.

Taxonomic Name	Common Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
<b>Fish</b>									
<i>Alosa pseudoharengus</i>	Alewife	0.19						0.75	
<i>Alosa sapidissima</i>	American shad	1.31	1.69	1.07					
<i>Micropogonias undulatus</i>	Atlantic croaker		1.31	1.34	0.54	0.19			0.38
<i>Brevoortia tyrannus</i>	Atlantic menhaden	54.41	0.75	123.29	4.56			0.19	
<i>Selene setapinnis</i>	Atlantic moonfish			0.8	0.27				
<i>Menidia menidia</i>	Atlantic silverside	0.38							
<i>Chaetodipterus faber</i>	Atlantic spadefish				0.54				
<i>Dasyatis sabina</i>	Atlantic stingray	0.94	1.69	0.27	0.8				
<i>Opisthonema oglinum</i>	Atlantic thread herring	12.38							
<i>Larimus fasciatus</i>	Black drum			6.16	1.61	5.25			
<i>Pomatomus saltatrix</i>	Bluefish	0.56	2.44	1.34	2.68				
<i>Myliobatis freminvillei</i>	Bullnose ray		0.38						
<i>Peprilus triacanthus</i>	Butterfish	0.38	0.75	1.07					
<i>Raja eglanteria</i>	Clearnose skate	1.13	3.75	0.27		1.13			
<i>Rhinoptera bonasus</i>	Cownose ray	54.6	1.13						
<i>Caranx hippos</i>	Crevalle jack			0.27					
<i>Trachinotus carolinus</i>	Florida pompano			12.33	12.87				
<i>Dorosoma cepedianum</i>	Gizzard shad	0.38	0.38	6.97	6.43	0.19		0.19	0.94
<i>Menticirrhus littoralis</i>	Gulf kingfish	0.38	0.19	2.14	2.41		0.19		
<i>Peprilus alepidotus</i>	Harvestfish	21.01	5.07	17.69	4.02				
<i>Alosa mediocris</i>	Hickory shad				1.07	1.88	1.31	2.25	0.56
<i>Selene vomer</i>	Lookdown			1.61	1.88				
<i>Menticirrhus saxatilis</i>	Northern kingfish	0.56	0.56						
<i>Sphoeroides maculatus</i>	Northern puffer	1.31	2.44		0.27	0.19			

Table 3-8. (Continued)

Taxonomic Name	Common Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
<i>Orthopristis chrysoptera</i>	Pigfish				0.27				
<i>Sciaenops ocellatus</i>	Red drum			0.54		0.94	0.38		
<i>Archosargus probatocephalus</i>	Sheepshead		0.56			0.19			
<i>Bairdiella chrysoura</i>	Silver perch		0.38						
<i>Gymnura micrura</i>	Smooth butterfly ray		0.56						
<i>Mustelus canis</i>	Smooth dogfish	0.94	3.94						
<i>Menticirrhus americanus</i>	Southern kingfish	0.94	0.94	3.75	4.56				
<i>Dasyatis americana</i>	Southern stingray	3.75	14.63						
<i>Scomberomorus maculatus</i>	Spanish mackerel			0.27					
<i>Leiostomus xanthurus</i>	Spot	130.02	208.82	57.09	39.4				
<i>Cynoscion nebulosus</i>	Spotted seatrout	0.56	0.56	0.8	1.88	0.38	0.19		
<i>Morone saxatilis</i>	Striped bass			2.14	0.27	0.38	1.5		1.31
<i>Chilomycterus schoepfi</i>	Striped burrfish	44.84	11.07						
<i>Mugil cephalus</i>	Striped mullet			2.14	0.8				
<i>Paralichthys dentatus</i>	Summer flounder	0.19		1.34	0.54	0.56			
<i>Cynoscion regalis</i>	Weakfish	4.13	9.57	1.07					
<i>Mugil curema</i>	White mullet				0.27				
<i>Scophthalmus aquosus</i>	Windowpane	0.19		3.22	1.88	0.38	0.75		
<b>Invertebrates</b>									
<i>Cancer irroratus</i>	Atlantic rock crab		0.56			0.38	0.19		
<i>Callinectes sapidus</i>	Blue crab	0.94	1.13	0.27		0.19	0.19		
<i>Ovalipes stephensi</i>	Coarsehand lady crab					0.38			
<i>Limulus polyphemus</i>	Horseshoe crab		0.19						
<i>Ovalipes ocellatus</i>	Lady crab	0.19	0.94	2.41	5.09	27.96	4.69		
<i>Libinia emarginata</i>	Portly spider crab					0.19			
<i>Arenaeus cibrarius</i>	Speckled swimming crab				0.27				

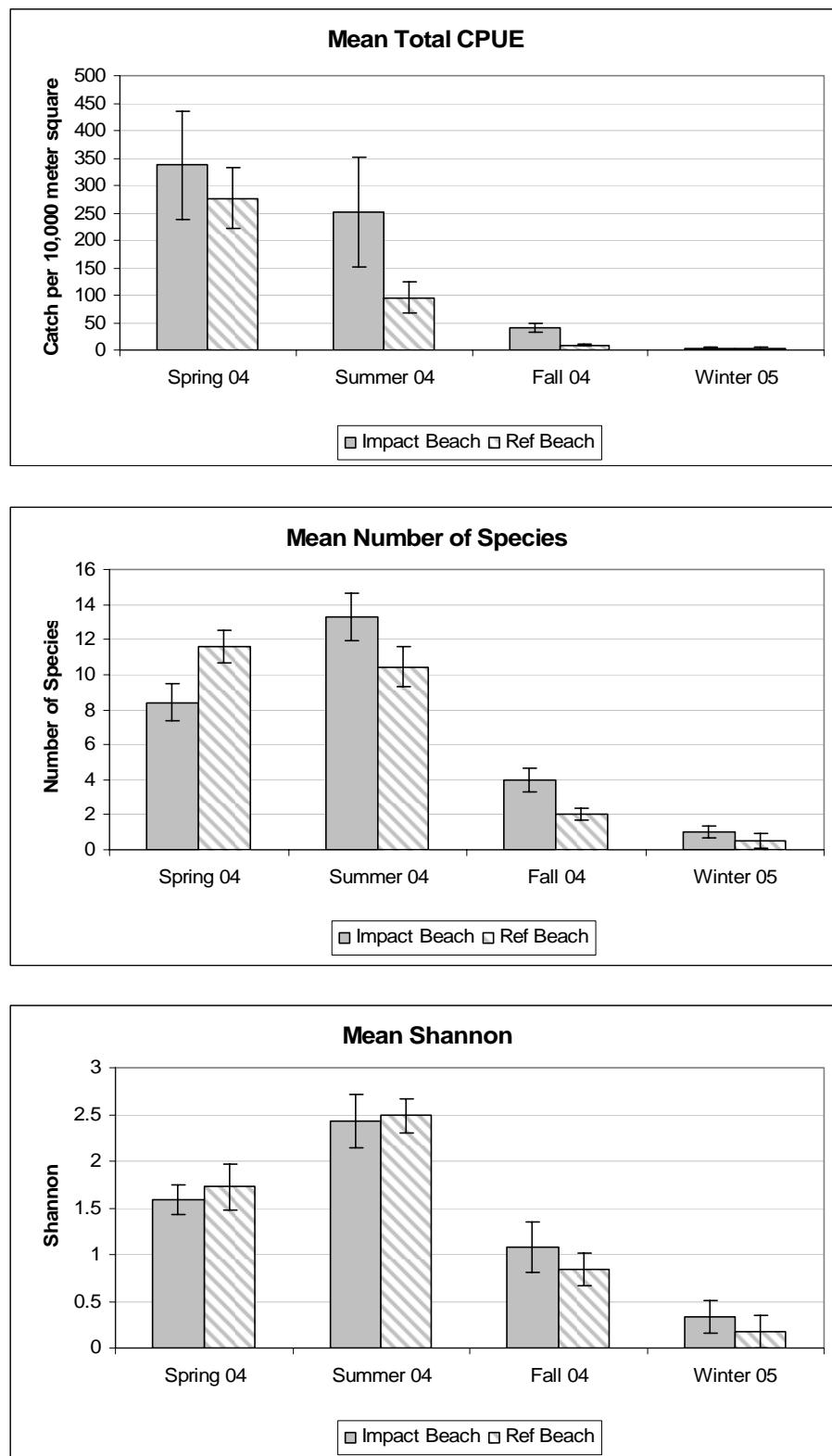


Figure 3-16. Seasonal mean total species CPUE, number of species, and species diversity collected in the haul seines at the impact and reference beaches in Dare County, NC.

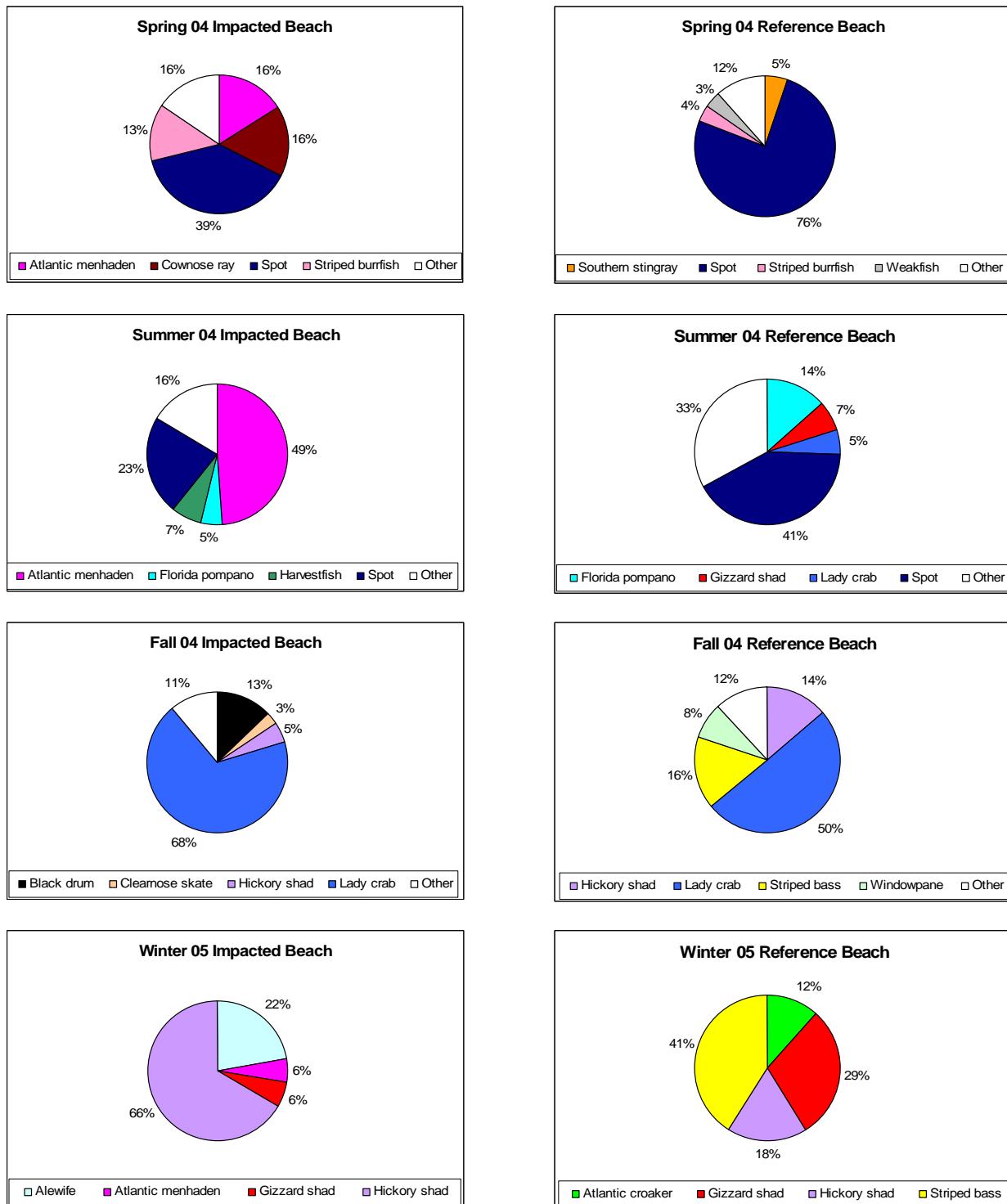


Figure 3-17. Community composition of fish and mobile benthos collected in the haul seines at the impact and reference beaches in Dare County, NC.

Several commercial, recreational, and ecologically important species were collected at both beaches during the first year. In particular, spot were abundant in the spring and summer surveys (Table 3-8), and comprised the majority of the catch in both seasons (Figure 3-17). Florida pompano, an important recreational fish, was present in equal numbers at both beaches in the summer (Table 3-8). The Atlantic menhaden, was collected at both beaches, but was most abundant in the spring and summer at the impact beach (Table 3-8 and Figure 3-17). In the winter, only four species of Alosids and striped bass were collected in the surf zone. Between them, the hickory shad (66% of the total catch) was most abundant at the impact beach and striped bass accounted for 41% of the catch at the reference beach.

There were several invertebrate species collected in the seines throughout the first year of monitoring (Table 3-8). Although the seine is not necessarily suited to capture crabs and other invertebrates effectively, it is important to document invertebrates collected by the seine because of their forage value to fish. The most notable invertebrate collected in the seines was the Lady crab, which accounted for the majority of the total catches during the fall collections (Table 3-8 and Figure 3-17).

### 3.3.2 Ocean Borrow and Reference Sites

Trawling was conducted at the borrow sites and borrow reference site to characterize seasonal densities of large fish and invertebrate species residing offshore. Overall, a total of 466 individuals were collected from a combination of 46 trawls at the borrow sites and 46 at the reference borrow site. In the collections there were a total of 32 species of fish including 7 species of sharks, skates, and rays (Table 3-9). In addition, there were 4 invertebrate species, represented by 3 decapod crustations and squid. Unlike the haul seines, seasonal trawling at the borrow and reference sites captured very few species in low abundance (Table 3-9). The spring had the highest collection of individuals at both sites with 342 organisms, which accounted for nearly 75% of the yearly collection.

The seasonal catches at the borrow sites and the borrow reference site followed similar trends of total species relative abundance (CPUE), mean numbers of species, and community diversity (Figure 3-18). The mean CPUE varied greatly between seasons and was highest in the spring for both sites. Catches were low in the summer and fall surveys and only one windowpane flounder was collected in the winter survey (Table 3-9). The reference borrow had the highest mean number of species in the fall and was slightly lower than the borrow site in the spring. The mean number of species for the borrow site was highest in the spring and second highest in the fall. Community diversity trends were similar to mean number of species at both sites, with the highest diversity in spring and lowest in the winter (Figure 3-18).

In the spring collections at the borrow site, weakfish and spotted hake had the highest CPUE and were responsible for 44% and 34%, of the total catch, respectively. Spotted hake had the highest CPUE at the reference site and accounted for over 50% of the total catch (Table 3-9 and Figure 3-19). Pinfish and Atlantic croaker were the most abundant species at the borrow site in the summer and the Atlantic croaker, pigfish, and spot were collected in nearly equal numbers

Table 3-9. Mean seasonal catch per unit effort (CPUE) of fish and mobile benthos collected in trawls at the borrow and reference borrow sites offshore of Dare County, NC.

Taxonomic Name	Common Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Borrow	Ref.	Borrow	Ref.	Borrow	Ref.	Borrow	Ref.
<b>Fish</b>									
<i>Micropogonias undulatus</i>	Atlantic croaker	0.12	0.28	0.19	0.08	0.53	0.72		
<i>Larimus fasciatus</i>	Banded drum						0.2		
<i>Anchoa mitchilli</i>	Bay anchovy	3.14			0.07	0.34	1.49		
<i>Centropristes striata</i>	Black sea bass								
<i>Pomatomus saltatrix</i>	Bluefish					0.09	0.09		
<i>Peprilus triacanthus</i>	Butterfish	2.83	0.28	0.1		0.34	0.71		
<i>Raja eglanteria</i>	Clearnose skate	0.81	0.56			0.09			
<i>Rhinoptera bonasus</i>	Cownose ray	0.12							
<i>Menticirrhus littoralis</i>	Gulf kingfish	0.14							
<i>Peprilus alepidotus</i>	Harvestfish					0.09			
<i>Sphoeroides maculatus</i>	Northern puffer		0.16						
<i>Orthopristis chrysoptera</i>	Pigfish			0.1	0.08	0.08			
<i>Lagodon rhomboides</i>	Pinfish	0.14	0.16	0.29					
<i>Dasyatis centroura</i>	Roughtail stingray		0.15						
<i>Bairdiella chrysoura</i>	Silver perch					0.46			
<i>Gymnura micrura</i>	Smooth butterfly ray					0.09			
<i>Mustelus canis</i>	Smooth dogfish		0.66						
<i>Menticirrhus americanus</i>	Southern kingfish						0.11		
<i>Dasyatis americana</i>	Southern stingray	0.12	0.38						
<i>Squalus acanthias</i>	Spiny dogfish	0.14				0.17	0.33		
<i>Leiostomus xanthurus</i>	Spot	0.43			0.1				
<i>Urophycis regia</i>	Spotted hake	13.5	3.97				0.35		
<i>Anchoa hepsetus</i>	Striped anchovy	0.14							
<i>Chilomycterus schoepfi</i>	Striped burrfish			0.09			0.08		

Table 3-9 (Continued)

Taxonomic Name	Common Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Borrow	Ref.	Borrow	Ref.	Borrow	Ref.	Borrow	Ref.
Prionotus evolans	Striped searobin					0.08			
Paralichthys dentatus	Summer flounder						0.09		
Cynoscion regalis	Weakfish	17.45	0.27			1.27	1.54		
Scophthalmus aquosus	Windowpane							0.17	
<b>Invertebrates</b>									
Penaeus aztecus	Brown shrimp			0.09					
Ovalipes ocellatus	Lady crab				0.08				
Crangon septemspinosa	Sand shrimp	0.13	0.13						
Cephalopoda	Squids	0.42	0.41				0.24		

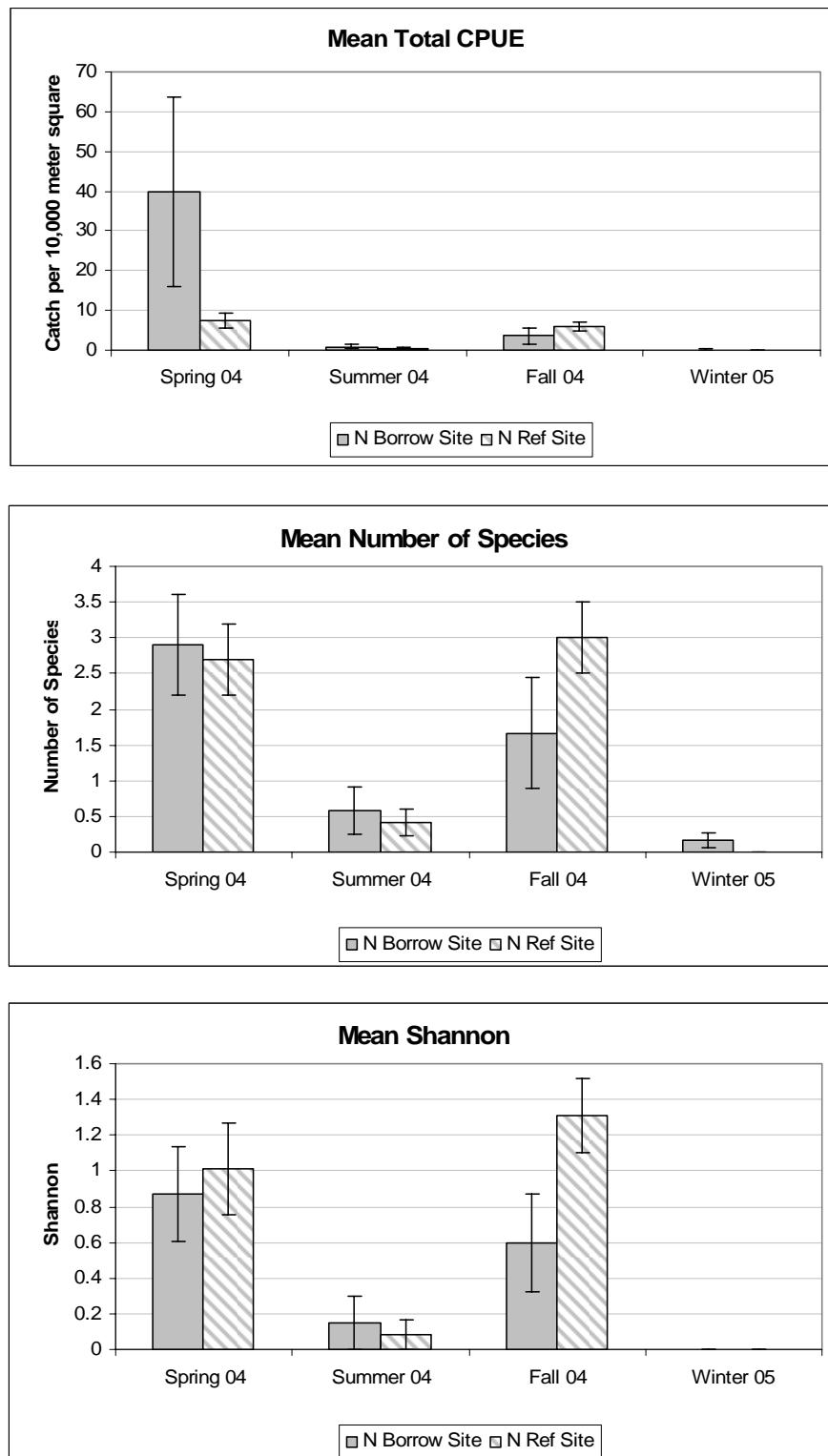


Figure 3-18. Seasonal mean total species CPUE, number of species, and species diversity of species collected in trawls at the borrow and reference borrow sites offshore of Dare County, NC.

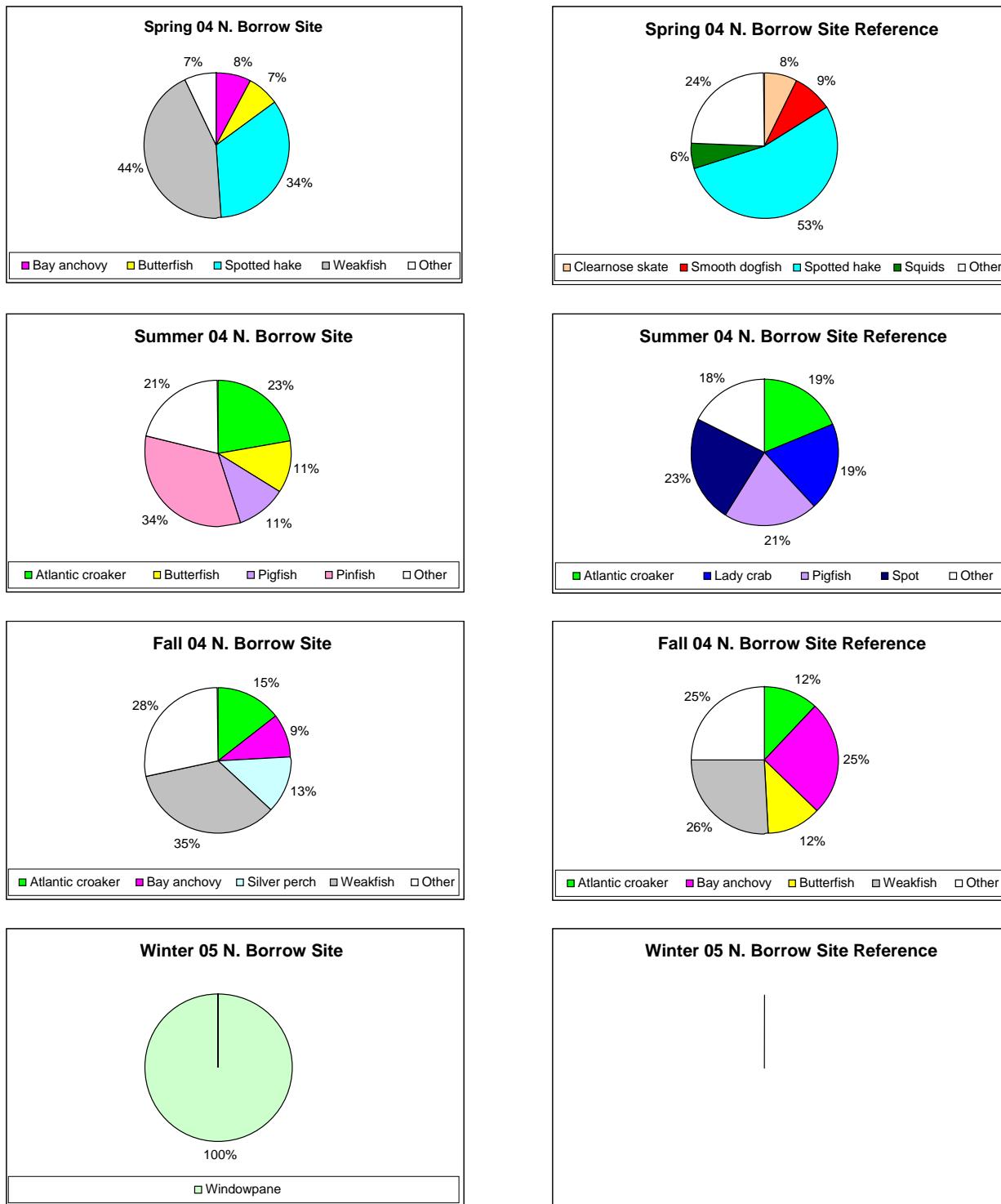


Figure 3-19. Community composition of fish and mobile benthos collected in trawls at the borrow and reference borrow sites offshore of Dare County, NC.

at the reference site (Table 3-9 and Figure 3-19). In the fall, weakfish, Atlantic croaker, and bay anchovy were collected in similar numbers at the borrow and reference sites comprising over 50% of the catches at both sites.

Very few invertebrate species were collected in the trawls throughout the first year of monitoring (Table 3-9). The squid was the most frequently occurring, collected at the borrow and reference sites in the spring and again at the reference in the fall survey. Two species shrimp were collected, the brown shrimp collected at the borrow site in the summer and the sand shrimp collected at both sites in the spring. The lady crab was collected at the reference site in the fall and accounted for 23% of the total catch in that season.

### 3.4 STOMACH CONTENTS

A total of 304 individual fish from several species were collected at the beaches and ocean borrow sites for stomach content analysis during the first year of sampling (Table 3-10 and Table 3-11). Nine species were collected in the seines and 6 were collected in the trawls. Seventy one percent of all stomachs collected contained prey items. Seven major prey groups were identified, including a group of unknown items, usually unidentifiable because of advanced digestion. For all the fishes studied, shrimp was the most frequently consumed prey item occurring in 22% of all stomachs containing prey items (Figure 3-20). Emerita, crabs, and bivalves were also common, occurring in 19%, 11%, and 7% of stomachs, respectively. Tables 3-10 and 3-11 present summaries of the abundance, occurrence and percent index of relative importance (%IRI) for all prey items found in fish stomachs at the beaches and borrow sites for all seasons but winter, when no target fish for stomach analysis were present in the collections. The food habits of all fish species collected with prey items in their stomachs are described below. Because of low sample sizes and inconsistent collections of target species in all seasons, only seasonal trends in food habits will be addressed for species with sufficient data.

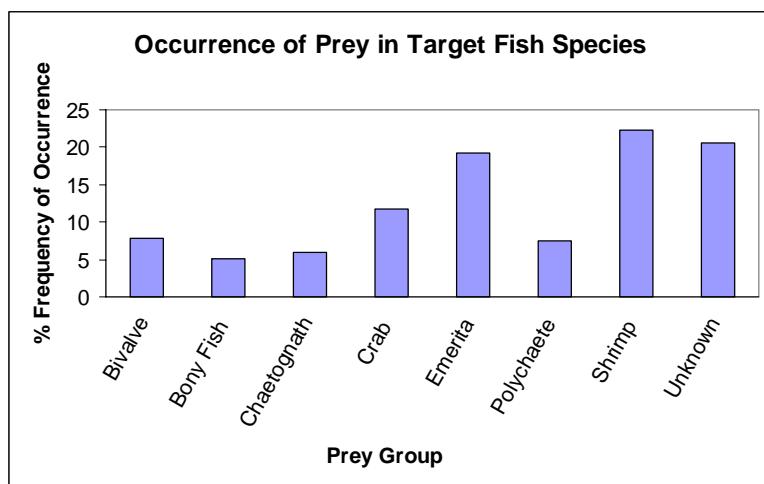


Figure 3-20. Frequency of occurrence (%) of prey groups in the stomachs of all target fish species collected in seines and trawls at the impact beach, reference beach, borrow site and borrow site reference in Dare County, NC.

Table 3-10. Summary of prey items found in stomachs of target fish species collected in trawls at the borrow and reference borrow sites offshore of Dare County, NC *n* = number of stomachs dissected, % full = percentage of stomachs with prey items, %N = percent numeric, %W=percent weight, %F= percent frequency, %IRI= percent of the index of relative importance.

					% N								% W							
Season	Site	Fish Species	<i>n</i>	% Full	Bivalve	Bony Fish	Chaetognath	Crab	Emerita	Poly-chaete	Shrimp	Unknown	Bivalve	Bony Fish	Chaetognath	Crab	Emerita	Poly-chaete	Shrimp	Unknown
Spring	Borrow	Atlantic croaker	1	100	0.0	0.0	25.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	10.4	87.5
		Gulf kingfish	1	100	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0
		Spot	4	100	21.4	28.6	0.0	7.1	7.1	0.0	35.7	0.0	11.4	62.5	0.0	0.2	0.0	0.0	1.3	24.6
		Spotted hake	18	100	1.2	3.5	3.5	2.4	0.0	0.0	89.4	0.0	0.5	30.3	0.0	0.2	0.0	0.0	24.5	44.6
	Reference	Spotted hake	14	100	0.0	9.7	3.2	0.0	0.0	3.2	83.9	0.0	0.0	64.9	0.0	0.0	0.0	0.3	11.4	23.3
Summer	Borrow	Atlantic croaker	2	100	0.0	0.0	11.1	22.2	0.0	66.7	0.0	0.0	0.0	0.0	2.9	8.8	0.0	11.8	0.0	76.5
		Atlantic croaker	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reference	Spot	1	100	1.0	0.0	0.0	0.0	0.0	98.5	0.5	0.0	4.5	0.0	0.0	0.0	0.0	95.3	0.2	0.0
		Atlantic croaker	7	100	0.0	0.0	0.0	1.0	0.0	70.8	28.1	0.0	0.0	0.0	0.0	0.2	0.0	81.1	6.9	11.7
Fall	Borrow	Silver perch	4	100	0.0	0.0	0.0	0.0	0.0	3.1	96.9	0.0	0.0	0.0	0.0	0.0	0.0	30.5	68.4	1.1
		Atlantic croaker	8	100	0.0	0.0	0.7	0.0	0.0	92.4	6.9	0.0	0.0	0.0	0.2	0.0	0.0	68.0	0.2	31.5
		Southern kingfish	1	100	0.0	14.3	0.0	0.0	0.0	57.1	28.6	0.0	0.0	15.4	0.0	0.0	0.0	16.7	10.3	57.7
		Spotted hake	4	50	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
					% F								% IRI							
Season	Site	Fish Species	<i>n</i>	% Full	Bivalve	Bony Fish	Chaetognath	Crab	Emerita	Poly-chaete	Shrimp	Unknown	Bivalve	Bony Fish	Chaetognath	Crab	Emerita	Poly-chaete	Shrimp	Unknown
Spring	Borrow	Atlantic croaker	1	100	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	24.1	0.0	0.0	0.0	75.9	0.0
		Gulf kingfish	1	100	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	37.5	0.0	0.0	0.0	0.0	0.0	62.5	0.0
		Spot	4	100	20.0	20.0	0.0	20.0	20.0	0.0	20.0	0.0	18.7	51.9	0.0	4.2	4.1	0.0	21.1	0.0
		Spotted hake	18	100	20.0	20.0	20.0	20.0	0.0	0.0	20.0	0.0	1.1	21.7	2.3	1.6	0.0	0.0	73.3	0.0
	Reference	Spotted hake	14	100	0.0	25.0	25.0	0.0	0.0	25.0	25.0	0.0	0.0	42.2	1.8	0.0	0.0	2.0	53.9	0.0
Summer	Borrow	Atlantic croaker	2	100	0.0	0.0	25.0	25.0	0.0	25.0	0.0	0.0	0.0	0.0	7.0	15.5	0.0	39.2	0.0	38.2
		Atlantic croaker	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Reference	Spot	1	100	33.3	0.0	0.0	0.0	0.0	33.3	33.3	0.0	2.7	0.0	0.0	0.0	0.0	96.9	0.3	0.0
		Atlantic croaker	7	100	0.0	0.0	0.0	25.0	0.0	25.0	25.0	0.0	0.0	0.0	0.0	0.6	0.0	76.0	17.5	5.9
Fall	Reference	Silver perch	4	100	0.0	0.0	0.0	0.0	0.0	33.3	33.3	0.0	0.0	0.0	0.0	0.0	0.0	16.8	82.7	0.5
		Atlantic croaker	8	100	0.0	0.0	25.0	0.0	0.0	25.0	25.0	0.0	0.0	0.0	0.5	0.0	0.0	80.2	3.6	15.8
		Southern kingfish	1	100	0.0	25.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0	14.8	0.0	0.0	0.0	36.9	19.4	28.8
		Spotted hake	4	50	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0

Table 3-11. Summary of prey items found in stomachs of target fish species collected in seines at the impact and reference beaches in Dare County, NC. *n* = number of stomachs dissected, %full = percentage of stomachs with prey items, %N = percent numeric, %W=percent weight, %F= percent frequency, %IRI= percent of the index of relative importance.

			% N										% W								
Season	Site	Fish Species	<i>n</i>	% Full	Bivalve	Bony Fish	Chaetog-nath	Crab	Emerita	Poly-chaete	Shrimp	Unknown	Bivalve	Bony Fish	Chaetog-nath	Crab	Emerita	Poly-chaete	Shrimp	Unknown	
Spring	Impact	Black drum	5	80	30.0	0.0	0.0	0.0	30.0	0.0	40.0	0.0	30.2	0.0	0.0	0.0	65.8	0.0	4.0	0.0	
		Gulf kingfish	2	100	0.0	0.0	0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0	0.0	0.0	68.5	0.0	24.0	7.6	
		Northern kingfish	3	67	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.5	0.0	0.0	14.5	
		Southern kingfish	2	50	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.6	0.0	0.0	68.4	
		Spot	27	63	3.3	0.0	70.0	0.0	6.7	6.7	13.3	0.0	0.3	0.0	0.1	0.0	6.0	0.0	0.3	93.3	
	Reference	Atlantic croaker	8	88	0.0	14.3	33.3	19.0	0.0	9.5	23.8	0.0	0.0	84.2	0.3	0.0	0.0	0.0	0.3	15.1	
		Gulf kingfish	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Northern kingfish	4	50	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9	69.1	0.0	0.0	16.0
		Silver perch	2	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	
		Southern kingfish	3	33	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	
		Spot	17	65	2.4	0.8	24.4	1.6	0.0	0.0	70.9	0.0	0.9	2.5	0.3	25.0	0.0	0.0	19.0	52.3	
Summer	Impact	Black drum	13	77	8.6	0.0	0.0	0.0	60.0	0.0	31.4	0.0	10.9	0.0	0.0	0.0	83.0	0.0	5.4	0.7	
		Florida pompano	16	69	2.1	0.0	0.0	0.0	52.6	0.0	45.4	0.0	0.7	0.0	0.0	0.0	96.0	0.0	0.4	3.0	
		Gulf kingfish	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Southern kingfish	7	57	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.7	0.0	0.0	7.3	
		Spot	25	64	0.1	0.0	0.0	0.4	3.0	0.0	96.5	0.0	0.7	0.0	0.0	0.0	62.4	0.0	19.7	17.2	
	Reference	Atlantic croaker	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Florida pompano	14	43	0.0	0.0	0.0	0.0	93.6	0.0	6.4	0.0	0.0	0.0	0.0	0.0	89.7	0.0	0.2	10.1	
		Gulf kingfish	7	86	0.0	0.0	0.0	10.0	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.2	64.4	0.0	0.0	1.4
		Southern kingfish	11	73	0.0	15.4	0.0	30.8	0.0	15.4	38.5	0.0	0.0	32.7	0.0	55.5	0.0	3.2	0.1	8.5	
		Spot	34	62	0.3	0.0	0.0	0.1	0.1	0.2	99.3	0.0	1.7	0.0	0.0	0.7	0.3	0.1	75.2	21.9	
Fall	Impact	Atlantic croaker	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Black drum	17	71	0.0	0.0	0.0	0.0	25.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	88.0	0.0	6.8	5.1	
		Florida pompano	5	60	0.0	0.0	0.0	0.0	37.5	0.0	62.5	0.0	0.0	0.0	0.0	0.0	97.2	0.0	2.8	0.0	
		Gulf kingfish	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Red drum	4	50	0.0	12.5	0.0	37.5	50.0	0.0	0.0	0.0	0.0	1.7	0.0	19.0	79.3	0.0	0.0	0.0	
		Southern kingfish	2	100	0.0	0.0	0.0	0.0	80.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	88.0	0.0	0.1	11.9	
	Reference	Gulf kingfish	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Red drum	2	50	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	

Table 3-11. (Continued)

			% F									% IRI								
Season	Site	Fish Species	n	% Full	Bivalve	Bony Fish	Chaetognath	Crab	Emerita	Poly-chaete	Shrimp	Unknown	Bivalve	Bony Fish	Chaetognath	Crab	Emerita spp.	Poly-chaete	Shrimp	Unknown
Spring	Impact	Black drum	5	80	33.3	0.0	0.0	0.0	33.3	0.0	33.3	0.0	30.1	0.0	0.0	0.0	47.9	0.0	22.0	0.0
		Gulf kingfish	2	100	0.0	0.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0	50.9	0.0	45.3	3.8
		Northern kingfish	3	67	0.0	0.0	0.0	33.3	33.3	0.0	0.0	33.3	0.0	0.0	0.0	25.0	67.7	0.0	0.0	7.3
		Southern kingfish	2	50	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	65.8	0.0	0.0	0.0	34.2
		Spot	27	63	16.7	0.0	16.7	0.0	16.7	16.7	16.7	16.7	1.8	0.0	35.0	0.0	6.3	3.3	6.8	46.7
	Reference	Atlantic croaker	8	88	0.0	16.7	16.7	16.7	0.0	16.7	16.7	16.7	0.0	49.3	16.8	9.5	0.0	4.8	12.1	7.5
		Gulf kingfish	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Northern kingfish	4	50	0.0	0.0	0.0	33.3	33.3	0.0	0.0	33.3	0.0	0.0	0.0	32.4	59.6	0.0	0.0	8.0
		Silver perch	2	100	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		Southern kingfish	3	33	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
		Spot	17	65	16.7	16.7	16.7	16.7	0.0	0.0	16.7	16.7	1.6	1.7	12.3	13.3	0.0	0.0	44.9	26.1
Summer	Impact	Black drum	13	77	25.0	0.0	0.0	0.0	25.0	0.0	25.0	25.0	9.7	0.0	0.0	0.0	71.5	0.0	18.4	0.4
		Florida pompano	16	69	25.0	0.0	0.0	0.0	25.0	0.0	25.0	25.0	1.4	0.0	0.0	0.0	74.3	0.0	22.9	1.5
		Gulf kingfish	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Southern kingfish	7	57	0.0	0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	96.4	0.0	0.0	0.0	3.6
		Spot	25	64	20.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0	0.4	0.0	0.0	0.2	32.7	0.0	58.1	8.6
	Reference	Atlantic croaker	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Florida pompano	14	43	0.0	0.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0	91.7	0.0	3.3	5.0
		Gulf kingfish	7	86	0.0	0.0	0.0	33.3	33.3	0.0	0.0	33.3	0.0	0.0	0.0	22.1	77.2	0.0	0.0	0.7
		Southern kingfish	11	73	0.0	20.0	0.0	20.0	0.0	20.0	20.0	20.0	0.0	24.1	0.0	43.1	0.0	9.3	19.3	4.2
		Spot	34	62	14.3	0.0	14.3	14.3	14.3	14.3	14.3	14.3	1.0	0.0	0.0	0.4	0.2	0.1	87.3	10.9
Fall	Impact	Atlantic croaker	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Black drum	17	71	0.0	0.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0	56.5	0.0	40.9	2.6
		Florida pompano	5	60	0.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	67.4	0.0	32.6	0.0
		Gulf kingfish	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Red drum	4	50	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0	7.1	0.0	28.2	64.7	0.0	0.0	0.0
		Southern kingfish	2	100	0.0	0.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0	84.0	0.0	10.1	5.9
	Reference	Gulf kingfish	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Red drum	2	50	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0

### **3.4.1 Atlantic croaker**

A total of 29 Atlantic croaker were collected; 10 at the beaches and 19 at the borrow sites (Table 3-10 and 3-11). Seventy percent of the stomachs collected at the beaches and 95% of the stomachs collected from the borrow sites contained prey. Atlantic croaker collected at the beaches consumed four of the six known prey items and five prey items were found in the stomachs of fish collected at the borrow sites. Unknown organisms also contributed to some of the stomach content items. For Atlantic croaker collected at the borrow sites, both polychaetes and shrimp dominated the diet in number (%N), weight (%W) and frequency of occurrence (%F) (Table 3-11). Atlantic croaker with stomach contents were only collected in the spring at the beaches and chaetognaths and shrimp were numerically (%N) dominant, but bony fish dominated by weight (84%) and was therefore more important (49 %IRI) to the diet than any other prey group (Table 3-10).

### **3.4.2 Black drum**

A total of 35 black drum were collected at the beach sites and none were collected at the borrow sites (Table 3-10). Seventy-four percent of black drum stomachs contained prey. The diet of black drum was very consistent throughout the seasons with only three known prey groups; bivalves, Emerita, and shrimp. Very few unknown organisms were found in the black drum stomachs. Overall, Emerita dominated the diet by weight (%W) and had the highest %IRI values for all three seasons. Shrimp were numerically dominant in spring (40%N) and fall (75%N), but contributed little to the weight of prey items. Bivalves were found in black drum stomachs in the spring and summer with the highest numbers, weight, and %IRI values in the spring collection (Table 3-10).

### **3.4.3 Florida pompano**

A total of 35 Florida pompano were collected at the beach sites and none were collected at the borrow sites (Table 3-10). Fifty-seven percent of Florida pompano stomachs contained prey. Florida pompano were only collected in the summer and fall. Similar to Black drum, the Florida pompano diet did not vary between seasons containing three known prey groups; bivalves, Emerita and shrimp. Very few unknown organisms were found (Table 3-10). Overall, Emerita dominated the diet by weight (%W) and had the highest %IRI values in both seasons. Numerically (%N), more shrimp were found in fall than were Emerita, but shrimp did not contribute much to the overall weight (3%W). Bivalves contributed little to the diet of Florida pompano and were found in the stomachs only in the summer season (Table 3-10).

### **3.4.4 Gulf kingfish**

A total of 16 gulf kingfish were collected; 15 at the beaches and one at the borrow sites (Table 3-10 and 3-11). Fifty-three percent of the stomachs collected at the beaches and the stomach from the borrow sites contained prey. Gulf kingfish were present in all seasonal collections on the beach, but prey items were only present in the spring and summer. Gulf

kingfish were only found in the spring at the borrow sites. Similar to black drum and Florida pompano, much of the gulf kingfish diet consisted of *Emerita* and shrimp. Crabs were also found in beach fish stomachs. Bivalves and shrimp were contained in the borrow site fish (Table 3-11). Unknown organisms contributed very little to stomach content items. For beach fish, *Emerita* were the numerically (%N) dominant prey in the summer and shrimp were in the spring. *Emerita* also comprised most of the biomass and had the highest % IRI for both seasons as well. Crabs replaced shrimp in the diet of beach fish during the summer (Table 3-10).

#### **3.4.5 Northern kingfish**

A total of 7 northern kingfish were collected in the spring at the beach sites and none were collected at the borrow sites (Table 3-10). Fifty-seven percent of northern kingfish stomachs contained *Emerita* and crabs. In addition, some of the northern kingfish diet consisted of unknown organisms. The numbers (%N) of crabs and *Emerita* found in northern kingfish stomachs were similar. *Emerita* dominated the diet by weight (%W) and had the highest %IRI value (Table 3-10).

#### **3.4.6 Red drum**

A total of six red drum were collected in the fall at the beach sites and none were collected at the borrow sites (Table 3-10). Fifty percent of red drum stomachs contained *Emerita*, crabs and bony fish. *Emerita* dominated the diet by number (%N), weight (%W) and had the highest %IRI value (Table 3-10).

#### **3.4.7 Silver perch**

A total of six silver perch were collected; two at the beaches and four at the borrow sites (Table 3-10 and 3-11). All silver perch stomachs contained prey items. The two silver perch collected in the spring at the borrow sites contained 100% unknown organisms. Shrimp and polychaetes were the dominant prey in the four silver perch collected at the beaches in the fall (Table 3-10).

#### **3.4.8 Southern kingfish**

A total of 21 southern kingfish were collected; 20 at the beaches and one at the borrow sites (Table 3-10 and 3-11). Seventy percent of the stomachs collected at the beaches and the stomach from the borrow sites contained prey. Southern kingfish with prey were collected in all three seasons at the beaches and only in the fall at the borrow sites. Polychaetes, shrimp, and bony fish were contained in the stomachs of borrow site fish (Table 3-11). No unknown organisms were found in the borrow site fish, but unknown organisms contributed to the stomach

content items of the beach fish. All prey items but bivalves were present in the stomachs of southern kingfish collected on the beach (Table 3-10). The spring and fall collections indicated a limited diet of Emerita and crabs in the spring and shrimp and Emerita in the fall. Summer diets were much more diverse with four known prey items in the stomachs. Crabs and Emerita were the most dominant and most frequently (%F) occurring prey items with the highest %IRI overall (Table 3-10). Shrimp were found in two seasons (summer and fall), but in limited numbers. Bony fish were only second to Emerita in weight (%W) and %IRI in the summer, but were not present in any other season.

### **3.4.9 Spot**

A total of 108 spot were collected; 103 at the beaches and five at the borrow sites (Table 3-10 and 3-11). Sixty-three percent of the stomachs collected at the beaches and all the stomachs from the borrow sites contained prey. Spot with prey items were collected in the spring and summer at both the beaches and the borrow sites. Spot stomachs collected at the borrow sites contained all prey items except chaetognaths (Table 3-11). Unknown organisms also contributed to a portion of the stomach content items in fish from the beaches and the borrow sites. For beach fish, diets were similar in both the spring and summer collections (Table 3-10). Shrimp and chaetognaths were numerically (%N) dominant and exhibited the highest %IRI for spot in the spring. However, crabs and shrimp contributed higher biomass (%W) to the diet in the spring. Shrimp also dominated the summer diets by number (%N), weight (%W) and exhibited the highest %IRI. Emerita were found in both seasons, but had higher weight (%W) and %IRI in the summer (Table 3-10).

### **3.4.10 Spotted hake**

A total of 36 spotted hake were collected at the borrow sites and none at the beaches (Table 3-11). Ninety-four percent of spotted hake stomachs contained prey. Spotted hake were only collected in the spring and fall. Unknown organisms contributed to a good portion of the stomach content items. All prey items but Emerita were present in the stomachs of spotted hake in the spring and only shrimp were present in the fall. Shrimp dominated by number (%N) in the spring and summer and also contributed the highest %IRI. However, bony fish contributed the highest weights (%W) for all prey in the spring but had lower overall %IRI (Table 3-11).

## **3.5 GHOST CRAB SURVEY**

Ghost crabs, as inferred from ghost crab hole counts, were present in every season but the winter (Figure 3-21). Ghost crab abundance was highly variable between seasons and between beaches. The highest densities of ghost crabs were recorded in the spring on the impact beach, with over three times more ghost crabs per square meter than the reference beach in that season. The reference beach had the second highest seasonal abundance in the summer, and ghost crab

abundance at that beach was greater than the impact beach in the summer and fall seasons (Figure 3-21). Ghost crab abundance on the impact beach decreased from high to low as the seasons progressed from spring to winter. However, on the control beach ghost crab abundance increased after spring and then decreased in the fall and winter (Figure 3-21).

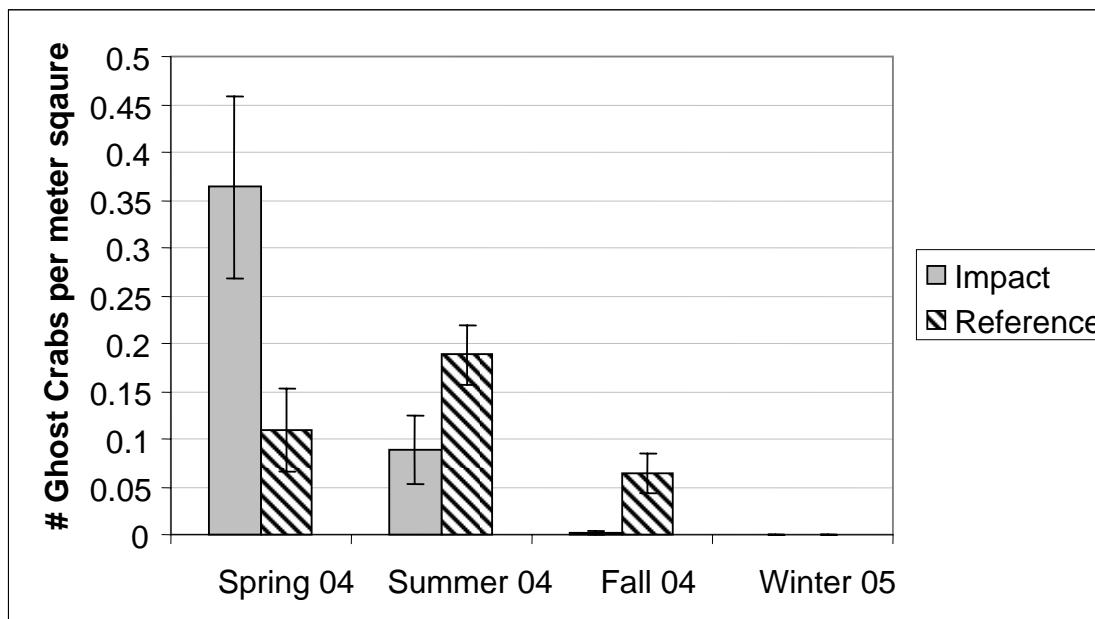


Figure 3-21. Mean abundance of ghost crabs (inferred from ghost crab hole counts) from the wrack line to the toe of the dune on the impact and reference beaches in Dare County, NC.

### 3.6 BIRD SURVEY

Nearly 11,000 birds were counted during 45 survey days conducted at the impact and reference beaches. A cumulative total of 36 species were documented consisting of 9 species of shorebird, 18 waterbirds, and 9 other species (Table 3-12). Six birds were unique to the impact beach and only one, the common goldeneye was unique to the reference beach. However, in general species composition was similar between the beaches in all seasons (Figure 3-23).

There were no obvious differences in total species abundance between the beaches during any season (Figure 3-22). Total species abundance was highest in the spring averaging between 25.4 and 27.8 birds/per 500 m at the impact and reference beaches, respectively (Table 3-13). Fall and summer abundance was lower, averaging between 12 and 20 birds/500 m. In the winter, total species abundance was the lowest with approximately 8 birds/500 m at the beaches. Shorebird and waterbird abundance followed similar patterns of high abundance in spring and fall, and lower abundance in the summer and winter months (Figure 3-25 and 3-28). Differences

in abundance between the beaches within bird groups were minor, but overall, shorebird abundance was much lower than waterbird abundance in all seasons.

Total mean species richness followed the same pattern as total abundance (Figure 3-22). Total species richness was highest in the spring averaging between 14.7 and 11 species/500 m. Species richness was lowest in the winter with between 6.4 and 5.8 species/500 m at the impact and reference beaches, respectively (Table 3-13). Only minor differences in total species richness between the beaches were seen throughout the year (Figure 3-22). Total species diversity was also similar to species richness with the highest diversity in summer and lowest in the winter (Figure 3-22). Shorebird and waterbird species richness and diversity followed the same seasonal trend and were similar at both beaches with shorebird values highest in spring and waterbird values nearly equal in all seasons (Figures 3-25 and 3-28).

Species composition was similar between the impact and reference beaches within each of the four seasons. However, there were large changes in species composition between seasons at both beaches during the first year of sampling (Figure 3-23). In the spring, summer and fall, the brown pelican and laughing gull were the most abundant species accounting for the majority of the birds at both the beaches in those seasons (Figure 3-23). Those two species were also the most frequently documented waterbird species in all seasons but winter when the ring-billed gull was more abundant (Figure 3-29). The semipalmated sandpiper was the most prevalent species of shorebird accounting for the majority of the species composition in all seasons at both beaches (Figure 3-26). Ruddy turnstones were the second most abundant shorebird species in the spring and summer and the western sandpiper was second in the fall. Two species other than shorebird or waterbird species that were prevalent on the beaches were the boat-tailed grackle and the pigeon (Figure 3-23).

Overall, more birds used the beach habitat and none were documented on the dunes (Figure 3-24a). Habitat use at both beaches were similar with most birds found using the beach in the summer, fall, and winter months, and slightly more in the surf/intertidal zone in the spring. Shorebirds used the beach exclusively at the reference beach and more in the summer and fall at impact beach (Figure 3-27a). In all seasons except the spring, waterbirds used the beach more than the surf/intertidal zone at both beaches (Figure 3-30a). Bird activity was similar between beaches with more birds flying on average than resting or feeding (Figure 3-24b). However, overall shorebirds were found to feed more than rest or fly, and waterbirds were resting or flying more than feeding (Figure 3-27b and 3-30b).

Pets and number of people were monitored to provide a means to assess their presence on bird counts. Pets (dogs specifically) are not allowed on Kill Devil Hills beaches from Memorial Day to Labor Day each year. Outside of these dates there is usually an average of 3-4 dogs throughout the length of the 3.5 mile transect during the months of November to March. September and October, April and May numbers may be slightly higher as the weather tends to be warmer (5 or 6).

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Dogs are allowed on the beaches in Nags Head year round, however they must be on a leash from Memorial Day to Labor Day. Many people bring their dogs in the summer months to the beach so it is possible to see high numbers of dogs (5 per section) from June to August. The number is similar to Kill Devil Hills for the rest of the year.

People vary over the year as well. The highest numbers are seen in the summer months (June to the end of August). However, human activity on the beach begins to increase in mid May and continues to be heavy through Columbus Day weekend. The last weeks of October show medium numbers of people. High numbers are defined to be over 50 people per section (10 sections in a 3.5 mile transect) of the transect, but during June and July numbers are closer to 75 or 100 people per section. Medium numbers are considered to be 26-49 people per section. Low numbers are considered to be 1-25 people per section and “none” equals 0 people per section.

During the months of November through March, it is possible to walk a transect and not see a person or see only 2 or 3. Late October and late May the numbers of people increase as Spotted Seatrout migrate during these times and local surf fishermen take to the beach. The same can be said from late November through February as striped bass are in the area as this is the southern most tip of their migration route. Overall, high winds during this time of year tend to keep numbers low as rough wave action near shore makes fishing difficult.

Table 3-12. Seasonal mean abundance (birds/500 meters) of individual shorebirds, waterbirds, and other birds counted on the impact and reference beaches in Dare County, NC.

Taxonomic Name	Common Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
<b>Shorebird</b>									
<i>Pluvialis squatarola</i>	Black Bellied Plover	0.1	0.03		0.02				
<i>Calidris minutilla</i>	Least Sandpiper			0.02	0.02				
<i>Arenaria interpres</i>	Ruddy Turnstone	1.27	2.8	0.41	0.54	0.11	0.19		
<i>Calidris alba</i>	Sanderling	1.3	2	0.01	0.14				
<i>Calidris pusilla</i>	Semipalmated Sandpiper	2.57	2.73	0.59	1.5	1.71	2.03		0.06
<i>Calidris mauri</i>	Western Sandpiper	1.07	1.73	0.09	0.4	0.8	0.69		
<i>Numenius phaeopus</i>	Whimbrel	0.4	0.07						
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	0.07		0.05	0.13			0.09	
<i>Catoptrophorus semipalmatus</i>	Willet			0.11	0.34	0.13	0.17		
<b>Waterbird</b>									
<i>Melanitta nigra</i>	Black Scoter					0.98			
<i>Pelecanus occidentalis</i>	Brown Pelican	6.83	6.27	3.89	4.12	2.16	2.95	1.64	1.34
<i>Sterna caspia</i>	Caspian Tern	0.2	0.03	0	0.01	0.03	0.06		
<i>Gavia immer</i>	Common Loon			0	0.06		0.01		
<i>Sterna hirundo</i>	Common Tern	0.8		0.38	0.57				
<i>Phalacrocorax</i> spp.	Cormorant spp.	1.87		0.01					
<i>Phalacrocorax auritus</i>	Double Crested Cormorant					0.07			
<i>Sterna forsteri</i>	Forster's Tern	0.53				0.5	0.25		
<i>Larus marinus</i>	Great Black Backed Gull	0.5	0.2	0.05	0.01	1.57	1.2	0.62	0.64
<i>Phalacrocorax carbo</i>	Great Cormorant					0.01			
<i>Larus</i> spp.	Gull spp.					2.5			
<i>Larus argentatus</i>	Herring Gull	2.6	2.2	0.43	0.3	0.28	0.11	0.16	0.36
<i>Larus atricilla</i>	Laughing Gull	4.77	6.7	3.15	6.04	5.05	4.17		
<i>Sterna antillarum</i>	Least Tern			0.02	0.02				
<i>Larus fuscus</i>	Lesser Black Back Gull					0.08	0.02	0.06	0.02

Table 3-12. (Continued)

Taxonomic Name	Common Name	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
<i>Morus bassanus</i>	Northern Gannet					0.07	0.4	0.48	0.62
<i>Pandion haliaetus</i>	Osprey	0.1	0.3	0.16	0.15	0.01			
<i>Larus delawarensis</i>	Ring-billed Gull	1.13	0.13	0.5	0.37	1.76	1.92	3.54	4.24
<b>Other Birds</b>									
<i>Corvus brachyrhynchos</i>	American Crow			0.01					
<i>Riparia riparia</i>	Bank Swallow			0.19	0.26		0.02		
<i>Quiscalus major</i>	Boat-tailed Grackle	1.03	0.2	1.7	0.51	0.4	0.32	0.58	0.46
<i>Quiscalus quiscula</i>	Common Grackle					0.03			
<i>Sturnus vulgaris</i>	European Starling			0.3	0.14				
<i>Quiscalus</i> spp.	Grackle spp.	0.13			0.02				
<i>Passer domesticus</i>	House Sparrow			0.05					
<i>Zenaida macroura</i>	Mourning Dove			0.06	0.01				
<i>Columba livia</i>	Pigeon	0.57		0.53	0.3	1.02	0.6	0.96	0.52

Table 3-13. Seasonal mean abundance (birds/500 meters) of all bird, shorebird and waterbird groups counted on the impact and reference beaches in Dare County, NC.

Species	Metric	Spring 04		Summer 04		Fall 04		Winter 05	
		Impact	Ref.	Impact	Ref.	Impact	Ref.	Impact	Ref.
Total	Abundance	27.83	25.40	12.71	15.98	19.27	15.20	8.04	8.26
	Richness	14.67	11.00	9.60	9.90	9.80	9.10	6.40	5.80
	Diversity	3.07	2.61	2.28	2.24	2.55	2.52	1.93	1.80
Shorebird	Abundance	6.77	9.37	1.28	3.09	2.75	3.17		0.06
	Richness	5.33	4.67	1.00	2.00	2.00	2.30		0.20
	Diversity	1.91	1.95	0.33	0.56	0.61	0.77		
Waterbird	Abundance	19.33	15.83	8.59	11.65	15.07	11.09	6.50	7.22
	Richness	7.00	5.33	5.40	5.50	6.00	5.40	4.40	4.40
	Diversity	2.10	1.49	1.50	1.48	1.90	1.83	1.33	1.35

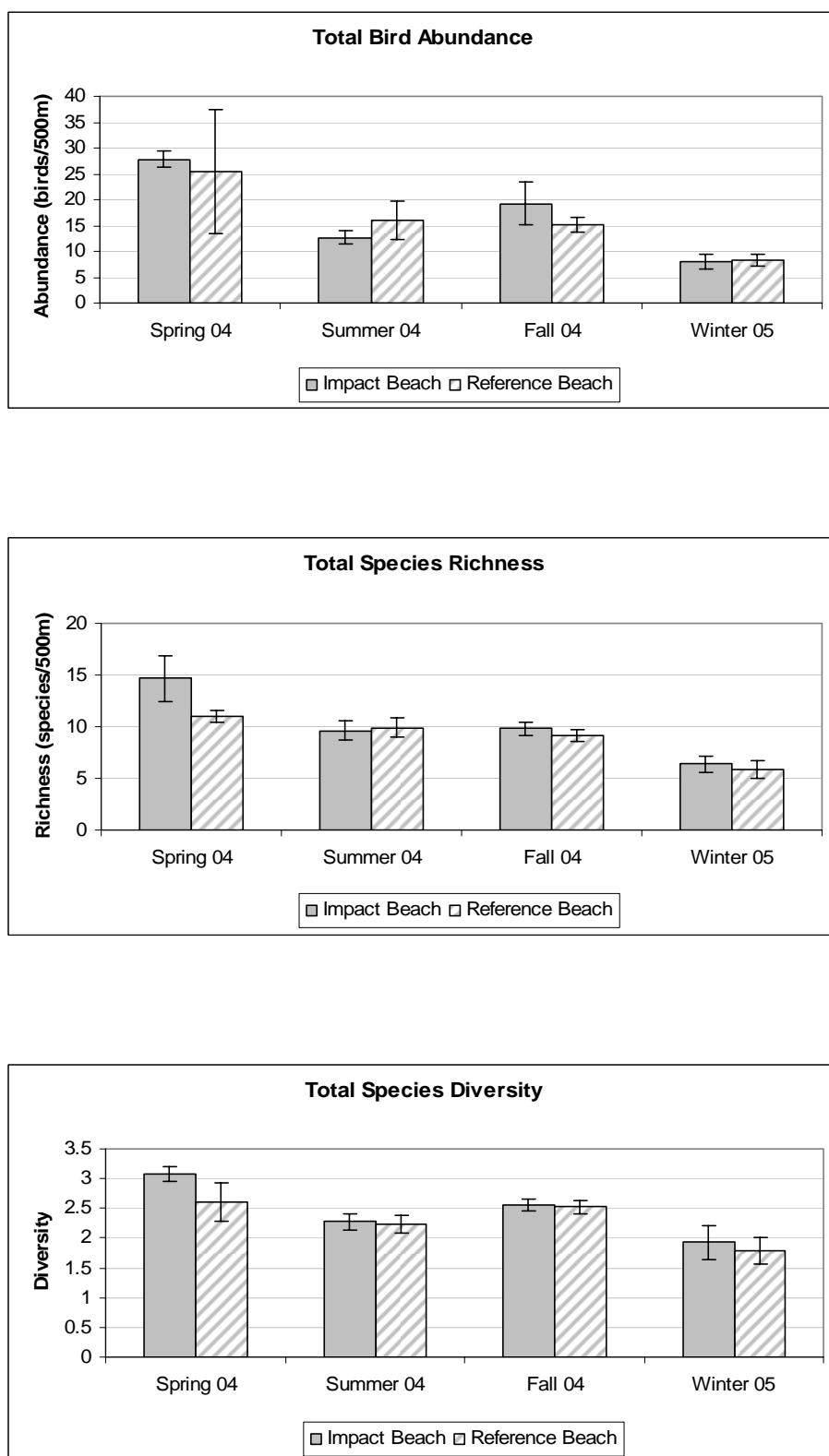


Figure 3-22. Seasonal mean total bird abundance, number of species, and species diversity occurring on the impact and reference beaches in Dare County, NC.

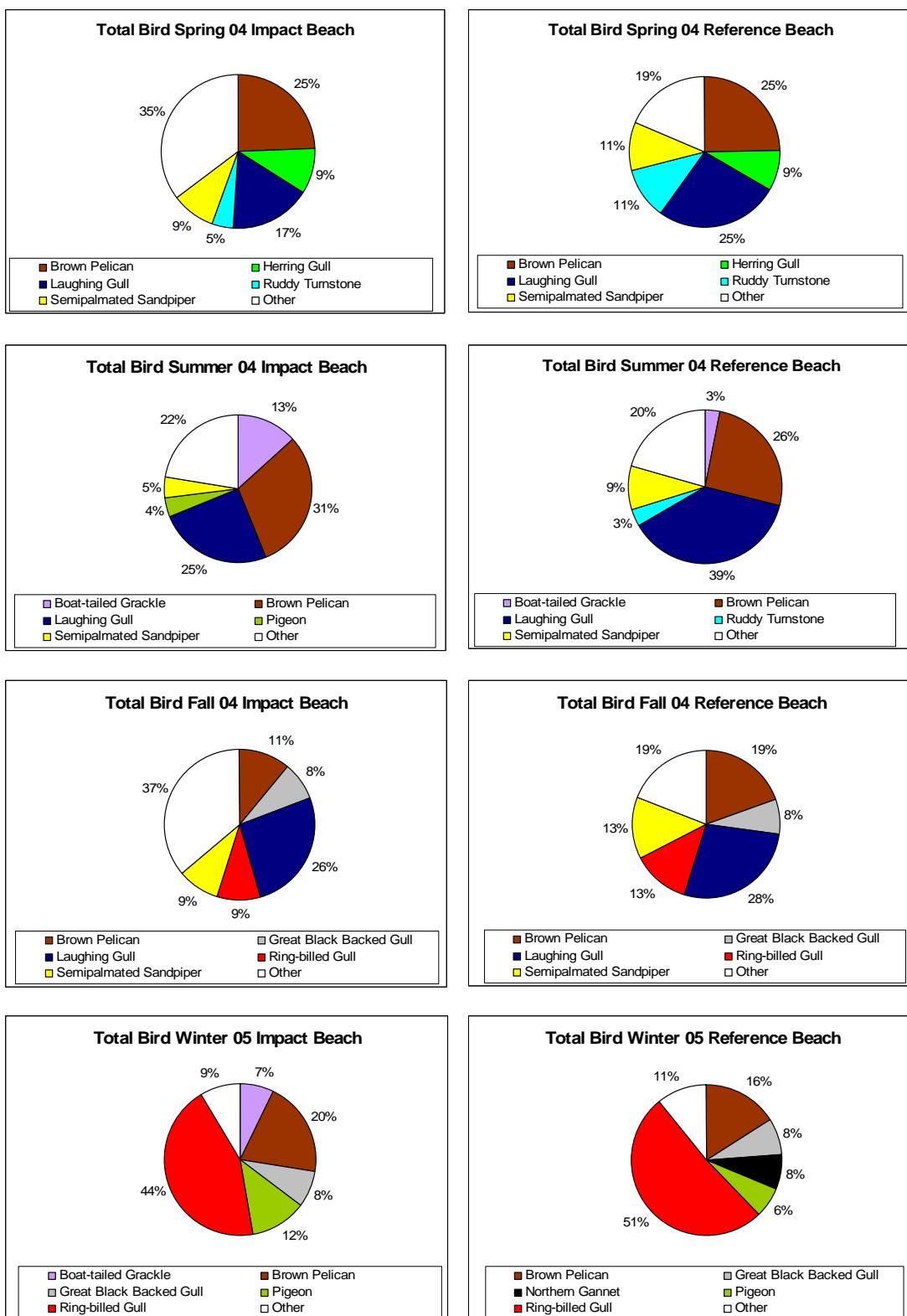


Figure 3-23. Seasonal total species composition occurring on the impact and reference beaches in Dare County, NC.

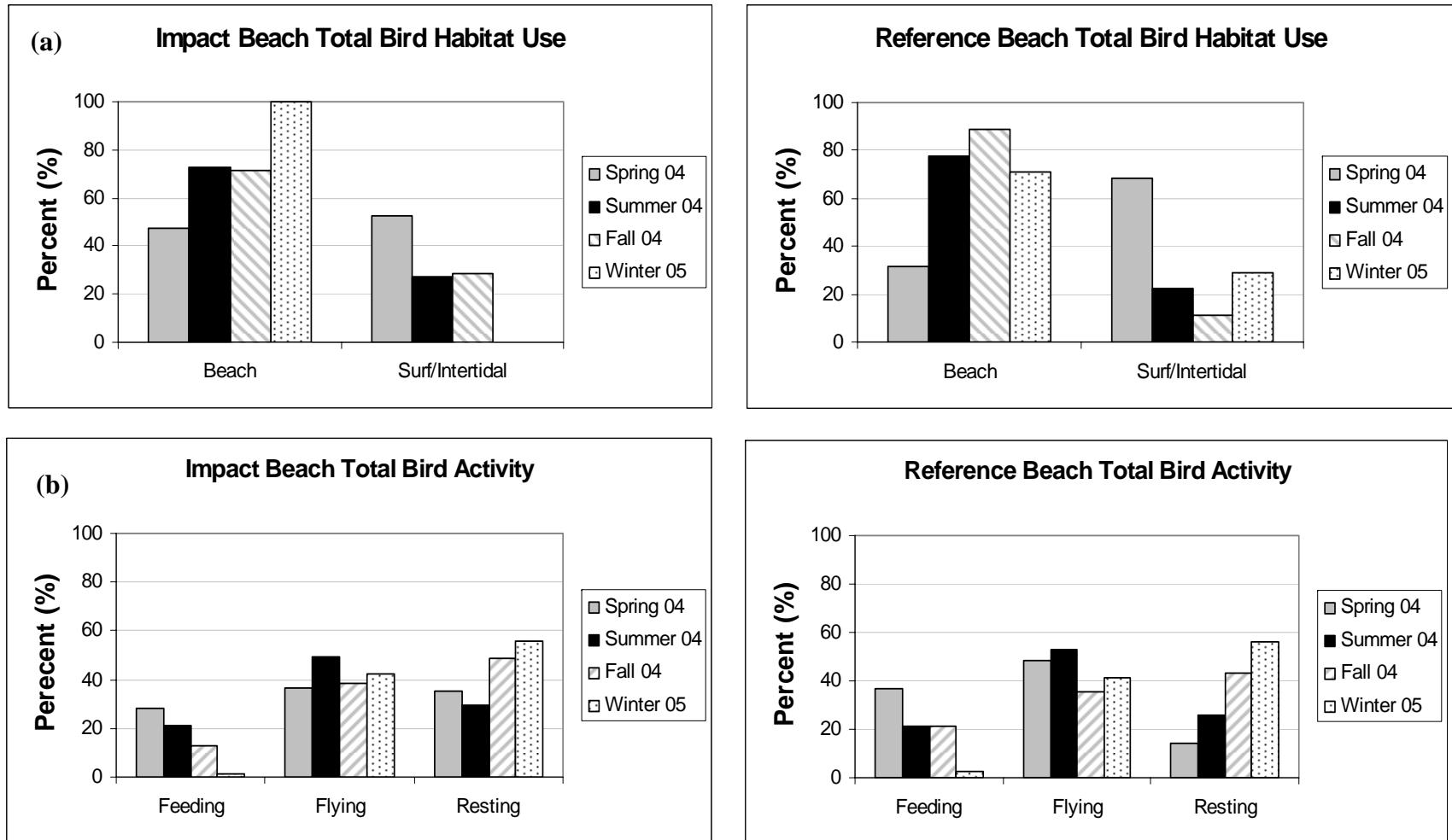


Figure 3-24. Seasonal habitat use by all birds counted on the impact and reference beaches in Dare County, NC (a). Seasonal activity of all birds counted on the impact and reference beaches in Dare County, NC (b).

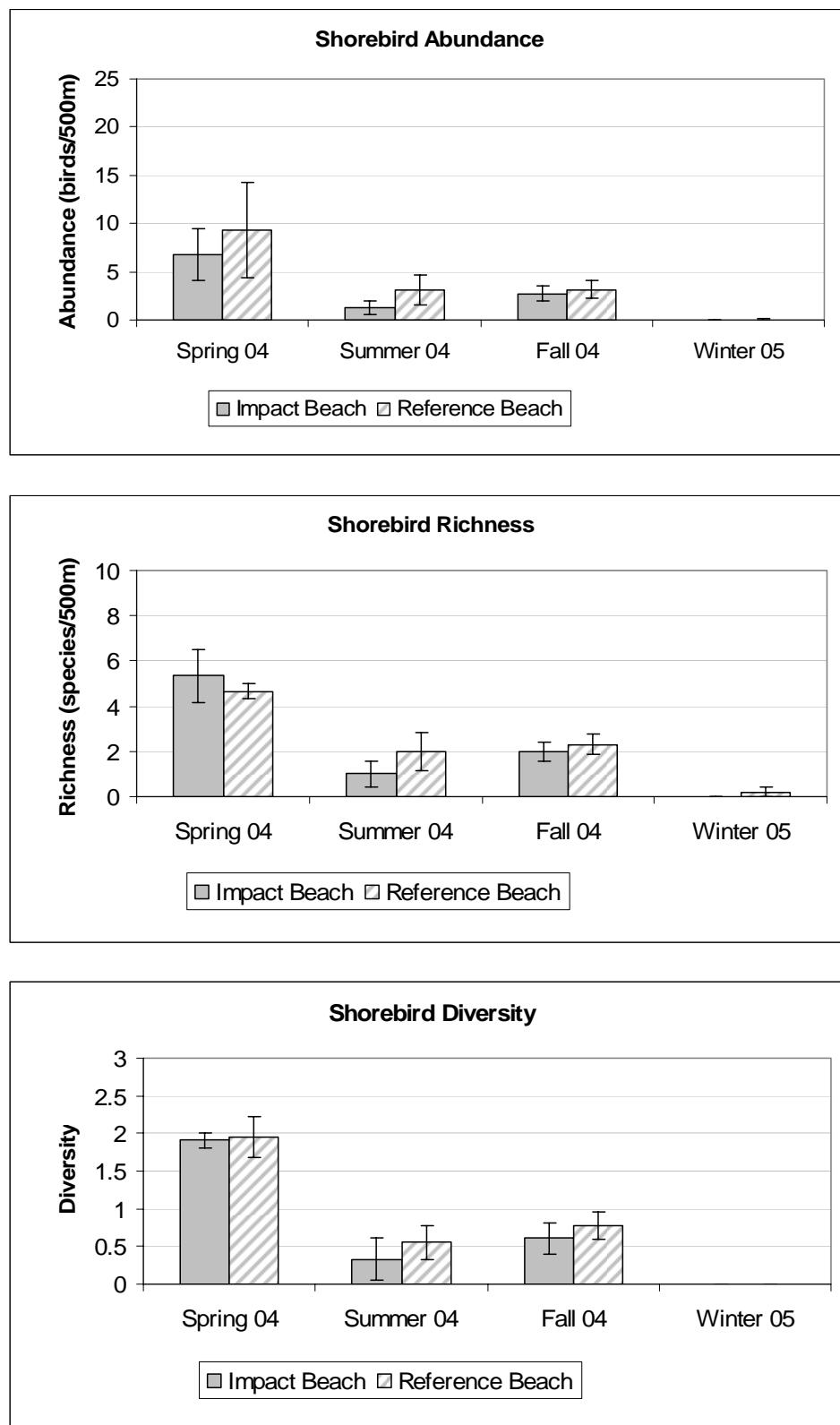


Figure 3-25. Seasonal mean shorebird abundance, number of species, and species diversity occurring on the impact and reference beaches in Dare County, NC.

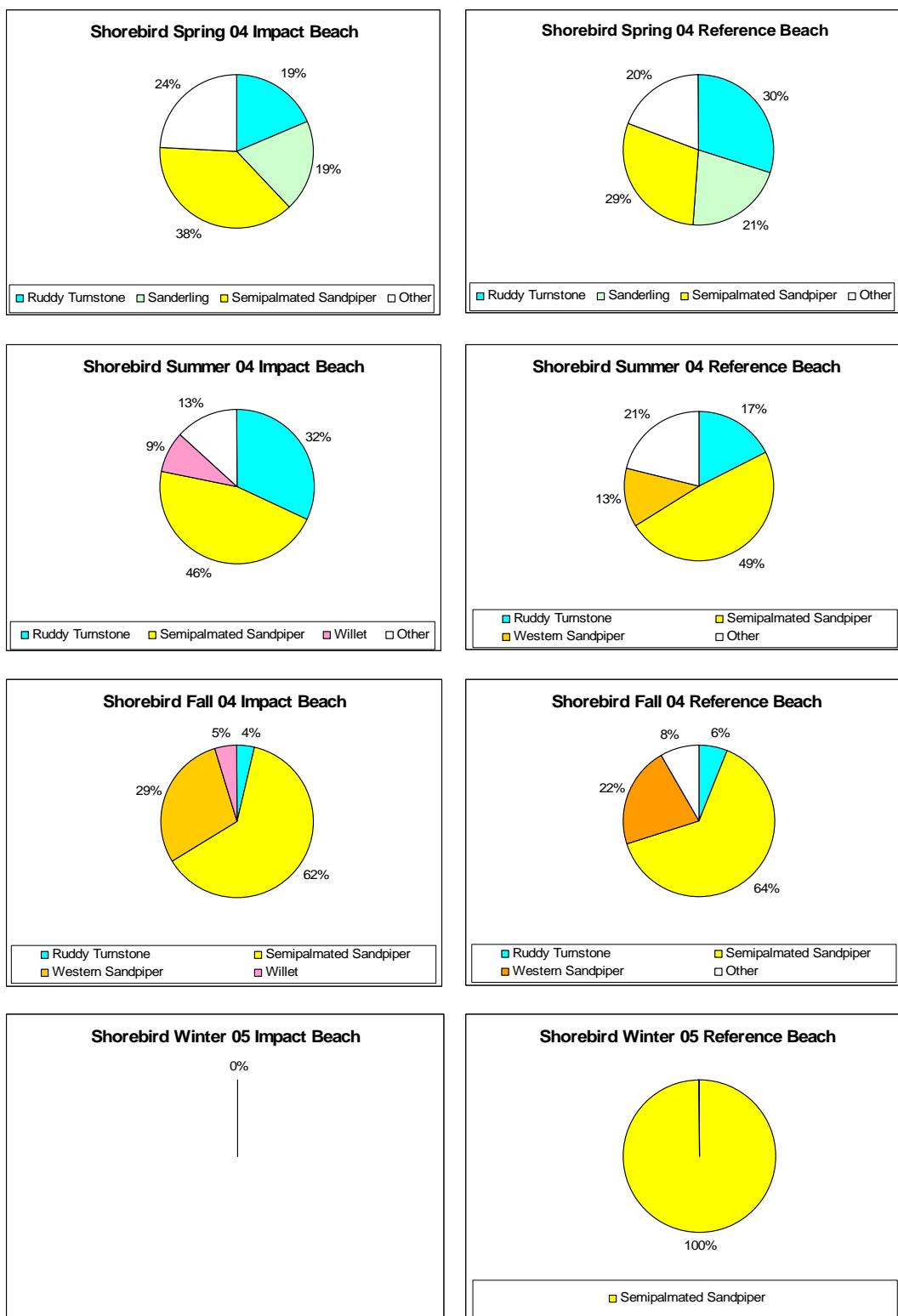


Figure 3-26. Seasonal shorebird species composition occurring on the impact and reference beaches in Dare County, NC.

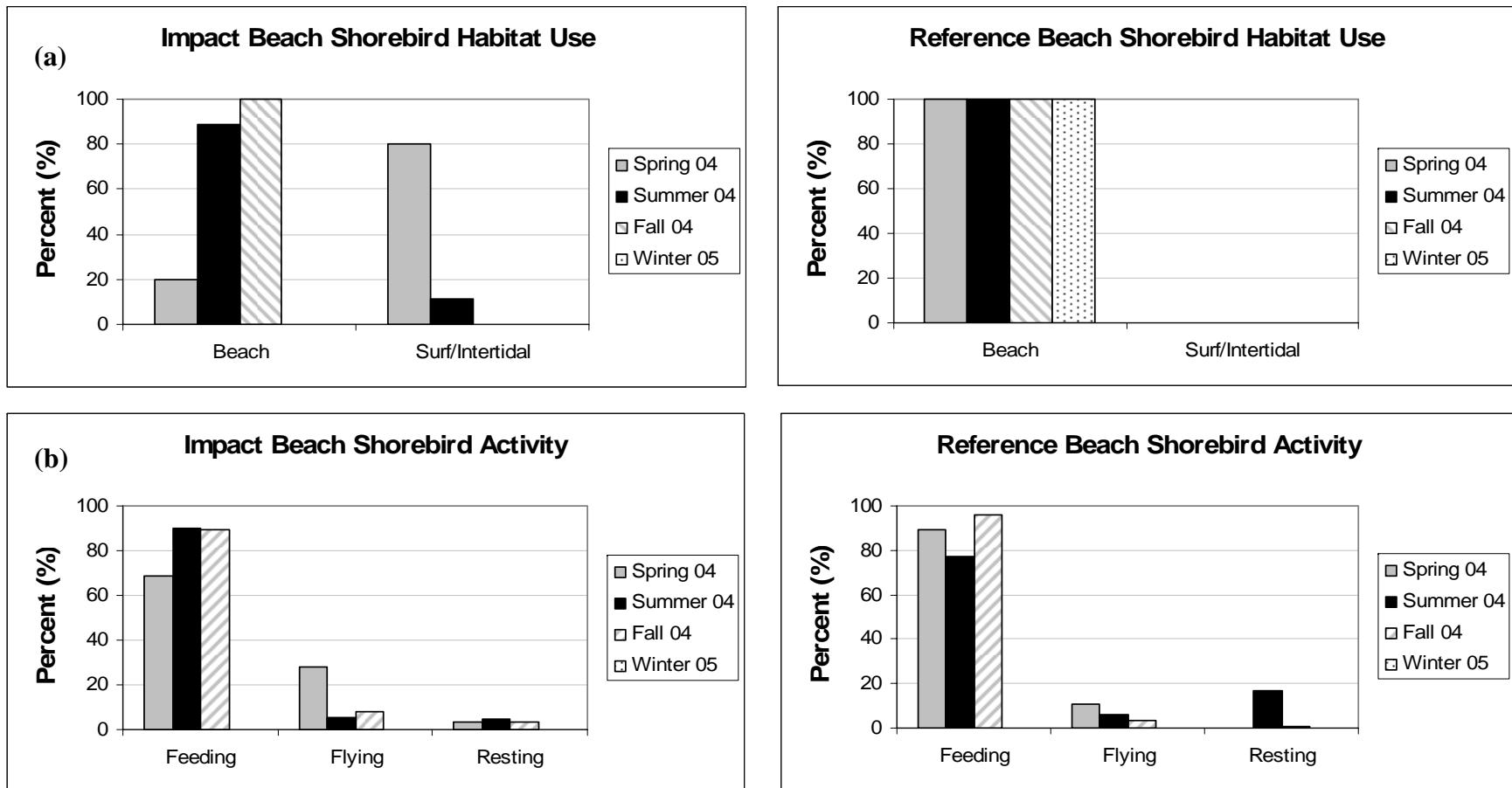


Figure 3-27. Seasonal habitat use by shorebirds on the impact and reference beaches in Dare County, NC (a). Seasonal activity of shorebirds on the impact and reference beaches in Dare County, NC (b).

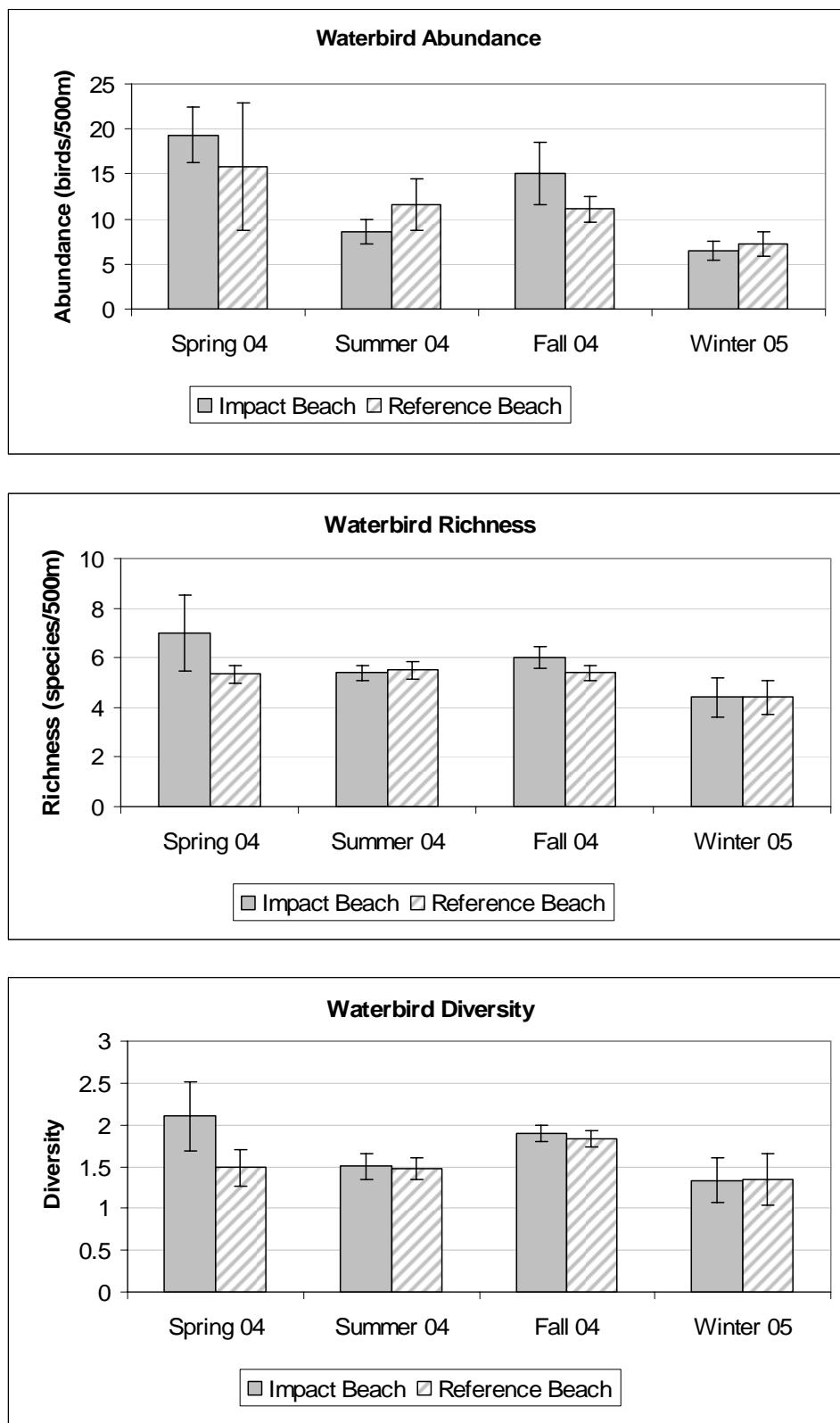


Figure 3-28. Seasonal mean waterbird abundance, number of species, and species diversity occurring on the impact and reference beaches in Dare County, NC.

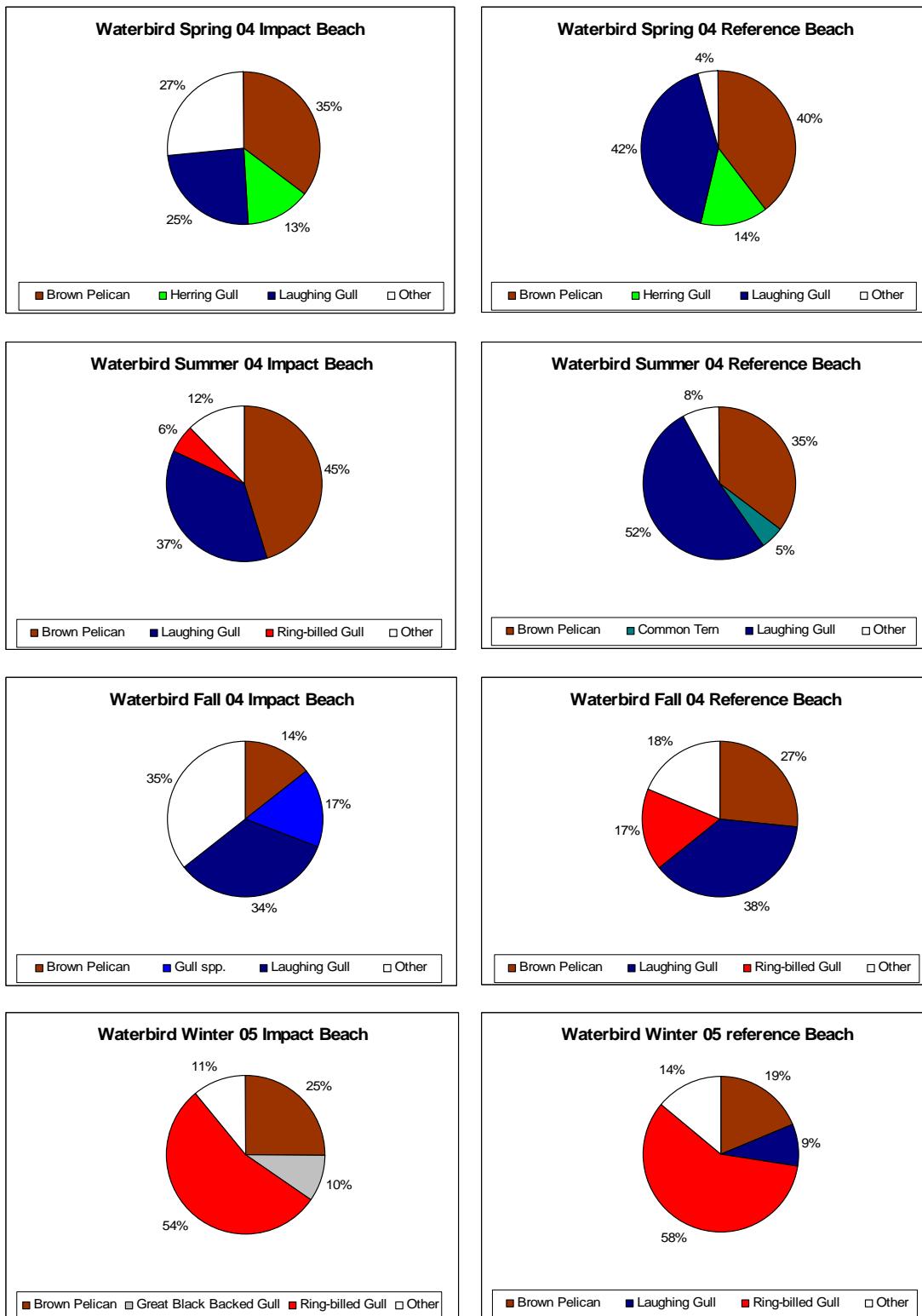


Figure 3-29. Seasonal waterbird composition occurring on the impact and reference beaches in Dare County, NC.

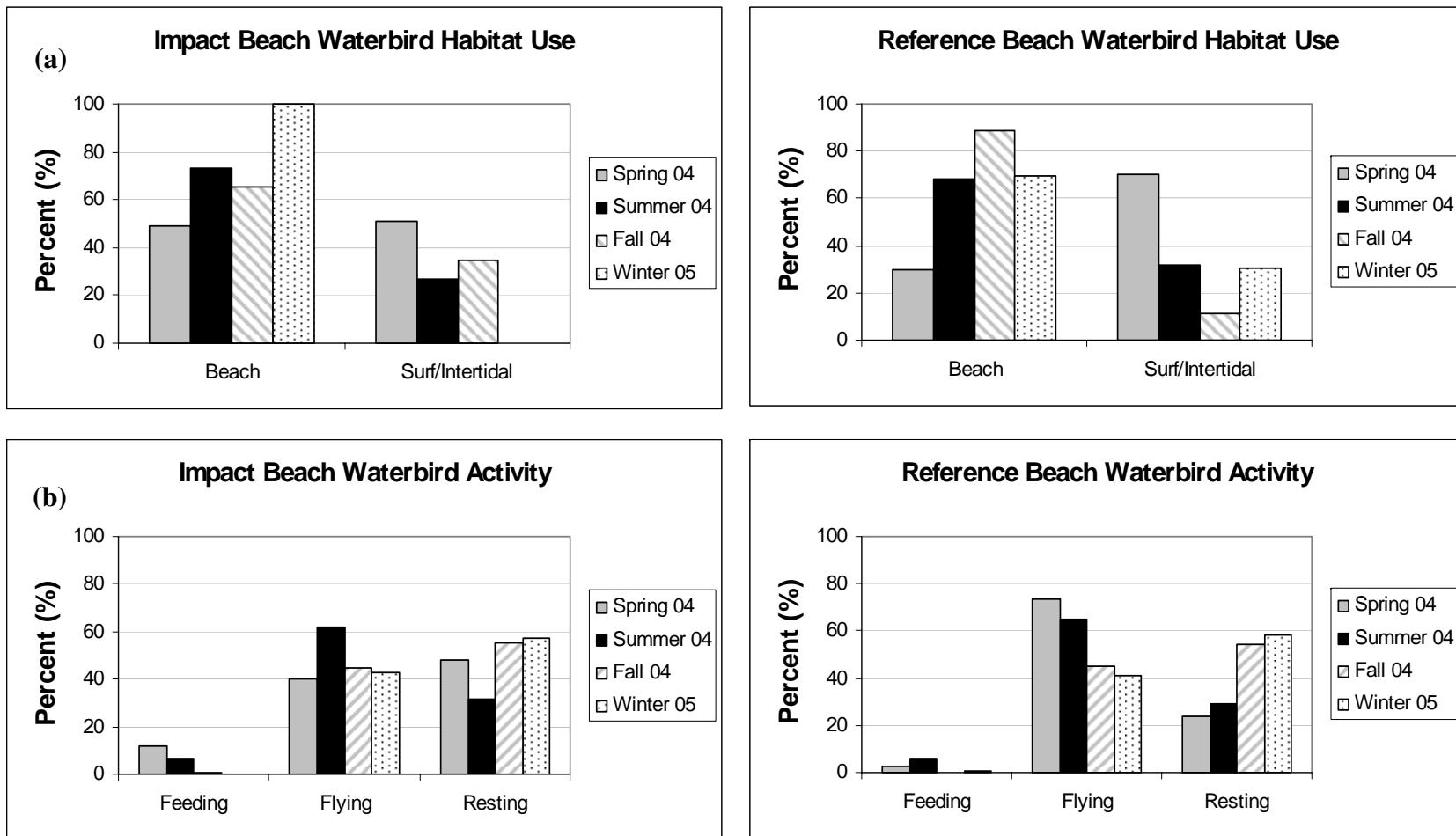


Figure 3-30. Seasonal habitat use by waterbirds on the impact and reference beaches in Dare County, NC (a). Seasonal activity of waterbirds on the impact and reference beaches in Dare County, NC (b).

### **3.7 CREEL SURVEY**

A total of 696 anglers were approached for interviews during 72 survey days from spring 2004 to winter 2005. Among them, 555 anglers were successfully interviewed and 141 declined to be interviewed. Fishing effort was generally greatest in the summer and fall with the majority of angler interviews occurring in those two seasons (Figure 3-31). Catch and total fishing effort were much greater on the piers than on the beaches with over 75% (n=425) of all interviews conducted at the piers (Figure 3-32 and 3-33). The impact beach supported greater fishing effort and catch rates than the reference beach. However, the differences were not statistically significant. The impact beach pier likewise supported greater total catch and fishing effort during summer and fall, but not significantly so (Figure 3-33).

Over 85% of all anglers interviewed at the beaches and piers were males (Figure 3-34). Slightly more female anglers were documented on the piers than at the beaches and no female anglers were interviewed in the spring season on the beaches. The majority of the anglers interviewed at both the beaches and piers were adults between 18 and 50 years old (Figure 3-35). Thirty-seven percent of the anglers interviewed were over 50 (seniors) and only 3 youths younger than 18 years old were interviewed during the creel survey.

Interviewed anglers were from twenty-four states with the majority residing from North Carolina (37%), Virginia (29%), and Pennsylvania (14%) (Figure 3-36). In general, there were higher numbers of out of state anglers interviewed at the piers, but overall, most of the anglers interviewed from season to season resided from North Carolina. Anglers who were from North Carolina resided in 24 different counties, some as far away as Graham (4%), but the majority of anglers were from Dare (50%), Pasquotank (9%), and Wake (4%) counties (Figure 3-37). Virginia anglers resided from 49 counties with the majority from Richmond (27%), Chesapeake (7%) and Chesterfield (7%) counties (Figure 3-38).

Anglers caught nearly 3,000 individual fish, skates and rays from 16 families during the first year of the survey (Table 3-14). Over half of the catch (58%) was released because of size, undesirable species or for conservation. The most commonly captured species were spot, bluefish, spotted seatrout, kingfish spp., and flounder spp. (Figure 3-33). Along with angler effort, angler catches were generally greatest in the summer and fall and most of the catch consisting of spot, bluefish, and spotted seatrout. Kingfish differed from this pattern and were captured in the greatest numbers on the piers and beaches during the spring. Flounder spp. were caught mostly in the summer. Compared to all fish species caught by anglers, spot were the most frequently documented and the highest numbers of spot were recorded on the piers (Figure 3-33).

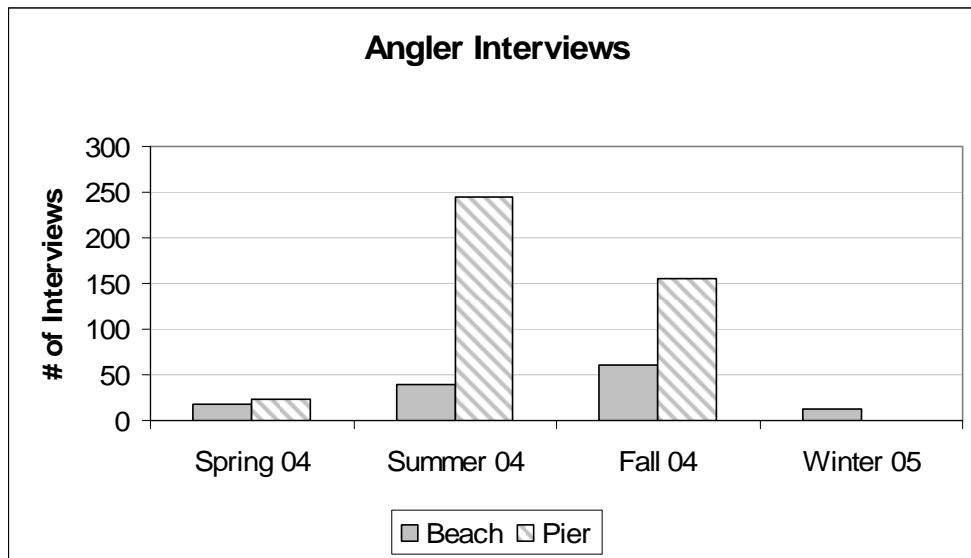


Figure 3-31. Seasonal number of angler interviews conducted on the beaches and piers at the impact and reference creel beaches in Dare County, NC.

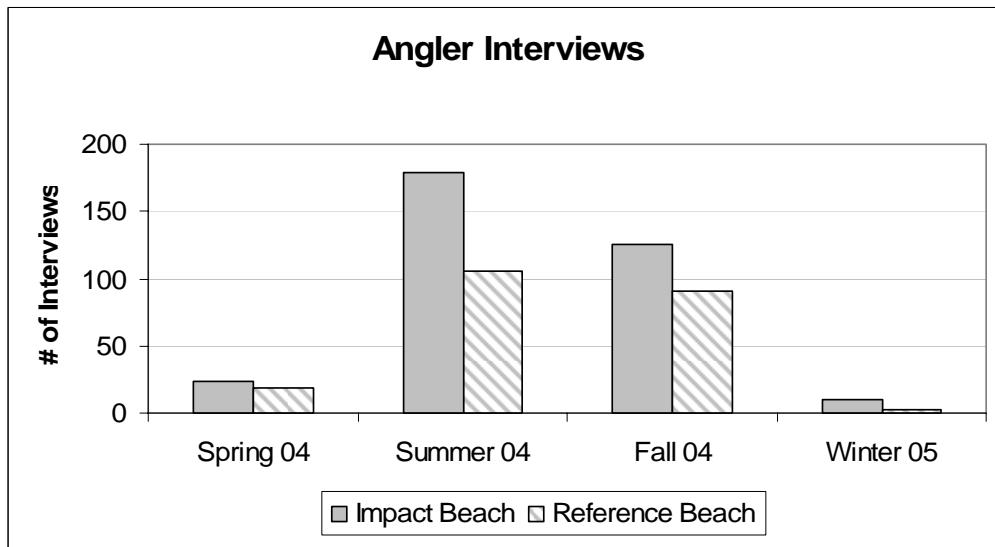


Figure 3-32. Seasonal number of angler interviews conducted at the at impact and reference creel beaches in Dare County, NC.

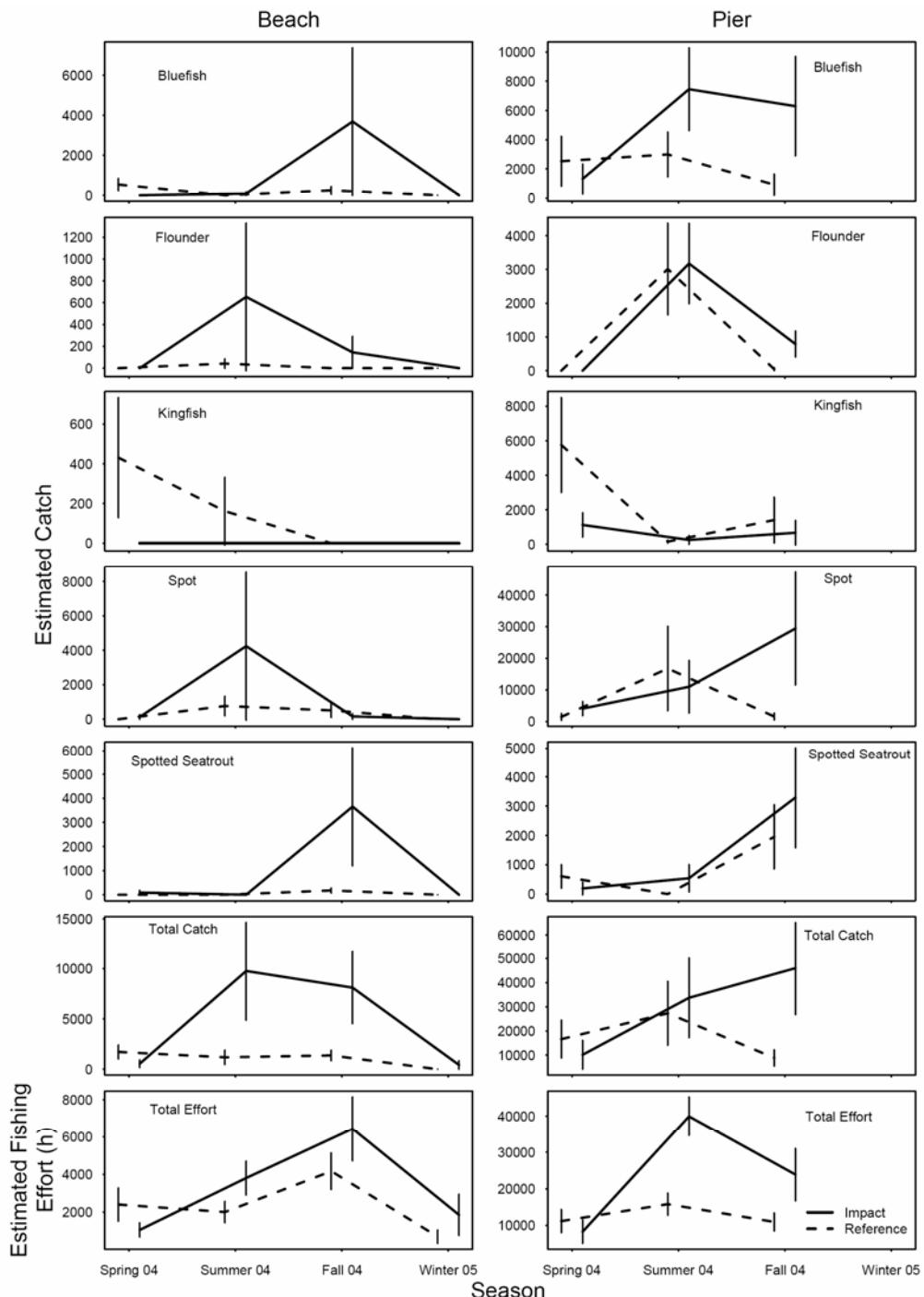


Figure 3-33. Catch of bluefish, flounder, kingfish, spot, and spotted seatrout, total catch, and total fishing effort at the impact and reference beaches and piers during the first complete year of angler interviews in Dare County, NC. Vertical bars indicate 1 SE. Piers were closed during winter. Note that y-axis scales differ among graphs.

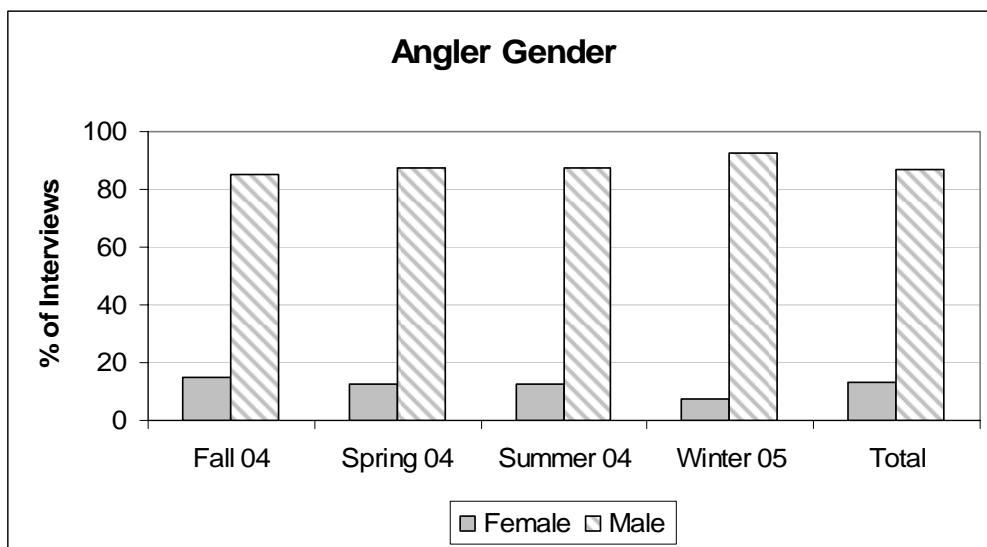


Figure 3-34 Percent of male and female anglers interviewed during the first year of angler interviews at the impact and reference beaches and piers in Dare County, NC.

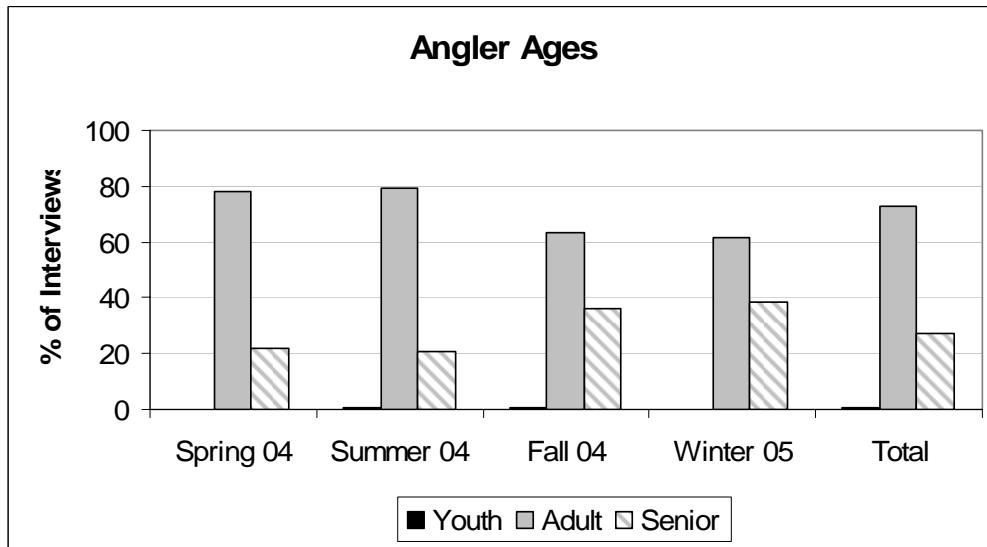


Figure 3-35. Ages of anglers interviewed during the first year of angler interviews at the impact and reference beaches and piers in Dare County, NC.

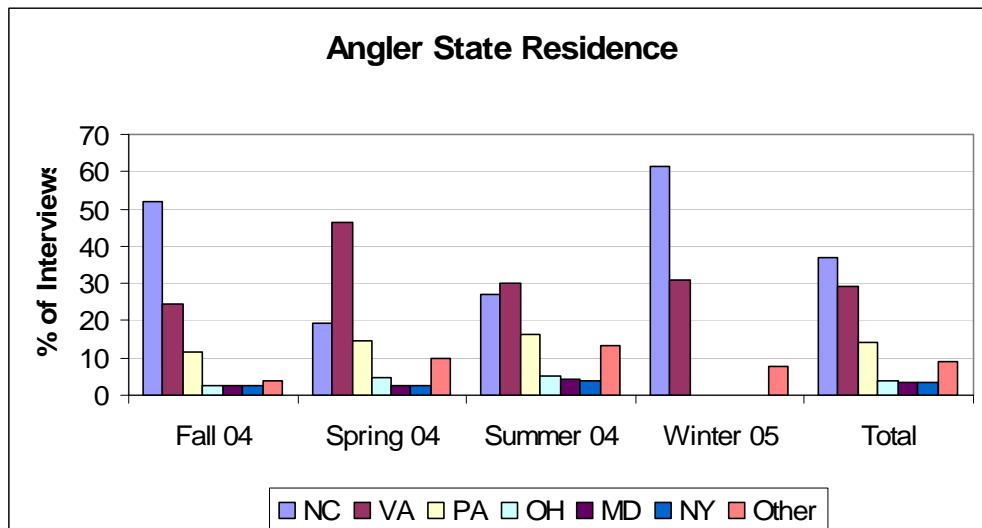


Figure 3-36. State residence of anglers interviewed during the first year of angler interviews at the impact and reference beaches and piers in Dare County, NC.

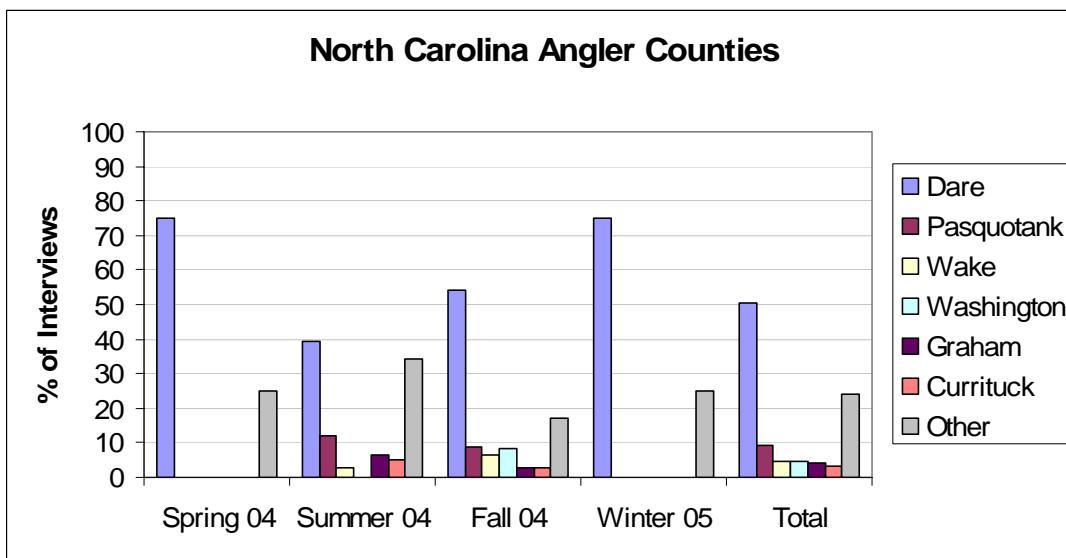


Figure 3-37. County of residence of North Carolina anglers interviewed during the first year of angler interviews at the impact and reference beaches and piers in Dare County, NC.

Table 3-14. Summary of fish species and family groups documented in the angler catches at the impact and reference beaches and piers in Dare County, NC.

Family	Taxonomic Name	Common Name
Sciaenidae	<i>Micropogonias undulatus</i>	Atlantic Croaker
Clupeidae	<i>Brevoortia tyrannus</i>	Atlantic Menhaden
Sciaenidae	<i>Pogonias cromis</i>	Black drum
Pomatomidae	<i>Pomatomus saltatrix</i>	Bluefish
Rachycentridae	<i>Rachycentron canadum</i>	Cobia
Squalidae		Dogfish Spp.
Sciaenidae		Drum Spp.
Pleuronectidae		Flounder Spp.
Serranidae		Grouper Spp.
Scombridae	<i>Scomberomorus cavalla</i>	King Mackerel
Sciaenidae	<i>Menticirrhus</i>	Kingfish Spp.
Tetraodontidae	<i>Sphoeroides maculatus</i>	Northern Puffer
Haemulidae	<i>Orthopristis chrysoptera</i>	Pigfish
Sparidae	<i>Lagodon rhomboides</i>	Pinfish
Sciaenidae	<i>Sciaenops</i>	Pompano Spp.
Tetraodontidae	<i>Tetraodon</i>	Pufferfish Spp.
Rajidae		Rajidae Spp.
Sciaenidae	<i>Sciaenops ocellatus</i>	Red Drum
Sciaenidae	<i>Cynoscion</i>	Sea Trout Spp.
Triglidae	<i>Prionotus</i>	Searobin Spp.
Clupeidae	<i>Alosa</i>	Shad Spp.
Sparidae	<i>Archosargus probatocephalus</i>	Sheepshead
Lutjanidae		Snapper Spp.
Scombridae	<i>Scomberomorus maculatus</i>	Spanish Mackerel
Squalidae	<i>Squalus acanthias</i>	Spiny Dogfish
Sciaenidae	<i>Leiostomus xanthurus</i>	Spot
Sciaenidae	<i>Cynoscion nebulosus</i>	Spotted Seatrout
Moronidae	<i>Morone saxatilis</i>	Striped Bass
Balistidae		Triggerfish Spp.
Sciaenidae	<i>Cynoscion regalis</i>	Weakfish

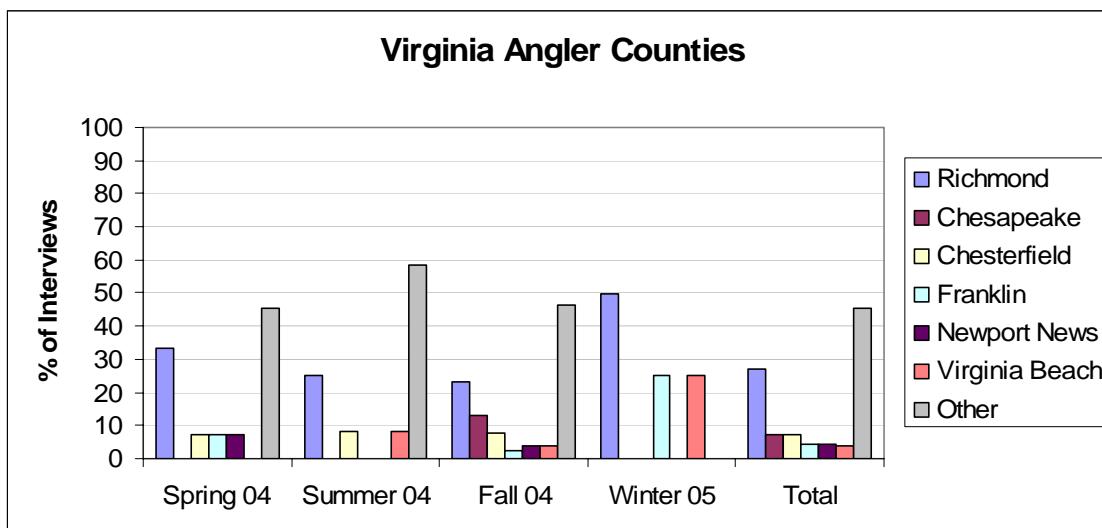


Figure 3-38. County of residence of Virginia anglers interviewed during the first year of angler interviews at the impact and reference beaches and piers in Dare County, NC.

### 3.8 UNDERWATER VIDEO SURVEY

Features documented in the video footage show differences in the physical habitat and only slight differences in the biological counts between the borrow sites and the reference borrow site. The substrate at both sites consisted of fine-medium sand with significant patches of shell in the substrate of the borrow sites and very little shell at the reference site (Figure 3-39 and 3-40). Bottom shape at the reference site was small-asymmetrical bedforms and the borrow site was more heterogeneous with portions of large and small-asymmetrical bedforms generally corresponding to areas of shell throughout the site (Figure 3-41). Although there were differences between each sites, a summary of all features indicate that the majority of physical features documented at both sites were small-smooth bedforms with fine-medium sand and less than 10% shell cover (Table 3-15).

Average counts of biogenic and biological features recorded on the video images at the borrow site and reference area were very similar suggesting nearly identical biological activity occurs within both areas (Figure 3-42). Biogenic features (burrows, mounds and biological traces) were documented in nearly equal numbers at both sites (Figure 3-42) and were distributed evenly throughout both sites (Figure 3-43). Burrows were the most dominant biogenic feature (Figure 3-42). Worm tubes and hermit crabs were also found in equal numbers at both sites and were the most dominant biological feature documented from video (Figure 3-42 and 3-44). Other biology documented in the video were starfish, squid, sand dollar and sea anemone (Figure 3-42).

Six fish species and one skate were also documented in equal numbers between the sites (Figure 3-45). Fish were rare and patchy throughout both sites (Figure 3-45). Spotted hake, clearnose skate and smallmouth and summer flounder were the most frequently encountered species at both sites, with sea robins and sheepshead occurring in limited numbers.

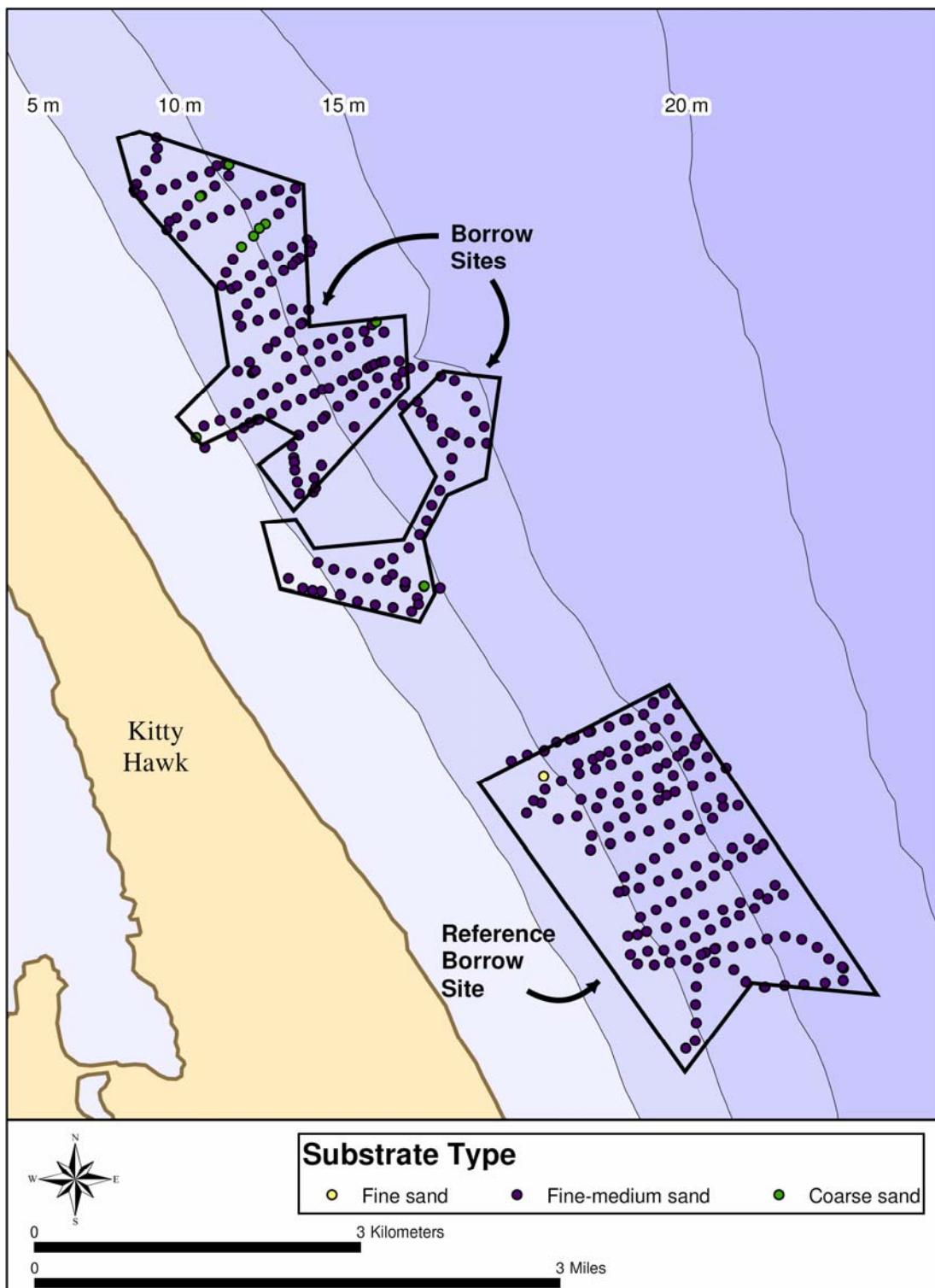


Figure 3-39. Distribution of substrate types observed in video images from an underwater video survey conducted within the borrow site and reference borrow site located offshore of Kitty Hawk in Dare County, NC. Points represent locations of 2-minute video clips analyzed from the video.

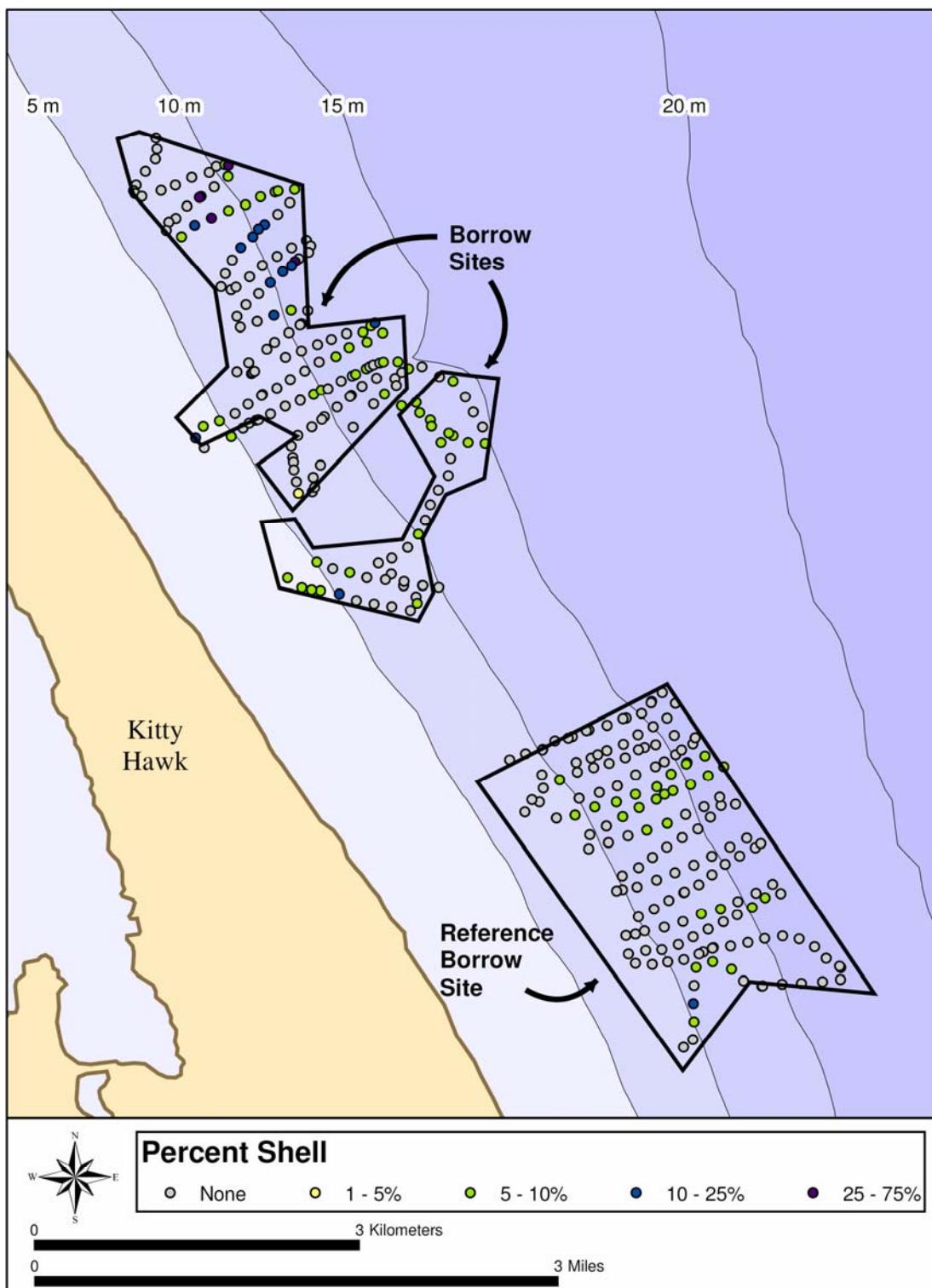


Figure 3-40. Distribution and coverage of shell observed in video images from an underwater video survey conducted within the borrow site and reference borrow site located offshore of Kitty Hawk in Dare County, NC. Points represent locations of 2-minute video clips analyzed from the video.

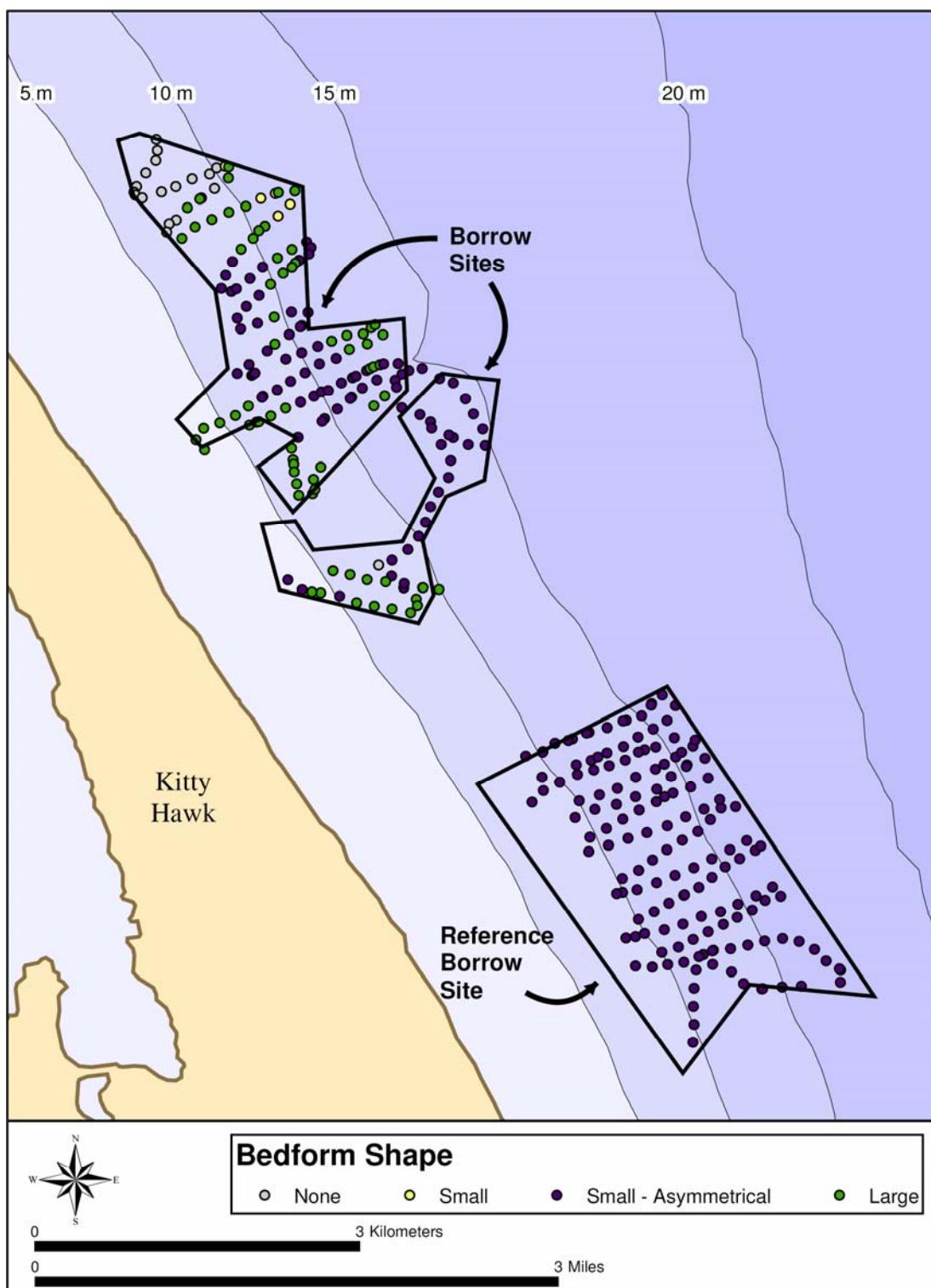


Figure 3-41. Distribution and shape of bedforms observed in video images from an underwater video survey conducted within the borrow site and reference borrow site located offshore of Kitty Hawk in Dare County, NC. Points represent locations of 2-minute video clips analyzed from the video.

Table 3-15. Frequency of final habitat classifications observed between the Dare county borrow areas and the adjacent reference site observed during the December 2004 benthic video sled survey conducted by VIMS.

Bed form Size	Bed form Shape	Grain-size	Shell Cover	Biogenic	Borrow		Reference	
					Total Frequency	%	Total Frequency	%
Large	Smooth	Fine-Medium sand	<10% Shell	Not Biogenic	47	25.54	0	0.00
Large	Smooth	Fine-Medium sand	<10% Shell	Biogenic	6	3.26	0	0.00
Large	Smooth	Fine-Medium sand	>10% Shell	Not Biogenic	9	4.89	0	0.00
Large	Smooth	Fine-Medium sand	>10% Shell	Biogenic	1	0.54	0	0.00
Large	Smooth	Coarse sand-Granules	<10% Shell	Not Biogenic	1	0.54	0	0.00
Large	Smooth	Coarse sand-Granules	>10% Shell	Not Biogenic	8	4.35	0	0.00
Large	Smooth	Coarse sand-Granules	>10% Shell	Biogenic	1	0.54	0	0.00
Small	Smooth	Fine-Medium sand	<10% Shell	Not Biogenic	88	47.83	143	95.33
Small	Smooth	Fine-Medium sand	<10% Shell	Biogenic	4	2.17	6	4.00
Small	Smooth	Fine-Medium sand	>10% Shell	Not Biogenic	1	0.54	1	0.67
None	None	Fine-Medium sand	<10% Shell	Not Biogenic	18	9.78	0	0.00
<b>Totals</b>					<b>184</b>	<b>100</b>	<b>150</b>	<b>100</b>

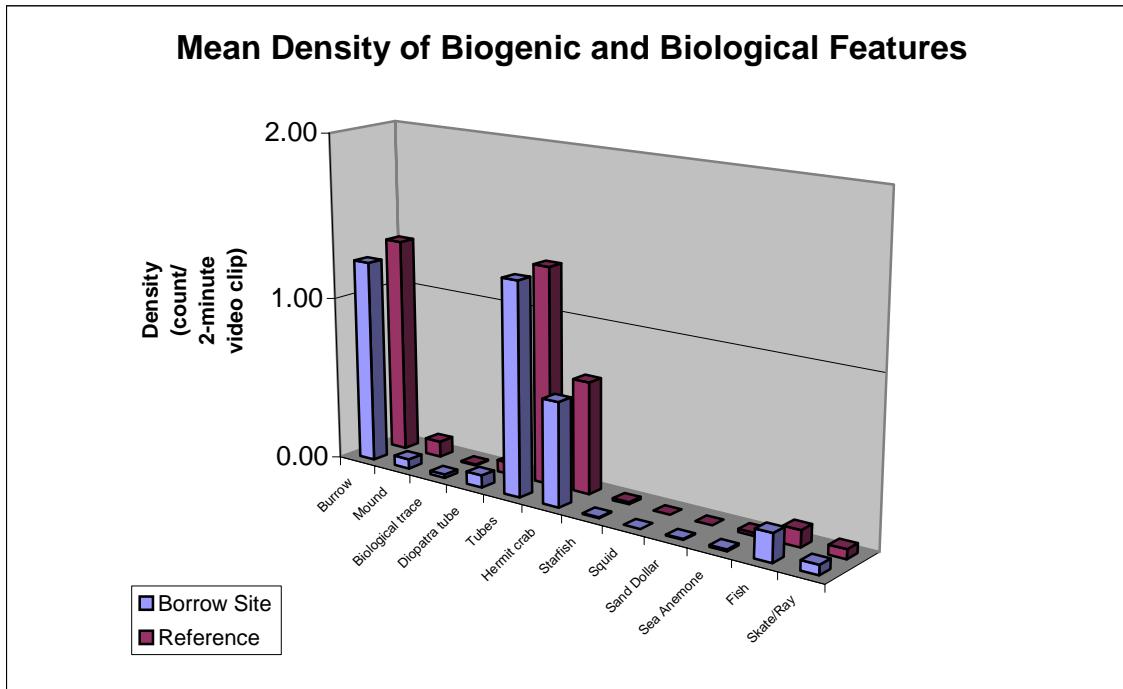


Figure 3-42. Mean count of biological features observed in video sled images taken within the Dare County borrow site and a nearby reference site in December 2004.

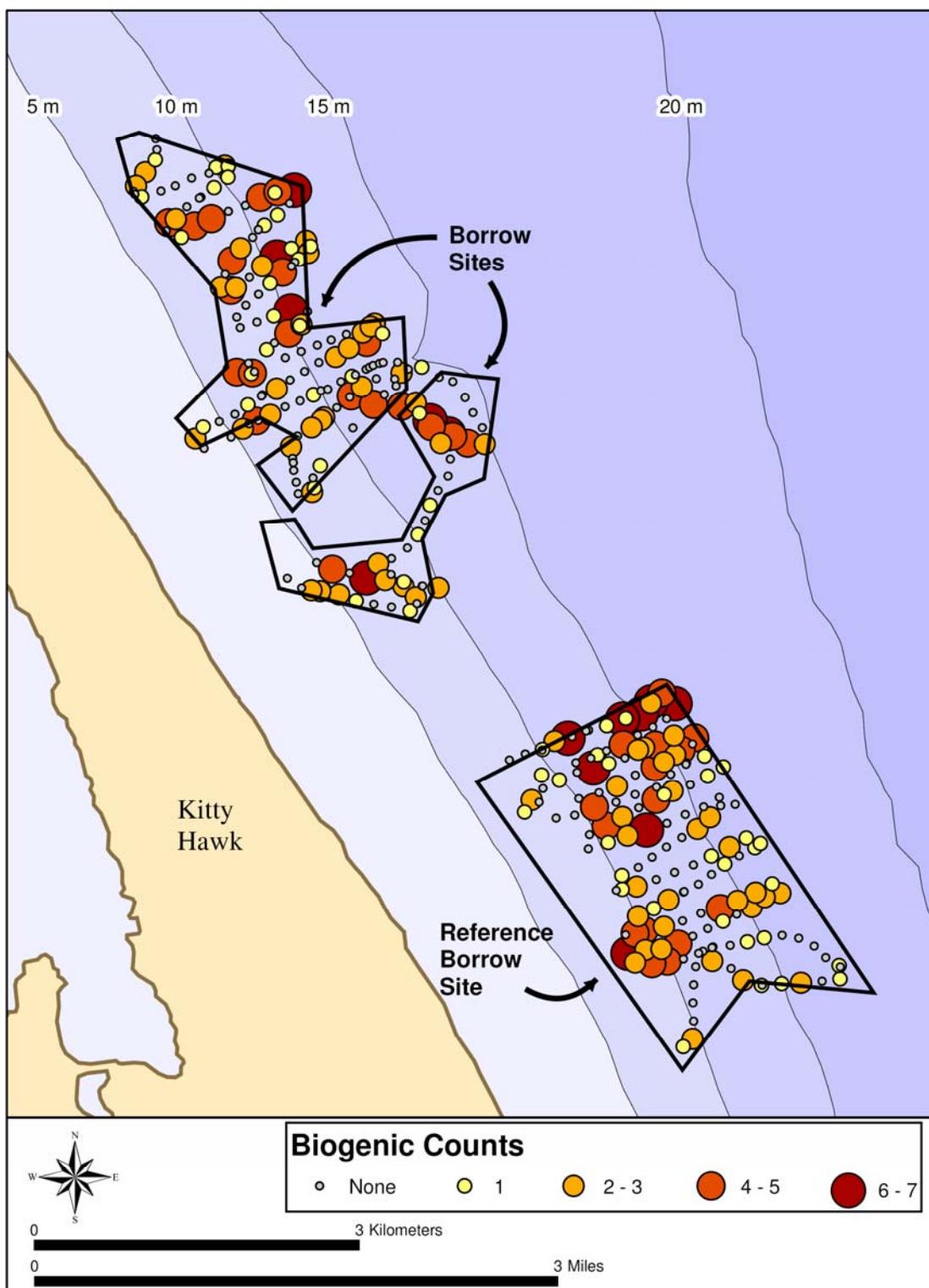


Figure 3-43. Distribution and quantity of all biogenic structure observed in video images from an underwater video survey conducted within the borrow site and reference borrow site located offshore of Kitty Hawk in Dare County, NC. Points represent locations of 2-minute video clips analyzed from the video.

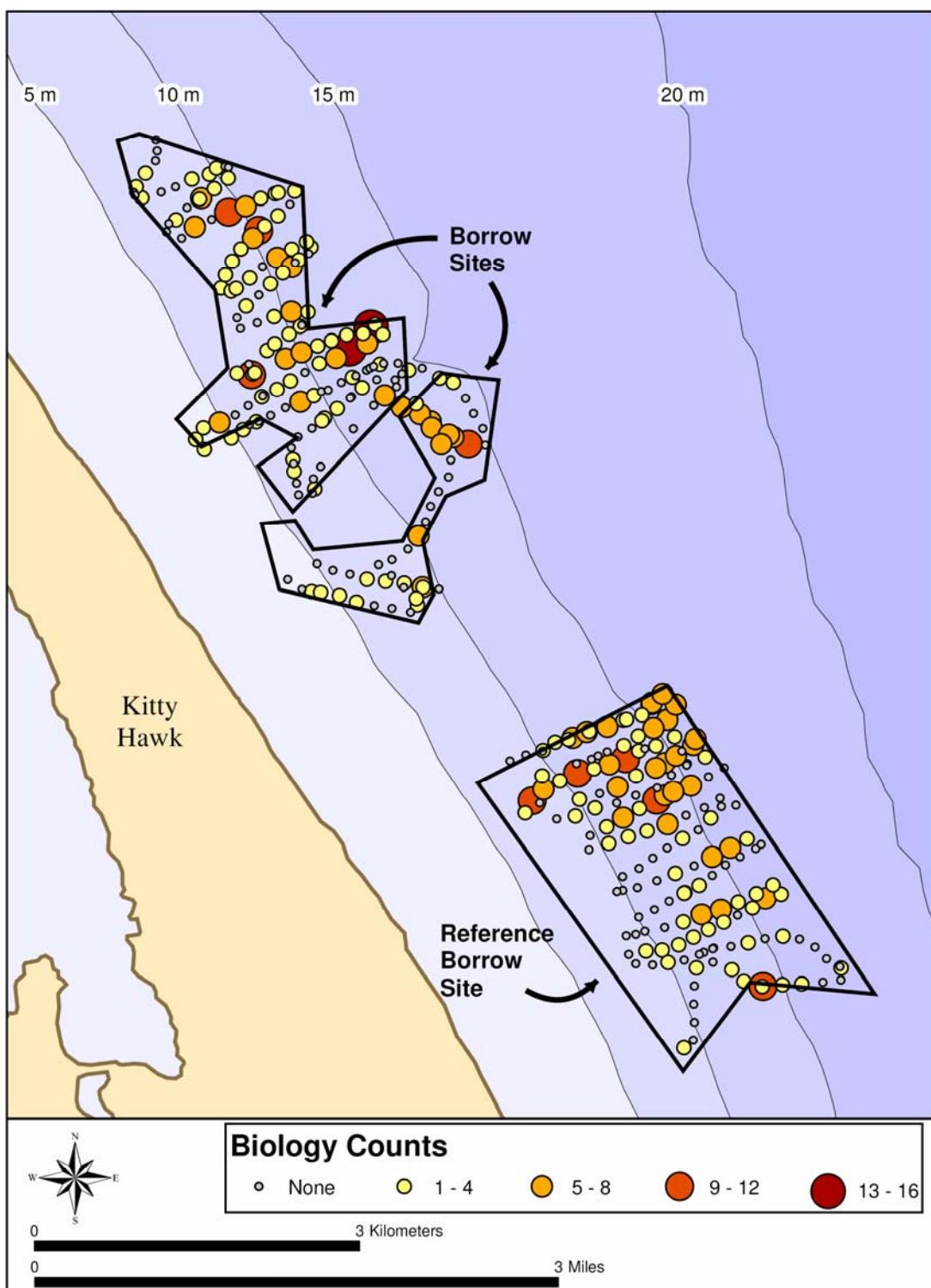


Figure 3-44. Distribution and quantity of surface biology observed in video images from an underwater video survey conducted within the borrow site and reference borrow site located offshore of Kitty Hawk in Dare County, NC. Points represent locations of 2-minute video clips analyzed from the video.

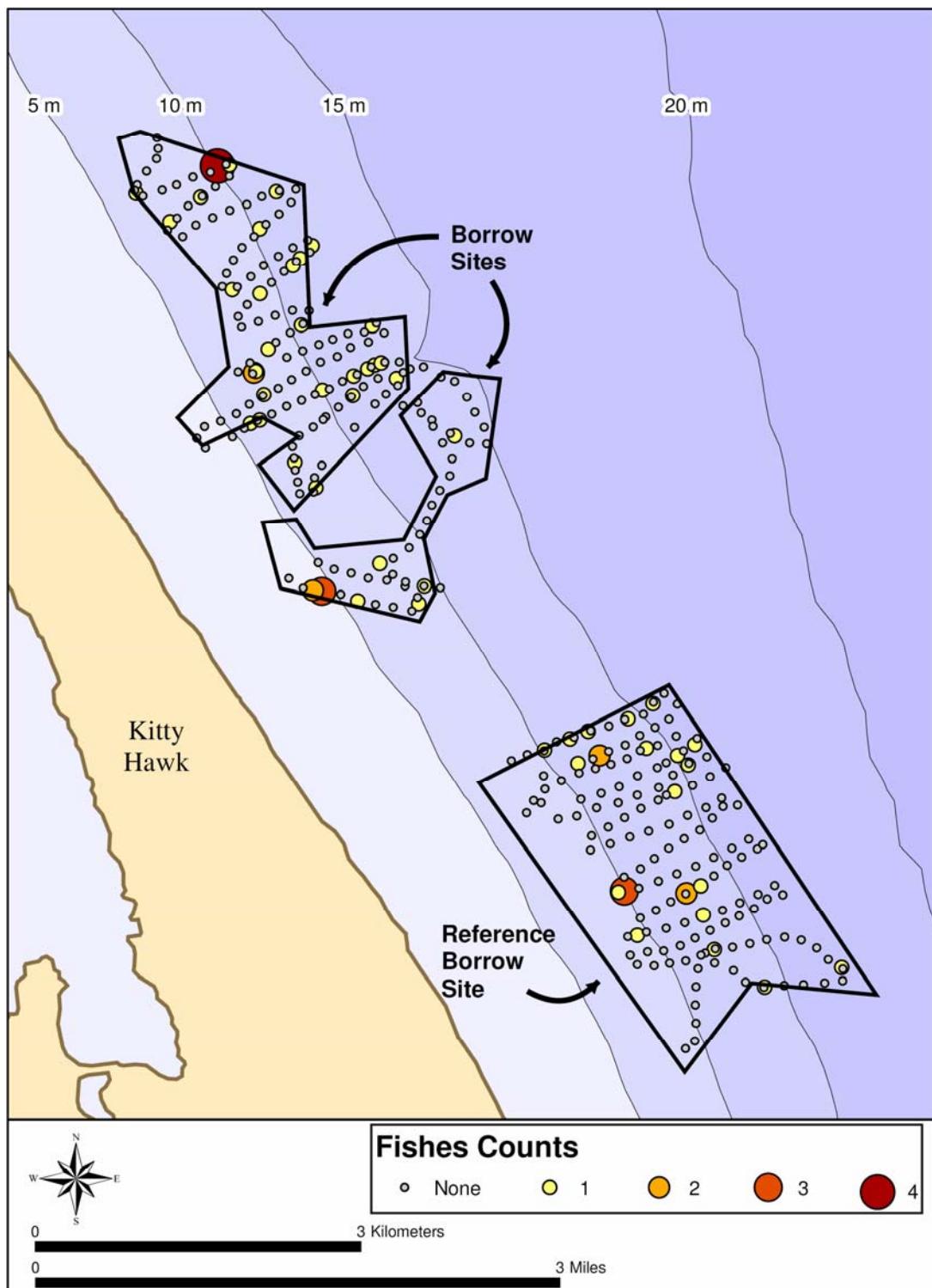


Figure 3-45. Distribution and quantity of fishes observed in video images from an underwater video survey conducted within the borrow site and reference borrow site located offshore of Kitty Hawk in Dare County, NC. Points represent locations of 2-minute video clips analyzed from the video.

## **4.0 DISCUSSION**

The first year of pre-construction monitoring indicates significant temporal and spatial scale fluctuations in many of the biological resources monitored. In some seasonal collections major differences in species abundances were documented between the reference and study sites. This was most apparent in the borrow site benthic data (Figure 3-12), fish data (Figure 3-16 and 3-18), and ghost crab data (Figure 3-21). There were also differences in creel survey data between the beaches (Figure 3-33). Although the differences between the sites were sometimes major, no obvious trends could be found and those differences are most likely attributed to small-scale seasonal variations rather than inherent site-specific variation.

Benthic communities at the beach sites were typical of those found at beaches along the Middle and Southern Atlantic Bight regions (Hackney et al. 1996, USACE 2001). Characteristic of high-energy beaches, the swash and shallow benthic communities exhibited low species diversity and were dominated by relatively few species. The swash zone community was dominated by two groups of worms; nematina and oligochaeta, and the mole crab, *Emerita talpoida* (Table 3-1). Farther offshore in the shallow habitat, fewer species at lower abundances were documented, with *Donax variabilis*, nematina worms, and the amphipod, *Amphiporeia virginiana*, being the most dominant. Similar communities were documented by Diaz and DeAlteris (1982), in their inventory of the benthic communities at the USACE Research Pier in Duck, NC. Two of the most dominant species in that survey; *Emerita talpoida* and *Donax variabilis*, also dominated the communities in our survey. Versar (2002), also found these two species dominated the surf zone benthic communities at beaches in Brunswick County, NC.

Because of their abundance and ease of capture within the surf zone, *Emerita talpoida* and *Donax variabilis* have been identified by some investigators as important biological indicators of anthropogenic impacts to beach benthic communities (Hackney et al. 1996, Versar 2002). Both *Emerita talpoida* and *Donax variabilis* dominated the communities in this survey and are common to the surf zone of the east coast (Diaz and DeAlteris 1982, Hackney et al. 1996, USACE 2001, Versar 2002). Therefore these two species are likely to be important indicators of potential deleterious impacts to the benthic community at the Dare County beaches when the nourishment process begins.

Borrow site benthic communities were much more diverse and abundant than the inshore benthic communities (Section 3.2.3, Table 3-5). During the first year, 168 taxa were documented at the borrow and reference borrow sites. These results are similar to those documented by Byrnes et al. (2003). In that survey, a total of 178 taxa were collected in spring and summer sampling at four potential sand borrow sites located offshore of Dare County in Federal waters. The seasonal densities of species and species numbers were also similar to the Byrnes et al. (2003), survey with lower densities and species numbers in the spring and higher densities and more species in the summer (Figures 3-12 and 3-14).

The fish community documented from seines in the surf zone was similar to that reported along the Middle and Southern Atlantic Bight regions (Hackney et al. 1996). Compared to the ocean sites, more species were found in higher abundance in the surf zone, indicating that the surf zone may be an important habitat to fish throughout the year. Many of the species collected in the surf are recreational and commercially important species (Table 3-8). Among them, spot was the most dominant species. In addition, several important forage species were also collected. Comparisons between similar studies may not be relevant because our study employed a much larger net than most other studies found in the literature. However, some species documented in other studies were common to the collections of this study (USACE 2001, Versar 2002).

Fish collections at the borrow sites indicate depauperate conditions. Aside from the spring survey, very few fish or invertebrate species were collected during the first year of surveys at the borrow site and borrow reference site (Figure 3-18). This could be attributed to the fact that we are using a large mesh trawl and that few large fish inhabit the offshore borrow area. However, these results are similar to those of Byrnes et al. (2003), who also documented depauperate conditions at four sand resource sites offshore of Dare County while using a 7.6 m, small mesh mongoose trawl. More than likely, the lack of fish in the trawls is due the natural variability in species distributions both spatially and seasonally (Colvocoresses and Musick 1984, Gabriel 1992). Cape Hatteras is the farthest extent of many southern and northern species ranges, and therefore species diversity and distributions are extremely variable. Additionally, during seasonal sampling no commercial or recreational fishing vessels were witnessed at either the borrow site or its reference site, indicating these sites are not very productive fishing areas (Ward Slacum, Versar, Inc. personal observation)

Stomach contents analyzed from fish collected at the beaches and borrow sites indicate a strong link to benthic resources located at those sites (Table 3-11 and 3-12). For example, most of the surf zone species relied upon *Emerita* as a significant part of their diets in all three seasons. *Emerita* were also the most dominant benthic organism collected in the surf zone. Stomachs analyzed from the borrow site and its reference indicate that the most dominant benthic organisms from those sites, polychaetes, were also an important food source for fish at those sites. These data suggests if impacts associated with the beach nourishment negatively affect *Emerita* or polychaetes, impacts could also affect fish utilizing these species as food sources.

Bird species documented at the beaches during the first year were representative of species commonly found on the Outer Banks (Fussell 1994). In a recent study of shore and waterbird distribution, CZR (2003) documented over 60 species on the beaches of Brunswick County, NC. This is more than three times the total number of shore (N=9) and waterbird (N=18) species documented in this study (Table 3-12). However, findings from that study are based on two years of data collection and many of the species documented in that study were incidentals occurring only occasionally. Most of the more common and abundant species from Brunswick County were also common and abundant at the Dare County Beaches.

The creel survey documented extensive fishing activity at the beaches and piers of the impact and recreational creel survey beaches (Figure 3-31 and 3-32). The majority of fishing occurred in the summer and fall, but fishing occurred the entire time piers were open, and throughout the year on the beaches. Although most of the anglers interviewed in the survey resided from North Carolina, many also resided from other states indicating that this area is an important resource for out of state residents. Most of the fish species documented in the angler catches were also species collected in the seines (Table 3-33 and 3-8). Many of these species were also found to be common in the Marine Recreational Fisheries Statistics Survey (MRFSS) conducted in North Carolina and nationally throughout the year (NOAA 2005). Data from that survey indicates that over 20 % of all marine recreational fishing occurring on the Atlantic Coast occurs in the state of North Carolina (NOAA 2005).



## 5.0 REFERENCES

- Boss, S.K. and C.W. Hoffman. 2001. Geologic Framework Derived from High-Resolution Seismic Reflection, Side-Scan Sonar, and Vibracore Data Offshore Oregon Inlet to Duck, Dare County, North Carolina. Prepared for the U.S. Minerals Management Service International Activities and Marine Minerals Division (INTERMAR) Under Cooperative Agreement 14-12-0001-30348. 47 pp.
- Buchanan, J.B. 1984. Sediment analysis. In: N.A. Holme and A.D. McIntyre, Eds. *Methods for Study of Marine Benthos*. IBP Handbook No. 16 2nd Edition. Blackwell Scientific Publications. Oxford, England. Pages 41-65.
- Byrnes, M.R., R.M. Hammer, B.A. Vittor, S.W. Kelley, D.B. Snyder, J.M. Côté, J.S. Ramsey, T.D. Thibaut, N.W. Phillips, J.D. Wood, and J.D. Germano. 2003. Collection of Environmental Data Within Sand Resource Areas Offshore North Carolina and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. U.S. Department of the Interior, Minerals Management Service, Leasing Division, Sand and Gravel Unit, Herndon, VA. OCS Report MMS 2000-056, Volume I: Main Text 256 pp. + Volume II: Appendices 69 pp.
- Colvocoresses, J.A. and J.A. Musick. 1984. Species associations and community composition of the Middle Atlantic Bight continental shelf demersal fishes. *Fishery Bulletin*, 82(4): 295-314.
- Cortes, E. 1997. A critical review of methods of studying fish feeding based on analysis of stomach contents: Application to elasmobranch fishes. *Can. J. Fish. Aquat. Sci.* 54: 726-738.
- CZR. 2003. Waterbird and Shorebird Use of Beaches in Brunswick County North Carolina. Final report Prepared by CZR, Wilmington, NC for U.S. Army Corps of Engineers, Wilmington District, Wilmington, NC.
- Diaz, R.J. and J.T. DeAlteris. 1982. Long-term changes in beach fauna at Duck, North Carolina. U.S. Army Corps of Engineers Coastal Engineering Research Center Miscellaneous Report 82-12. November 1982, 48 pp.
- Efron, B. 1982. *The jackknife, the bootstrap, and other resampling plans*. Society for Industrial and Applied Mathematics. Philadelphia, Pennsylvania, U.S.A.
- Fussell, J.O. 1994. *A Birder's Guide to Coastal North Carolina*. The University of North Carolina Press, Chapel Hill, NC. 540 pp.
- Gabriel, W. 1992. Persistence of demersal fish assemblages between Cape Hatteras and Nova Scotia, Northwest Atlantic. *Journal Northwest Atlantic Fisheries Science*, 14: 29-46.

- Hackney, C.T., M.H. Posey, S.W. Ross, and A.R. Norris. 1996. A review and synthesis of data on surf zone fishes and invertebrates in the South Atlantic Bight and the potential impacts from beach nourishment. Prepared by the University of North Carolina at Wilmington and the North Carolina National Estuarine Research Reserve for the U.S. Army Corps of Engineers, Wilmington, NC.
- Hyslop, E. J. 1980. Stomach content analysis: a review of methods and their applications. *J. Fish Biol.*, Southampton, v. 17, no.4, p.411-429.
- National Oceanic and Atmospheric Administration (NOAA). 2005. Fisheries of the United States 2004. National Marine Fisheries Service Office of Science and Technology Fisheries, Statistics Division, Silver Springs, MD. 109 pp.
- Pinkas, L.M., S. Oliphant & I.L.K. Iverson. 1971. Food habits of albacore, bluefin tuna and bonito in Californian waters. *Calif. Fish Game.* 152: 1–105.
- Pollock, K.H., Jones, C.M., & Brown, T.L. 1994. Angler surveys and their application to fisheries management. American Fisheries Society Special Publication 25. Bethesda, MD. 371pp.
- Slacum, H.W. 2006. Personal Observation. Versar, Inc. 9200 Rumsey Road, Columbia, MD. 21045.
- USACE. 2000. Final Feasibility Report And Environmental Impact Statement On Hurricane Protection And Beach Erosion Control For Dare County Beaches. USACE Wilmington, NC District. 99 pp.
- USACE. 2001. The New York District's Biological Monitoring Program for the Atlantic Coast of New Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project, Final Report. Prepared by U.S. Army Corps of Engineers, Waterways Experiment Station Vicksburg, MS 39180.
- Versar, Inc. 1999. Versar Benthic Laboratory Standard Operating Procedures and Quality Control Procedures. Columbia, Maryland.
- Versar. 2002. Effects of dredged material beach disposal on surf zone and nearshore fish and benthic resources on Bald Head Island, Caswell Beach, Oak Island, and Holden Beach, North Carolina: Interim study findings. Prepared by Versar, Inc., Columbia MD for U.S. Army Corps of Engineers, Wilmington District, Wilmington, NC. 2 volumes.

**APPENDIX A****GRAIN SIZE DATA**



Table A-1. Sediment grain sizes for samples taken in the spring 2004 at the impact beach, reference beach, borrow site, and reference borrow site. SW = Swash habitat samples; SH = Shallow habitat samples

Sample	s_00_063	s_00_075	s_00_106	s_00_250	s_00_425	s_00_850	s_02_000	s_04_750	% siltclay	% gravel	% sand	
<b>Beach</b>												
Impact	SH	0.12	0.13	0.36	28.27	44.42	54.84	79.41	97.77	0.12	20.59	79.29
	SW	0.25	0.25	0.27	13.52	31.96	63.11	90.54	99.40	0.25	9.46	90.29
Reference	SH	0.21	0.23	0.28	31.44	60.60	72.26	85.35	96.55	0.21	14.65	85.14
	SW	0.18	0.18	0.20	10.46	26.60	44.60	86.63	99.15	0.18	13.37	86.46
<b>Borrow</b>												
Borrow	1	0.80	0.84	1.15	15.81	71.71	98.54	99.86	100.00	0.80	0.14	99.06
	2	1.14	1.57	5.45	63.14	96.77	99.54	99.93	100.00	1.14	0.07	98.79
	3	1.39	1.66	2.75	27.57	83.58	99.10	99.82	100.00	1.39	0.18	98.43
	4	1.31	1.56	2.88	20.71	54.70	95.12	99.77	100.00	1.31	0.23	98.46
	5	0.80	0.85	1.11	4.68	14.86	30.58	58.43	84.22	0.80	41.57	57.63
	6	0.76	0.83	1.10	2.91	11.30	39.19	77.76	98.43	0.76	22.24	77.00
	7	16.05	16.41	18.90	74.94	98.25	99.59	99.98	100.00	16.05	0.02	83.93
	8	1.26	2.06	9.74	92.42	96.34	99.07	100.00	100.00	1.26	0.00	98.74
	9	1.01	1.02	1.14	5.25	54.83	91.60	98.86	100.00	1.01	1.14	97.85
	10	2.01	3.00	10.42	94.71	98.03	99.02	99.50	100.00	2.01	0.50	97.49
Reference	1	5.00	7.79	27.20	97.99	99.25	99.72	100.00	100.00	5.00	0.00	95.00
	2	3.15	4.94	21.01	98.33	99.51	99.84	99.95	100.00	3.15	0.05	96.80
	3	1.96	3.09	15.34	96.17	99.21	99.61	99.87	100.00	1.96	0.13	97.91
	4	1.69	2.25	7.86	95.44	98.87	99.34	99.69	100.00	1.69	0.31	97.99
	5	1.09	1.36	4.43	74.93	98.88	99.95	100.00	100.00	1.09	0.00	98.91
	6	1.65	1.95	6.41	79.69	97.04	99.26	99.77	100.00	1.65	0.23	98.13
	7	1.96	2.79	9.13	90.31	98.18	99.76	99.99	100.00	1.96	0.01	98.03
	8	1.54	2.09	13.59	88.68	98.29	99.55	99.78	100.00	1.54	0.22	98.24
	9	2.42	3.82	13.98	94.55	98.28	99.35	99.77	100.00	2.42	0.23	97.35
	10	1.73	2.46	8.95	84.37	96.23	98.60	99.73	99.73	1.73	0.27	98.01

Table A-2. Sediment grain sizes for samples taken in the summer 2004 at the impact beach, reference beach, borrow site, and reference borrow site.

Sample	s_00_063	s_00_075	s_00_106	s_00_250	s_00_425	s_00_850	s_02_000	s_04_750	% siltclay	% gravel	% sand	
<b>Borrow</b>												
Borrow	1	1.08	1.20	1.55	12.14	52.65	91.42	98.73	99.87	1.08	1.27	97.65
	2	1.12	1.18	1.27	1.75	21.05	64.14	92.89	98.76	1.12	7.11	91.78
	3	1.09	1.24	1.72	7.41	28.93	67.31	89.43	97.88	1.09	10.57	88.34
	4	2.35	3.20	5.16	9.88	19.97	34.70	58.44	86.09	2.35	41.56	56.09
	5	1.29	1.50	2.19	16.75	63.88	96.73	99.52	100.00	1.29	0.48	98.23
	6	1.23	1.93	6.63	93.17	96.89	99.15	99.72	100.00	1.23	0.28	98.48
	7	11.55	24.31	68.29	98.23	99.60	99.98	100.00	100.00	11.55	0.00	88.45
	8	1.36	2.35	10.47	82.18	94.47	98.32	99.66	100.00	1.36	0.34	98.30
	9	5.27	9.33	29.36	94.53	98.63	99.21	99.83	100.00	5.27	0.17	94.56
	10	7.11	11.98	53.35	96.35	99.53	99.89	100.00	100.00	7.11	0.00	92.89
Reference	1	2.03	2.99	9.81	90.48	97.55	99.41	99.83	100.00	2.03	0.17	97.80
	2	0.77	0.82	1.44	68.73	98.77	99.84	99.88	100.00	0.77	0.12	99.11
	3	1.75	2.87	11.62	96.81	99.26	99.60	99.75	100.00	1.75	0.25	98.01
	4	1.22	1.80	8.02	83.89	97.74	99.52	99.79	100.00	1.22	0.21	98.57
	5	1.06	1.65	7.55	81.74	97.58	99.25	99.69	100.00	1.06	0.31	98.63
	6	1.06	1.70	9.66	84.47	97.99	99.61	99.90	100.00	1.06	0.10	98.84
	7	1.52	2.24	11.67	94.60	98.70	99.65	100.00	100.00	1.52	0.00	98.48
	8	2.57	3.96	13.45	93.66	98.30	99.38	100.00	100.00	2.57	0.00	97.43
	9	2.69	4.38	17.14	94.90	98.47	99.36	100.00	100.00	2.69	0.00	97.31
	10	2.16	3.29	12.34	94.66	98.92	99.54	100.00	100.00	2.16	0.00	97.84

Table A-3. Sediment grain sizes for samples taken in the fall 2004 at the impact beach, reference beach, borrow site, and reference borrow site. SW = Swash habitat samples; SH = Shallow habitat samples

Sample		s_00_063	s_00_075	s_00_106	s_00_250	s_00_425	s_00_850	s_02_000	s_04_750	% siltclay	% gravel	% sand
<b>Beach</b>												
Impact	SH	0.31	0.32	0.32	0.55	1.55	8.23	32.08	80.20	0.31	67.92	31.77
	SW	0.32	0.32	0.33	1.85	7.54	38.12	87.57	98.95	0.32	12.43	87.25
Reference	SH	0.23	0.24	0.29	21.14	31.97	36.07	56.23	87.09	0.23	43.77	56.00
	SW	0.34	0.35	0.39	16.34	34.84	61.85	93.92	100.00	0.34	6.08	93.58
<b>Borrow</b>												
Borrow	1	0.32	0.34	0.44	6.51	39.29	95.20	99.77	100.00	0.32	0.23	99.45
	2	0.38	0.44	0.69	7.19	34.29	75.90	93.02	99.82	0.38	6.98	92.63
	3	0.57	0.60	0.77	2.04	8.26	27.45	65.28	89.86	0.57	34.72	64.71
	4	0.83	1.12	2.66	26.72	52.49	83.98	96.60	99.66	0.83	3.40	95.78
	5	0.57	0.59	0.73	13.31	66.46	92.10	98.18	100.00	0.57	1.82	97.61
	6	0.80	0.83	1.14	22.42	77.80	95.04	99.32	100.00	0.80	0.68	98.53
	7	0.44	0.46	0.68	16.96	67.74	97.52	99.98	100.00	0.44	0.02	99.54
	8	1.83	2.78	9.01	87.27	92.40	97.89	100.00	100.00	1.83	0.00	98.17
	9	1.18	1.91	9.39	96.14	99.40	99.90	99.97	100.00	1.18	0.03	98.79
	10	0.77	1.23	8.36	90.02	96.93	99.50	100.00	100.00	0.77	0.00	99.23
Reference	1	1.52	2.56	11.59	91.25	99.12	100.00	100.00	100.00	1.52	0.00	98.48
	2	1.24	2.09	8.82	94.25	99.21	100.00	100.00	100.00	1.24	0.00	98.76
	3	1.30	2.23	9.68	91.20	98.36	100.00	100.00	100.00	1.30	0.00	98.70
	4	1.93	3.47	11.82	94.40	98.79	100.00	100.00	100.00	1.93	0.00	98.07
	5	1.16	1.90	7.83	89.10	98.13	100.00	100.00	100.00	1.16	0.00	98.84
	6	1.59	2.57	10.82	87.91	98.05	100.00	100.00	100.00	1.59	0.00	98.41
	7	1.94	2.89	13.83	92.17	98.66	100.00	100.00	100.00	1.94	0.00	98.06
	8	1.86	3.26	13.11	95.75	98.95	100.00	100.00	100.00	1.86	0.00	98.14
	9	1.37	2.43	9.63	96.04	99.46	100.00	100.00	100.00	1.37	0.00	98.63
	10	3.86	5.19	13.35	97.49	98.93	100.00	100.00	100.00	3.86	0.00	96.14

Table A-4. Sediment grain sizes for samples taken in the winter 2005 at the impact beach, reference beach, borrow site, and reference borrow site. SW = Swash habitat samples; SH = Shallow habitat samples

Sample	s_00_063	s_00_075	s_00_106	s_00_250	s_00_425	s_00_850	s_02_000	s_04_750	% siltclay	% gravel	% sand	
<b>Beach</b>												
Impact	SH	0.36	0.36	0.37	1.86	6.76	20.28	48.40	86.50	0.36	51.60	48.05
	SW	0.53	0.56	0.66	10.04	40.88	90.71	99.77	100.00	0.53	0.23	99.24
Reference	SH	0.20	0.21	0.21	0.22	0.27	1.38	33.47	78.11	0.20	66.53	33.26
	SW	0.35	0.35	0.37	2.66	9.87	51.44	96.79	100.00	0.35	3.21	96.44
<b>Borrow</b>												
Borrow	1	0.63	0.65	0.75	5.63	29.65	76.13	92.66	99.36	0.63	7.34	92.03
	2	1.96	2.97	8.42	88.35	98.07	99.56	100.00	100.00	1.96	0.00	98.04
	3	0.82	0.92	1.86	53.66	94.83	99.79	100.00	100.00	0.82	0.00	99.18
	4	1.02	1.13	1.82	32.93	69.57	91.23	99.70	100.00	1.02	0.30	98.68
	5	0.51	0.52	0.60	9.18	53.56	95.83	99.69	100.00	0.51	0.31	99.18
	6	0.60	0.72	1.57	39.60	52.77	85.86	99.81	100.00	0.60	0.19	99.21
	7	0.49	0.51	0.60	3.92	30.16	82.70	97.08	99.59	0.49	2.92	96.59
	8	0.63	0.67	0.99	8.52	27.64	65.72	91.76	99.01	0.63	8.24	91.13
	9	0.47	0.48	0.50	1.85	16.28	64.66	90.21	99.78	0.47	9.79	89.73
	10	0.56	0.57	0.68	9.11	49.67	83.65	99.26	100.00	0.56	0.74	98.70
Reference	1	1.68	2.12	4.26	85.52	96.98	99.18	100.00	100.00	1.68	0.00	98.32
	2	1.51	3.05	11.33	89.48	97.30	99.37	99.99	100.00	1.51	0.01	98.48
	3	3.09	6.27	21.72	93.50	98.40	99.76	100.00	100.00	3.09	0.00	96.91
	4	2.71	4.57	19.77	94.95	98.30	99.73	100.00	100.00	2.71	0.00	97.29
	5	1.97	4.17	19.12	95.25	98.88	100.00	100.00	100.00	1.97	0.00	98.03
	6	1.77	3.06	15.07	90.51	98.29	99.46	99.94	100.00	1.77	0.06	98.17
	7	2.05	4.24	17.33	91.40	98.48	99.61	100.00	100.00	2.05	0.00	97.95
	8	1.28	2.19	14.14	91.99	98.28	99.59	100.00	100.00	1.28	0.00	98.72
	9	4.33	6.17	20.92	94.85	98.42	99.50	100.00	100.00	4.33	0.00	95.67
	10	2.85	5.84	23.81	98.19	99.36	99.77	100.00	100.00	2.85	0.00	97.15

**APPENDIX B**

**BENTHIC DATA**



## **SWASH HABITAT**



Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 05	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	44640	0.1360
Arthropoda : Amphipoda Amphiporeia virginiana	880	0.6200
Arthropoda : Decapoda Emerita talpoida	80	3.4200
Nemertina Nemertina	1480	0.0160
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	47080	
Total Abundance w/o Epi.	47080	
Total Biomass w/ Epi.		4.1920
Total Biomass w/o Epi.		4.1920

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 15	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	200	0.0020
Arthropoda : Decapoda Emerita talpoida	200	4.3600
Mollusca : Bivalvia Mytilus edulis (Epi.)	40	0.0040
Nemertina Nemertina	5920	0.0480
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	6360	
Total Abundance w/o Epi.	6320	
Total Biomass w/ Epi.		4.4140
Total Biomass w/o Epi.		4.4100

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 25	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	920	0.0040
Arthropoda : Amphipoda Amphiporeia virginiana	160	0.1080
Nemertina Nemertina	680	0.0080
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1760	
Total Abundance w/o Epi.	1760	
Total Biomass w/ Epi.		0.1200
Total Biomass w/o Epi.		0.1200

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 35	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	108200	0.3080
Arthropoda : Amphipoda Amphiporeia virginiana	4880	0.6720
Haustorius canadensis	40	0.2720
Arthropoda : Decapoda Emerita talpoida	40	0.1960
Nemertina Nemertina	1320	0.0080
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	114480	
Total Abundance w/o Epi.	114480	
Total Biomass w/ Epi.		1.4560
Total Biomass w/o Epi.		1.4560

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 45	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	280	0.0020
Nemertina Nemertina	4120	0.0600
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	4400	
Total Abundance w/o Epi.	4400	
Total Biomass w/ Epi.		0.0620
Total Biomass w/o Epi.		0.0620

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 55	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	680	0.0020
Arthropoda : Decapoda Emerita talpoida	80	30.536
Nemertina Nemertina	2120	0.0280
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	2880	
Total Abundance w/o Epi.	2880	
Total Biomass w/ Epi.		30.566
Total Biomass w/o Epi.		30.566

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 65	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Nemertina Nemertina	2760	0.0440
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Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	2800	
Total Abundance w/o Epi.	2800	
Total Biomass w/ Epi.		0.0460
Total Biomass w/o Epi.		0.0460
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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	5320	0.0240
Arthropoda : Decapoda Emerita talpoida	40	0.2160
Nemertina Nemertina	2520	0.0400
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Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	7880	
Total Abundance w/o Epi.	7880	
Total Biomass w/ Epi.		0.2800
Total Biomass w/o Epi.		0.2800
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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	4320	0.0240
Arthropoda : Amphipoda Amphiporeia virginiana		0.0120
Nemertina Nemertina	320	0.0020
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Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	4640	
Total Abundance w/o Epi.	4640	
Total Biomass w/ Epi.		0.0380
Total Biomass w/o Epi.		0.0380
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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	40	0.0080
Oligochaeta		
Nemertina	1880	0.0320
Nemertina		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1920	
Total Abundance w/o Epi.	1920	
Total Biomass w/ Epi.		0.0400
Total Biomass w/o Epi.		0.0400

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 05	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	200	0.0040
Annelida : Polychaeta Amastigus caperatus Polycyrtus spp.	40 40	0.0020 0.0020
Arthropoda : Amphipoda Atylus cf. minimus	40	0.0020
Nemertina Nemertina	360	0.0120
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Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	680	
Total Abundance w/o Epi.	680	
Total Biomass w/ Epi.		0.0220
Total Biomass w/o Epi.		0.0220
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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	8560	4.6680
Nemertina Nemertina	40	0.0020
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	8600	
Total Abundance w/o Epi.	8600	
Total Biomass w/ Epi.		4.6700
Total Biomass w/o Epi.		4.6700
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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 25	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	760	1.2480
Annelida : Polychaeta Scolelepis squamata	40	0.0040
Nemertina Nemertina	40	0.0020
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Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	840	
Total Abundance w/o Epi.	840	
Total Biomass w/ Epi.		1.2540
Total Biomass w/o Epi.		1.2540
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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 35	Type : Swash	Gear : PP
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	4360	0.0160
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	4360	
Total Abundance w/o Epi.	4360	
Total Biomass w/ Epi.		0.0160
Total Biomass w/o Epi.		0.0160

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	1120	0.0200
Nemertina Nemertina	40	0.0020
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1160	
Total Abundance w/o Epi.	1160	
Total Biomass w/ Epi.		0.0220
Total Biomass w/o Epi.		0.0220

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Arthropoda : Decapoda Emerita talpoida	920	0.4680
Nemertina Nemertina	800	0.0080
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1760	
Total Abundance w/o Epi.	1760	
Total Biomass w/ Epi.		0.4780
Total Biomass w/o Epi.		0.4780

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Microphthalmus aberrans	280	0.0040
Arthropoda : Amphipoda		
Atylus cf. minimus	40	0.0020
Mollusca : Gastropoda		
Crepidula spp. (Epi.)	40	0.0020
Nemertina		
Nemertina	280	0.0040
<hr/>		
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	640	
Total Abundance w/o Epi.	600	
Total Biomass w/ Epi.		0.0120
Total Biomass w/o Epi.		0.0100
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea		
No Organisms Present	0	0.0000
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda		
Amphiporeia virginiana	240	0.0160
Arthropoda : Decapoda		
Emerita talpoida	3920	2.1680
Nemertina		
Nemertina	80	0.0020
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	4240	
Total Abundance w/o Epi.	4240	
Total Biomass w/ Epi.		2.1860
Total Biomass w/o Epi.		2.1860
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	1640	0.0200
Oligochaeta		
Arthropoda : Decapoda	1800	1.5480
Emerita talpoida		
Nemertina	560	0.0080
Nemertina		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	4000	
Total Abundance w/o Epi.	4000	
Total Biomass w/ Epi.		1.5760
Total Biomass w/o Epi.		1.5760

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 05	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda		
Emerita talpoida	120	1. 5960
Nemertina		
Nemertina	400	0. 0080
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	520	
Total Abundance w/o Epi.	520	
Total Biomass w/ Epi.		1. 6040
Total Biomass w/o Epi.		1. 6040

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda		
Emerita talpoida	240	12. 740
Nemertina		
Nemertina	480	0. 0080
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	720	
Total Abundance w/o Epi.	720	
Total Biomass w/ Epi.		12. 748
Total Biomass w/o Epi.		12. 748

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 25	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	6160	0. 0160
Arthropoda : Decapoda		
Emerita talpoida	80	0. 6760
Nemertina		
Nemertina	720	0. 0160
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	6960	
Total Abundance w/o Epi.	6960	
Total Biomass w/ Epi.		0. 7080
Total Biomass w/o Epi.		0. 7080

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 35	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	80	0.0020
Arthropoda : Decapoda Emerita talpoida	40	1.3120
Nemertina Nemertina	560	0.0040
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	680	
Total Abundance w/o Epi.	680	
Total Biomass w/ Epi.		1.3180
Total Biomass w/o Epi.		1.3180

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Parapriionospio pinnata Polycyrtodus spp.	40 200	0.0020 0.0040
Nemertina Nemertina	1160	0.0080
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1400	
Total Abundance w/o Epi.	1400	
Total Biomass w/ Epi.		0.0140
Total Biomass w/o Epi.		0.0140

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	80	1.0640
Nemertina Nemertina	840	0.0080
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	920	
Total Abundance w/o Epi.	920	
Total Biomass w/ Epi.		1.0720
Total Biomass w/o Epi.		1.0720

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	240	0.0080
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	240	
Total Abundance w/o Epi .	240	
Total Biomass w/ Epi .		0.0080
Total Biomass w/o Epi .		0.0080

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	40	0.0020
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	40	
Total Abundance w/o Epi .	40	
Total Biomass w/ Epi .		0.0020
Total Biomass w/o Epi .		0.0020

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	840	0.0040
Arthropoda : Decapoda Emerita talpoida	120	26.340
Nemertina Nemertina	2840	0.0520
Number of Taxa w/ Epi .	3	
Number of Taxa w/o Epi .	3	
Total Abundance w/ Epi .	3800	
Total Abundance w/o Epi .	3800	
Total Biomass w/ Epi .		26.396
Total Biomass w/o Epi .		26.396

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Arthropoda : Decapoda Emerita talpoida	40	36.296
Nemertina Nemertina	880	0.0120
Number of Taxa w/ Epi .	3	
Number of Taxa w/o Epi .	3	
Total Abundance w/ Epi .	960	
Total Abundance w/o Epi .	960	
Total Biomass w/ Epi .		36.310
Total Biomass w/o Epi .		36.310

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 05	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	1160	0.0120
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	1160	
Total Abundance w/o Epi .	1160	
Total Biomass w/ Epi .		0.0120
Total Biomass w/o Epi .		0.0120

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	7720	0.1200
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	7720	
Total Abundance w/o Epi .	7720	
Total Biomass w/ Epi .		0.1200
Total Biomass w/o Epi .		0.1200

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 25	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	3560	0.0680
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	3560	
Total Abundance w/o Epi .	3560	
Total Biomass w/ Epi .		0.0680
Total Biomass w/o Epi .		0.0680

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 35	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	11080	0.1760
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	11080	
Total Abundance w/o Epi .	11080	
Total Biomass w/ Epi .		0.1760
Total Biomass w/o Epi .		0.1760

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	6760	0.1080
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	6760	
Total Abundance w/o Epi .	6760	
Total Biomass w/ Epi .		0.1080
Total Biomass w/o Epi .		0.1080

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	3400	0.0640
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	3400	
Total Abundance w/o Epi .	3400	
Total Biomass w/ Epi .		0.0640
Total Biomass w/o Epi .		0.0640

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	4640	0.1040
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	4640	
Total Abundance w/o Epi .	4640	
Total Biomass w/ Epi .		0.1040
Total Biomass w/o Epi .		0.1040

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	5760	0.1120
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	5760	
Total Abundance w/o Epi .	5760	
Total Biomass w/ Epi .		0.1120
Total Biomass w/o Epi .		0.1120

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Polycordius spp.	40	0.0020
Nemertina Nemertina	1560	0.0160
Number of Taxa w/ Epi .	2	
Number of Taxa w/o Epi .	2	
Total Abundance w/ Epi .	1600	
Total Abundance w/o Epi .	1600	
Total Biomass w/ Epi .		0.0180
Total Biomass w/o Epi .		0.0180

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Mollusca : Gastropoda Acteonina canalculata	40	0.0020
Nemertina Nemertina	6120	0.1040
Number of Taxa w/ Epi .	3	
Number of Taxa w/o Epi .	3	
Total Abundance w/ Epi .	6200	
Total Abundance w/o Epi .	6200	
Total Biomass w/ Epi .		0.1080
Total Biomass w/o Epi .		0.1080

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 05	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	18720	0.0800
Arthropoda : Decapoda Emerita talpoida	80	26.148
Mollusca : Bivalvia Donax variabilis	40	0.0020
Nemertina Nemertina	520	0.0040
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	19360	
Total Abundance w/o Epi.	19360	
Total Biomass w/ Epi.		26.234
Total Biomass w/o Epi.		26.234

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	80	0.0020
Arthropoda : Decapoda Emerita talpoida	40	0.4600
Nemertina Nemertina	520	0.0020
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	640	
Total Abundance w/o Epi.	640	
Total Biomass w/ Epi.		0.4640
Total Biomass w/o Epi.		0.4640

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 25	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	40	2.5240
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		2.5240
Total Biomass w/o Epi.		2.5240

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 35	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	71640	0.3160
Nemertina Nemertina	240	0.0120
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	71880	
Total Abundance w/o Epi.	71880	
Total Biomass w/ Epi.		0.3280
Total Biomass w/o Epi.		0.3280
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	15160	0.0560
Arthropoda : Decapoda Emerita talpoida	40	3.2000
Nemertina Nemertina	120	0.0020
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	15320	
Total Abundance w/o Epi.	15320	
Total Biomass w/ Epi.		3.2580
Total Biomass w/o Epi.		3.2580
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	13760	0.0480
Nemertina Nemertina	7200	0.0880
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	20960	
Total Abundance w/o Epi.	20960	
Total Biomass w/ Epi.		0.1360
Total Biomass w/o Epi.		0.1360
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda		
Emerita talpo da	80	26.788
Nemertina		
Nemertina	1600	0.0240
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1680	
Total Abundance w/o Epi.	1680	
Total Biomass w/ Epi.		26.812
Total Biomass w/o Epi.		26.812

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	80	0.0020
Annelida : Polychaeta		
Polycera spp.	40	0.0020
Arthropoda : Amphipoda		
Amphipisca abdita	40	0.0020
Amphiporeia virginiana	40	0.0200
Arthropoda : Decapoda		
Emerita talpo da	40	0.5200
Nemertina		
Nemertina	2160	0.0280
Number of Taxa w/ Epi.	6	
Number of Taxa w/o Epi.	6	
Total Abundance w/ Epi.	2400	
Total Abundance w/o Epi.	2400	
Total Biomass w/ Epi.		0.5740
Total Biomass w/o Epi.		0.5740

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	1400	0.0020
Mollusca : Bivalvia		
Mytilus edulis (Epi.)	40	0.0020
Nemertina		
Nemertina	11920	0.1920
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	13360	
Total Abundance w/o Epi.	13320	
Total Biomass w/ Epi.		0.1960
Total Biomass w/o Epi.		0.1940

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	400	0.0020
Oligochaeta	40	0.2360
Arthropoda : Decapoda	880	0.0040
Emertita talpoida		
Nemertina		
Nemertina		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1320	
Total Abundance w/o Epi.	1320	
Total Biomass w/ Epi.		0.2420
Total Biomass w/o Epi.		0.2420

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 05	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	8200	0.0240
Nemertina Nemertina	240	0.0020
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	8440	
Total Abundance w/o Epi.	8440	
Total Biomass w/ Epi.		0.0260
Total Biomass w/o Epi.		0.0260
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emitatalpolida	40	0.0280
Nemertina Nemertina	80	0.0040
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	120	
Total Abundance w/o Epi.	120	
Total Biomass w/ Epi.		0.0320
Total Biomass w/o Epi.		0.0320
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 25	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	520	0.0040
Arthropoda : Decapoda Emitatalpolida	480	0.6240
Nemertina Nemertina	2000	0.0200
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	3000	
Total Abundance w/o Epi.	3000	
Total Biomass w/ Epi.		0.6480
Total Biomass w/o Epi.		0.6480
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 35	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda		
Emerita talpoida	3240	4.1480
Nemertina		
Nemertina	280	0.0040
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	3520	
Total Abundance w/o Epi.	3520	
Total Biomass w/ Epi.		4.1520
Total Biomass w/o Epi.		4.1520

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	3040	0.0080
Arthropoda : Decapoda		
Emerita talpoida	640	1.2160
Mollusca : Bivalvia		
Donax variabilis	40	0.3040
Nemertina		
Nemertina	11160	0.0840
<hr/>		
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	14880	
Total Abundance w/o Epi.	14880	
Total Biomass w/ Epi.		1.6120
Total Biomass w/o Epi.		1.6120

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda		
Emerita talpoida	520	1.1520
Mollusca : Bivalvia		
Donax variabilis	40	0.3720
Nemertina		
Nemertina	720	0.0040
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1280	
Total Abundance w/o Epi.	1280	
Total Biomass w/ Epi.		1.5280
Total Biomass w/o Epi.		1.5280

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	1080	0.8240
Nemertina Nemertina	200	0.0040
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1280	
Total Abundance w/o Epi.	1280	
Total Biomass w/ Epi.		0.8280
Total Biomass w/o Epi.		0.8280

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	6600	0.0160
Arthropoda : Amphipoda Amphiporeia virginiana	40	0.0040
Arthropoda : Decapoda Emerita talpoida	1640	1.7200
Mollusca : Bivalvia Donax variabilis	40	0.1600
Nemertina Nemertina	120	0.0080
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	8440	
Total Abundance w/o Epi.	8440	
Total Biomass w/ Epi.		1.9080
Total Biomass w/o Epi.		1.9080

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	240	0.0020
Arthropoda : Decapoda Emerita talpoida	480	0.4920
Mollusca : Bivalvia Donax variabilis	40	0.4120
Nemertina Nemertina	560	0.0040
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	1320	
Total Abundance w/o Epi.	1320	
Total Biomass w/ Epi.		0.9100
Total Biomass w/o Epi.		0.9100

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	30640	0.0800
Arthropoda : Decapoda		
Emerita talpoidea	1240	0.8800
Mollusca : Bivalvia		
Donax variabilis	40	0.4600
Nemertina		
Nemertina	1120	0.0080
<hr/>		
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	33040	
Total Abundance w/o Epi.	33040	
Total Biomass w/ Epi.		1.4280
Total Biomass w/o Epi.		1.4280
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 05	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Arthropoda : Decapoda Emerita talpoida	160	1.8920
Nemertina Nemertina	1320	0.0240
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1520	
Total Abundance w/o Epi.	1520	
Total Biomass w/ Epi.		1.9180
Total Biomass w/o Epi.		1.9180
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	240	0.0020
Arthropoda : Decapoda Emerita talpoida	80	0.8040
Nemertina Nemertina	280	0.0080
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	600	
Total Abundance w/o Epi.	600	
Total Biomass w/ Epi.		0.8140
Total Biomass w/o Epi.		0.8140
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 25	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	40	0.0120
Arthropoda : Decapoda Emerita talpoida	40	0.0160
Nemertina Nemertina	200	0.0020
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	280	
Total Abundance w/o Epi.	280	
Total Biomass w/ Epi.		0.0300
Total Biomass w/o Epi.		0.0300
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 35	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	720	0.0080
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	720	
Total Abundance w/o Epi .	720	
Total Biomass w/ Epi .		0.0080
Total Biomass w/o Epi .		0.0080

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	2640	0.0160
Nemertina Nemertina	2680	0.0360
Number of Taxa w/ Epi .	2	
Number of Taxa w/o Epi .	2	
Total Abundance w/ Epi .	5320	
Total Abundance w/o Epi .	5320	
Total Biomass w/ Epi .		0.0520
Total Biomass w/o Epi .		0.0520

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	80	0.0240
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	80	
Total Abundance w/o Epi .	80	
Total Biomass w/ Epi .		0.0240
Total Biomass w/o Epi .		0.0240

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	80	0.0020
Arthropoda : Amphipoda Phoxocephalidae	40	0.0020
Arthropoda : Decapoda Emerita talpoida	240	2.9080
Nemertina Nemertina	960	0.0120
<hr/>		
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	1320	
Total Abundance w/o Epi.	1320	
Total Biomass w/ Epi.		2.9240
Total Biomass w/o Epi.		2.9240
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Scolelepis squamata	40	0.0320
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0320
Total Biomass w/o Epi.		0.0320
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	240	0.0080
Annelida : Polychaeta Amastigus caperatus	40	0.0020
Microphtalmus aberrans	3120	0.0320
Arthropoda : Decapoda Emerita talpoida	40	0.2480
Nemertina Nemertina	440	0.0120
<hr/>		
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	3880	
Total Abundance w/o Epi.	3880	
Total Biomass w/ Epi.		0.3020
Total Biomass w/o Epi.		0.3020
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	400	0.0040
Arthropoda : Decapoda		
Emerita talpoida	320	9.8120
Nemertina		
Nemertina	1040	0.0480
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1760	
Total Abundance w/o Epi.	1760	
Total Biomass w/ Epi.		9.8640
Total Biomass w/o Epi.		9.8640

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 05	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	480	0.0040
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	480	
Total Abundance w/o Epi .	480	
Total Biomass w/ Epi .		0.0040
Total Biomass w/o Epi .		0.0040

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 15	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	280	0.0080
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	280	
Total Abundance w/o Epi .	280	
Total Biomass w/ Epi .		0.0080
Total Biomass w/o Epi .		0.0080

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 25	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	560	0.0080
Number of Taxa w/ Epi .	1	
Number of Taxa w/o Epi .	1	
Total Abundance w/ Epi .	560	
Total Abundance w/o Epi .	560	
Total Biomass w/ Epi .		0.0080
Total Biomass w/o Epi .		0.0080

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 35	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	2080	0.0400
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	2080	
Total Abundance w/o Epi.	2080	
Total Biomass w/ Epi.		0.0400
Total Biomass w/o Epi.		0.0400

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 45	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Pagurus spp. (Epi.)	40	0.0080
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0080
Total Biomass w/o Epi.		0.0080

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 55	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	3120	0.0640
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	3120	
Total Abundance w/o Epi.	3120	
Total Biomass w/ Epi.		0.0640
Total Biomass w/o Epi.		0.0640

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 65	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Nemertina Nemertina	360	0.0040
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	400	
Total Abundance w/o Epi.	400	
Total Biomass w/ Epi.		0.0060
Total Biomass w/o Epi.		0.0060

Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 75	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Amastigus caperatus	40	0.0020
Tharyx sp. A Morris	40	0.0080
Nemertina Nemertina	840	0.0160
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	920	
Total Abundance w/o Epi.	920	
Total Biomass w/ Epi.		0.0260
Total Biomass w/o Epi.		0.0260

Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 85	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 95	Type : Swash	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Amastigus caperatus	40	0.0080
Nemertina Nemertina	4320	0.0320
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	4360	
Total Abundance w/o Epi.	4360	
Total Biomass w/ Epi.		0.0400
Total Biomass w/o Epi.		0.0400



## **SHALLOW HABITAT**



Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Ariidea cathierenae	80	0.0020
Siphonophores bombyx	40	0.0020
Arthropoda : Amphipoda Amphiporeia virginiana	40	0.0040
Nemertina Nemertina	360	0.0080
Phoronida Phoronis spp.	240	0.0280
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	760	
Total Abundance w/o Epi.	760	
Total Biomass w/ Epi.		0.0440
Total Biomass w/o Epi.		0.0440

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Polycora spp.	40	0.0020
Arthropoda : Amphipoda Amphiporeia virginiana	320	0.1200
Arthropoda : Decapoda Emerita talpoida	40	18.376
Mollusca : Bivalvia Mytilus edulis (Epi.)	80	0.0020
Nemertina Nemertina	80	0.0020
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	560	
Total Abundance w/o Epi.	480	
Total Biomass w/ Epi.		18.502
Total Biomass w/o Epi.		18.500

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	120	0.0020
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	120	
Total Abundance w/o Epi.	120	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Diopatra socialis	40	0.0020
Arthropoda : Amphipoda		
Ampithoe valida (Epi.)	40	0.0020
Arthropoda : Mysidae		
Neomysis americana (Epi.)	40	0.0020
Mollusca : Bivalvia		
Mytilus edulis (Epi.)	200	0.0040
Nemertina		
Nemertina	280	0.0040
<hr/>		
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	600	
Total Abundance w/o Epi.	320	
Total Biomass w/ Epi.		0.0140
Total Biomass w/o Epi.		0.0060
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea		
No Organisms Present	0	0.0000
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Microphthalmus aberrans	2240	0.0960
Nemertina		
Nemertina	280	0.0200
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	2520	
Total Abundance w/o Epi.	2520	
Total Biomass w/ Epi.		0.1160
Total Biomass w/o Epi.		0.1160
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	160	0.1000
Nemertina Nemertina	120	0.0020
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	280	
Total Abundance w/o Epi.	280	
Total Biomass w/ Epi.		0.1020
Total Biomass w/o Epi.		0.1020

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Microphthalmus aberrans	40	0.0040
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0040
Total Biomass w/o Epi.		0.0040

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Bathyporeia parkeri Parahaustorius longimerus	400 40	0.0480 0.0020
Arthropoda : Decapoda Ovalipes stephensi (Epi.)	40	5.9160
Mollusca : Bivalvia Donax variabilis	720	0.0920
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1200	
Total Abundance w/o Epi.	1160	
Total Biomass w/ Epi.		6.0580
Total Biomass w/o Epi.		0.1420

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Sample Year : Yr1	Trip : Spring 04	Site : Impact Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Mollusca : Bivalvia Donax variabilis	80	0.0040
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		0.0040
Total Biomass w/o Epi.		0.0040

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Protodriloides chaetifer (Epi.)	40	0.0020
Spironidae	40	0.0020
Arthropoda : Amphipoda Atylus cf. minnicoi	40	0.0020
Arthropoda : Decapoda Emerita talpoida	40	0.0640
Arthropoda : Mysidacea Neomysis americana (Epi.)	200	0.0280
Mollusca : Bivalvia Donax variabilis	120	0.0440
Nemertina Nemertina	40	0.0020
<hr/>		
Number of Taxa w/ Epi.	7	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	520	
Total Abundance w/o Epi.	280	
Total Biomass w/ Epi.		0.1440
Total Biomass w/o Epi.		0.1140
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Polycordius spp. Scolelepis squamata	40 40	0.0020 0.0080
Arthropoda : Amphipoda Atylus cf. minnicoi Haustorius canadensis	760 40	0.0020 0.0440
Microprotopus raneyi (Epi.)	80	0.0080
Arthropoda : Decapoda Emerita talpoida	80	0.1360
Arthropoda : Mysidacea Mysidae (Epi.)	80	0.0240
Mollusca : Bivalvia Mytilidae (Epi.)	40	0.0080
Tellina agilis	40	0.0040
<hr/>		
Number of Taxa w/ Epi.	9	
Number of Taxa w/o Epi.	6	
Total Abundance w/ Epi.	1200	
Total Abundance w/o Epi.	1000	
Total Biomass w/ Epi.		0.2360
Total Biomass w/o Epi.		0.1960
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	360	0.1680
Arthropoda : Amphipoda		
Amphiporeia virginiana	40	0.0040
Atylus cf. minimus	80	0.0020
Arthropoda : Decapoda		
Emerita talpoida	400	0.1720
Cnidaria : Anthozoa		
Anthozoa	40	0.0020
Mollusca : Bivalvia		
Donax variabilis	40	0.2600
<hr/>		
Number of Taxa w/ Epi.	6	
Number of Taxa w/o Epi.	6	
Total Abundance w/ Epi.	960	
Total Abundance w/o Epi.	960	
Total Biomass w/ Epi.		0.6080
Total Biomass w/o Epi.		0.6080

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	80	0.0160
Terebellidae	40	0.0020
Arthropoda : Amphipoda		
Amphiporeia virginiana	40	0.0020
Atylus cf. minimus	80	0.0020
Arthropoda : Decapoda		
Emerita talpoida	120	0.1120
Arthropoda : Mysidacea		
Neomysis americana (Epi.)	480	0.0800
Mollusca : Bivalvia		
Donax variabilis	40	0.0880
Nematina		
Nematina	80	0.0040
<hr/>		
Number of Taxa w/ Epi.	8	
Number of Taxa w/o Epi.	7	
Total Abundance w/ Epi.	960	
Total Abundance w/o Epi.	480	
Total Biomass w/ Epi.		0.3060
Total Biomass w/o Epi.		0.2260

---

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	40	0.0840
Arthropoda : Mysidacea		
Neomysis americana (Epi.)	160	0.0320
Nematina		
Nematina	1160	0.0320
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1360	
Total Abundance w/o Epi.	1200	
Total Biomass w/ Epi.		0.1480
Total Biomass w/o Epi.		0.1160

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Microphthalmus aberrans	80	0.0020
Arthropoda : Decapoda Emerita talpoida	80	0.0840
Nemertina Nemertina	80	0.0020
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	240	
Total Abundance w/o Epi.	240	
Total Biomass w/ Epi.		0.0880
Total Biomass w/o Epi.		0.0880

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	280	0.0040
Nemertina Nemertina	40	0.0020
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	320	
Total Abundance w/o Epi.	320	
Total Biomass w/ Epi.		0.0060
Total Biomass w/o Epi.		0.0060

---

Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Haustorius canadensis	40	0.1160
Mollusca : Bivalvia Donax variabilis	40	0.0240
Nemertina Nemertina	560	0.0040
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	640	
Total Abundance w/o Epi.	640	
Total Biomass w/ Epi.		0.1440
Total Biomass w/o Epi.		0.1440

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Mollusca : Bivalvia Donax variabilis	480	0.1760
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	480	
Total Abundance w/o Epi.	480	
Total Biomass w/ Epi.		0.1760
Total Biomass w/o Epi.		0.1760

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Sample Year : Yr1	Trip : Summer 04	Site : Impact Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Scolelepis squamata	280	0.2240
Arthropoda : Amphipoda Atylus cf. minimus Haustorius canadensis	40 40	0.0020 0.0440
Arthropoda : Decapoda Emerita talpoidea	40	0.0120
Mollusca : Bivalvia Donax variabilis	480	0.0680
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	880	
Total Abundance w/o Epi.	880	
Total Biomass w/ Epi.		0.3500
Total Biomass w/o Epi.		0.3500

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	80	0.0020
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	680	0.0020
Nemertina		
Nemertina	480	0.0040
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1160	
Total Abundance w/o Epi.	1160	
Total Biomass w/ Epi.		0.0060
Total Biomass w/o Epi.		0.0060
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	40	0.0020
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea		
No Organisms Present	0	0.0000
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	200	3.9920
Nemertina Nemertina	200	0.0040
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	400	
Total Abundance w/o Epi.	400	
Total Biomass w/ Epi.		3.9960
Total Biomass w/o Epi.		3.9960

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Mysidacea Neomysis americana (Epi.)	80	0.0240
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.		
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.		
Total Biomass w/ Epi.		0.0240
Total Biomass w/o Epi.		

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Sample Year : Yr1	Trip : Fall 04	Site : Impact Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Annelida : Polychaeta Amastigus caperatus	120	0.0020
Polycordius spp.	440	0.0040
Tharyx sp. A Morris	80	0.0120
Nemertina Nemertina	680	0.0040
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	1360	
Total Abundance w/o Epi.	1360	
Total Biomass w/ Epi.		0.0240
Total Biomass w/o Epi.		0.0240

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	720	0.0200
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	720	
Total Abundance w/o Epi.	720	
Total Biomass w/ Epi.		0.0200
Total Biomass w/o Epi.		0.0200

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	80	0.0020
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Microprotopus raneyi (Epi.)	40 40	0.0020 0.0020
Uncinaria serrata		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0040
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Amastigogos caperatus	40	0.0020
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0280
Annelida : Polychaeta Tharyx sp. A Morris	120	0.0080
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	160	
Total Abundance w/o Epi.	160	
Total Biomass w/ Epi.		0.0360
Total Biomass w/o Epi.		0.0360
<hr/>		

Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Amastigidae caperatus	40	0.0020
Tharyx sp. A Morris	80	0.0040
Nemertina Nemertina	40	0.0020
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	160	
Total Abundance w/o Epi.	160	
Total Biomass w/ Epi.		0.0080
Total Biomass w/o Epi.		0.0080
<hr/>		

Sample Year : Yr1	Trip : Winter 05	Site : Impact Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000
<hr/>		

Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	240	0.0200
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	240	
Total Abundance w/o Epi.	240	
Total Biomass w/ Epi.		0.0200
Total Biomass w/o Epi.		0.0200

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	280	0.0240
Arthropoda : Decapoda Ovalipes stephensi (Epi.)	40	4.5680
Mollusca : Bivalvia Donax variabilis	160	0.0160
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	480	
Total Abundance w/o Epi.	440	
Total Biomass w/ Epi.		4.6080
Total Biomass w/o Epi.		0.0400

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Amphiporeia virginiana	680	0.0800
Haustorius canadensis	200	1.2360
Arthropoda : Decapoda Ovalipes stephensi (Epi.)	40	23.448
Mollusca : Bivalvia Donax variabilis	120	0.0280
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1040	
Total Abundance w/o Epi.	1000	
Total Biomass w/ Epi.		24.792
Total Biomass w/o Epi.		1.3440

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda		
Amphiporeia virginiana	280	0.0360
Bathyporeia parkeri	40	0.0080
Haustorius canadensis	80	0.4000
Parahaustorius longimerus	40	0.0240
Nemertina		
Nemertina	40	0.0040
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	480	
Total Abundance w/o Epi.	480	
Total Biomass w/ Epi.		0.4720
Total Biomass w/o Epi.		0.4720

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Microphtalmus aberrans	40	0.0040
Polydora cornuta	40	0.0020
Polyynoidae (Epi.)	40	0.0080
Protodrilus spp. (Epi.)	40	0.0040
Scolelepis squamata	40	0.1520
Arthropoda : Amphipoda		
Amphiporeia virginiana	240	0.0400
Nemertina		
Nemertina	240	0.0240
Number of Taxa w/ Epi.	7	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	680	
Total Abundance w/o Epi.	600	
Total Biomass w/ Epi.		0.2340
Total Biomass w/o Epi.		0.2220

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		
Oligochaeta	280	0.0020
Annelida : Polychaeta		
Protodrilus spp. (Epi.)	40	0.0020
Arthropoda : Amphipoda		
Haustorius canadensis	40	0.0760
Mollusca : Bivalvia		
Donax variabilis	200	0.0400
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	560	
Total Abundance w/o Epi.	520	
Total Biomass w/ Epi.		0.1200
Total Biomass w/o Epi.		0.1180

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	40	0.0320
Arthropoda : Amphipoda		
Amphiporeia virginiana	1120	0.0920
Arthropoda : Decapoda		
Ovalipes stephensoni (Epi.)	40	0.2000
Nemertina		
Nemertina	40	0.0020
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	1240	
Total Abundance w/o Epi.	1200	
Total Biomass w/ Epi.		0.3260
Total Biomass w/o Epi.		0.1260

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda		
Amphiporeia virginiana	160	0.0040
Bathyporeia parkeri	40	0.0020
Mollusca : Bivalvia		
Donax variabilis	680	0.1120
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	880	
Total Abundance w/o Epi.	880	
Total Biomass w/ Epi.		0.1180
Total Biomass w/o Epi.		0.1180

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Microphtalmus aberrans	280	0.0080
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	280	
Total Abundance w/o Epi.	280	
Total Biomass w/ Epi.		0.0080
Total Biomass w/o Epi.		0.0080

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Sample Year : Yr1	Trip : Spring 04	Site : Ref Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda		
Amphiporeia virginiana	520	0.0400
Haustorius canadensis	80	0.5720
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	600	
Total Abundance w/o Epi.	600	
Total Biomass w/ Epi.		0.6120
Total Biomass w/o Epi.		0.6120

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Annelida : Polychaeta Scolelepis squamata	80	0.0400
Arthropoda : Mysidacea Neomysis americana (Epi.)	40	0.0020
Mollusca : Bivalvia Donax variabilis	40	0.0020
Nemertina Nemertina	200	0.0020
<hr/>		
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	400	
Total Abundance w/o Epi.	360	
Total Biomass w/ Epi.		0.0480
Total Biomass w/o Epi.		0.0460
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Scolelepis squamata	40	0.0080
Arthropoda : Amphipoda Amphiporeia virginiana	120	0.0080
Arthropoda : Decapoda Emerita talpoida	120	0.0480
Arthropoda : Mysidacea Neomysis americana (Epi.)	120	0.0200
Mollusca : Bivalvia Donax variabilis	160	0.0120
<hr/>		
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	4	
Total Abundance w/ Epi.	560	
Total Abundance w/o Epi.	440	
Total Biomass w/ Epi.		0.0960
Total Biomass w/o Epi.		0.0760
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Microphthalmus aberrans	40	0.0040
Scolelepis squamata	200	0.1880
Arthropoda : Amphipoda Amphiporeia virginiana	120	0.0080
Arthropoda : Cumacea Mancocuma stellifera	40	0.0040
Arthropoda : Decapoda Emerita talpoida	120	0.0480
Mollusca : Bivalvia Donax variabilis	40	0.0440
Nemertina Nemertina	80	0.0020
<hr/>		
Number of Taxa w/ Epi.	7	
Number of Taxa w/o Epi.	7	
Total Abundance w/ Epi.	640	
Total Abundance w/o Epi.	640	
Total Biomass w/ Epi.		0.2980
Total Biomass w/o Epi.		0.2980
<hr/>		

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Microphtalmus aberrans	40	0.0020
Arthropoda : Mysidacea Neomysis americana (Epi.)	40	0.0020
Mollusca : Bivalvia Anadara spp.	40	0.0280
Nemertina Nemertina	240	0.0020
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	360	
Total Abundance w/o Epi.	320	
Total Biomass w/ Epi.		0.0340
Total Biomass w/o Epi.		0.0320

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta		0.0020
Mollusca : Bivalvia Macoma tenta	40	0.0020
Mollusca : Gastropoda Crepidula spp. (Epi.)	40	0.0020
Nemertina Nemertina	480	0.0080
Number of Taxa w/ Epi.	4	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	560	
Total Abundance w/o Epi.	520	
Total Biomass w/ Epi.		0.0140
Total Biomass w/o Epi.		0.0120

---

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	1480	0.0240
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	1480	
Total Abundance w/o Epi.	1480	
Total Biomass w/ Epi.		0.0240
Total Biomass w/o Epi.		0.0240

---

Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	40	0.2280
Nemertina		
Nemertina	1400	0.0400
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1440	
Total Abundance w/o Epi.	1440	
Total Biomass w/ Epi.		0.2680
Total Biomass w/o Epi.		0.2680

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	280	0.2840
Arthropoda : Decapoda		
Emerita talpoida	120	0.0440
Mollusca : Bivalvia		
Donax variabilis	40	0.2600
<hr/>		
Number of Taxa w/ Epi.	3	
Number of Taxa w/o Epi.	3	
Total Abundance w/ Epi.	440	
Total Abundance w/o Epi.	440	
Total Biomass w/ Epi.		0.5880
Total Biomass w/o Epi.		0.5880

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	160	0.2440
Nemertina		
Nemertina	1040	0.0240
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	1200	
Total Abundance w/o Epi.	1200	
Total Biomass w/ Epi.		0.2680
Total Biomass w/o Epi.		0.2680

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Sample Year : Yr1	Trip : Summer 04	Site : Ref Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Scolelepis squamata	640	0.2440
Arthropoda : Decapoda		
Emerita talpoida	40	0.0080
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	680	
Total Abundance w/o Epi.	680	
Total Biomass w/ Epi.		0.2520
Total Biomass w/o Epi.		0.2520

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	80	2.8000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		2.8000
Total Biomass w/o Epi.		2.8000

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Amphipoda Haustorius canadensis	40	0.0120
Mollusca : Bivalvia Donax variabilis	40	0.0240
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		0.0360
Total Biomass w/o Epi.		0.0360

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	80	0.0020
Arthropoda : Decapoda Emerita talpoida	280	11.256
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	360	
Total Abundance w/o Epi.	360	
Total Biomass w/ Epi.		11.258
Total Biomass w/o Epi.		11.258
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Scolelepis squamata	40	0.3280
Arthropoda : Amphipoda Haustorius canadensis	200	0.1960
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	240	
Total Abundance w/o Epi.	240	
Total Biomass w/ Epi.		0.5240
Total Biomass w/o Epi.		0.5240
<hr/>		

Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	40	0.0020
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Microphthalmus aberrans	320	0.0040
Nemertina Nemertina	120	0.0040
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	440	
Total Abundance w/o Epi.	440	
Total Biomass w/ Epi.		0.0080
Total Biomass w/o Epi.		0.0080

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Arthropoda : Decapoda Emerita talpoida	80	3.6960
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		3.6960
Total Biomass w/o Epi.		3.6960

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Sample Year : Yr1	Trip : Fall 04	Site : Ref Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Polycordius spp.	40	0.0040
Arthropoda : Decapoda Emerita talpoida	80	10.104
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	120	
Total Abundance w/o Epi.	120	
Total Biomass w/ Epi.		10.108
Total Biomass w/o Epi.		10.108

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 05	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 15	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Amastigus caperatus	40	0.0020
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 25	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 35	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 45	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	4480	0.0560
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	4480	
Total Abundance w/o Epi.	4480	
Total Biomass w/ Epi.		0.0560
Total Biomass w/o Epi.		0.0560

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 55	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 65	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	40	0.0020
Nemertina Nemertina	120	0.0020
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	160	
Total Abundance w/o Epi.	160	
Total Biomass w/ Epi.		0.0040
Total Biomass w/o Epi.		0.0040

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 75	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Polycordius spp.	40	0.0020
Arthropoda : Amphipoda Acanthohaustorius spp.	40	0.0020
<hr/>		
Number of Taxa w/ Epi.	2	
Number of Taxa w/o Epi.	2	
Total Abundance w/ Epi.	80	
Total Abundance w/o Epi.	80	
Total Biomass w/ Epi.		0.0040
Total Biomass w/o Epi.		0.0040

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 85	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Nemertina Nemertina	40	0.0020
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	40	
Total Abundance w/o Epi.	40	
Total Biomass w/ Epi.		0.0020
Total Biomass w/o Epi.		0.0020

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Sample Year : Yr1	Trip : Winter 05	Site : Ref Beach
Station : 95	Type : Shallow	Gear : PP
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Miscellanea No Organisms Present	0	0.0000
<hr/>		
Number of Taxa w/ Epi.	1	
Number of Taxa w/o Epi.	1	
Total Abundance w/ Epi.	0	
Total Abundance w/o Epi.	0	
Total Biomass w/ Epi.		0.0000
Total Biomass w/o Epi.		0.0000

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## **BORROW SITE HABITAT**



Sample Year : Yr1	Trip : Spring 04	Site : N Borrow Site
Station : 01	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	182	0.0011
Annelida : Polychaeta Amastigites caperatus	23	0.0011
Braniawelli fleetensis	23	0.0011
Capitella capitata complex	68	0.0023
Caulieriella sp. B (Blake)	23	0.0045
Lumbrineridae	23	0.0011
Nephtys picta	23	0.0955
Notomastus spp.	23	0.0091
Parapionosyllis longicirrata	23	0.0011
Parouga caeca	114	0.0023
Polycordius spp.	136	0.0273
Protodorvilea kefersteini	68	0.0011
Siphonophores bombyx	23	0.0011
Syliidae	23	0.0011
Nemertina		
Micrura spp.	23	0.0023
Number of Taxa w/ Epi.	15	
Number of Taxa w/o Epi.	15	
Total Abundance w/ Epi.	795	
Total Abundance w/o Epi.	795	
Total Biomass w/ Epi.		0.1523
Total Biomass w/o Epi.		0.1523

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Sample Year : Yr1	Trip : Spring 04	Site : N Borrow Site
Station : 02	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	159	0.0068
Annelida : Polychaeta Amastigites caperatus	227	0.0068
Ampharete finmarchica	23	0.0136
Asbeloides oculata	114	0.0011
Capitella capitata complex	1295	0.0205
Glycera dibranchiata	23	1.7068
Leptoscoloplos spp.	68	0.0011
Maldividae	477	0.0091
Mediomastus ambiseta	136	0.0011
Microphtalmus aggregatus	23	0.0011
Nephtys picta	23	0.0011
Paracanthis fulgens	23	0.0023
Parapionospio spinata	23	0.0011
Parouga caeca	3023	0.1841
Polycirrus eximus	23	0.0011
Polydora cornuta	45	0.0011
Polycordius spp.	1909	0.6318
Spiro setosa	136	0.0011
Tharyx sp. A Morris	136	0.0114
Arthropoda : Amphipoda Uncinaria rorata	45	0.0523
Chordata : Ascidacea Ascidacea (Epi.)	159	0.0023
Chordata : Cephalochordata Branchiostoma caribaeum	23	0.0227
Mollusca : Bivalvia Bivalvia	227	0.0023
Spirula solidissima	23	0.0011
Tellina spp.	23	0.0011
Mollusca : Gastropoda Crepidula spp. (Epi.)	23	0.0011
Nemertina		
Nemertina	364	0.0136
Number of Taxa w/ Epi.	27	
Number of Taxa w/o Epi.	25	
Total Abundance w/ Epi.	8773	
Total Abundance w/o Epi.	8591	
Total Biomass w/ Epi.		2.7000
Total Biomass w/o Epi.		2.6966

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Sample Year : Yr1	Trip : Spring 04	Site : N Borrow Site
Station : 03	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta Oligochaeta Annelida : Polychaeta Amastigaster caperatus Ampharetidae Ariidea cathartae Capitella capitata complex Dorvillea rudolphii Glycerida branchiata Leptoscoloplos spp. Lumbrineridae Maldanidae Mediomastus ambiseta Nephtys picta Parapionosyllis longicirrata Parouga caeca Polydora cornuta Polycordius spp. Spirosetosa Tharyx sp. A Morris	227 114 23 23 23 1227 91 23 45 23 114 114 23 159 23 364 477 68	0.0011 0.0023 0.0011 0.0023 0.0386 0.2182 0.0011 0.0023 0.0011 0.0011 0.0011 0.0011 0.0011 0.0114 0.0011 0.1182 0.0750 0.0011
Arthropoda : Decapoda Pagurus spp. (Epi.)	23	0.0011
Hemichordata Saccoglossus kowalevskii	23	0.0011
Mollusca : Bivalvia Ensis directus Spisula solidissima Tellina spp.	45 23 23	0.0011 0.0795 0.0011
Nemertina Micrura spp. Nemertina	23 45	0.0045 0.0011
Number of Taxa w/ Epi.	25	
Number of Taxa w/o Epi.	24	
Total Abundance w/ Epi.	3341	
Total Abundance w/o Epi.	3318	
Total Bi mass w/ Epi.		0.5682
Total Bi mass w/o Epi.		0.5670

Sample Year : Yr1	Trip : Spring 04	Site : N Borrow Site
Station : 04	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta Oligochaeta Annelida : Polychaeta Ariidea cathartae Caulieriella sp. B (Blake) Mediomastus ambiseta Opheliidae Owenia fusiformis Parapionosyllis longicirrata Polycordius spp. Tharyx sp. A Morris	114 23 23 23 23 23 23 23 114 91	0.0023 0.0023 0.0023 0.0011 0.0011 0.0011 0.0068 0.0011 0.0136 0.0227
Arthropoda : Isopoda Chiridotea caeca	23	0.0273
Arthropoda : Tanaidacea Tanasus psammophilus	45	0.0045
Mollusca : Bivalvia Ensis directus	23	2.0909
Nemertina Nemertina	159	0.0068
Number of Taxa w/ Epi.	13	
Number of Taxa w/o Epi.	13	
Total Abundance w/ Epi.	705	
Total Abundance w/o Epi.	705	
Total Bi mass w/ Epi.		2.1829
Total Bi mass w/o Epi.		2.1829

Sample Year : Yr1		Trip : Spring 04	Site : N Borrow Site
Station : 05		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta		318	0.0159
Oligochaeta		23	0.0023
Annelida : Polychaeta		23	0.0045
Aporionospio pygmaea		159	0.0114
Ariidea cathartae		23	0.0023
Bhawania heteroseta		23	0.0182
Braniawelli fleetensis		750	0.0011
Capitella capitata complex		23	0.0045
Cirrrophorus sp. A Morris		23	2.3704
Glycera americana		68	0.0068
Leptoscoloplos spp.		159	0.0091
Mediomastus ambiseta		23	0.0023
Microphtalmus aberrans		45	0.0591
Nephtys picta		500	0.0136
Parapionosyllis longicirrata		932	0.0659
Parougiacaeca		23	0.0295
Polyclerus eximus		1591	0.0023
Polydora cornuta		68	0.0023
Polygordius spp.		23	0.5023
Sigambra tentaculata		705	0.0023
Spiro setosa		45	0.0500
Tharyx sp. A Morris			0.0159
Arthropoda : Amphipoda			
Tiron tropakis		23	0.0091
Uncinaria ritteri		45	0.0227
Chordata : Ascidiacea			
Ascidacea (Epi.)		23	0.0023
Mollusca : Bivalvia			
Ensis directus		23	0.0023
Spirula solidissima		159	0.0364
Tellina agilis		23	0.0023
Nemertina			
Nemertina		23	0.0023
Phoronida			
Phoronis spp.		23	0.0068
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		28	
Total Abundance w/ Epi.		5886	
Total Abundance w/o Epi.		5864	
Total Bi mass w/ Epi.			3.2739
Total Bi mass w/o Epi.			3.2716

Sample Year : Yr1		Trip : Spring 04	Site : N Borrow Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta			
Oligochaeta		250	0.0023
Annelida : Polychaeta			
Amastigus caperatus		68	0.0011
Bhawania heteroleta		23	0.0091
Capitella capitata complex		23	0.0045
Opheliidae		45	0.0023
Parapionosyllis longicirrata		114	0.0045
Parougiacaeca		136	0.0045
Pista crista		23	0.0011
Polycirrus eximus		23	0.0364
Polygordius spp.		455	0.0977
Protodorvillaea kefersteini		23	0.0068
Sigmabra bassi		23	0.0011
Spirosetosa		136	0.0023
Spiophanes bombyx		23	0.0295
Syllidae		23	0.0023
Arthropoda : Amphipoda			
Uncinaria ritteri		45	0.0682
Arthropoda : Tanaidacea			
Tanaidus psammophilus		23	0.0023
Mollusca : Bivalvia			
Bivalvia		23	0.0023
Spisula solidissima		23	0.1159
Tellina spp.		23	0.0023
Nemertina			
Nemertina		364	0.0045
Number of Taxa w/ Epi.		21	
Number of Taxa w/o Epi.		21	
Total Abundance w/ Epi.		1886	
Total Abundance w/o Epi.		1886	
Total Bi mass w/ Epi.			0.4011
Total Bi mass w/o Epi.			0.4011

Sample Year : Yr1		Trip : Spring 04	Site : N Borrow Site
Station : 07		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	182	0.0045
Annelida : Polychaeta	Amastigus caperatus	318	0.0091
	Ampharetidae	23	0.0023
	Apopriionospio pygmaea	432	0.0750
	Arididea catharinae	500	0.0295
	Capitella capitata complex	45	0.0023
	Caulieriella sp. B (Blake)	23	0.0068
	Dorvillea rudolphi	23	0.0068
	Heteromastus filiformis	23	0.0182
	Magelona spp.	114	0.0295
	Mediomastus ambiseta	2091	0.0841
	Nephtys picta	341	0.1477
	Notomastus spp.	23	0.0091
	Owenia fusiformis	23	0.0205
	Parougiacaeca	23	0.0045
	Phylloodoce arenae	23	0.0159
	Polygordius spp.	318	0.0500
	Sigambra bassi	23	0.0045
	Spirosetosa	45	0.0023
	Spiophanes bombyx	205	0.0545
	Tharyx sp. A Morris	568	0.0409
Arthropoda : Amphipoda			
	Acanthohaustorius millesi	23	0.0011
	Americhelidium americanum	23	0.0023
	Ampelisca verrilli	23	0.0500
	Tiron tropakis	23	0.0011
Arthropoda : Isopoda			
	Ancinus depressus	23	0.0011
	Edotea triloba (Epi.)	45	0.0136
Mollusca : Bivalvia			
	Ensis directus	45	0.0023
	Tellina agilis	159	0.0045
Mollusca : Gastropoda			
	Cylinchella bidentata (Epi.)	23	0.0114
Nemertina			
	Carenomella lactea	23	0.0068
	Nemertina	23	0.0011
Number of Taxa w/ Epi		32	
Number of Taxa w/o Epi		30	
Total Abundance w/ Epi		5795	
Total Abundance w/o Epi		5727	
Total Biomass w/ Epi			0.7136
Total Biomass w/o Epi			0.6886

Sample Year : Yr1		Trip : Spring 04	Site : N Borrow Site
Station : 08		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	227	0.0023
Annelida : Polychaeta	Aglaphamus verrilli	23	0.0068
	Amastigus caperatus	545	0.0341
	Apophionospio pygmaea	4205	0.6386
	Ariidea cathartinae	455	0.0182
	Ariidea wassi	68	0.0011
	Capitella capitata complex	23	0.0011
	Caulieriella sp. B (Blake)	500	0.0341
	Drilonereis longa	23	0.0011
	Goniada littorea	23	0.0182
	Magelona spp.	68	0.0159
	Mediomastus ambiseta	386	0.0091
	Nephtys picta	364	0.5273
	Notomastus spp.	23	0.0011
	Owenia fusi formis	45	0.0227
	Polydora cornuta	23	0.0011
	Polygordius spp.	114	0.0136
	Spiro setosa	91	0.0364
	Spiophanes bombyx	159	0.0114
	Tharyx sp. A Morris	1091	0.2795
Arthropoda : Amphipoda	Ampelisca verrilli	45	0.1045
	Byblis serrata	45	0.0091
	Rhepoxynius hudsoni	68	0.0250
	Uncinaria rorata	136	0.1045
Arthropoda : Decapoda			
	Pagurus longicarpus (Epi.)	23	0.0136
Mollusca : Bivalvia			
	Lucinidae	23	0.0011
	Tellinagialis	68	0.0136
Nemertina			
	Carinomella lactea	23	0.0068
Platyhelminthes : Turbellaria			
	Turbellaria (Epi.)	23	0.0011
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		27	
Total Abundance w/ Epi.		8909	
Total Abundance w/o Epi.		8864	
Total Biomass w/ Epi.			1.9534
Total Biomass w/o Epi.			1.9386

Sample Year : Yr1		Trip : Spring 04	Site : N Borrow Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	45	0.0023
Annelida : Polychaeta			
	Apophionospio pygmaea	68	0.0023
	Ariidea cathartinae	23	0.0023
	Phylodoce arenae	23	0.0011
	Polygordius spp.	91	0.0114
	Spiophanes bombyx	114	0.0045
	Tharyx sp. A Morris	68	0.0045
Arthropoda : Tanaidacea			
	Tanassis psammophilus	91	0.0023
Chordata : Ascidacea			
	Ascidacea (Epi.)	23	0.0091
Mollusca : Bivalvia			
	Ensis directus	23	0.0011
	Spirula solida sisma	23	0.0011
Nemertina			
	Microtura spp.	23	0.0023
	Nemertina	23	0.0023
Number of Taxa w/ Epi.		13	
Number of Taxa w/o Epi.		12	
Total Abundance w/ Epi.		636	
Total Abundance w/o Epi.		614	
Total Biomass w/ Epi.			0.0466
Total Biomass w/o Epi.			0.0375

Sample Year : Yr1		Trip : Spring 04	Site : N Borrow Site
Station : 10		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta			
Oligochaeta		136	0.0023
Annelida : Polychaeta			
Aglaphamus verrilli		68	0.0886
Amastigus caperatus		727	0.7091
Ampharete finmarchica		23	0.0011
Apopriionospio pygmaea		1318	0.1886
Ariidea catherinae		1068	0.0477
Ariidea wassi		91	0.0023
Asabelides oculata		68	0.0023
Capitella capitata complex		23	0.0011
Caulieriella sp. B (Blake)		614	0.0523
Drilonereis longa		23	0.0068
Glycera dibranchiata		45	0.0364
Magefona spp.		341	0.1477
Mediomastus ambi seta		523	0.0114
Microphtalmus sczelkowi		23	0.0011
Nephthys picta		159	0.0011
Opeliaidae		23	0.0011
Owenia fusiformis		23	0.1864
Phylodoce arenae		23	0.0068
Polygordius spp.		705	0.0864
Protodorvillea kefersteini		23	0.0159
Scoletoma aciculatum		23	0.0011
Spirosetosa		795	0.3591
Spiophanes bombyx		23	0.0091
Tharyx sp. A Morris		3045	0.6636
Arthropoda : Amphipoda			
Ampelisca vadorum		23	0.0011
Ampelisca verrilli		68	0.0750
Byblis serrata		45	0.0011
Rhepoxynius hudsoni		45	0.0205
Uncinaria rorata		159	0.0250
Chordata : Ascidiacea			
Ascidacea (Epi.)		23	0.0011
Cnidaria : Anthozoa			
Ceriantheopsis americanus		23	0.3341
Mollusca : Bivalvia			
Ensis directus		114	0.0295
Lucinidae		23	0.0011
Tellina agilis		136	0.0159
Mollusca : Gastropoda			
Turbonilla stricta (Epi.)		45	0.0068
Vitrinella spp. (Epi.)		23	0.0011
Nemertina			
Carenomella lactea		45	0.0159
Phoronida			
Phoronis spp.		45	0.0045
Number of Taxa w/ Epi.		39	
Number of Taxa w/o Epi.		36	
Total Abundance w/ Epi.		10750	
Total Abundance w/o Epi.		10659	
Total Biomass w/ Epi.			3.1625
Total Biomass w/o Epi.			3.1534

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 01		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		432	0.0068
Oligochaeta		227	0.0114
Annelida : Polychaeta		23	0.0011
Aporionospio pygmaea		23	0.0023
Capitellidae		45	0.0136
Glycera spp.		45	0.0045
Magefona spp.		159	0.0341
Mediomastus ambi seta		45	0.1114
Owenia fusiformis		3409	0.0295
Parapironospio spinifera		23	0.0068
Polygordius spp.		23	0.0011
Scolopendropsis squamata		23	0.0068
Spirachaeopterus costarum		23	0.0091
Spirophanes bombyx		23	0.0091
Tharyx sp. A Morris		273	
Arthropoda : Amphipoda		23	0.0068
Uncinaria rorata		45	0.0011
Arthropoda : Decapoda		23	0.0023
Ovalipes stephensi (Epi.)		68	0.0091
Arthropoda : Tanaidacea		45	15.423
Tanassis psammophilus		23	
Cnidaria : Anthozoa		45	
Anthozoa		23	
Echino dermata : Echinidea		114	0.0068
Melita qui nqua esperforata		23	
Mollusca : Bivalvia		22	
Ensis directus		5205	15.751
Macoma tenta		5159	15.750
Spirula solida			
Tellina agilis			
Nemertina			
Nemertina			
Number of Taxa w/ Epi		23	
Number of Taxa w/o Epi		22	
Total Abundance w/ Epi			
Total Abundance w/o Epi			
Total Biomass w/ Epi			
Total Biomass w/o Epi			

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 02		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Ancistrosyllis hartmanae	23	0.0011	
Apoprionospio pygmaea	114	0.0023	
Caulieriella sp. B (Blake)	182	0.0023	
Glycera dibranchiata	23	0.0011	
Heteromastus filiformis	91	0.0011	
Magelona spp.	159	0.0182	
Nephtyidae *	23	0.0011	
Nephtys buceras	23	0.3545	
Owenia fusiformis	227	0.0295	
Parapironosyllis longicirrata	23	0.0011	
Parapironospio spinifera	23	0.0318	
Polycordius spp.	3886	0.0295	
Sigalion arenicolae	23	0.0091	
Spirochaetopterus costarum	45	0.0023	
Spiophanes bombyx	23	0.0045	
Tharyx sp. A Morris	1227	0.1000	
Arthropoda : Amphipoda			
Acanthohaustorius similis	45	0.0011	
Ampelisca abdita	45	0.0045	
Ampelisca verrilli	23	0.0011	
Protohaustorius cf. deichmannae	68	0.0091	
Arthropoda : Cumacea			
Oxyurostylis smithi	45	0.0068	
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)	23	0.0909	
Arthropoda : Tanaidacea			
Tanaidessus psammophilus	68	0.0011	
Cnidaria : Anthozoa			
Anthozoa	45	0.0023	
Edwardsia elegans	45	0.0045	
Mollusca : Bivalvia			
Ensis directus	68	0.0011	
Lyonsia spp.	23	0.0011	
Spirula solidissima	205	0.0227	
Telliina agilis	68	0.0432	
Nemertina			
Carenomella lactea	68	0.0045	
Nemertina	159	0.0011	
Number of Taxa w/ Epi.	30		
Number of Taxa w/o Epi.	29		
Total Abundance w/ Epi.	7114		
Total Abundance w/o Epi.	7091		
Total Biomass w/ Epi.		0.7852	
Total Biomass w/o Epi.		0.6943	

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 03		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta			
Oligochaeta		500	0.0136
Annelida : Polychaeta			
Amastigites caperatus		45	0.0023
Ampharete arctica		68	0.0977
Ancistrosyllis hartmanae		23	0.0011
Apopriionospio pygmaea		45	0.0045
Ariidea catherinae		23	0.0011
Braniawelli fleetensis		159	0.0023
Dipolydora socialis		45	0.0011
Dorvillea rudolfi		68	0.0023
Euclymenes zonalis		23	0.0136
Eumida sanguinea		227	0.0136
Glycera dibranchiata		91	0.1864
Nephtys picta		45	0.0886
Notomastus spp.		114	0.0011
Onuphis eremita		23	0.0011
Opheliidae		45	0.0011
Owenia fusiformis		136	0.0091
Parapriionospio spinata		23	0.0250
Polycirrus spp.		68	0.0011
Polygordius spp.		18454	0.2705
Spirosetosa		636	2.0954
Spirochaetopterus costarum		23	0.0023
Spiophanes bombyx		182	0.0682
Tharyx sp. A Morris		2773	0.1886
Arthropoda : Amphipoda			
Ampelisca spp.		45	0.0011
Parametopila cypris (Epi.)		68	0.0011
Tiron tropakis		23	0.0011
Uncinella irrorata		114	0.0318
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)		91	0.1977
Arthropoda : Isopoda			
Edoteatriloba (Epi.)		23	0.0011
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.0011
Cnidaria : Anthozoa			
Edwardsia elegans		23	0.0023
Mollusca : Bivalvia			
Ensis directus		341	0.9386
Macoma tenta		136	0.2205
Tellina agilis		68	0.0591
Mollusca : Gastropoda			
Crepidula spp. (Epi.)		114	0.0011
Nassarius trivittatus		23	0.0364
Natica pusilla		23	0.0568
Nemertina			
Micrura spp.		23	0.0011
Nemertina		795	0.0227
Number of Taxa w/ Epi.		40	
Number of Taxa w/o Epi.		36	
Total Abundance w/ Epi.		25773	
Total Abundance w/o Epi.		25477	
Total Biomass w/ Epi.			4.6659
Total Biomass w/o Epi.			4.4648

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 04		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		409	0.0068
Oligochaeta		45	0.0182
Annelida : Polychaeta		23	0.0011
Ampharete arctica		45	0.0023
Ancistrosyllis hartmanae		159	0.0045
Bhawania heteroseta		45	0.0477
Braniawelli fleetensis		23	0.0273
Clymenella torquata		23	0.0045
Dipolydora socialis		23	0.0045
Drilonereis longa		23	0.0045
Eteone heteropoda		23	0.1727
Euclymene zonalis		45	0.0011
Eumida sanguinea		159	0.1159
Glycera dibranchiata		23	0.0011
Mediomastus ambiseta		23	0.0011
Nephtyidae *		23	0.0011
Nephtys picta		23	0.0273
Notomastus spp.		45	0.0011
Owenia fusiformis		23	0.0023
Phylodoce arenacea		91	0.0500
Polycrirus eximus		114	0.1045
Polygordius spp.		9841	0.1795
Polyynidae (Epi.)		23	0.0068
Protodorvilia kefersteini		318	0.0159
Scoletoma spp.		23	0.0023
Sigalion arenicola		23	0.0068
Spiro setosa		614	2.1045
Spiophanes bombyx		45	0.0068
Tharyx sp. A Morris		932	0.1068
Arthropoda : Amphipoda			
Ampelisca spp.		23	0.0011
Protohaustorius cf. dei chmannae		23	0.0011
Tiron tropakis		23	0.0011
Uncinaria ritterata		318	0.0614
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)		45	0.0182
Arthropoda : Tanaidacea			
Tanassis psammophilus		23	0.0023
Cnidaria : Anthozoa			
Edwardsia elegans		68	0.0159
Hemichordata			
Saccoglossus kowalevskii		23	0.0023
Mollusca : Bivalvia			
Ensis directus		45	0.0500
Spirula soliddissima		114	0.1432
Mollusca : Gastropoda			
Crepidula spp. (Epi.)		136	0.0045
Nematina			
Nemertina		568	0.0227
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		35	
Total Abundance w/ Epi.		14591	
Total Abundance w/o Epi.		14386	
Total Biomass w/ Epi.			3.3477
Total Biomass w/o Epi.			3.3182

Sample Year : Yr1	Trip : Summer 04	Site : N Borrow Site
Station : 05	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	23	0.0011
Annelida : Polychaeta Caulieriella sp. B (Blake)	23	0.0011
Clymenella torquata	23	0.0205
Magelona spp.	23	0.0011
Mediomastus ambiseta	68	0.0011
Owenia fusiformis	114	0.0205
Polygordius spp.	1705	0.0182
Spirillicornis	23	0.0011
Spirophanes bombyx	91	0.0159
Tharyx sp. A Morris	500	0.0705
Arthropoda : Amphipoda Byblis serrata	136	0.0011
Protohaustorius cf. deichmannae	182	0.0159
Uncinaria rorata	45	0.0318
Arthropoda : Tanaidacea Tanaidus psammophilus	91	0.0023
Chordata : Cephalochordata Branchiostoma caribaeum	23	0.0011
Mollusca : Bivalvia Spirula solidissima	91	0.1977
Tellina agilis	45	0.0023
Mollusca : Gastropoda Cylindrella bidentata (Epi.)	23	0.0136
Epteronium humphreysi (Epi.)	23	0.0227
Nassarius trivittatus	23	1.2545
Nemertina Amphiporus bimaculatus	23	0.0227
Nemertina	273	0.0114
Number of Taxa w/ Epi.	22	
Number of Taxa w/o Epi.	20	
Total Abundance w/ Epi.	3568	
Total Abundance w/o Epi.	3523	
Total Biomass w/ Epi.		1.7284
Total Biomass w/o Epi.		1.6920

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		68	0.0011
Oligochaeta			
Annelida : Polychaeta			
Amastigaster caperatus		318	0.0045
Aporionospio pygmaea		523	0.0409
Ariidea cathartae		91	0.0023
Ariidea wassi		159	0.0114
Capitella capitata complex		523	0.0068
Caulieriella sp. B (Blake)		23	0.0068
Dorvillea rudolphii		23	0.0011
Glycera dibranchiata		23	0.0114
Leitoscoloplos spp.		23	0.0159
Magefona spp.		23	0.0011
Mediomastus ambiseta		23	0.0011
Nephtyidae *		45	0.0011
Nephtys picta		114	0.2864
Owenia fusiformis		568	0.0455
Parapriionospio spinata		45	0.0432
Polygordius spp.		591	0.0023
Spiralia setosa		45	0.0500
Spirochaetopterus costarum		45	0.0011
Spirophanes bombyx		114	0.0045
Tharyx sp. A Morris		7455	0.3500
Arthropoda : Amphipoda			
Americochelidium americanum		68	0.0068
Ampelisca verrilli		136	0.0159
Rhepoxynius hudsoni		250	0.0295
Tiron tropakis		45	0.0045
Uncinaria rorata		23	0.0023
Arthropoda : Cumacea			
Oxyurostylis smithi		23	0.0011
Cnidaria : Anthozoa			
Anthozoa			
Mollusca : Bivalvia			
Ensis directus		45	0.1705
Spirula solidissima		68	0.0011
Tellina agilis		159	0.0114
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		205	0.0136
Kurtziella astrostyla (Epi.)		23	0.0318
Natica pusilla		23	0.0023
Nemertina			
Amphiporus bicoloratus		23	0.0045
Nemertina		23	0.0477
Number of Taxa w/ Epi		35	
Number of Taxa w/o Epi		33	
Total Abundance w/ Epi		11977	
Total Abundance w/o Epi		11750	
Total Biomass w/ Epi			1.2341
Total Biomass w/o Epi			1.1886

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 07		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta		23	0.0011
Oligochaeta			
Annelida : Polychaeta		2023	0.1068
Amastigaster		23	0.0011
Ampelisca heteroseta		409	0.0341
Capitella capitata complex		23	0.0011
Euclymene zonalis		23	0.0364
Glycera americana		159	0.4295
Leptoscoloplos spp.		23	0.0011
Magelona spp.		68	0.0091
Mediomastus ambiseta		4636	0.2477
Nephtys incisa		23	0.0545
Owenia fusiformis		591	0.0568
Parapriionospio spinata		705	2.0204
Polygordius spp.		45	0.0023
Scolepiopsis bousfieldi		114	0.0341
Sigambra tentaculata		386	0.0386
Spirochaetopterus costarum		68	0.0091
Spiophanes bombyx		45	0.0114
Sthenelais limicola		68	0.0636
Tharyx sp. A Morris		4182	0.2750
Arthropoda : Amphipoda			
Ampelisca abdita		23	0.0011
Arthropoda : Cumacea			
Oxyurostylis smithi		23	0.0045
Arthropoda : Isopoda			
Edotea triloba (Epi.)		45	0.0011
Cnidaria : Anthozoa			
Anthozoa		68	0.0159
Edwardsia elegans		91	0.0682
Hemichordata			
Saccoglossus kowalevskii		45	0.0182
Mollusca : Bivalvia			
Ensis directus		114	2.1091
Macoma tenta		432	0.9523
Mulinia lateralis		23	0.2545
Mytilus edulis (Epi.)		23	0.0011
Tellina agilis		795	1.4182
Yoldia limatula		23	0.8318
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		1341	0.1023
Eponium spp. (Epi.)		23	0.0091
Nassarius trivittatus		68	0.4000
Odostomia spp. (Epi.)		91	0.0045
Polinices duplex		23	11.525
Nemertina			
Amphiporus biconatus		45	0.0011
Carenzia lactea		455	0.1250
Micrura spp.		23	0.0159
Phoronida			
Phoronis spp.		614	0.0455
Number of Taxa w/ Epi.		42	
Number of Taxa w/o Epi.		37	
Total Abundance w/ Epi.		18045	
Total Abundance w/o Epi.		16523	
Total Bi mass w/ Epi.			21.340
Total Bi mass w/o Epi.			21.222

Sample Year : Yr1	Trip : Summer 04	Site : N Borrow Site
Station : 08	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Polychaeta		
Amastigogos caperatus	68	0.0011
Ampharetdae	23	0.0011
Apopriionospio pygmaea	23	0.0011
Chaetopterus spp.	23	0.0011
Leitoscoloplos spp.	23	0.0068
Magelona spp.	205	0.0409
Nephtyidae *	91	0.0091
Nephrys picta	23	0.0659
Notomastus spp.	136	0.0205
Owenia fusiformis	795	0.1523
Paragonius fulgens	23	0.0011
Parapriionospio spinata	23	0.0432
Phylodoce arenae	23	0.0114
Polygordius spp.	977	0.0045
Pygospio elegans	23	0.0023
Spirosetosa	45	0.0091
Spiochaetopterus costarum	23	0.0023
Spiophanes bombyx	45	0.0295
Tharyx sp. A Morris	955	0.0591
Arthropoda : Amphipoda		
Acanthohaustorius similis	45	0.0295
Acanthohaustorius similis	45	0.0159
Acanthohaustorius spp. *	114	0.0023
Americichelidium americanum	23	0.0023
Ampelisca spp.	23	0.0023
Protohaustorius cf. deichmannae	750	0.0977
Rhepoxynius hudsoni	23	0.0011
Tiron tropakis	23	0.0011
Uncinaria irrora	23	0.0091
Arthropoda : Cumacea		
Oxyurostylis smithi	23	0.0045
Arthropoda : Isopoda		
Chiridotea tuftsi	68	0.0250
Arthropoda : Tanaidacea		
Tanassis psammophilus	68	0.0023
Chordata : Cephalochordata		
Branchiostoma californiense	23	0.0011
Cnidaria : Anthozoa		
Anthozoa	23	0.0011
Echi noidea : Echinidea		
Echinidea	23	0.0045
Hemichordata		
Saccoglossus kowalevskii	23	0.0091
Mollusca : Bivalvia		
Ensis directus	45	0.0091
Spirula solidissima	409	0.0068
Mollusca : Gastropoda		
Natica pusilla	23	0.0011
Odostomia spp. (Epi.)	91	0.0023
Nemertina		
Micrura spp.	23	0.0114
Nemertina	477	0.0227
Number of Taxa w/ Epi.	39	
Number of Taxa w/o Epi.	38	
Total Abundance w/ Epi.	5932	
Total Abundance w/o Epi.	5841	
Total Bi mass w/ Epi.		0.7250
Total Bi mass w/o Epi.		0.7227

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Amastigogos caperatus		3318	0.1182
Ampharetdae		23	0.0011
Aporionospio pygmaea		205	0.0068
Glycera spp.		45	0.0011
Glycinde solitaria		23	0.0011
Leptoscoloplos spp.		23	0.0045
Magelona spp.		23	0.0011
Mediomastus ambi seta		2136	0.0386
Nephtys picta		136	0.1500
Owenia fusiformis		227	0.0136
Parapriionospio pinnata		205	0.3114
Pectinaria gouldii		23	0.0011
Phylodoce arenae		23	0.0011
Polygordius spp.		91	0.0023
Spirochaetopterus costarum		45	0.0068
Spiophanes bombyx		68	0.0011
Terebellidae		23	0.0023
Tharyx sp. A Morris		1364	0.0591
Arthropoda : Amphipoda			
Ampelisca abdita		45	0.0011
Ampelisca verrilli		23	0.0023
Protohaustorius cf. deichmannae		23	0.0045
Arthropoda : Cumacea			
Cyclaspis varians		23	0.0023
Oxyurostylis smithi		68	0.0023
Arthropoda : Decapoda			
Ogyrides spp.		23	0.0023
Arthropoda : Isopoda			
Edotea triloba (Epi.)		45	0.0045
Cnidaria : Anthozoa			
Anthozoa		91	0.0273
Mollusca : Bivalvia			
Ensis di rectus		23	0.0409
Spirula solidissima		136	0.0011
Tellina agilis		455	0.2000
Mollusca : Gastropoda			
Acteocina canalculata		23	0.0011
Cylindrella bidentata (Epi.)		727	0.0227
Nassarius trivittatus		45	0.0273
Odostomia spp. (Epi.)		68	0.0011
Nemertina			
Nemertina		68	0.0068
Phoronida			
Phoronis spp.		273	0.0182
Platyhelminthes : Turbellaria			
Turbellaria (Epi.)		45	0.0114
Number of Taxa w/ Epi.		36	
Number of Taxa w/o Epi.		32	
Total Abundance w/ Epi.		10205	
Total Abundance w/o Epi.		9318	
Total Biomass w/ Epi.			1.0989
Total Biomass w/o Epi.			1.0591

Sample Year : Yr1		Trip : Summer 04	Site : N Borrow Site
Station : 10		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		23	0.0011
Oligochaeta			
Annelida : Polychaeta			
Amastigaster caperatus		705	0.0227
Apopriionospio pygmaea		1227	0.1136
Dipolydora quadrilobata (Epi.)		23	0.0023
Euclymene zonalis		23	0.0250
Eumida sanginea		45	0.0011
Glycera spp.		23	0.0023
Glycinde solitaria		45	0.0136
Leptoscoloplos spp.		91	0.0114
Magelona spp.		23	0.0011
Mediomastus ambiseta		1295	0.0568
Nephtyidae		45	0.0091
Notomastus spp.		45	0.0011
Owenia fusiformis		841	0.0886
Parapriionospio spinata		227	0.9114
Pectinaria gouldii		23	0.0011
Phylodoce arenae		45	0.0068
Sabacaelongatus		23	0.0114
Scolelepis bousfieldi		23	0.0045
Sigambra tentaculata		45	0.0023
Spirophanes bombyx		68	0.0091
Sthenelais limicola		68	0.0727
Tharyx sp. A Morris		2182	0.1636
Arthropoda : Amphipoda			
Americanellidium americanum		45	0.0023
Ampelisca verrilli		23	0.0068
Arthropoda : Cumacea			
Oxyurostylis smithi		68	0.0011
Arthropoda : Decapoda			
Pagurus pollicaris (Epi.)		23	0.1477
Hemichordata			
Saccoglossus kowalevskii		23	0.0045
Mollusca : Bivalvia			
Ensis directus		91	0.1977
Tellina agilis		932	0.4773
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		955	0.1114
Eponidium humphreysi (Epi.)		23	0.0023
Nassarius trivittatus		205	0.9432
Odostomia spp. (Epi.)		205	0.0091
Nemertina			
Carenomella lactea		136	0.0182
Phoronida			
Phoronis spp.		136	0.0045
Number of Taxa w/ Epi.		36	
Number of Taxa w/o Epi.		31	
Total Abundance w/ Epi.		10023	
Total Abundance w/o Epi.		8795	
Total Biomass w/ Epi.			3.4591
Total Biomass w/o Epi.			3.1864

Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 01	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	45	0.0011
Annelida : Polychaeta Parougia caeca	68	0.0023
Scoloplos rubra	23	0.0023
Arthropoda : Isopoda Ancinus depressus	23	0.0011
Arthropoda : Tanaidacea Tanaissus psammophilus	23	0.0023
Chordata : Cephalochordata Branchiostoma caribaeum	68	0.2250
Mollusca : Bivalvia Spirula solidissima	23	0.0011
Nemertina	409	0.0136
Number of Taxa w/ Epi.	8	
Number of Taxa w/o Epi.	8	
Total Abundance w/ Epi.	682	
Total Abundance w/o Epi.	682	
Total Biomass w/ Epi.		0.2489
Total Biomass w/o Epi.		0.2489

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Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 02	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	23	0.0011
Annelida : Polychaeta Hesionura coerulea	23	0.0011
Opheliidae	23	0.0045
Parapionosyllis longicirrata	23	0.0011
Parougia caeca	23	0.0011
Protodorvillea kefersteini	23	0.0011
Arthropoda : Decapoda Pagurus spp. (Epi.)	23	0.0011
Arthropoda : Mysidacea Bomaniella spp. (Epi.)	23	0.0011
Arthropoda : Tanaidacea Tanaissus psammophilus	91	0.0011
Chordata : Cephalochordata Branchiostoma caribaeum	23	0.0045
Mollusca : Bivalvia Spirula solidissima	136	0.0011
Mollusca : Gastropoda Natica pusilla	68	0.0045
Nemertina	91	0.0023
Number of Taxa w/ Epi.	13	
Number of Taxa w/o Epi.	11	
Total Abundance w/ Epi.	591	
Total Abundance w/o Epi.	545	
Total Biomass w/ Epi.		0.0261
Total Biomass w/o Epi.		0.0239

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Sample Year : Yr1		Trip : Fall 04	Site : N Borrow Site
Station : 03		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	91	0.0045
Annelida : Polychaeta			
Amastigidae caperatus		159	0.0091
Ancistrosyllis hartmanae		23	0.0045
Dorvillea rudolphi		23	0.0011
Mediomastus ambi seta		1773	0.0523
Microphtalmus aberrans		727	0.0045
Parapionosyllis longicirrata		23	0.0023
Parouliga caeca		182	0.0136
Polydora cornuta		45	0.0023
Polydora websteri (Epi.)		23	0.0011
Polygordius spp.		1136	0.0750
Spiophanes bombyx		23	0.0023
Tharyx sp. A Morris		227	0.0455
Arthropoda : Amphipoda			
Micropontoporus raneyi (Epi.)		23	0.0011
Uncinaria ritteri		23	0.0011
Arthropoda : Decapoda			
Pagurus spp. (Epi.)		45	0.0068
Arthropoda : Isopoda			
Edotea triloba (Epi.)		68	0.0068
Arthropoda : Tanaidacea			
Tanassis psammophilus		23	0.0023
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.0273
Echinodermata : Holothuroidea			
Pentamerula pulcherima		23	0.0011
Nemertina			
Nemertina		23	0.0023
Number of Taxa w/ Epi.		21	
Number of Taxa w/o Epi.		17	
Total Abundance w/ Epi.		4705	
Total Abundance w/o Epi.		4545	
Total Bi mass w/ Epi.			0.2670
Total Bi mass w/o Epi.			0.2511

Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 04	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	23	0.0011
Annelida : Polychaeta Amastigaster caperatus	477	0.0091
Mediomastus ambiseta	45	0.0011
Nephtys picta	136	0.1341
Owenia fusiformis	114	0.0011
Polycyora websteri (Epi.)	23	0.0011
Polycordius spp.	205	0.0045
Spirophanes bombyx	23	0.0011
Tharyx sp. A Morris	227	0.0750
Arthropoda : Amphipoda Protohaustorius cf. deichmannae	45	0.0011
Tiron tropakis	23	0.0011
Arthropoda : Cumacea Oxyurostylis smithi	23	0.0045
Arthropoda : Decapoda Pagurus longicarpus (Epi.)	45	0.0500
Arthropoda : Isopoda Edotea triloba (Epi.)	23	0.0023
Mollusca : Bivalvia Spirula solidissima	68	0.0011
Tellina agilis	23	0.0091
Mollusca : Gastropoda Nassarius trivittatus	23	0.0114
Natica pusilla	295	0.0182
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Number of Taxa w/ Epi.	18	
Number of Taxa w/o Epi.	15	
Total Abundance w/ Epi.	1841	
Total Abundance w/o Epi.	1750	
Total Biomass w/ Epi.		0.3273
Total Biomass w/o Epi.		0.2739
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Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 05	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	23	0.0011
Annelida : Polychaeta Amastigaster caperatus	23	0.0432
Hesionura coerulea	23	0.0011
Magelona spp.	45	0.0250
Mediomastus ambiseta	23	0.0011
Owenia fusiformis	45	0.0023
Phylodoce arenae	23	0.0011
Polycordius spp.	91	0.0068
Tharyx sp. A Morris	23	0.0023
Arthropoda : Amphipoda Acanthohaustorius similis	23	0.0011
Microprotopus raneyi (Epi.)	45	0.0011
Protohaustorius wigleyi	45	0.0011
Arthropoda : Tanaidacea Tanaidessus psammophilus	159	0.0023
Mollusca : Bivalvia Spirula solidissima	23	0.0011
Mollusca : Gastropoda Nassarius trivittatus	23	0.3114
Natica pusilla	68	0.0011
Nemertina Cerebratulus lacteus	23	0.0011
Nemertina	45	0.0068
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Number of Taxa w/ Epi.	18	
Number of Taxa w/o Epi.	17	
Total Abundance w/ Epi.	773	
Total Abundance w/o Epi.	727	
Total Biomass w/ Epi.		0.4114
Total Biomass w/o Epi.		0.4102
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Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 06	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Bhawania heteroseta Magelona spp. Nephtys buccula Polycordius spp. Arthropoda : Amphipoda Parahaustorius longimerus Arthropoda : Mysidacea Bowmaniella spp. (Epi.) Arthropoda : Tanaidacea Tanaissus psammophilus Chordata : Cephalochordata Branchiostoma caribaeum Mollusca : Gastropoda Natica pusilla	23 23 23 91 23 45 68 23 23	0.0011 0.0295 0.0011 0.0011 0.0864 0.0023 0.0068 0.0011
Number of Taxa w/ Epi.	9	
Number of Taxa w/o Epi.	8	
Total Abundance w/ Epi.	341	
Total Abundance w/o Epi.	295	
Total Biomass w/ Epi.		0.1307
Total Biomass w/o Epi.		0.0443

Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 07	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta Annelida : Polychaeta Amastigus caperatus Magelona spp. Nephtys picta Owenia fusiformis Paroquia caeca Polycordius spp. Spirophanes bombyx Tharyx sp. A Morris Arthropoda : Amphipoda Microprotopus raneyi (Epi.) Protohaustorius cf. dei chmannae Rhepoxynius hudsoni Mollusca : Bivalvia Spirula solidissima Mollusca : Gastropoda Nassarius trivittatus Natica pusilla Nemertina Nemertina	23 205 68 23 23 68 136 23 23 68 23 23 16 23 23 159 23	0.0011 0.0091 0.0636 0.0727 0.0011 0.0011 0.0068 0.0068 0.0045 0.0023 0.0011 0.0011 0.0011 0.0011 0.1227 0.0114 0.0023
Number of Taxa w/ Epi.	16	
Number of Taxa w/o Epi.	15	
Total Abundance w/ Epi.	932	
Total Abundance w/o Epi.	864	
Total Biomass w/ Epi.		0.3091
Total Biomass w/o Epi.		0.3068

Sample Year : Yr1		Trip : Fall 04	Site : N Borrow Site
Station : 08		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	45	0.0011
Annelida : Polychaeta			
Amastigaster caperatus		341	0.0068
Ancistrosyllis hartmanae		23	0.0045
Apophionospio pygmaea		159	0.0159
Ariidea catherinae		818	0.0455
Ariidea wassi		205	0.0136
Caulieriella sp. B (Blake)		318	0.0159
Dironereis longa		23	0.0114
Magelona spp.		23	0.0114
Nephtys picta		159	0.1705
Owenia fusiformis		273	0.0091
Polygordius spp.		386	0.0091
Scolelepis bousfieldi		45	0.0114
Siphonophanes bombyx		159	0.0091
Tharyx sp. A Morris		955	0.1045
Arthropoda : Amphipoda			
Ampelisca verrilli		23	0.0341
Protohaustorius cf. deichmannae		23	0.0011
Rhepoxynius hudsoni		91	0.0159
Tiron tropakis		45	0.0091
Arthropoda : Isopoda			
Edotea triloba (Epi.)		23	0.0011
Mollusca : Bivalvia			
Ensis directus		45	0.0045
Spirula solidissima		23	0.0045
Tellina agilis		45	0.0068
Mollusca : Gastropoda			
Kurtziella atrostyla (Epi.)		23	0.0136
Natica pusilla		159	0.0682
Nemertina			
Carenomella lactea		68	0.0455
Number of Taxa w/ Epi.		26	
Number of Taxa w/o Epi.		24	
Total Abundance w/ Epi.		4500	
Total Abundance w/o Epi.		4455	
Total Biomass w/ Epi.			0.6443
Total Biomass w/o Epi.			0.6295

Sample Year : Yr1		Trip : Fall 04	Site : N Borrow Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Apophionospio pygmaea		23	0.0045
Ariidea catherinae		23	0.0023
Magelona spp.		23	0.0114
Nephtys picta		23	0.0114
Owenia fusiformis		45	0.0011
Polydora websteri (Epi.)		23	0.0011
Polygordius spp.		45	0.0023
Arthropoda : Amphipoda			
Acanthohaustorius spp.		23	0.0011
Ampelisca verrilli		23	0.0114
Microprotopus raneyi (Epi.)		23	0.0011
Protohaustorius cf. deichmannae		136	0.0273
Mollusca : Gastropoda			
Natica pusilla		91	0.0227
Nemertina			
Cerebratulus lacteus		23	0.0864
Nemertina		68	0.0227
Number of Taxa w/ Epi.		14	
Number of Taxa w/o Epi.		12	
Total Abundance w/ Epi.		591	
Total Abundance w/o Epi.		545	
Total Biomass w/ Epi.			0.2068
Total Biomass w/o Epi.			0.2045

Sample Year : Yr1	Trip : Fall 04	Site : N Borrow Site
Station : 10	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Polychaeta		
<i>Dipolydora commensalis</i> (Epi.)	23	0.0011
<i>Magelona</i> spp.	23	0.0023
<i>Polydora websteri</i> (Epi.)	68	0.0091
<i>Polygordius</i> spp.	68	0.0011
<i>Scolelepis squamata</i>	23	0.0011
Arthropoda : Amphipoda		
<i>Protohaustorius cf. deichmannae</i>	159	0.0091
Arthropoda : Cumacea		
<i>Mancocuma stellifera</i>	23	0.0011
Arthropoda : Decapoda		
<i>Pagurus longicarpus</i> (Epi.)	45	0.1955
Cnidaria : Anthozoa		
<i>Edwardsia elegans</i>	23	0.0023
Mollusca : Gastropoda		
<i>Nassarius trivittatus</i>	23	0.0841
<i>Natica pusilla</i>	68	0.0045
Nemertina		
Nemertinea	114	0.1068
<hr/>		
Number of Taxa w/ Epi.	12	
Number of Taxa w/o Epi.	9	
Total Abundance w/ Epi.	659	
Total Abundance w/o Epi.	523	
Total Bi mass w/ Epi.		0.4182
Total Bi mass w/o Epi.		0.2125

Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 01	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	227	0.0068
Annelida : Polychaeta Branchiwellfleetensis	23	0.0011
Hesionura coineau	159	0.0011
Protodriloides chaetifer (Epi.)	114	0.0023
Arthropoda : Amphipoda Uncinaria ritterata	23	0.0023
Nemertina Nemertina	955	0.0409
<hr/>		
Number of Taxa w/ Epi.	6	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	1500	
Total Abundance w/o Epi.	1386	
Total Biomass w/ Epi.		0.0545
Total Biomass w/o Epi.		0.0523
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Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 02	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta Caulieriella sp. B (Blake) Magelona spp. Nephtys picta Polygordius spp. Siphophanes bombyx Tharyx sp. A Morris	23 23 91 45 45 68	0.0011 0.0068 0.1318 0.0011 0.0011 0.0159
Arthropoda : Amphipoda Acanthohaustorius similis Protohaustorius cf. dei chmannae Rhepoxynius hudsoni	182 114 23	0.0727 0.0182 0.0011
Chordata : Cephalochordata Branchiostoma caribaeum	91	0.3159
Nemertina Nemertina	68	0.0091
<hr/>		
Number of Taxa w/ Epi.	11	
Number of Taxa w/o Epi.	11	
Total Abundance w/ Epi.	773	
Total Abundance w/o Epi.	773	
Total Biomass w/ Epi.		0.5750
Total Biomass w/o Epi.		0.5750
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Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 03	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Dorvillea rudolfi	91	0.0068
Hesionura coineau	23	0.0068
Magelona spp.	23	0.0250
Polygordius spp.	68	0.0023
Scolelepis bousfieldi	23	0.0114
Arthropoda : Amphipoda		
Acanthohaustorius similis	23	0.0159
Protohaustorius cf. deichmannae	23	0.0182
Arthropoda : Cumacea		
Oxyurostylis smithi	23	0.0023
Arthropoda : Tanaidacea		
Tanassisus psammophilus	136	0.0011
Chordata : Cephalochordata		
Branchiostoma caribaeum	23	0.0136
Nemertina		
Nemertina	227	0.0250
Number of Taxa w/ Epi.	11	
Number of Taxa w/o Epi.	11	
Total Abundance w/ Epi.	682	
Total Abundance w/o Epi.	682	
Total Biomass w/ Epi.		0.1284
Total Biomass w/o Epi.		0.1284

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Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 04	Type : Offshore	Gear : VV-YM
<hr/>		
TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Amastigaster caperatus	23	0.0011
Magelona spp.	45	0.0568
Polygordius spp.	68	0.0011
Arthropoda : Amphipoda		
Protohaustorius cf. deichmannae	23	0.0023
Arthropoda : Tanaidacea		
Tanassisus psammophilus	318	0.0091
Mollusca : Bivalvia		
Spirula solidaissima	23	2.8454
Number of Taxa w/ Epi.	6	
Number of Taxa w/o Epi.	6	
Total Abundance w/ Epi.	500	
Total Abundance w/o Epi.	500	
Total Biomass w/ Epi.		2.9159
Total Biomass w/o Epi.		2.9159

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Sample Year : Yr1		Trip : Winter 05	Site : N Borrow Site
Station : 05		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Polycordius spp.		23	0.0011
Scolelepis bousfieldi		23	0.0091
Tharyx sp. A Morris		23	0.0011
Arthropoda : Amphipoda			
Acanthohaustorius similis		23	0.0341
Protohaustorius cf. deichmannae		45	0.0295
Arthropoda : Isopoda			
Ancinus depressus		23	0.1955
Arthropoda : Tanaidacea			
Tanaidus psammophilus		45	0.0023
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.0295
Nemertina			
Nemertina		273	0.0114
Number of Taxa w/ Epi.		9	
Number of Taxa w/o Epi.		9	
Total Abundance w/ Epi.		500	
Total Abundance w/o Epi.		500	
Total Biomass w/ Epi.			0.3136
Total Biomass w/o Epi.			0.3136

Sample Year : Yr1		Trip : Winter 05	Site : N Borrow Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Amastigus caperatus		205	0.0011
Dorvillea rudolphi		45	0.0011
Polynoidae (Epi.)		23	0.0045
Arthropoda : Amphipoda			
Protohaustorius cf. deichmannae		23	0.0045
Arthropoda : Cumacea			
Mancocuma stellifera		45	0.0011
Arthropoda : Isopoda			
Ancinus depressus		45	0.0159
Mollusca : Gastropoda			
Nassarius trivittatus		23	0.0773
Number of Taxa w/ Epi.		7	
Number of Taxa w/o Epi.		6	
Total Abundance w/ Epi.		409	
Total Abundance w/o Epi.		386	
Total Biomass w/ Epi.			0.1057
Total Biomass w/o Epi.			0.1011

Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 07	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta Oligochaeta	136	0.0011
Annelida : Polychaeta Amastigaster caperatus	23	0.0011
Hesionura coineau	23	0.0011
Opheliidae	23	0.0045
Polynoidae (Epi.)	23	0.0011
Protodriloides chaetifer (Epi.)	91	0.0011
Tharyx sp. A Morris	23	0.0011
Arthropoda : Isopoda Chiridotea caeca	45	0.0500
Nemertina Micrura spp.	23	0.0477
Nemertina	2295	0.0591
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Number of Taxa w/ Epi.	10	
Number of Taxa w/o Epi.	8	
Total Abundance w/ Epi.	2705	
Total Abundance w/o Epi.	2591	
Total Bi mass w/ Epi.		0.1682
Total Bi mass w/o Epi.		0.1659
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Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 08	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Polychaeta Dorvillea rudolphi	91	0.0023
Glycera spp.	23	0.0011
Polygordius spp.	45	0.0023
Mollusca : Bivalvia Spirula solidissima	91	0.0023
Nemertina Nemertina	3682	0.1045
<hr/>		
Number of Taxa w/ Epi.	5	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	3932	
Total Abundance w/o Epi.	3932	
Total Bi mass w/ Epi.		0.1125
Total Bi mass w/o Epi.		0.1125
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Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 09	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	68	0.0011
Annelida : Polychaeta Glycera dibranchiata	91	0.0182
Hesionura coineaui	659	0.0091
Microphtalmus aberrans	45	0.0409
Opheliidae	23	0.0011
Protodriloides chaetifer (Epi.)	23	0.0011
Arthropoda : Tanaidacea Tanaissus psammophilus	91	0.0011
Nemertina Nemertina	1205	0.0409
Number of Taxa w/ Epi.	8	
Number of Taxa w/o Epi.	7	
Total Abundance w/ Epi.	2205	
Total Abundance w/o Epi.	2182	
Total Biomass w/ Epi.		0.1136
Total Biomass w/o Epi.		0.1125

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Sample Year : Yr1	Trip : Winter 05	Site : N Borrow Site
Station : 10	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	23	0.0011
Annelida : Polychaeta Amastigites caperatus	45	0.0011
Arthropoda : Tanaidacea Tanaissus psammophilus	136	0.0011
Mollusca : Gastropoda Cylinchella bidentata (Epi.)	23	0.0023
	68	0.0023
Nemertina Nemertina	477	0.0023
Number of Taxa w/ Epi.	6	
Number of Taxa w/o Epi.	5	
Total Abundance w/ Epi.	773	
Total Abundance w/o Epi.	750	
Total Biomass w/ Epi.		0.0102
Total Biomass w/o Epi.		0.0080

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Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 01		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		227	0.0068
Oligochaeta		45	0.4159
Annelida : Polychaeta		8659	0.4705
Aglaphamus verrilli		568	0.0591
Amastigosa caperatus		795	0.0568
Aporionospio pygmaea		114	0.0114
Ariidea catherinae		318	0.0045
Asabelides oculata		23	0.0045
Capitella capitata complex		23	0.0205
Caulieriella sp. B (Blake)		23	0.1795
Drilonereis longa		250	0.0409
Leitoscoloplos robustus		2545	0.1091
Mageلونا spp.		159	0.0432
Mediomastus ambi seta		45	0.0091
Nephtys picta		68	0.0682
Notomastus spp.		45	0.0045
Owenia fusi formis		114	0.0011
Phylodoce arenae		136	0.0045
Polydora cornuta		205	0.0227
Polygordius spp.		318	0.0591
Spirosetosa		45	0.5636
Spiophanes bombyx		11841	1.9773
Sthenelais limicola			
Tharyx sp. A Morris			
Arthropoda : Amphipoda		45	0.0159
Uncinaria rorata		23	0.0068
Arthropoda : Cumacea			
Oxyurostylis smithi			
Mollusca : Bivalvia			
Ensis directus		182	0.0250
Gemma gemma		23	0.0011
Petricola pholadiformis		45	0.0011
Tellina agilis		636	0.6364
Mollusca : Gastropoda			
Cylchnella bidentata (Epi.)		23	0.0023
Epteronium spp. (Epi.)		23	0.0011
Nassarius trivittatus		23	0.5295
Odostoma spp. (Epi.)		159	0.0159
Turbonilla interrupta (Epi.)		45	0.0023
Turbonilla stricta (Epi.)		23	0.0023
Nemertina			
Carinomella lactea		23	0.0011
Micrura spp.		68	0.0182
Phoronida			
Phoronis spp.		68	0.0091
Platyhelminthes : Turbellaria			
Turbellaria (Epi.)		68	0.0045
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		32	
Total Abundance w/ Epi.		28045	
Total Abundance w/o Epi.		27704	
Total Biomass w/ Epi.			5.4057
Total Biomass w/o Epi.			5.3773

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 02		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta			
Oligochaeta		136	0.0023
Annelida : Polychaeta			
Aglaphamus verrilli		68	0.1273
Amastigus caperatus		3455	0.2364
Ampharetidae		23	0.0023
Apopriionospio pygmaea		273	0.0341
Ariidea cathirinae		818	0.0682
Ariidea wassi		23	0.0023
Capitella capitata complex		91	0.0023
Caulieriella sp. B (Blake)		23	0.0023
Glycera americana		45	0.1682
Magelona spp.		432	0.1432
Mediomastus ambiseta		5273	0.2273
Nephtys picta		114	0.1318
Notomastus spp.		91	0.0182
Owenia fusiformis		45	0.3841
Parapriionospio spinata		23	0.0011
Pista cristata		23	0.3477
Polycydra cornuta		91	0.0023
Polygordius spp.		114	0.0091
Scolelepis bousfieldi		45	0.0045
Sigmabra tentaculata		23	0.0011
Spirosetosa		136	0.0011
Spiochaetopterus costarum		45	0.0023
Spiophanes bombyx		205	0.0568
Tharyx sp. A Morris		3705	0.6727
Arthropoda : Amphipoda			
Uncinaria rorata		68	0.0318
Arthropoda : Isopoda			
Edotea triloba (Epi.)		23	0.0114
Cnidaria : Anthozoa			
Anthozoa		23	0.3500
Mollusca : Bivalvia			
Ensis directus		91	0.0023
Tellina agilis		432	0.0773
Mollusca : Gastropoda			
Cylinchella oldentata (Epi.)		136	0.0318
Kurtziella atrostyla (Epi.)		23	0.0091
Odostomia spp. (Epi.)		68	0.0023
Turbonilla stricta (Epi.)		91	0.0068
Vitrinella spp. (Epi.)		23	0.0011
Nemertina			
Carenomella lactea		182	0.0477
Micrura spp.		45	0.0045
Phoronida			
Phoronis spp.		91	0.0045
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		32	
Total Abundance w/ Epi.		16614	
Total Abundance w/o Epi.		16250	
Total Biomass w/ Epi.			3.2295
Total Biomass w/o Epi.			3.1670

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 03		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	45	0.0011
Annelida : Polychaeta	Aglaphamus verrilli	23	0.0795
	Amastigaster caperatus	2500	0.1114
	Ampharete finmarchica	23	0.0205
	Apophionospio pygmaea	614	0.0727
	Ariidea catherinae	45	0.0023
	Asabellides oculata	23	0.0023
	Caulieriella sp. B (Blake)	227	0.0205
	Dridionereis longa	23	0.0045
	Glycera dibranchiata	23	0.0011
	Magefona spp.	114	0.0295
	Mediomastus ambiseta	364	0.0114
	Nephtys picta	136	0.2000
	Owenia fusiformis	23	0.0091
	Phylodoce arenae	45	0.0159
	Polygordius spp.	159	0.0136
	Scolelepis bousfieldi	23	0.0011
	Spirifera setosa	68	0.0011
	Spiophanes bombyx	182	0.0227
	Tharyx sp. A Morris	1795	0.5295
Arthropoda : Cumacea	Oxyurostylis smithi	23	0.0011
Cnidaria : Anthozoa	Ceriantheopsis americanus	23	0.0011
Mollusca : Bivalvia	Ensis directus	23	0.0011
	Gemma gemma	23	0.0011
	Tellina agilis	136	0.0523
Mollusca : Gastropoda	Circulus beauforti (Epi.)	45	0.0011
	Cylindrella bidentata (Epi.)	45	0.0011
	Nassarius trivittatus	23	0.3568
	Odostomia spp. (Epi.)	23	0.0023
	Turbonilla stricta (Epi.)	23	0.0023
Nemertina	Carenoma lactea	23	0.0045
	Nemertina	23	0.0318
Platyhelminthes : Turbellaria	Turbellaria (Epi.)	23	0.0011
Number of Taxa w/ Epi :		33	
Number of Taxa w/o Epi :		28	
Total Abundance w/ Epi :		6909	
Total Abundance w/o Epi :		6750	
Total Bi mass w/ Epi .			1.6079
Total Bi mass w/o Epi .			1.6000

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 04		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta			
Oligochaeta		68	0.0045
Annelida : Polychaeta			
Amastigus caperatus		45	0.1318
Aporionospio pygmaea		91	0.0114
Aricia wassi		68	0.0114
Asabellides oculata		23	0.0045
Caulieriella sp. B (Blake)		91	0.0068
Glycerida branchiata		23	1.1727
Magelona spp.		432	0.1773
Mediomastus ambiseta		23	0.0045
Nephtys picta		114	0.1750
Owenia fusiformis		45	0.0932
Spirosetosa		23	0.0068
Spirchaetopterus costarum		23	0.0045
Spiophanes bombyx		182	0.0091
Tharyx sp. A Morris		91	0.0318
Arthropoda : Amphipoda			
Americhelidium americanum		23	0.0023
Protohaustorius cf. deichmannae		45	0.0011
Tiron tropakis		45	0.0068
Arthropoda : Isopoda			
Ancinus depressus		23	0.0091
Edotea triloba (Epi.)		23	0.0045
Mollusca : Bivalvia			
Ensis directus		68	0.0011
Tolina agilis		23	0.0068
Mollusca : Gastropoda			
Turbonilla interrupta (Epi.)		23	0.0091
Phoronida			
Phoronis spp.		23	0.0068
Number of Taxa w/ Epi.		24	
Number of Taxa w/o Epi.		22	
Total Abundance w/ Epi.		1636	
Total Abundance w/o Epi.		1591	
Total Biomass w/ Epi.			1.8932
Total Biomass w/o Epi.			1.8795

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 05		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Amastigus caperatus		45	0.0023
Aricia wassi		23	0.0011
Caulieriella sp. B (Blake)		23	0.0045
Spiophanes bombyx		114	0.0250
Tharyx sp. A Morris		45	0.0091
Arthropoda : Amphipoda			
Byblis serrata		23	0.0409
Protohaustorius cf. deichmannae		23	0.0023
Arthropoda : Tanaidacea			
Tanais sus psammophilus		45	0.0011
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.2000
Echiuromorpha : Echiuromorpha			
Meiliota quinqueesperforata		23	0.0773
Mollusca : Bivalvia			
Ensis directus		45	0.0023
Mollusca : Gastropoda			
Nassarius trivittatus		23	0.5886
Number of Taxa w/ Epi.		12	
Number of Taxa w/o Epi.		12	
Total Abundance w/ Epi.		455	
Total Abundance w/o Epi.		455	
Total Biomass w/ Epi.			0.9545
Total Biomass w/o Epi.			0.9545

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		45	0.0045
Oligochaeta		23	0.2227
Annelida : Polychaeta		727	0.0682
Aglaphamus verrilli		3091	0.5068
Amastigus caperatus		136	0.0114
Apophionospio pygmaea		182	0.0182
Ariidea catherinae		500	0.0364
Ariidea wassi		23	0.1341
Caulieriella sp. B (Blake)		23	0.0273
Glycera dibranchiata		182	0.0409
Goniada littorea		136	0.0023
Magelona spp.		114	0.1159
Mediomastus ambiseta		23	0.0045
Nephtys picta		68	0.0568
Notomastus spp.		23	0.0011
Owenia fusiformis		23	0.0045
Phylodoce arenae		68	0.0045
Polygordius spp.		114	0.0205
Siphonophanes bombyx		23	1.1250
Sthenelais limicola		636	0.1455
Tharyx sp. A Morris			
Arthropoda : Amphipoda			
Americichelidium americanum		23	0.0045
Protohaustorius cf. chmannae		23	0.0011
Rhepoxynius hudsoni		23	0.0114
Arthropoda : Isopoda			
Ancinus depressus		23	0.0068
Mollusca : Bivalvia			
Ensis directus		23	0.0011
Pitar morrhuanus		23	0.0091
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		45	0.0045
Nassarius trivittatus		23	0.3818
Nemertina			
Micrura spp.		45	0.1045
Phoronida			
Phoronis spp.		23	0.0091
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		28	
Total Abundance w/ Epi.		6409	
Total Abundance w/o Epi.		6364	
Total Biomass w/ Epi.			3.0807
Total Biomass w/o Epi.			3.0761

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 07		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		91	0.0023
Oligochaeta			
Annelida : Polychaeta			
Amastigites caperatus		1091	0.0659
Aporionospio pygmaea		1432	0.2886
Ariidea cathernae		23	0.0045
Ariidea wassi		45	0.0023
Asabellides oculata		45	0.0045
Caulieriella sp. B (Blake)		1364	0.0909
Leptoscoloplos robustus		23	1.1409
Mageلونا spp.		182	0.0250
Mediomastus ambo seta		45	0.0023
Nephtys picta		136	0.0273
Notomastus spp.		23	0.0011
Polygordius spp.		159	0.0114
Siphophanes bombyx		182	0.0659
Tharyx sp. A Morris		773	0.3932
Arthropoda : Decapoda			
Pagurus spp. (Epi.)		23	0.0023
Cnidaria : Anthozoa			
Anthozoa		23	0.4409
Mollusca : Bivalvia			
Ensis directus		45	0.0068
Tellina agilis		182	0.0795
Mollusca : Gastropoda			
Turbonilla interrupta (Epi.)		23	0.0011
Nemertina			
Carenomella lactea		23	0.0023
Cerebratulus lacteus		23	0.7659
Micrura spp. *		23	0.0011
Nemertina	*	23	0.0045
Number of Taxa w/ Epi.		23	
Number of Taxa w/o Epi.		21	
Total Abundance w/ Epi.		6000	
Total Abundance w/o Epi.		5955	
Total Biomass w/ Epi.			3.4307
Total Biomass w/o Epi.			3.4273

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 08		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	68	0.0011
Annelida : Polychaeta	Aglaothamus verrilli	23	0.1114
	Amastigaster caperatus	500	0.0136
	Apopriionospio pygmaea	659	0.1000
	Ariidea catharticae	23	0.0011
	Ariidea wassi	45	0.0023
	Asabellides oculata	23	0.0523
	Capitella capitata complex	91	0.0011
	Caulieriella sp. B (Blake)	341	0.0114
	Glycera dibranchiata	23	0.5205
	Magelona spp.	68	0.0114
	Maldividae	23	0.0011
	Mediomastus ambiseta	91	0.0023
	Nephtys picta	68	0.0477
	Owenia fusiformis	45	0.0659
	Phylodoce arenae	23	0.0023
	Polygordius spp.	45	0.0011
	Siphophanes bombyx	250	0.0295
	Tharyx sp. A Morris	136	0.0795
Arthropoda : Amphipoda			
	Microprotopus raneyi (Epi.)	23	0.0011
	Parametopella cypris (Epi.)	23	0.0011
	Rhepoxynius hudsoni	45	0.0159
	Tiron tropakis	23	0.0091
	Uncinaria ritterata	23	0.0011
Cnidaria : Anthozoa			
	Anthozoa	23	1.5704
Mollusca : Bivalvia			
	Ensis directus	23	0.0023
	Tellina agilis	91	0.1318
Mollusca : Gastropoda			
	Eptonium multistriatum (Epi.)	23	0.0011
	Turbonilla interrupta (Epi.)	23	0.0068
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		25	
Total Abundance w/ Epi.		2864	
Total Abundance w/o Epi.		2773	
Total Bi mass w/ Epi.			2.7966
Total Bi mass w/o Epi.			2.7864

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		205	0.0045
Oligochaeta			
Annelida : Polychaeta			
Amastigus caperatus		4818	0.2341
Apopriionospio pygmaea		386	0.0500
Ariciaea cathartae		114	0.0136
Asabellides oculata		45	0.0045
Capitella capitata complex		91	0.0068
Caulieriella sp. B (Blake)		91	0.0045
Dironereis longa		23	0.0205
Glycera dibranchiata		23	0.5636
Heteromastus filiformis		23	0.0045
Leitoscoloplos robustus		23	0.2636
Magelona spp.		45	0.0205
Mediomastus ambiseta		364	0.0114
Nephtys picta		205	0.2136
Notomastus spp.		45	0.0091
Owenia fusiformis		23	0.0295
Parapriionospio pinnata		23	0.0011
Polygordius spp.		23	0.0068
Spirosetosa		23	0.0011
Spirochaetopterus costarum		23	0.0011
Spiophanes bombyx		341	0.0864
Tharyx sp. A Morris		1000	0.2841
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)		23	0.0045
Mollusca : Bivalvia			
Ensis directus		45	0.0023
Tellina agilis		205	0.0500
Mollusca : Gastropoda			
Cylchnella bidentata (Epi.)		23	0.0045
Natica pusilla		23	0.0011
Turbonilla interrupta (Epi.)		23	0.0045
Phoronida			
Phoronis spp.		23	0.0023
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		26	
Total Abundance w/ Epi.		8318	
Total Abundance w/o Epi.		8250	
Total Biomass w/ Epi.			1.9045
Total Biomass w/o Epi.			1.8909

Sample Year : Yr1		Trip : Spring 04	Site : N Ref Site
Station : 10		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	91	0.0011
Annelida : Polychaeta	Amastigidae caperatus	864	0.0477
	Ampharetidae	23	0.0114
	Apopriionospio pygmaea	1750	0.2545
	Arididea catharinae	68	0.0045
	Capitellida capitata complex	182	0.0045
	Caulieriella sp. B (Blake)	1136	0.0932
	Mageolina spp.	182	0.0364
	Mediomastus ambiseta	136	0.0045
	Nephtys picta	250	0.1886
	Notomastus spp.	23	0.0045
	Onuphis eremita	23	0.1114
	Owenia fusiformis	91	0.0705
	Paraoonis fulgens	23	0.0011
	Phylodoce arenae	45	0.0136
	Polygordius spp.	91	0.0045
	Spirosetosa	91	0.0023
	Spirochaetopterus costarum	23	0.0011
	Spiophanes bombyx	273	0.1000
	Sthenelais limicola	23	1.0568
	Tharyx sp. A Morris	1182	0.3659
Arthropoda : Amphipoda			
	Amphiporeia virginiana	23	0.0011
Mollusca : Bivalvia			
	Ensis directus	68	0.0023
	Tellina agilis	205	0.0364
Mollusca : Gastropoda			
	Cylchnella bidentata (Epi.)	23	0.0045
	Gastropoda (Epi.)	23	0.0023
Phoronida			
	Phoronis spp.	45	0.0023
Number of Taxa w/ Epi.		27	
Number of Taxa w/o Epi.		25	
Total Abundance w/ Epi.		6955	
Total Abundance w/o Epi.		6909	
Total Biomass w/ Epi.			2.4273
Total Biomass w/o Epi.			2.4204

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 01		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		568	0.0159
Oligochaeta			
Annelida : Polychaeta		3205	0.1023
Amastigaster caperatus		705	0.0318
Aporionospio pygmaea		295	0.0023
Ariidea catharticae		68	0.0205
Ariidea wassi		182	0.0011
Capitella capitata complex		295	0.0159
Caulerella sp. B (Blake)		23	0.0091
Eteone heteropoda		68	0.0205
Magelona spp.		864	0.0432
Mediomastus ambiseta		114	0.2341
Nephtys picta		1386	0.1136
Owenia fusiformis		23	0.0273
Parapriionospio spinifera		23	0.0114
Phylodoce arenae		227	0.0023
Polygordius spp.		91	0.0205
Scolelepis bousfieldi		45	0.0068
Spirochaetopterus costarum		91	0.0159
Spiophanes bombyx		27068	2.9954
Tharyx sp. A Morris			
Arthropoda : Amphipoda		91	0.0091
Ampelisca verrilli		23	0.0023
Rhepoxynius hudsoni			
Arthropoda : Cumacea		23	0.0045
Oxyurostylis smithi			
Arthropoda : Isopoda		91	0.0068
Edotea triloba (Epi.)		23	0.0011
Cnidaria : Anthozoa		23	0.0045
Anthozoa			
Ceriantheopsis americanus		45	0.0011
Hemichordata		182	0.7341
Saccoglossus kowalevskii		45	0.2727
Mollusca : Bivalvia		455	0.0705
Ensis directus			
Pitar morrhuanus		23	
Tellina agilis		23	
Mollusca : Gastropoda		23	0.0011
Caecum spp.		409	0.0295
Cylindrella bidentata (Epi.)		23	0.0068
Kurtziella astrostyla (Epi.)		205	3.5273
Nassarius trivittatus		182	0.0114
Odostomia spp. (Epi.)		68	0.0068
Turbonilla stricta (Epi.)			
Nemertina		159	0.0114
Carenoma pallactea		23	0.0068
Micrura spp.			
Phoronida		136	0.0068
Phoronis spp.			
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		33	
Total Abundance w/ Epi.		37568	
Total Abundance w/o Epi.		36795	
Total Biomass w/ Epi.			8.4045
Total Biomass w/o Epi.			8.3432

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 02		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Amastigaster caperatus		182	0.0023
Apopionopis pygmaea		45	0.0023
Ariidea wassi		45	0.0023
Glycera spp.		45	0.0068
Magelona spp.		114	0.0159
Nephtyidae		23	0.0045
Onuphis eremita		23	0.0011
Owenia fusiformis		432	0.0932
Polygordius spp.		273	0.0023
Sigambra bassi		23	0.0023
Spiro spp.		23	0.0011
Spirochaetopterus costarum		23	0.0045
Spirophanes bombyx		68	0.0295
Tharyx sp. A Morris		682	0.0659
Arthropoda : Amphipoda			
Acanthohaustorius similis		159	0.0114
Americhelidium americanum		23	0.0011
Protohaustorius cf. deichmannae		545	0.0432
Arthropoda : Decapoda			
Pinnotheridae		136	0.0045
Arthropoda : Tanaidacea			
Tanais susus psammophilus		23	0.0011
Cnidaria : Anthozoa			
Anthozoa		23	0.0023
Echinodermata : Echinoidea			
Melita quinquepunctata		23	17.689
Hemichordata			
Saccoglossus kowalevskii		23	0.0023
Mollusca : Bivalvia			
Ensis directus		23	0.0591
Spirula solidissima		159	0.0045
Tellina agilis		23	0.0011
Mollusca : Gastropoda			
Cylindrella bipunctata (Epi.)		114	0.0114
Nassarius trivittatus		23	0.0545
Nemertina			
Carenatella lactea		23	0.0011
Nemertina		136	0.0205
Phoronida			
Phoronis spp.		23	0.0011
Number of Taxa w/ Epi.		30	
Number of Taxa w/o Epi.		29	
Total Abundance w/ Epi.		3477	
Total Abundance w/o Epi.		3364	
Total Biomass w/ Epi.			18.142
Total Biomass w/o Epi.			18.131

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 03		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	68	0.0011
Annelida : Polychaeta	Amastigosa caperatus	864	0.0227
	Aporionospio pygmaea	1773	0.1591
	Ariidea wassi	136	0.0068
	Capitella capitata complex	114	0.0045
	Caulerellasp. B (Blake)	182	0.0068
	Eumida sanguinea	45	0.0114
	Glycera spp.	91	0.0091
	Goniada littorea	23	0.0045
	Leitoscoloplos spp.	23	0.0011
	Magefona spp.	68	0.0159
	Mediomastus ambiseta	45	0.0011
	Nephtys picta	68	0.0568
	Owenia fusi formis	4636	1.1500
	Phylodoce arenae	45	0.0023
	Polygordius spp.	250	0.0011
	Scoloplos bousfieldi	23	0.0045
	Spirchaetopterus costarum	23	0.0023
	Spiophanes bombyx	136	0.0045
	Sthenelais limicola	45	0.0136
	Tharyx sp. A Morris	1864	0.1114
Arthropoda : Amphipoda			
	Acanthohaustorius spp.	23	0.0011
	Microprotopus raneyi (Epi.)	23	0.0011
	Rhepoxynius hudsoni	45	0.0023
Arthropoda : Cumacea			
	Cyclaspis varians	23	0.0011
	Oxyurostylis smithi	23	0.0011
Arthropoda : Isopoda			
	Ancinus depressus	23	0.0011
	Edotea triloba (Epi.)	23	0.0023
Arthropoda : Mysidacea			
	Bowmaniella spp. (Epi.)	23	0.0045
Cnidaria : Anthozoa			
	Anthozoa	23	0.0011
Echiuromorpha : Holothuroidea			
	Pentamera pulcherima	45	0.0205
Mollusca : Bivalvia			
	Ensis directus	23	0.1455
	Spirula solida issima	91	0.0011
	Tellina agilis	659	0.0091
Mollusca : Gastropoda			
	Nassarius trivittatus	45	1.4091
Nemertina			
	Carenomella lactea	136	0.0409
	Nemertina	45	0.0068
Platyhelminthes : Turbellaria			
	Turbellaria (Epi.)	23	0.0011
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		34	
Total Abundance w/ Epi.		11818	
Total Abundance w/o Epi.		11727	
Total Biomass w/ Epi.			3.2409
Total Biomass w/o Epi.			3.2318

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 04		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	91	0.0011
Annelida : Polychaeta			
Amastigosa caperatus		1659	0.0250
Aporionospio pygmaea		750	0.0682
Ariidea wassi		91	0.0011
Capitella capitata complex		45	0.0011
Caulieriella sp. B (Blake)		1614	0.0409
Eumida sanguinea		23	0.0011
Glycera spp.		68	0.0045
Magefona spp.		114	0.0205
Nephtys picta		91	0.1591
Onuphis eremita		23	0.0011
Owenia fusiformis		2364	0.5318
Parapriionospio spinata		23	0.0432
Phylodoce arenae		23	0.0045
Polygordius spp.		932	0.0068
Scolepiopsis squamata		23	0.0045
Spiophanes bombyx		23	0.0011
Tharyx sp. A Morris		2568	0.1636
Arthropoda : Amphipoda			
Americichlidium americanum		23	0.0011
Micropriopodus raneyi (Epi.)		23	0.0023
Protohaustorius cf. deichmannae		68	0.0045
Rhepoxynius hudsoni		182	0.0068
Arthropoda : Cumacea			
Cyclaspis varians		114	0.0011
Oxyurostylis smithi		114	0.0023
Arthropoda : Isopoda			
Edoteatriloba (Epi.)		68	0.0011
Arthropoda : Mysidacea			
Bowmaniella spp. (Epi.)		23	0.0045
Cnidaria : Anthozoa			
Anthozoa		91	0.0409
Edwardsia elegans		91	0.0045
Mollusca : Bivalvia			
Bivalvia		23	0.0023
Ensis directus		91	0.1795
Spirula solida		114	0.0011
Tellina agilis		432	0.0114
Mollusca : Gastropoda			
Crepidula spp. (Epi.)		68	0.0011
Cylindrella bidentata (Epi.)		136	0.0136
Eptonyx rupicolus (Epi.)		23	0.0011
Nassarius trivittatus		23	0.1795
Natica pusilla		68	0.0477
Odostomia spp. (Epi.)		45	0.0011
Richtaxis punctostriatus		45	0.0023
Nemertina			
Carenoma lactea		68	0.0136
Nemertina		205	0.0318
Number of Taxa w/ Epi.		41	
Number of Taxa w/o Epi.		34	
Total Abundance w/ Epi.		12659	
Total Abundance w/o Epi.		12273	
Total Bi mass w/ Epi.			1.6352
Total Bi mass w/o Epi.			1.6102

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 05		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	23	0.0011
Annelida : Polychaeta	Amastigosa caperatus	227	0.0023
	Aporionospio pygmaea	727	0.0682
	Ariidea wassi	273	0.0091
	Capitella capitata complex	114	0.0045
	Caulieriella sp. B (Blake)	523	0.0091
	Diplouncinata	23	0.2114
	Eumida sanguinea	23	0.0011
	Glycera spp.	91	0.0091
	Magefona spp.	136	0.0432
	Mediomastus ambi seta	23	0.0011
	Nephtys picta	45	0.1227
	Onuphis eremita	23	0.0011
	Owenia fusiformis	2750	0.8523
	Polygordius spp.	182	0.0011
	Spiophanes bombyx	23	0.0011
	Tharyx sp. A Morris	614	0.0386
Arthropoda : Amphipoda	Protohaustorius cf. chmannae	182	0.0091
	Rhepoxynius hudsoni	91	0.0023
Arthropoda : Cumacea	Cyclospis varians	68	0.0011
	Oxyurostylis smithi	159	0.0011
Arthropoda : Decapoda	Pinnotheridae	68	0.0273
Arthropoda : Mysidae	Bowmaniella spp. (Epi.)	45	0.0205
Cnidaria : Anthozoa	Anthozoa	23	0.0011
	Edwardsia elegans	68	0.0182
Echiuromorpha : Echiuromorpha	Echiuromorpha	23	8.3386
Hemichordata	Saccoglossus kowalevskii	23	0.0023
Mollusca : Bivalvia	Ensis directus	23	0.1977
	Spirula solidissima	273	0.0023
	Tellina agilis	341	0.0023
Mollusca : Gastropoda	Crepidula spp. (Epi.)	23	0.0011
	Cylindrella bidentata (Epi.)	182	0.0205
Nemertina	Amphiporus bicoloratus	45	0.0023
	Carenomella lactea	23	0.0227
	Micrura spp.	23	0.0182
	Nemertina	114	0.1614
Phoronida	Phoronis spp.	68	0.0011
Number of Taxa w/ Epi.		37	
Number of Taxa w/o Epi.		34	
Total Abundance w/ Epi.		7682	
Total Abundance w/o Epi.		7432	
Total Biomass w/ Epi.			10.228
Total Biomass w/o Epi.			10.186

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	68	0.0023
Annelida : Polychaeta			
Amastigosa caperatus		1432	0.0182
Apopionospio pygmaea		2250	0.2318
Ariidea wassi		159	0.0114
Capitella capitata complex		159	0.0023
Caulieriella sp. B (Blake)		818	0.0227
Eumida sanguinea		68	0.0045
Glycera dibranchiata		23	0.0159
Magefona spp.		386	0.0500
Nephtys picta		205	0.1455
Onuphis eremita		23	0.0011
Owenia fusiformis		2591	0.5864
Phylodoce arenae		23	0.0011
Polygordius spp.		591	0.0068
Spiochaetopterus costarum		68	0.0068
Spiophanes bombyx		45	0.0023
Tharyx sp. A Morris		1591	0.1068
Arthropoda : Amphipoda			
Ampelisca abdita		23	0.0023
Microprotopus raneyi (Epi.)		23	0.0011
Protohaustorius cf. dei chmannae		159	0.0159
Rhepoxynius hudsoni		68	0.0023
Arthropoda : Cumacea			
Cyclaspis varians		68	0.0023
Oxyurostylis smithi		45	0.0011
Arthropoda : Isopoda			
Edotea triloba (Epi.)		23	0.0023
Arthropoda : Mysidacea			
Bowmaniella spp. (Epi.)		23	0.0045
Cnidaria : Anthozoa			
Anthozoa		91	0.1159
Edwardsia elegans		45	0.0159
Mollusca : Bivalvia			
Ensis directus		45	0.2205
Spirula solida sisma		159	0.0023
Tellina agilis		455	0.1364
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		114	0.0114
Gastropoda *		23	0.0011
Nassarius trivittatus		23	0.1068
Odostomia spp. (Epi.)		23	0.0023
Turbonilla interrupta (Epi.)		23	0.0011
Nematina			
Carenomella lactea		114	0.0318
Microtura spp.		23	0.1114
Nemertina		68	0.0182
Number of Taxa w/ Epi.		37	
Number of Taxa w/o Epi.		31	
Total Abundance w/ Epi.		12136	
Total Abundance w/o Epi.		11886	
Total Bi mass w/ Epi.			2.0227
Total Bi mass w/o Epi.			1.9989

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 07		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	477	0.0114
Annelida : Polychaeta			
Amastigosa caperatus		4409	0.0909
Aporionospio pygmaea		3250	0.2182
Ariidea cathartinae		45	0.0045
Ariidea wassi		45	0.0023
Capitella capitata complex		91	0.0023
Caulieriella sp. B (Blake)		364	0.0159
Eumida sanginea		68	0.0068
Glycera spp.		68	0.0114
Goniada littorea		23	0.0023
Magelona spp.		114	0.0159
Mediomastus ambiseta		91	0.0011
Nephtys picta		136	0.2568
Onuphis eremita		45	0.0545
Owenia fusiformis		2000	0.5523
Phylodoce arenae		23	0.0023
Podarkeopsis levi fuscina		23	0.0023
Polygordius spp.		750	0.0091
Spiochaetopterus costarum		91	0.0273
Spiophanes bombyx		227	0.0091
Tharyx sp. A Morris		10045	0.6159
Arthropoda : Amphipoda			
Americoloides americanum		23	0.0011
Rhepoxynius hudsoni		91	0.0182
Arthropoda : Cumacea			
Cyclaspis varians		91	0.0023
Oxyurostylis smithi		136	0.0068
Arthropoda : Isopoda			
Edotea triloba (Epi.)		205	0.0114
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.0114
Cnidaria : Anthozoa			
Anthozoa		250	0.1909
Mollusca : Bivalvia			
Ensis directus		45	0.2205
Spirula solidissima		136	0.0011
Tellina agilis		477	0.0250
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		182	0.0205
Kurtziella atrostyla (Epi.)		23	0.0011
Nassarius trivittatus		114	1.9682
Natica pusilla		23	0.0011
Odostomia spp. (Epi.)		91	0.0045
Turbonilla spp. (Epi.)		23	0.0011
Nemertina			
Carenomella lactea		91	0.0205
Phoronida			
Phoronis spp.		68	0.0068
Number of Taxa w/ Epi.		39	
Number of Taxa w/o Epi.		34	
Total Abundance w/ Epi.		24477	
Total Abundance w/o Epi.		23954	
Total Biomass w/ Epi.			4.4250
Total Biomass w/o Epi.			4.3863

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 08		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta		250	0.0045
Oligochaeta			
Annelida : Polychaeta			
Amastigus caperatus		7068	0.1841
Aporionospio pygmaea		3159	0.2227
Ariidea catherinae		114	0.0068
Capitella capitata complex		68	0.0011
Drilonereis longa		91	1.9795
Glycera spp.		159	0.0182
Goniada littorea		23	0.0023
Heteromastus filiformis		23	0.0068
Leitoscoloplos spp.		23	0.0250
Magefona spp.		205	0.0636
Mediomastus ambisetosa		68	0.0011
Nephtys picta		159	0.3909
Onuphis eremita		45	0.0023
Owenia fusiformis		1227	0.1409
Parapriionospio pinnata		23	0.0409
Pectinaria gouldi		23	0.0023
Phylodoce arenae		45	0.0500
Polycyrtodus spp.		1182	0.0114
Sigambra tentaculata		23	0.0023
Spiro setosa		68	0.0273
Spirochaetopterus costarum		45	0.0045
Spiophanes bombyx		159	0.0136
Tharyx sp. A Morris		17795	1.3909
Arthropoda : Amphipoda			
Americochelidium americanum		68	0.0045
Ampelisca abdita		23	0.0023
Ampelisca verrilli		68	0.0136
Rhepoxynius hudsoni		45	0.0011
Tiron tropakis		23	0.0011
Arthropoda : Cumacea			
Cyclaspis varians		23	0.0011
Oxyurostylis smithi		182	0.0159
Arthropoda : Isopoda			
Edotea triloba (Epi.)		91	0.0045
Cnidaria : Anthozoa			
Anthozoa		68	0.0182
Echinoderata : Ophiuroidea			
Micropolypholis atra		23	0.0023
Hemichordata			
Saccoglossus kowalevskii		23	0.0023
Mollusca : Bivalvia			
Cardiidae		45	0.0011
Ensis directus		295	1.5523
Spirula solidissima		136	0.0011
Tellina agilis		477	0.1295
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		341	0.0409
Kurtziella astrostyla (Epi.)		23	0.0011
Nassarius trivittatus		91	0.0011
Odostomia spp. (Epi.)		91	0.0045
Nemertina			
Carenomella lactea		205	0.0136
Phoronida			
Phoronis spp.		114	0.0045
Number of Taxa w/ Epi.		45	
Number of Taxa w/o Epi.		41	
Total Abundance w/ Epi.		34500	
Total Abundance w/o Epi.		33954	
Total Biomass w/ Epi.			6.4102
Total Biomass w/o Epi.			6.3591

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	455	0.0091
Annelida : Polychaeta	Amastigus caperatus	2295	0.0705
	Aporionospio pygmaea	1886	0.1136
	Ariidea cathartinae	23	0.0011
	Ariidea wassi	23	0.0023
	Capitella capitata complex	68	0.0045
	Caulieriella sp. B (Blake)	205	0.0091
	Dridonereis longa	23	0.0523
	Eumida sanguinea	23	0.0011
	Glycera dibranchiata	45	0.0250
	Magelona spp.	136	0.0159
	Nephtyidae *	68	0.0068
	Nephthys picta	114	0.1864
	Owenia fusiformis	614	0.0614
	Phylodoce arenae	91	0.0591
	Polygordius spp.	568	0.0011
	Scolelepis bousfieldi	23	0.0011
	Spiophanes bombyx	68	0.0068
	Tharyx sp. A Morris	11841	0.8136
Arthropoda : Amphipoda	Americanum americanum	23	0.0011
	Ampelisca verrilli	68	0.0068
	Microprotopus raneyi (Epi.)	23	0.0011
	Rhepoxynius hudsoni	45	0.0023
Arthropoda : Cumacea	Cyclaspis varians	23	0.0011
	Oxyurostylis smithi	23	0.0011
Arthropoda : Isopoda	Edotea triloba (Epi.)	136	0.0045
Arthropoda : Mysidacea	Bowmaniella spp. (Epi.)	45	0.0091
Cnidaria : Anthozoa	Anthozoa	23	0.0023
	Edwardsiella elegans	45	0.0273
Echiuromorpha : Ophiuroidae	Micropolypholisia atra	23	0.0011
Mollusca : Bivalvia	Ensis directus	136	0.4886
	Mytilus edulis (Epi.)	23	0.0023
	Spirula soliddissima	23	0.0023
	Tellina agilis	205	0.0011
Mollusca : Gastropoda	Cylindrella bidentata (Epi.)	159	0.0159
	Natica pusilla	45	0.0977
	Odostomia spp. (Epi.)	23	0.0011
Nematina	Carenomella lactea	68	0.0045
	Micrura spp.	23	0.0045
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		32	
Total Abundance w/ Epi.		19750	
Total Abundance w/o Epi.		19341	
Total Biomass w/ Epi.			2.1170
Total Biomass w/o Epi.			2.0829

Sample Year : Yr1		Trip : Summer 04	Site : N Ref Site
Station : 10		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta		409	0.0091
Oligochaeta			
Annelida : Polychaeta			
Amastigus caperatus		4182	0.1364
Apophionospio pygmaea		3864	0.2227
Ariidea cathartinae		68	0.0045
Ariidea wassi		23	0.0011
Capitella capitata complex		114	0.0011
Eumida sanguinea		45	0.0011
Glycera spp.		114	0.0205
Goniada littorea		23	0.0023
Leitoscoloplos spp.		23	0.0045
Magelona spp.		159	0.0136
Mediomastus ambiseta		523	0.0136
Nephtyidae *		23	0.0011
Nephtys picta		159	0.2727
Onuphis eremita		23	0.0011
Owenia fusiformis		1295	0.1386
Phylodoce arenae		68	0.0227
Polygordius spp.		1091	0.0114
Scolelepis bousfieldi		45	0.0159
Sigambra tentaculata		23	0.0011
Siphophanes bombyx		68	0.0091
Tharyx sp. A Morris		15727	1.1750
Arthropoda : Amphipoda			
Americanidium americanum		23	0.0011
Ampelisca vadorum		23	0.0068
Cerapus tubularis (Epi.)		23	0.0011
Listrilla barnardi		23	0.0011
Rhepoxynius hudsoni		23	0.0011
Uncinaria rorata		23	0.0068
Arthropoda : Cumacea			
Cyclaspis varians		68	0.0011
Oxyurostylis smithi		136	0.0136
Arthropoda : Isopoda			
Edoteatriloba (Epi.)		205	0.0114
Arthropoda : Mysidae			
Bowmaniella spp. (Epi.)		23	0.0136
Cnidaria : Anthozoa			
Anthozoa		182	0.0545
Echinodermata : Ophiuroidea			
Ophiuroidea		23	0.0011
Mollusca : Bivalvia			
Ensis directus		227	1.5500
Pandora spp.		23	0.0068
Spirula solida		45	0.1341
Tellina agilis		500	0.2636
Mollusca : Gastropoda			
Crepidula spp. (Epi.)		23	0.0011
Cylindrella bidentata (Epi.)		591	0.0682
Nassarius trivittatus		114	1.1295
Natica pusilla		91	0.0068
Odostomia spp. (Epi.)		114	0.0068
Turbonilla interrupta (Epi.)		68	0.0136
Nematina			
Carenomella lactea		318	0.0341
Micrura spp.		23	0.0091
Phoronida			
Phoronis spp.		136	0.0068
Platyhelminthes : Turbellaria			
Turbellaria (Epi.)		23	0.0023
Number of Taxa w/ Epi.		47	
Number of Taxa w/o Epi.		39	
Total Abundance w/ Epi.		31136	
Total Abundance w/o Epi.		30068	
Total Bi mass w/ Epi.			5.4261
Total Bi mass w/o Epi.			5.3079

Sample Year : Yr1	Trip : Fall 04	Site : N Ref Site
Station : 01	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta		
Amastigogos caperatus	23	0.0011
Ariidea cathernae	23	0.0023
Ariidea wassi	23	0.0011
Caulieriella sp. B (Blake)	91	0.0011
Goniada littorea	23	0.0136
Magelona spp.	23	0.0068
Mediomastus ambi seta	23	0.0011
Nephtys picta	45	0.0295
Onuphis eremita	23	0.0932
Owenia fusiformis	227	0.1091
Polycyrtodus spp.	45	0.0011
Spiophanes bombyx	68	0.0011
Arthropoda : Amphipoda		
Acanthohaustorius spp.	23	0.0011
Protohaustorius cf. deichmannae	45	0.0011
Rhepoxynius hudsoni	68	0.0159
Tiron tropakis	45	0.0011
Echi nodermata : Echinidea		
Melita quinqueesperforata	23	0.0011
Mollusca : Bivalvia		
Tellina agilis	23	0.0011
Mollusca : Gastropoda		
Cylinchella bidentata (Epi.)	23	0.0023
Natica pusilla	23	0.0011
Nemertina		
Nemertina	68	0.0386
Tetrastemma spp.	23	0.0011
Number of Taxa w/ Epi.	22	
Number of Taxa w/o Epi.	21	
Total Abundance w/ Epi.	1000	
Total Abundance w/o Epi.	977	
Total Biomass w/ Epi.		0.3261
Total Biomass w/o Epi.		0.3239

Sample Year : Yr1	Trip : Fall 04	Site : N Ref Site
Station : 02	Type : Offshore	Gear : VV-YM
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TAXA	Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta Oligochaeta	114	0.0045
Annelida : Polychaeta Aglaphamus verrilli	23	0.0011
Amastigus caperatus	45	0.0045
Ariidea catherinae	45	0.0011
Ariidea wassi	45	0.0011
Caulieriella sp. B (Blake)	205	0.0091
Glycera dibranchiata	23	0.0091
Magefona spp.	23	0.0068
Nephtys picta	114	0.1273
Owenia fusiformis	886	0.4614
Polydora websteri (Epi.)	23	0.0011
Sabellaria vulgaris (Epi.)	23	0.0023
Sigambra bassi	23	0.0011
Siphophanes bombyx	159	0.0045
Tharyx sp. A Morris	45	0.0091
Arthropoda : Amphipoda Bathyporeia parkeri	23	0.0011
Rhepoxynius hudsoni	68	0.0011
Arthropoda : Cumacea Oxyurostylis smithi	23	0.0011
Arthropoda : Mysidacea Neomysis americana (Epi.)	23	0.0011
Mollusca : Bivalvia Telliina spp.	23	0.0227
Mollusca : Gastropoda Kurtziella atrostyla (Epi.)	23	0.0011
Natica pusilla	68	0.0068
Nemertina Carenomella lactea	23	0.0159
Nemertina	23	0.0409
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Number of Taxa w/ Epi.	24	
Number of Taxa w/o Epi.	20	
Total Abundance w/ Epi.	2091	
Total Abundance w/o Epi.	2000	
Total Biomass w/ Epi.		0.7364
Total Biomass w/o Epi.		0.7307

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 03		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	136	0.0182
Annelida : Polychaeta			
Amastigidae caperatus		4250	0.1000
Aporionopis o pygmaea		68	0.0136
Ariidea catherinae		273	0.0159
Ariidea wassi		45	0.0091
Caulieriella sp. B (Blake)		68	0.0114
Glycera dibranchiata		91	0.0659
Goniada littorea		23	0.0273
Magelona spp.		23	0.0182
Mediomastus ambiseta		45	0.0068
Nephtys picta		227	0.3068
Owenia fusiformis		932	0.3205
Phylodoce arenae		23	0.0045
Polygordius spp.		205	0.0023
Siphophanes bombyx		295	0.0182
Sthenelais limicola		23	0.0045
Tharyx sp. A Morris		1023	0.1205
Arthropoda : Amphipoda			
Rhepoxynius hudsoni		23	0.0068
Tiron tropakis		23	0.0023
Arthropoda : Cumacea			
Oxyurostylis smithi		23	0.0023
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.0341
Cnidaria : Anthozoa			
Anthozoa		23	0.0182
Mollusca : Bivalvia			
Macoma tenta		45	0.0091
Tellina agilis		68	0.0341
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		68	0.0250
Nassarius trivittatus		45	0.1568
Natica pusilla		91	0.0011
Nemertina			
Carinomella lactea		45	0.0091
Nemertina		45	0.0636
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		28	
Total Abundance w/ Epi.		8273	
Total Abundance w/o Epi.		8205	
Total Biomass w/ Epi.			1.4261
Total Biomass w/o Epi.			1.4011

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 04		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	273	0.0091
Annelida : Polychaeta			
Amastigosa caperatus		4227	0.0932
Aporionospio pygmaea		4432	0.5114
Ariidea catherinae		341	0.0068
Capitellidae *		23	0.0068
Caulieriella sp. B (Blake)		45	0.0045
Dipolydora commensalis (Epi.)		23	0.0011
Drilonereis longa		23	0.0011
Goniada littorea		23	0.0011
Magefona spp.		23	0.0045
Mediomastus ambiseta		182	0.0011
Nephtys picta		114	0.1841
Owenia fusiformis		136	0.2591
Phylodoce arenae		23	0.0011
Polydora websteri (Epi.)		114	0.0011
Polygordius spp.		1682	0.0295
Scolepites bousfieldi		23	0.0011
Sigambra tentaculata		23	0.0045
Spirachopterus costarum		23	0.0011
Spiophanes bombyx		386	0.0182
Sthenelais limicola		23	0.0068
Tharyx sp. A Morris		4250	0.5750
Arthropoda : Amphipoda			
Parametopella cypris (Epi.)		23	0.0011
Arthropoda : Decapoda			
Pagurus annulipes (Epi.)		45	0.1182
Arthropoda : Isopoda			
Edotea triloba (Epi.)		68	0.0011
Echinoderata : Ophiuroidea			
Micromorphophilis atra		23	0.0011
Mollusca : Bivalvia			
Macoma tenta		114	0.0023
Tellina agilis		114	0.0977
Mollusca : Gastropoda			
Anachis spp. (Epi.)		23	0.0023
Cylindrella bidentata (Epi.)		23	0.0023
Gastropoda *		23	0.0011
Nassarius trivittatus		23	0.0614
Natica pusilla		114	0.0068
Richtaxis punctostriatus		45	0.0659
Turbonilla interrupta (Epi.)		45	0.0409
Nemertina			
Carenomella lactea		114	0.0011
Phoronida			
Phoronis spp.		68	0.0023
Number of Taxa w/ Epi.		35	
Number of Taxa w/o Epi.		27	
Total Abundance w/ Epi.		17273	
Total Abundance w/o Epi.		16886	
Total Biomass w/ Epi.			2.1284
Total Biomass w/o Epi.			1.9591

Sample Year : Yr1	Trip : Fall 04	Site : N Ref Site
Station : 05	Type : Offshore	Gear : VV-YM
TAXA	Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta Oligochaeta	91	0.0068
Annelida : Polychaeta Amastigaster caperatus	1568	0.0500
Aporionospio pygmaea	364	0.0409
Ariidea cathartae	68	0.0045
Caulieriella sp. B (Blake)	432	0.0295
Glycerida branchiata	23	0.0159
Nephtys picta	114	0.3023
Owenia fusiformis	295	1.8500
Parapriionospio spinata	23	0.0011
Polydora websteri (Epi.)	23	0.0045
Polygordius spp.	68	0.0045
Sigambra bassi	23	0.0045
Spiro setosa	23	0.0705
Spirophanes bombyx	477	0.0318
Tharyx sp. A Morris	1477	0.1591
Arthropoda : Amphipoda Americhelidium americanum	23	0.0011
Ampelisca abdita	23	0.0023
Corophiidae (Epi.)	23	0.0011
Micropontopushaneyi (Epi.)	68	0.0023
Tiron tropakis	23	0.0045
Arthropoda : Decapoda Ogyrides spp.	23	0.0011
Pagurus annulipes (Epi.)	159	0.3545
Pagurus pollicaris (Epi.)	23	0.0091
Pagurus spp. *	45	0.0182
Cnidaria : Anthozoa Anthozoa	23	0.1523
Echinoderata : Holothuroidea Pentamera pulcherrima	23	0.0011
Echinoderata : Ophiuroidea Ophiuroidea	23	0.0273
Mollusca : Bivalvia Ensis directus	23	0.0023
Macoma tenta	68	0.0045
Mollusca : Gastropoda Crepidula spp. (Epi.)	68	0.0114
Eptonium humphreysi (Epi.)	23	0.0011
Kurtziella astrostyla (Epi.)	45	0.0295
Nassarius trivittatus	23	0.0568
Natica pustilla	205	0.0182
Turbonilla interrupta (Epi.)	23	0.0159
Vitrinella spp. (Epi.)	23	0.0011
Nemertina Carinomella lactea	23	0.0318
Number of Taxa w/ Epi.	37	
Number of Taxa w/o Epi.	27	
Total Abundance w/ Epi.	6727	
Total Abundance w/o Epi.	6159	
Total Bi mass w/ Epi.		3.3375
Total Bi mass w/o Epi.		2.8886

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	23	0.0011
Annelida : Polychaeta	Aglaphamus verrilli	23	0.0011
	Amastigaster caperatus	773	0.2409
	Apopriionospio pygmaea	295	0.0364
	Ariidea catharticae	23	0.0011
	Ariidea wassi	205	0.0091
	Caulieriella sp. B (Blake)	114	0.0045
	Glycera dibranchiata	45	2.7682
	Magefona spp.	91	0.0295
	Mediomastus ambiseta	23	0.0011
	Nephtys picta	91	0.1182
	Onuphis eremita	23	0.0011
	Owenia fusiformis	1864	1.1432
	Polydora websteri (Epi.)	23	0.0011
	Polygordius spp.	205	0.0045
	Spirachelopterus costarum	23	0.0011
	Spiophanes bombyx	273	0.0227
	Tharyx sp. A Morris	136	0.0114
Arthropoda : Amphipoda	Americanichthium americanum	23	0.0011
	Ampelisca abdita	23	0.0045
	Rhepoxynius hudsoni	23	0.0011
Arthropoda : Cumacea	Oxyurostylis smithi	23	0.0023
Arthropoda : Isopoda	Edotea triloba (Epi.)	91	0.0023
Cnidaria : Anthozoa	Edwardsia elegans	68	0.0205
Mollusca : Bivalvia	Macoma tenta	23	0.0011
	Tellina agilis	136	0.0841
Mollusca : Gastropoda	Cylindrella obdentata (Epi.)	68	0.0045
	Kurtziella atrostyla (Epi.)	45	0.0409
	Nassarius trivittatus	68	0.0011
	Natica pusilla	114	0.0068
	Turbonilla interrupta (Epi.)	23	0.0023
Nematina	Amphiporus biconatus	23	0.0011
	Micrura spp.	23	0.0023
	Nemertina	45	0.0159
Number of Taxa w/ Epi.		34	
Number of Taxa w/o Epi.		29	
Total Abundance w/ Epi.		5068	
Total Abundance w/o Epi.		4818	
Total Biomass w/ Epi.			4.5886
Total Biomass w/o Epi.			4.5375

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 07		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	23	0.0023
Annelida : Polychaeta	Aglaphamus verrilli	23	0.0011
	Amastigaster caperatus	795	0.0295
	Apopriionospio pygmaea	250	0.0318
	Arididea wassi	68	0.0068
	Caulieriella sp. B (Blake)	68	0.0068
	Glycera dibranchiata	45	0.0341
	Magefona spp.	23	0.0114
	Nephtys picta	159	0.3591
	Onuphis eremita	23	0.0545
	Owenia fusi formis	1341	0.8545
	Polygordius spp.	45	0.0023
	Siphophanes bombyx	250	0.0205
	Tharyx sp. A Morris	159	0.0182
Arthropoda : Amphipoda			
	Americanum americanum	45	0.0045
	Microprotopus raneyi (Epi.)	68	0.0023
	Rhepoxynius hudsoni	91	0.0205
	Tiron tropakis	23	0.0023
Arthropoda : Isopoda	Edotea triloba (Epi.)	45	0.0023
Arthropoda : Mysidacea	Bowmaniella spp. (Epi.)	23	0.0011
Cnidaria : Anthozoa	Anthozoa	45	0.1455
Mollusca : Bivalvia	Macoma tenta	23	0.0011
	Tellina agilis	91	0.0705
Mollusca : Gastropoda	Cylindrella bidentata (Epi.)	23	0.0045
	Kurtziella astrostyla (Epi.)	23	0.0205
	Nassarius trivittatus	23	0.0205
	Natica pusilla	45	0.0068
Nematina	Nematina	23	0.0318
Number of Taxa w/ Epi.		28	
Number of Taxa w/o Epi.		23	
Total Abundance w/ Epi.		3864	
Total Abundance w/o Epi.		3682	
Total Biomass w/ Epi.			1.7670
Total Biomass w/o Epi.			1.7364

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 08		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	182	0.0136
Annelida : Polychaeta			
Amastigidae caperatus		4136	0.0955
Ampharetidae		23	0.0023
Apopionopis pygmaea		4455	0.5250
Ariidea cathirinae		136	0.0114
Caulieriella sp. B (Blake)		136	0.0114
Dironereis longa		23	0.0591
Glycera dibranchiata		23	0.0068
Goniada littorea		23	0.0011
Leitoscoloplos spp.		23	0.0250
Mediomastus ambi seta		136	0.0227
Nephtys picta		205	0.4523
Owenia fusiformis		568	0.1091
Phylodoce arenae		23	0.0136
Polygordius spp.		614	0.0159
Scolelepis bousfieldi		45	0.0068
Sigambra tentaculata		23	0.0045
Spirochaetopterus costarum		68	0.0091
Spiophanes bombyx		818	0.0545
Spiophanes soederstroemi		23	0.0011
Tharyx sp. A Morris		4568	0.6977
Arthropoda : Amphipoda			
Americichelidium americanum		23	0.0011
Microprotopus raneyi (Epi.)		45	0.0091
Tiron tropakis		23	0.0011
Arthropoda : Decapoda			
Pagurus annulipes (Epi.)		23	0.0273
Mollusca : Bivalvia			
Macoma tenta		23	0.0091
Mulinia lateralis		23	0.0091
Tellina agilis		91	0.0636
Mollusca : Gastropoda			
Acteoniana canaliculata		23	0.0114
Cylindrella bidentata (Epi.)		91	0.0136
Kurtziella atrostyla (Epi.)		23	0.0114
Natica pusilla		68	0.0136
Turbonilla stricta (Epi.)		23	0.0011
Phoronida			
Phoronis spp.		23	0.0068
Number of Taxa w/ Epi.		34	
Number of Taxa w/o Epi.		29	
Total Abundance w/ Epi.		16750	
Total Abundance w/o Epi.		16545	
Total Bi mass w/ Epi.			2.3170
Total Bi mass w/o Epi.			2.2545

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	250	0.0068
Annelida : Polychaeta			
Amastigidae caperatus		3614	0.0682
Aporionospio pygmaea		2455	0.3795
Ariidea catherinae		23	0.0011
Caulieriella sp. B (Blake)		91	0.0045
Glyceridae branchiata		23	0.0318
Magelona spp.		23	0.0011
Mediomastus ambiseta		45	0.0023
Nephtys picta		159	0.4886
Onuphis eremita		23	0.0091
Owenia fusi formis		1318	1.0023
Polygordius spp.		705	0.0091
Siphophanes bombyx		341	0.0159
Tharyx sp. A Morris		2750	0.3318
Arthropoda : Cumacea			
Oxyurostylis smithi		23	0.0011
Arthropoda : Isopoda			
Edotea triloba (Epi.)		45	0.0023
Cnidaria : Anthozoa			
Anthozoa		45	0.0023
Edwardsia elegans		91	0.0159
Hemichordata			
Saccoglossus kowalevskii		23	0.3477
Mollusca : Bivalvia			
Tellina agilis		136	0.0227
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		23	0.0011
Kurtziella astrostyla (Epi.)		23	0.0011
Nassarius trivittatus		23	0.1000
Natica pusilla		45	0.0011
Turbonilla interrupta (Epi.)		45	0.0045
Nemertina			
Carenomella lactea		45	0.0011
Micrura spp.		23	0.0727
Phoronida			
Phorons spp.		91	0.0045
Number of Taxa w/ Epi.		28	
Number of Taxa w/o Epi.		24	
Total Abundance w/ Epi.		12500	
Total Abundance w/o Epi.		12364	
Total Biomass w/ Epi.			2.9307
Total Biomass w/o Epi.			2.9216

Sample Year : Yr1		Trip : Fall 04	Site : N Ref Site
Station : 10		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	318	0.0091
Annelida : Polychaeta	Amastigidae caperatus	1750	0.0273
	Ampharetidae	23	0.0068
	Apopriionospio pygmaea	5159	0.5295
	Arididea cathirinae	705	0.0091
	Bhawani a heteroseta	23	0.0023
	Drilonereis longa	23	0.0182
	Glycera dibranchiata	23	0.0045
	Goniada littorea	23	0.0159
	Magefona spp.	23	0.0045
	Mediomastus ambi seta	682	0.0205
	Nephtys picta	45	0.0568
	Owenia fusiformis	295	0.3682
	Pectinaria gouldii	23	0.0011
	Polygordius spp.	977	0.0182
	Scolelepis bousfieldi	114	0.0114
	Spirosetosa	23	0.0011
	Spiophanes bombyx	227	0.0182
	Tharyx sp. A Morris	2659	0.2364
Arthropoda : Amphipoda			
	Microprotopus raneyi (Epi.)	68	0.0045
	Tiron tropakis	23	0.0011
Arthropoda : Cumacea	Oxyurostylis smithi	23	0.0045
Arthropoda : Decapoda	Pagurus spp. (Epi.)	45	0.0068
Arthropoda : Isopoda	Edoteatriloba (Epi.)	23	0.0068
Cnidaria : Anthozoa			
	Anthozoa	23	0.0091
Mollusca : Bivalvia			
	Gemma gemma	23	0.0091
	Macoma tenta	68	0.0023
	Pitar morrhuanus	23	0.0011
	Tellina agilis	23	0.0011
Mollusca : Gastropoda			
	Cylchnella obdentata (Epi.)	364	0.0500
	Kurtziella atrostyla (Epi.)	45	0.0227
	Nassarius trivittatus	45	1.2045
	Natica pusilla	114	0.0250
	Turbonilla interrupta (Epi.)	136	0.0205
	Turbonilla stricta (Epi.)	45	0.0011
Nemertina			
	Carinomella lactea	68	0.0182
	Nemertina	23	0.0011
Phoronida			
	Phoronis spp.	23	0.0023
Number of Taxa w/ Epi :		38	
Number of Taxa w/o Epi :		31	
Total Abundance w/ Epi :		14318	
Total Abundance w/o Epi :		13591	
Total Biomass w/ Epi .			2.7511
Total Biomass w/o Epi .			2.6386

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 01		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Magelona spp.		23	0.0159
Nephtys buccata		23	0.4750
Nephtys picta		91	0.0659
Arthropoda : Amphipoda			
Protohaustorius cf. dei chmannae		318	0.0727
Arthropoda : Cumacea			
Oxyurostylis smithi		23	0.0011
Arthropoda : Isopoda			
Chiridotea tuftsi		23	0.0011
Arthropoda : Tanaidacea			
Tanaissus psammophilus		295	0.0068
Nemertina			
Micrura spp.		45	0.0023
Number of Taxa w/ Epi.		8	
Number of Taxa w/o Epi.		8	
Total Abundance w/ Epi.		841	
Total Abundance w/o Epi.		841	
Total Biomass w/ Epi.			0.6409
Total Biomass w/o Epi.			0.6409

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 02		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta			
Oligochaeta		23	0.0011
Annelida : Polychaeta			
Amastigites caperatus		45	0.0011
Ariciae catherinae		250	0.0114
Ariciae wassi		23	0.0011
Caulieriella sp. B (Blake)		159	0.0114
Glycera dibranchiata		91	0.1091
Magelona spp.		250	0.1182
Meditomastus ambi seta		23	0.0011
Nephtys picta		205	0.3455
Owenia fusiformis		45	0.0023
Siphophanes bombyx		750	0.1341
Tharyx sp. A Morris		523	0.1045
Arthropoda : Amphipoda			
Acanthohaustorius similis		23	0.0011
Americhelidium americanum		23	0.0011
Ampelisca verrilli		45	0.0659
Rhepoxynius hudsoni		23	0.0136
Arthropoda : Decapoda			
Pagurus spp. (Epi.)		23	0.0136
Arthropoda : Isopoda			
Cyathura burbancki		23	0.0045
Arthropoda : Tanaidacea			
Tanaissus psammophilus		23	0.0011
Chordata : Cephalochordata			
Branchiostoma caribaeum		23	0.0068
Mollusca : Bivalvia			
Telliina agilis		23	0.0023
Mollusca : Gastropoda			
Cylichnella bidentata (Epi.)		23	0.0091
Natica pusilla		68	0.0023
Turbonilla spp. (Epi.)		23	0.0011
Nemertina			
Carinomella lactea		91	0.0091
Cerebratulus lacteus		23	0.6818
Nemertina		45	0.0659
Phoronida			
Phoronis spp.		45	0.0011
Number of Taxa w/ Epi.		28	
Number of Taxa w/o Epi.		25	
Total Abundance w/ Epi.		2932	
Total Abundance w/o Epi.		2864	
Total Biomass w/ Epi.			1.7216
Total Biomass w/o Epi.			1.6977

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 03		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	227	0.0068
Annelida : Polychaeta			
Amastigidae caperatus		1364	0.0364
Aporionospio pygmaea		1545	0.2091
Ariidea catherinae		682	0.0273
Asabellides oculata		23	0.0045
Caulieriella sp. B (Blake)		1591	0.0227
Glycera dibranchiata		45	0.1318
Heteromastus filiformis		91	0.0591
Magefona spp.		205	0.0227
Nephtyidae *		182	0.0136
Nephthys picta		91	0.2568
Owenia fusiformis		91	0.0068
Phylodoce arenae		159	0.0227
Podarkeopsis levifusca		23	0.0011
Polygordius spp.		1932	0.0545
Scolelepis squamata		23	0.0023
Sigambra tentaculata		23	0.0011
Siphophanes bombyx		1364	0.1455
Tharyx sp. A Morris		5659	0.6818
Arthropoda : Amphipoda			
Ampelisca verrilli		23	0.0386
Microprotopus raneyi (Epi.)		68	0.0011
Uncinaria rorata		136	0.0523
Arthropoda : Cumacea			
Cyclaspis varians		23	0.0011
Oxyurostylis smithi		23	0.0011
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)		45	0.0182
Arthropoda : Isopoda			
Edotea triloba (Epi.)		45	0.0011
Chordata : Cephalochordata			
Branchiostoma floridae		23	0.0341
Hemichordata			
Saccoglossus kowalevskii		23	0.0023
Mollusca : Bivalvia			
Tellina agilis		68	0.0727
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		136	0.0364
Kurtziella astrostyla (Epi.)		114	0.0500
Nassarius trivittatus		23	0.0295
Natica pusilla		182	0.0455
Odostomia spp. (Epi.)		23	0.0011
Turbonilla interrupta (Epi.)		68	0.0023
Turbonilla stricta (Epi.)		23	0.0045
Nemertina			
Carenomella lactea		114	0.0205
Micrura spp.		364	0.0068
Phoronida			
Phoronis spp.		91	0.0023
Number of Taxa w/ Epi.		38	
Number of Taxa w/o Epi.		30	
Total Abundance w/ Epi.		16932	
Total Abundance w/o Epi.		16409	
Total Bi mass w/ Epi.			2.1284
Total Bi mass w/o Epi.			2.0136

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 04		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta	Oligochaeta	205	0.0045
Annelida : Polychaeta			
Amastigidae caperatus		17977	0.5205
Aporionopis o pygmaea		682	0.0614
Ariidea catherinae		2568	0.1045
Asabellides oculata		23	0.0023
Capitella capitata complex		23	0.0045
Caulieriella sp. B (Blake)		68	0.0023
Glycera spp.		23	0.0011
Magefona spp.		182	0.0045
Mediomastus ambiseta		23	0.0011
Nephtyidae *		205	0.0091
Nephtys picta		159	0.4295
Owenia fusiformis		45	0.0023
Phylodoce arenae		114	0.0045
Polygordius spp.		2000	0.0614
Scolelepis bousfieldi		45	0.0023
Siphophanes bombyx		1295	0.1295
Tharyx sp. A Morris		3045	0.3523
Arthropoda : Amphipoda			
Americichelidium americanum		45	0.0023
Micropotopus raneyi (Epi.)		45	0.0011
Rhepoxynius hudsoni		23	0.0227
Tiron tropakis		45	0.0023
Uncinaria ritteri		45	0.0045
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)		182	0.8909
Arthropoda : Isopoda			
Edotea triloba (Epi.)		23	0.0159
Echinodermata : Ophiuroidea			
Micromorpholiopsis atra		23	0.1386
Mollusca : Bivalvia			
Tellina agilis		68	0.0614
Mollusca : Gastropoda			
Crepidula convexa (Epi.)		23	0.0011
Crepidula spp. (Epi.)			0.0068
Cylindrella bipunctata (Epi.)		68	0.0136
Kurtziella astrostyla (Epi.)		91	0.0705
Nassarius trivittatus		23	0.0182
Natica pusilla		114	0.0091
Odostomia spp. (Epi.)		68	0.0023
Nemertina			
Micrura spp.		455	0.0114
Phoronida			
Phoronis spp.		159	0.0023
Platyhelminthes : Trematoda			
Trematoda (Epi.)		45	0.0011
Number of Taxa w/ Epi.		36	
Number of Taxa w/o Epi.		27	
Total Abundance w/ Epi.		30227	
Total Abundance w/o Epi.		29682	
Total Bi mass w/ Epi.			2.9739
Total Bi mass w/o Epi.			1.9704

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 05		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	159	0.0045
Annelida : Polychaeta	Aglaphamus verrilli	23	0.1341
	Amastigaster caperatus	4591	0.1477
	Apopionospio pygmaea	3477	0.3864
	Ariidea cathartae	2159	0.0955
	Caulieriella sp. B (Blake)	364	0.0091
	Dironereis longa	23	0.0205
	Glycera dibranchiata	23	0.0523
	Heteromastus filiformis	23	0.0023
	Magelona spp.	182	0.0273
	Nephtyidae *	273	0.0295
	Nephtys picta	91	0.3636
	Owenia fusiformis	136	0.0159
	Phylodoce arenae	45	0.0023
	Polygordius spp.	1114	0.0318
	Polyynidae (Epi.)	23	0.0011
	Scolelepis bousfieldi	45	0.0136
	Siphophanes bombyx	1568	0.1591
	Tharyx sp. A Morris	3773	0.4773
Arthropoda : Amphipoda			
	Americochelidium americanum	23	0.0023
	Tiron tropakis	23	0.0011
Arthropoda : Cumacea	Oxyurostylis smithi	23	0.0011
Arthropoda : Decapoda	Ovalipes stephensi (Epi.)	23	0.2818
Hemichordata	Saccoglossus kowalevskii	23	0.0011
Mollusca : Gastropoda			
	Cylindrella bidentata (Epi.)	91	0.0136
	Kurtziella astrostyla (Epi.)	23	0.0136
	Nassarius trivittatus	45	0.0500
	Natica pusilla	23	0.0011
	Richtaxis punctostriatus	23	0.0023
	Turbonilla interrupta (Epi.)	68	0.0068
Nemertina			
	Carinomella lactea	91	0.0182
	Micrura spp.	205	0.0045
Phoronida	Phoronis spp.	182	0.0068
Number of Taxa w/ Epi.		32	
Number of Taxa w/o Epi.		27	
Total Abundance w/ Epi.		18954	
Total Abundance w/o Epi.		18727	
Total Biomass w/ Epi.			2.3784
Total Biomass w/o Epi.			2.0614

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 06		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	23	0.0023
Annelida : Polychaeta	Amastigospio caperatus	91	0.0011
	Aporionospio pygmaea	23	0.0045
	Ariidea wassi	136	0.0091
	Caulieriella sp. B (Blake)	45	0.0011
	Glycera dibranchiata	23	0.0568
	Magefona spp.	45	0.0011
	Maldivana dae	23	0.0011
	Nephtys picta	114	0.0636
	Owenia fusiformis	159	0.0636
	Polygordius spp.	341	0.0114
	Polyynoidae (Epi.)	23	0.0011
	Siphophanes bombyx	182	0.0159
	Tharyx sp. A Morris	45	0.0114
Arthropoda : Amphipoda	Americanum americanum	68	0.0068
	Protohaustorius cf. chmannae	23	0.0011
Arthropoda : Cumacea	Oxyurostylis smithi	68	0.0023
Arthropoda : Isopoda	Acanthodiscus depressus	23	0.0227
	Edoteatriloba (Epi.)	23	0.0011
Chordata : Cephalochordata	Branchiostoma caribaeum	23	0.0182
Mollusca : Bivalvia	Tellina agilis	23	0.0227
Mollusca : Gastropoda	Cylindrella bidentata (Epi.)	23	0.0136
	Nassarius trivittatus	45	0.1091
	Natica pusilla	91	0.0091
Nemertina	Carenoma tremaphoros	136	0.0932
Number of Taxa w/ Epi.		25	
Number of Taxa w/o Epi.		22	
Total Abundance w/ Epi.		1818	
Total Abundance w/o Epi.		1750	
Total Biomass w/ Epi.			0.5443
Total Biomass w/o Epi.			0.5284

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 07		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	159	0.0091
Annelida : Polychaeta	Amastigosa caperatus	545	0.0182
	Caulieriella sp. B (Blake)	205	0.0011
	Glycera dibranchiata	68	0.1318
	Goniadella littorea	23	0.0011
	Magelona spp.	227	0.0500
	Nephtyidae *	114	0.0068
	Nephtys picta	45	0.1864
	Owenia fusiformis	818	0.9455
	Phylodoce arenae	23	0.0011
	Polygordius spp.	455	0.0023
	Scolopendropsis bousfieldi	23	0.0091
	Spiophanes bombyx	773	0.1364
	Tharyx sp. A Morris	273	0.0523
Arthropoda : Amphipoda	Americhelidium americanum	23	0.0011
	Microprotopus raneyi (Epi.)	45	0.0011
	Rhepoxynius hudsoni	23	0.0023
	Uncinaria rirorata	23	0.0023
Arthropoda : Cumacea	Leucon americanus	23	0.0023
	Oxyurostylis smithi	205	0.0068
Cnidaria : Anthozoa	Anthozoa	23	0.1477
Mollusca : Bivalvia	Ensis directus	91	0.0011
	Spirula soliddissima	23	0.0068
Mollusca : Gastropoda	Cylindrella bidentata (Epi.)	23	0.0136
	Natica pusilla	23	0.0023
	Turbonilla interrupta (Epi.)	45	0.0045
Nemertina	Carenomella lactea	114	0.0227
	Nemertina	45	0.0841
Phoronida	Phoronis spp.	23	0.0011
Number of Taxa w/ Epi.		28	
Number of Taxa w/o Epi.		25	
Total Abundance w/ Epi.		4500	
Total Abundance w/o Epi.		4386	
Total Biomass w/ Epi.			1.8511
Total Biomass w/o Epi.			1.8318

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 08		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Bi mass (g/m2)
Annelida : Oligochaeta		23	0.0023
Oligochaeta			
Annelida : Polychaeta			
Amastigus caperatus		500	0.0159
Apopionospio pygmaea		45	0.0045
Ariidea wassi		205	0.0091
Caulieriella sp. B (Blake)		23	0.0045
Glycera dibranchiata		45	0.0205
Magelona spp.		45	0.0011
Nephtyidae *		91	0.0045
Nephtys picta		68	0.1727
Owenia fusiformis		568	3.0591
Phylodoce arenae		23	0.0023
Polygordius spp.		91	0.0011
Siphophanes bombyx		159	0.0091
Tharyx sp. A Morris		23	0.0011
Arthropoda : Amphipoda			
Americanum americanum		45	0.0045
Protohaustorius cf. chmannae		45	0.0011
Rhepoxynius hudsoni		23	0.0136
Uncinaria rirorata		45	0.0045
Arthropoda : Cumacea			
Mancocuma stellifera		23	0.0011
Oxyurostylis smithi		45	0.0011
Arthropoda : Decapoda			
Pagurus longicarpus (Epi.)		23	0.0136
Arthropoda : Isopoda			
Edoteatriloba (Epi.)		45	0.0045
Arthropoda : Tanaidacea			
Tanassis psammophilus		23	0.0023
Cnidaria : Anthozoa			
Anthozoa		68	0.0500
Mollusca : Gastropoda			
Epteronium multistriatum (Epi.)		23	0.0455
Nassarius trivittatus		45	0.8068
Natica pusilla		23	0.0273
Nemertina			
Carinomella lactea		45	0.0045
Micrura spp.		45	0.0011
Nemertina		45	0.0045
Number of Taxa w/ Epi.		29	
Number of Taxa w/o Epi.		26	
Total Abundance w/ Epi.		2523	
Total Abundance w/o Epi.		2432	
Total Bi mass w/ Epi.			4.2943
Total Bi mass w/o Epi.			4.2307

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 09		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Polychaeta			
Amastigogos caperatus		2159	0.0818
Aporionospio pygmaea		409	0.0545
Ariidea catherinae		23	0.0023
Ariidea wassi		23	0.0045
Caulieriella sp. B (Blake)		409	0.0023
Glycera dibranchiata		45	0.0568
Heteromastus filiformis		23	0.0011
Magelona spp.		23	0.0011
Nephtyidae *		182	0.0159
Nephtys picta		159	0.5045
Owenia fusiformis		841	0.9182
Polygordius spp.		614	0.0091
Spiophanes bombyx		1159	0.1114
Tharyx sp. A Morris		1136	0.1727
Arthropoda : Amphipoda			
Microprotopus raneyi (Epi.)		23	0.0011
Rhepoxynius hudsoni		23	0.0159
Uncinaria ritterata		23	0.0011
Arthropoda : Cumacea			
Mancocuma stellifera		23	0.0011
Oxyurostylis smithi		114	0.0023
Arthropoda : Isopoda			
Edotea triloba (Epi.)		23	0.0023
Mollusca : Bivalvia			
Tellina agilis		68	0.0409
Mollusca : Gastropoda			
Cylindrella bidentata (Epi.)		23	0.0068
Turbonilla spp. (Epi.)		23	0.0011
Nemertina			
Carenomella lactea		23	0.0023
Micrura spp.		273	0.0091
Nemertina		45	0.0705
Phoronida			
Phoronis spp.		91	0.0045
Number of Taxa w/ Epi.		26	
Number of Taxa w/o Epi.		22	
Total Abundance w/ Epi.		7977	
Total Abundance w/o Epi.		7886	
Total Biomass w/ Epi.			2.0954
Total Biomass w/o Epi.			2.0841

Sample Year : Yr1		Trip : Winter 05	Site : N Ref Site
Station : 10		Type : Offshore	Gear : VV-YM
TAXA		Abundance (#/m2)	Biomass (g/m2)
Annelida : Oligochaeta	Oligochaeta	23	0.0091
Annelida : Polychaeta	Aglaphamus verrilli	23	0.0682
	Amastigaster caperatus	13477	0.3591
	Apopionospio pygmaea	1545	0.1705
	Ariidea catharticae	136	0.0136
	Ariidea wassi	23	0.0011
	Heteromastus filiformis	23	0.0045
	Magelona spp.	159	0.0227
	Mediomastus ambi seta	23	0.0023
	Nephtyidae *	114	0.0091
	Nephtys picta	114	0.3295
	Owenia fusiformis	273	0.3864
	Phylodoce arenae	91	0.0091
	Polydora cornuta	23	0.0023
	Polygordius spp.	591	0.0205
	Siphonophanes bombyx	477	0.0364
	Tharyx sp. A Morris	4523	0.8136
Arthropoda : Amphipoda			
	Americochelidium americanum	45	0.0023
	Tiron tropakis	23	0.0011
	Uncinaria rorata	23	0.0023
Arthropoda : Cumacea	Oxyurostylis smithi	114	0.0114
Arthropoda : Decapoda	Ovalipes stephensi (Epi.)	23	1.0773
Arthropoda : Isopoda	Edotea triloba (Epi.)	45	0.0023
Hemichordata	Saccoglossus kowalevskii	23	0.0011
Mollusca : Bivalvia			
	Tellina agilis	68	0.0114
Mollusca : Gastropoda			
	Cylindrella obdentata (Epi.)	136	0.0523
	Kurtziella atrostyla (Epi.)	45	0.0318
	Nassarius trivittatus	68	0.2045
	Natica pusilla	23	0.0136
	Odostomia spp. (Epi.)	23	0.0011
	Vitrinella spp. (Epi.)	23	0.0011
Nematina			
	Carenomella lactea	45	0.0045
	Micrura spp.	500	0.0136
Phoronida			
	Phoronis spp.	23	0.0136
Number of Taxa w/ Epi.		33	
Number of Taxa w/o Epi.		27	
Total Abundance w/ Epi.		22886	
Total Abundance w/o Epi.		22591	
Total Biomass w/ Epi.			3.7034
Total Biomass w/o Epi.			2.5375

**APPENDIX C**

**FISH DATA**



Table C-1. Raw fish data at sites where fish were collected in haul seines during the first year of sampling at the Impact and Reference Impact Beaches in Dare County, N.C. The total number of individuals collected for a species and the total length for up to 25 individuals is presented by season, site, and station number. The latitude and longitude of each station is presented in Table C-2 (Station table).

Station	Scientific Name	Common Name	Species Total	Length (mm)																												
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
<b>Spring 04 – Impacted Beach</b>																																
01	<i>Alosa Pseudoharengus</i>	Alewife	1	287																												
	<i>Alosa Sapidissima</i>	American Shad	5	431	443	385	315	395																								
	<i>Brevoortia Tyrannus</i>	Atlantic Menhaden	17	260	262	271	246	261	295	331	365	251	271	280	252	271	265	291	345	331												
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	96	185	230	241	233	200	151	155	170	212	160	130	201	135	200	192	191	205	161	261	197	225	201	210	223	165				
	<i>Cynoscion Regalis</i>	Weakfish	14	355	361	341	351	315	231	235	335	362	351	342	332	387	337															
	<i>Dasyatis Americana</i>	Southern Stingray	14	250	305	278	275	280	250	290	310	331	291	301	262	351	282															
	<i>Dasyatis Sabina</i>	Atlantic Stingray	4	251	195	460	251																									
	<i>Leiostomus Xanthurus</i>	Spot	375	201	275	251	241	260	231	335	245	237	242	281	251	235	271	245	260	237	231	223	241	221	232	222	251	230				
	<i>Menticirrhus Americanus</i>	Southern Kingfish	3	341	335	312																										
	<i>Peprilus Triacanthus</i>	Butterfish	2	200	237																											
	<i>Pomatomus Saltatrix</i>	Bluefish	1	335																												
	<i>Raja Eglanteria</i>	Clearnose Skate	6	401	390	641	591	575	395																							
	<i>Rhinoptera Bonasus</i>	Cownose Ray	3	485	441	461																										
02	<i>Alosa Sapidissima</i>	American Shad	1	460																												
	<i>Brevoortia Tyrannus</i>	Atlantic Menhaden	2	260	251																											
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	11	131	261	245	192	192	221	242	240	192	198	165																		
	<i>Dasyatis Americana</i>	Southern Stingray	1	570																												
	<i>Leiostomus Xanthurus</i>	Spot	4	260	249	252	247																									
	<i>Menidia Menidia</i>	Atlantic Silverside	2	95	93																											
	<i>Mustelus Canis</i>	Smooth Dogfish	2	655	582																											
	<i>Ovalipes Ocellatus</i>	Lady Crab	1	58																												
	<i>Rhinoptera Bonasus</i>	Cownose Ray	32	630	520	720	700	730	600	720	700	650	600	600	675	600	625	700	720	610	620	590	600	650	550	620	500	675				
	<i>Sphoeroides Maculatus</i>	Northern Puffer	2	291	212																											
03	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	35	200	190	160	172	135	170	196	162	125	221	271	180	181	175	210	166	165	165	200	166	192	180	225	150	220				
	<i>Cynoscion Nebulosus</i>	Spotted Seatrout	1	305																												
	<i>Cynoscion Regalis</i>	Weakfish	1	321																												
	<i>Dasyatis Americana</i>	Southern Stingray	1	600																												
	<i>Dasyatis Sabina</i>	Atlantic Stingray	1	510																												
	<i>Leiostomus Xanthurus</i>	Spot	81	242	241	250	245	235	220	251	242	250	251	243	245	231	240	245	252	260	249	260	261	252	240	237	256	249				
	<i>Menticirrhus Littoralis</i>	Gulf Kingfish	2	309	305																											
	<i>Rhinoptera Bonasus</i>	Cownose Ray	11	550	610	710	690	550	665	600	800	645	570	580																		
04	<i>Callinectes Sapidus</i>	Blue Crab	1	145																												
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	18	255	145	220	235	192	212	151	201	181	192	125	160	159	271	190	180	195	180											
	<i>Cynoscion Regalis</i>	Weakfish	1	370																												
	<i>Dasyatis Americana</i>	Southern Stingray	1	351																												
	<i>Dorosoma Cepedianum</i>	Gizzard Shad	1	305																												
	<i>Leiostomus Xanthurus</i>	Spot	6	215	251	291	250	255	253																							
	<i>Peprilus Alepidotus</i>	Harvestfish	1	105																												
	<i>Rhinoptera Bonasus</i>	Cownose Ray	47	412	430	480	461	230	490	540	421	420	520	471	470	470	420	461	531	481	440	490	481	470	445	410						
	<i>Sphoeroides Maculatus</i>	Northern Puffer	1	185																												
05	<i>Callinectes Sapidus</i>	Blue Crab	1	160																												
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	10	190	185	170	165	150	230	180	160	155	181																			
	<i>Cynoscion Regalis</i>	Weakfish	2	360	361																											
	<i>Dorosoma Cepedianum</i>	Gizzard Shad	1	355																												
	<i>Leiostomus Xanthurus</i>	Spot	225	235	255	263	265	263	245	235	260	250	260	240	240	260	245	225	250	250	260	235	245	260	250	245	240	260	260	260		
	<i>Rhinoptera Bonasus</i>	Cownose Ray	95	435	440	515	550	445	480	430	465	460	500	590	505	440	480	425	590	525	435	560	550	400	570							

Table C-1. Continued

Station	Scientific Name	Common Name	Species Total	Length (mm)																											
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25			
06	<i>Brevoortia Tyrannus</i>	Atlantic Menhaden	26	350	270	260	245	274	280	285	270	260	290	260	275	280	260														
	<i>Callinectes Sapidus</i>	Blue Crab	2	160	171																										
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	33	280	200	240	170	200	230	210	210	180	210	210	200	171	220	215	200	220	210	200	180	190	260	180					
	<i>Cynoscion Regalis</i>	Weakfish	1	385																											
	<i>Leiostomus Xanthurus</i>	Spot	1	280																											
	<i>Opisthonema Oglumen</i>	Atlantic Thread Herring	1	235																											
	<i>Peprilus Alepidotus</i>	Harvestfish	6	195	205	200	200	204	181																						
	<i>Rhinoptera Bonasus</i>	Cownose Ray	29	590	490	430	460	490	450	445	480	480	500	500	475	430	450	560	512	460	460	405	521	520	440	460	480	540			
	<i>Sphoeroides Maculatus</i>	Northern Puffer	1	250																											
07	<i>Alosa Sapidissima</i>	American Shad	1	385																											
	<i>Brevoortia Tyrannus</i>	Atlantic Menhaden	245	345	230	321	221	221	370	231	251	261	235	241	271	235	217	250	251	240	230	235	241	235	212	231	245	225			
	<i>Callinectes Sapidus</i>	Blue Crab	1	131																											
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	5	190	285	200	221	205																							
	<i>Cynoscion Regalis</i>	Weakfish	3	350	326	395																									
	<i>Dasyatis Americana</i>	Southern Stingray	1	310																											
	<i>Menticirrhus Americanus</i>	Southern Kingfish	2	312	345																										
	<i>Menticirrhus Saxatilis</i>	Northern Kingfish	1	307																											
	<i>Mustelus Canis</i>	Smooth Dogfish	1	705																											
	<i>Opisthonema Oglumen</i>	Atlantic Thread Herring	65	200	232	221	192	221	220	212	237	221	206	225	197	201	212	200	215	225	212	237	220	207	200	222	242	221			
	<i>Rhinoptera Bonasus</i>	Cownose Ray	16	470	470	500	420	430	440	480	480	441	400	450	450	520	541	521	471												
	<i>Sphoeroides Maculatus</i>	Northern Puffer	1	202																											
08	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	9	210	225	140	140	120	180	160	140	221																			
	<i>Rhinoptera Bonasus</i>	Cownose Ray	19	510	560	470	525	460	465	476	480	550	450	435	530	470	460	500	450	460	470	460									
09	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	3	201	261	235																									
	<i>Cynoscion Nebulosus</i>	Spotted Seatrout	2	341	342																										
	<i>Leiostomus Xanthurus</i>	Spot	1	267																											
	<i>Peprilus Alepidotus</i>	Harvestfish	80	185	182	193	191	200	202	171	192	190	192	203	198	192	175	210	186	181	201	200	200	210	198	211	195	192			
	<i>Rhinoptera Bonasus</i>	Cownose Ray	14	381	510	560	431	461	440	440	510	451	461	471	571	410	500														
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	19	200	180	290	200	160	190	195	160	190	180	210	200	155	155	170	200	220	210	205									
10	<i>Dasyatis Americana</i>	Southern Stingray	2	330	250																										
	<i>Menticirrhus Saxatilis</i>	Northern Kingfish	2	360	340																										
	<i>Mustelus Canis</i>	Smooth Dogfish	2	590	605																										
	<i>Paralichthys Dentatus</i>	Summer Flounder	1	213																											
	<i>Peprilus Alepidotus</i>	Harvestfish	25	195	190	190	185	210	180	195	215	195	190	210	205	180	220	180	190	195	185	190	215	180	191	206	180	195			
	<i>Pomatomus Saltatrix</i>	Bluefish	2	410	385																										
	<i>Rhinoptera Bonasus</i>	Cownose Ray	25	920	520	430	560	580	490	440	470	520	480	460	430	460	445	460	420	490	490	520	500	530	570	530	460	520			
	<i>Scophthalmus Aquosus</i>	Windowpane	1	225																											
	<i>Sphoeroides Maculatus</i>	Northern Puffer	2	220	250					</																					

Table C-1. Continued

**Table C-1. Continued**

Table C-1. Continued

C-7

Table C-1. Continued

**Table C-1. Continued**

G-9

Table C-1. Continued

C-10

Table C-1. Continued

Station	Scientific Name	Common Name	Species Total	Length (mm)																								
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
02	<i>Raja Eglanteria</i>	Clearnose Skate	1	655																								
03	<i>Alosa Mediocris</i>	Hickory Shad	3	344	323	310																						
	<i>Cancer Irroratus</i>	Atlantic Rock Crab	1	63																								
	<i>Ovalipes Ocellatus</i>	Lady Crab	5	53	42	54	43	53																				
	<i>Ovalipes Stephensonii</i>	Coarsehand Lady Crab	1	70																								
	<i>Paralichthys Dentatus</i>	Summer Flounder	1	267																								
	<i>Raja Eglanteria</i>	Clearnose Skate	2	617	575																							
04	<i>Scophthalmus Aquosus</i>	Windowpane	2	237	273																							
	<i>Libinia Emarginata</i>	Portly Spider Crab	1	67																								
	<i>Ovalipes Ocellatus</i>	Lady Crab	12	47	46	43	40	52	54	57	68	53	44	43	50													
	<i>Paralichthys Dentatus</i>	Summer Flounder	1	313																								
	<i>Pogonias Cromis</i>	Black Drum	1	247																								
05	<i>Sphoeroides Maculatus</i>	Northern Puffer	1	267																								
	<i>Cynoscion Nebulosus</i>	Spotted Seatrout	1	497																								
	<i>Ovalipes Ocellatus</i>	Lady Crab	15	35	47	52	61	45	43	55	46	43	44	47	50	53	42	46										
06	<i>Pogonias Cromis</i>	Black Drum	2	224	210																							
	<i>Ovalipes Ocellatus</i>	Lady Crab	6	54	57	60	42	44	53																			
07	<i>Raja Eglanteria</i>	Clearnose Skate	1	670																								
	<i>Cancer Irroratus</i>	Atlantic Rock Crab	1	57																								
08	<i>Ovalipes Ocellatus</i>	Lady Crab	26	38	52	51	46	54	44	56	53	44	47	44	42	57	52	40	33	40	47	52	41	37	54	48	37	
	<i>Ovalipes Ocellatus</i>	Lady Crab	2	51	47																							
09	<i>Ovalipes Stephensonii</i>	Coarsehand Lady Crab	1	63																								
	<i>Pogonias Cromis</i>	Black Drum	22	268	264	270	237	254	270	270	282	247	290	278	254	257	261	260	287	264	252	257	274	263	230			
	<i>Archosargus Probatocephalus</i>	Sheepshead	1	177																								
10	<i>Cynoscion Nebulosus</i>	Spotted Seatrout	1	500																								
	<i>Morone Saxatilis</i>	Striped Bass	1	407																								
	<i>Sciaenops Ocellatus</i>	Red Drum	4	370	384	410	460																					
	<b>Fall 04 - Ref Beach</b>																											
01	<i>Cynoscion Nebulosus</i>	Spotted Seatrout	1	333																								
	<i>Ovalipes Ocellatus</i>	Lady Crab	2	43	47																							
02	<i>Ovalipes Ocellatus</i>	Lady Crab	8	43	42	36	40	43	47	45	44																	
	<i>Sciaenops Ocellatus</i>	Red Drum	2	430	406																							
03	<i>Callinectes Sapidus</i>	Blue Crab	1	149																								
	<i>Ovalipes Ocellatus</i>	Lady Crab	6	53	50	57	56	50	37																			
04	<i>Cancer Irroratus</i>	Atlantic Rock Crab	1	58																								
	<i>Menticirrhus Littoralis</i>	Gulf Kingfish	1	109																								
	<i>Morone Saxatilis</i>	Striped Bass	2	420	435																							
	<i>Ovalipes Ocellatus</i>	Lady Crab	4	47	56	53	57																					
06	<i>Ovalipes Ocellatus</i>	Lady Crab	1	53																								
	<i>Scophthalmus Aquosus</i>	Windowpane	1	238																								
07	<i>Ovalipes Ocellatus</i>	Lady Crab	1	37																								
	<i>Scophthalmus Aquosus</i>	Windowpane	1	238																								
08	<i>Ovalipes Ocellatus</i>	Lady Crab	2	62	45																							
	<i>Morone Saxatilis</i>	Striped Bass	2	375	474																							
09	<i>Oval</i>																											

Table C-1. Continued

Station	Scientific Name	Common Name	Species Total	Length (mm)																						
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
10	<i>Alosa Mediocris</i>	Hickory Shad	7	357	348	356	352	344	342	342																
	<i>Morone Saxatilis</i>	Striped Bass	4	488	432	520	497																			
<b>Winter 05 - Impacted Beach</b>																										
03	<i>Alosa Mediocris</i>	Hickory Shad	1	436																						
	<i>Dorosoma Cepedianum</i>	Gizzard Shad	1	330																						
04	<i>Alosa Mediocris</i>	Hickory Shad	2	447	437																					
	<i>Alosa Pseudoharengus</i>	Alewife	1	314																						
05	<i>Alosa Mediocris</i>	Hickory Shad	3	502	471	480																				
	<i>Alosa Pseudoharengus</i>	Alewife	2	371	321																					
	<i>Brevoortia Tyrannus</i>	Atlantic Menhaden	1	302																						
06	<i>Alosa Pseudoharengus</i>	Alewife	1	269																						
07	<i>Alosa Mediocris</i>	Hickory Shad	1	497																						
10	<i>Alosa Mediocris</i>	Hickory Shad	5	443	480	473	467	472																		
<b>Winter 05 - Ref Beach</b>																										
01	<i>Alosa Mediocris</i>	Hickory Shad	3	437	457	397																				
	<i>Dorosoma Cepedianum</i>	Gizzard Shad	5	393	334	417	416	304																		
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	262																						
	<i>Morone Saxatilis</i>	Striped Bass	7	377	424	432	454	474	555	421																
05	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	320																						

Table C-2. Latitude and Longitude (Decimal Degrees) of haul seine sampling stations at the Impact and Reference Impact Beaches in Dare County, N.C.

<b>Station</b>	<b>Date</b>	<b>Latitude</b>	<b>Longitude</b>
<b>Spring 04 - Impacted Beach</b>			
01	05/07/04	36.02550	75.66211
02	05/07/04	36.02479	75.66171
03	05/07/04	36.04009	75.67174
04	05/07/04	36.06832	75.69053
05	05/07/04	36.06584	75.68873
06	05/07/04	36.06126	75.68596
07	05/07/04	36.06017	75.68515
08	05/07/04	36.05848	75.68400
09	05/07/04	36.05487	75.68143
10	05/07/04	36.06919	75.69118
<b>Spring 04 - Ref Beach</b>			
01	05/12/04	36.12476	75.72348
02	05/12/04	36.12192	75.72192
03	05/12/04	36.11800	75.71992
04	05/12/04	36.11737	75.71965
05	05/12/04	36.14027	75.73162
06	05/12/04	36.14147	75.73228
07	05/12/04	36.13938	75.73128
08	05/12/04	36.13822	75.73072
09	05/12/04	36.13207	75.72760
10	05/12/04	36.12912	75.72585
<b>Summer 04 - Impacted Beach</b>			
01	10/17/04	36.06628	75.68910
02	10/17/04	36.06513	75.68848
03	10/17/04	36.06253	75.68687
04	10/17/04	36.05967	75.68507
05	10/17/04	36.04072	75.67200
06	10/17/04	36.03918	75.67107
07	10/17/04	36.05795	75.68360
<b>Summer 04 - Ref Beach</b>			
01	10/17/04	36.12265	75.72245
02	10/17/04	36.12133	75.72182
03	10/17/04	36.11688	75.71948
04	10/17/04	36.11467	75.71823
05	10/17/04	36.11037	75.71580
06	10/17/04	36.13248	75.72768
07	10/17/04	36.13037	75.72650

Table C-2. Continued

<b>Station</b>	<b>Date</b>	<b>Latitude</b>	<b>Longitude</b>
<b>Fall 04 – Impacted Beach</b>			
01	12/05/04	36.06608	75.68875
02	12/05/04	36.06470	75.68792
03	12/05/04	36.06342	75.68708
04	12/05/04	36.06002	75.68508
05	12/05/04	36.05892	75.68435
06	12/05/04	36.06803	75.69028
07	12/05/04	36.06720	75.68967
08	12/07/04	36.06327	75.68705
09	12/07/04	36.06257	75.68662
10	12/07/04	36.06197	75.68643
<b>Fall 04 – Ref Beach</b>			
01	12/05/04	36.12442	75.72325
02	12/05/04	36.12535	75.72388
03	12/06/04	36.13723	75.73027
04	12/06/04	38.13642	75.72970
05	12/06/04	36.13477	75.72897
06	12/06/04	36.13312	75.72803
07	12/06/04	36.13203	75.72752
08	12/06/04	36.13125	75.72697
09	12/06/04	36.13037	75.72657
10	12/06/04	36.12722	75.72488
<b>Winter 05 – Impacted Beach</b>			
01	03/03/05	36.06678	75.68963
02	03/03/05	36.06627	75.68922
03	03/03/05	36.06328	75.68693
04	03/03/05	36.06273	75.68672
05	03/03/05	36.06202	75.68628
06	03/03/05	36.06118	75.68588
07	03/03/05	36.06060	75.68535
08	03/03/05	36.05903	75.68455
09	03/03/05	36.05835	75.68410
10	03/04/05	36.05788	75.68373
<b>Winter 05 – Ref Beach</b>			
01	04/05/05	36.12482	75.72368
02	04/05/05	36.12372	75.72302
03	04/05/05	36.12278	75.72255
04	04/05/05	36.12185	75.72190
05	04/05/05	36.12088	75.72155
06	04/05/05	36.12040	75.72130
07	04/05/05	36.12848	75.72545
08	04/05/05	36.12788	75.72512
09	04/05/05	36.12718	75.72477
10	04/05/05	36.12607	75.72418

Table C-3. Raw fish data at sites where fish were collected in trawls during the first year of sampling at the Borrow and Reference Borrow Sites offshore of Dare County, N.C. The total number of individuals collected for a species and the total length for up to 25 individuals is presented by season, site, and station number. The latitude and longitude of each station is presented in Table C-4 (Station table).

Table C-3. Continue

Station	Scientific Name	Common Name	Species Total	Length (mm)																						
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
07	<i>Mustelus Canis</i>	Smooth Dogfish	1	545																						
	<i>Urophycis Regia</i>	Spotted Hake	2	86	91																					
08	<i>Cephalopoda</i>	Squids	1																							
	<i>Lagodon Rhomboides</i>	Pinfish	1	114																						
	<i>Raja Eglanteria</i>	Clearnose Skate	1	612																						
	<i>Sphoeroides Maculatus</i>	Northern Puffer	1	123																						
	<i>Urophycis Regia</i>	Spotted Hake	8	100	83	97	95	102	100	103	87															
09	<i>Dasyatis Centoura</i>	Roughtail Stingray	1	490																						
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	204																						
	<i>Peprilus Triacanthus</i>	Butterfish	1	147																						
	<i>Raja Eglanteria</i>	Clearnose Skate	1	615																						
	<i>Urophycis Regia</i>	Spotted Hake	1	143																						
10	<i>Mustelus Canis</i>	Smooth Dogfish	1	1500																						
<b>Summer 04 – N Borrow Site</b>																										
01	<i>Penaeus Aztecus</i>	Brown Shrimp	1																							
02	<i>Lagodon Rhomboides</i>	Pinfish	3	122	118	114																				
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	157																						
	<i>Orthopristis Chrysoptera</i>	Pigfish	1	197																						
	<i>Peprilus Triacanthus</i>	Butterfish	1	180																						
03	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	163																						
07	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	1	210																						
<b>Summer 04 – N Ref Site</b>																										
02	<i>Leiostomus Xanthurus</i>	Spot	1	176																						
06	<i>Anchoa Mitchilli</i>	Bay Anchovy	1	86																						
10	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	163																						
	<i>Ovalipes Ocellatus</i>	Lady Crab	1	53																						
12	<i>Orthopristis Chrysoptera</i>	Pigfish	1	155																						
<b>Fall 04 – N Borrow Site</b>																										
02	<i>Peprilus Triacanthus</i>	Butterfish	1	206																						
04	<i>Anchoa Mitchilli</i>	Bay Anchovy	2	83	68																					
	<i>Peprilus Triacanthus</i>	Butterfish	2	213	233																					
08	<i>Anchoa Mitchilli</i>	Bay Anchovy	1	83																						
	<i>Bairdiella Chrysoura</i>	Silver Perch	4	132	128	122	205																			
	<i>Cynoscion Regalis</i>	Weakfish	7	167	157	157	166	172	184	163																
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	2	196	177																					
	<i>Peprilus Alepidotus</i>	Harvestfish	1	100																						
	<i>Peprilus Triacanthus</i>	Butterfish	1	70																						
	<i>Raja Eglanteria</i>	Clearnose Skate	1	647																						
	<i>Squalus Acanthias</i>	Spiny Dogfish	1	836																						
09	<i>Anchoa Mitchilli</i>	Bay Anchovy	1	77																						
	<i>Bairdiella Chrysoura</i>	Silver Perch	1	200																						
	<i>Cynoscion Regalis</i>	Weakfish	7	205	183	208	184	194	183	172																
	<i>Gymnura Micrura</i>	Smooth Butterfly Ray	1	678																						
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	4	234	251	225	220																			
	<i>Pomatomus Saltatrix</i>	Bluefish	1	284																						

Table C-3. Continue

Station	Scientific Name	Common Name	Species Total	Length (mm)																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
12	<i>Orthopristis Chrysoptera</i>	Pigfish	1	154																							
	<i>Prionotus Evolans</i>	Striped Seerobin	1	133																							
	<i>Squalus Acanthias</i>	Spiny Dogfish	1	757																							
<b>Fall 04 – N Ref Site</b>																											
02	<i>Anchoa Mitchilli</i>	Bay Anchovy	1	68																							
	<i>Paralichthys Dentatus</i>	Summer Flounder	1	292																							
	<i>Urophycis Regia</i>	Spotted Hake	1	216																							
03	<i>Larimus Fasciatus</i>	Banded Drum	1	96																							
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	2	266	252																						
	<i>Urophycis Regia</i>	Spotted Hake	1	180																							
04	<i>Cephalopoda</i>	Squids	2																								
	<i>Cynoscion Regalis</i>	Weakfish	2	172	163																						
	<i>Squalus Acanthias</i>	Spiny Dogfish	2	825	920																						
05	<i>Cynoscion Regalis</i>	Weakfish	1	176																							
06	<i>Anchoa Mitchilli</i>	Bay Anchovy	6	77	82	90	83	80	83																		
	<i>Cynoscion Regalis</i>	Weakfish	1	159																							
	<i>Larimus Fasciatus</i>	Banded Drum	1	85																							
	<i>Menticirrhus Americanus</i>	Southern Kingfish	1	154																							
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	237																							
	<i>Peprilus Triacanthus</i>	Butterfish	1	188																							
07	<i>Anchoa Mitchilli</i>	Bay Anchovy	1	60																							
	<i>Cynoscion Regalis</i>	Weakfish	1	174																							
08	<i>Cephalopoda</i>	Squids	1																								
	<i>Chilomycterus Schoepfi</i>	Striped Burrfish	1	130																							
	<i>Cynoscion Regalis</i>	Weakfish	3	186	164	166																					
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	252																							
	<i>Squalus Acanthias</i>	Spiny Dogfish	1	885																							
09	<i>Anchoa Mitchilli</i>	Bay Anchovy	1	74																							
	<i>Cynoscion Regalis</i>	Weakfish	2	200	86																						
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	1	290																							
	<i>Peprilus Triacanthus</i>	Butterfish	3	134	127	124																					
	<i>Squalus Acanthias</i>	Spiny Dogfish	1	899																							
10	<i>Cynoscion Regalis</i>	Weakfish	1	190																							
	<i>Micropogonias Undulatus</i>	Atlantic Croaker	3	272	266	234																					
	<i>Pomatomus Saltatrix</i>	Bluefish	1	314																							
11	<i>Anchoa Mitchilli</i>	Bay Anchovy	7	88	78	68	77	70	62	94																	
	<i>Cynoscion Regalis</i>	Weakfish	6	163	190	154	187	147	158																		
12	<i>Cynoscion Regalis</i>	Weakfish	1	190																							
	<i>Peprilus Triacanthus</i>	Butterfish	4	168	117	100	100																				
	<i>Urophycis Regia</i>	Spotted Hake	2	177	203																						
<b>Winter 05 – N Borrow Site</b>																											
03	<i>Scophthalmus Aquosus</i>	Windowpane	1	223																							
08	<i>Scophthalmus Aquosus</i>	Windowpane	1	267																							

Table C-4. Latitude and Longitude (Decimal Degrees) of commercial trawl sampling stations at the Borrow and Reference Borrow Sites offshore of Dare County, N.C. Spring sampling was conducted with a 9.7 m trawl and all subsequent seasonal sampling was done with a 12.7 m trawl net.

<b>Station</b>	<b>Date</b>	<b>Latitude</b>	<b>Longitude</b>
<b>Spring 04 – N Borrow Site</b>			
02	05/11/04	36.07155	75.68035
03	05/11/04	36.08258	75.67778
04	05/11/04	36.06407	75.67415
05	05/11/04	36.08388	75.67878
01	05/13/04	36.07170	75.66633
06	05/13/04	36.06952	75.66480
07	05/13/04	36.07122	75.66155
08	05/13/04	36.06528	75.65817
09	05/13/04	36.06025	75.66148
10	05/13/04	36.07220	75.65592
<b>Spring 04 – N Ref Site</b>			
01	05/13/04	36.02320	75.63225
02	05/13/04	36.02688	75.63453
03	05/13/04	36.02722	75.63818
04	05/13/04	36.03425	75.65487
05	05/13/04	36.03913	75.64698
06	05/13/04	36.03492	75.65250
07	05/13/04	36.03367	75.64278
08	05/13/04	36.02433	75.64480
09	05/13/04	36.02437	75.63897
10	05/13/04	36.03313	75.64258
<b>Summer 04 – N Borrow Site</b>			
01	08/27/04	36.03843	75.64687
02	08/27/04	36.03460	75.63917
03	08/27/04	36.02995	75.63692
04	08/27/04	36.04103	75.64303
05	08/27/04	36.04172	75.64595
06	08/27/04	36.04040	75.64323
07	08/27/04	36.03988	75.64147
08	08/27/04	36.03858	75.64117
09	08/27/04	36.03645	75.64053
10	08/27/04	36.03502	75.64060
11	08/27/04	36.03302	75.64152
12	08/27/04	36.03115	75.63810

Table C-4. Continued

<b>Station</b>	<b>Date</b>	<b>Latitude</b>	<b>Longitude</b>
<b>Summer 04 – N Ref Site</b>			
01	08/28/04	36.08865	75.67373
02	08/28/04	36.08623	75.67400
03	08/28/04	36.08542	75.67150
04	08/28/04	36.08440	75.67135
05	08/28/04	36.08307	75.67077
06	08/28/04	36.08218	75.66967
07	08/28/04	36.07637	75.67168
08	08/28/04	36.07478	75.67190
09	08/28/04	36.07407	75.66625
10	08/28/04	36.07050	75.65978
11	08/28/04	36.06183	75.66010
12	08/28/04	36.05342	75.66415
<b>Fall 04 – N Borrow Site</b>			
01	11/19/04	36.08785	75.68197
02	11/19/04	36.08622	75.68078
03	11/19/04	36.08872	75.67328
04	11/19/04	36.08460	75.67593
05	11/19/04	36.08537	75.66907
06	11/19/04	36.08485	75.67818
07	11/19/04	36.08595	75.66962
08	11/19/04	36.07718	75.67255
09	11/19/04	36.07075	75.67867
10	11/20/04	36.06883	75.67070
11	11/20/04	36.07063	75.66113
12	11/20/04	36.05817	75.65743
<b>Fall 04 – N Ref Site</b>			
01	11/20/04	36.04158	75.64423
02	11/20/04	36.03628	75.65265
03	11/20/04	36.03975	75.64382
04	11/20/04	36.03247	75.65068
05	11/20/04	36.03540	75.64160
06	11/20/04	36.02848	75.64823
07	11/20/04	36.03467	75.64317
08	11/20/04	36.03050	75.63575
09	11/20/04	36.02872	75.64735
10	11/20/04	36.02875	75.63763
11	11/20/04	36.02578	75.64487
12	11/20/04	36.02533	75.63575

Table C-4. Continued

<b>Station</b>	<b>Date</b>	<b>Latitude</b>	<b>Longitude</b>
<b>Winter 05 – N Borrow Site</b>			
01	02/20/05	36.09410	75.68145
02	02/20/05	36.09323	75.68248
03	02/20/05	36.09135	75.68040
04	02/20/05	36.09122	75.67605
05	02/20/05	36.08783	75.67277
06	02/20/05	36.08523	75.67122
07	02/20/05	36.07753	75.67202
08	02/20/05	36.07425	75.66823
09	02/20/05	36.07370	75.66362
10	02/20/05	36.07243	75.65967
11	02/20/05	36.06310	75.65928
12	02/20/05	36.05527	75.66130
<b>Winter 05 – N Ref Site</b>			
01	02/21/05	36.03930	75.65328
02	02/21/05	36.04180	75.64680
03	02/21/05	36.03878	75.64862
04	02/21/05	36.03875	75.64765
05	02/21/05	36.03508	75.64725
06	02/21/05	36.03438	75.64283
07	02/21/05	36.03105	75.64468
08	02/21/05	36.03025	75.64332
09	02/21/05	36.02765	75.64465
10	02/21/05	36.02728	75.64300
11	02/21/05	36.02610	75.64312
12	02/21/05	36.02377	75.64165