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Zooplankton Biodiversity in the Northeast Gulf of Mexico and on the West Florida Shelf from 2005 - 2014

Megan Ferguson
University of South Florida

Zooplankton Biodiversity in the Northeast Gulf of Mexico and on the West Florida Shelf from 2005 - 2014

by

Megan Ferguson

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Major Professor: Kendra L. Daly, Ph.D.
Cameron Ainsworth, Ph.D.
Brad Seibel, Ph.D.

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Abstract

Zooplankton abundance and biodiversity was measured in the northeast Gulf of Mexico (NEGoM) and on the West Florida Shelf. Bongo net samples were collected between May 2005 to September 2009 through the SEAMAP program, and between July 2010 to August 2014 through the C-IMAGE program. Calanoid copepods were the most abundant zooplankton group in most of the samples collected, but ostracods, larvaceans, and chaetognaths were also abundant. Shannon and Inverse Simpson indices were calculated for all zooplankton samples and generally showed similar trends, but only Shannon indices were used for statistical analyses. In the winter and spring there were significant interannual differences (2010 – 2014) in biodiversity in the NEGoM, however this was not the case for summer. This metric may indicate that zooplankton were not appreciably impacted by the Deepwater Horizon oil spill, which occurred during spring and summer of 2010 in this region. Biodiversity indices were significantly higher off-shelf than nearshore. For nearshore NEGoM samples, the dominant plankton were the calanoid copepods, *Centropages* spp. and *Temora* spp., and ostracods. The dominant zooplankton for nearshore West Florida Shelf samples were the calanoid copepods, *Centropages* spp. and *Temora* spp., and cladocerans. In addition, nearshore biodiversity indices remained similar between seasons (winter, spring, summer), while offshore diversity indices were variable between seasons and highest in spring (May). Shannon indices also were significantly higher for nearshore samples in the NEGoM than nearshore samples over the West Florida Shelf. This study provides baseline data so that effects of future ecological perturbations on zooplankton communities can be better understood.

Chapter 1: Introduction

1.1 Zooplankton

Zooplankton are among the most important groups of organisms in the ocean (Banse 1995). Zooplankton, as primary and secondary consumers, are near the base of the marine food web and are a vital food source for many higher trophic levels, including commercially important fish. In addition, many commercially and recreationally important fish and crustaceans spend their larval life stages as zooplankton (Cushing 1995). Thus, zooplankton are crucial to both ecological processes and the economics of food services. Despite the importance of zooplankton, they remain vastly under-sampled, particularly in the Gulf of Mexico. It is uncertain how anthropogenic disturbances, such as oil spills, may impact zooplankton communities. In addition, little is known about major traits of even the dominant zooplankton, or other important community variables, such as biodiversity.

1.2 Zooplankton in the Gulf of Mexico

Daly et al. (2021) used Bongo tows and the SIPPER camera imaging system to collect or observe zooplankton in the northeast Gulf of Mexico (NEGoM) between May and June 2010, during the Deepwater Horizon (DWH) oil spill, and then after the oil spill up until August 2014. Zooplankton abundances were highest nearshore and lower off-shelf. Copepods were the most abundant taxa at most stations. On shelf during summer, the taxa rank of percent composition, on average, were copepods, larvaceans, chaetognaths, and ostracods. Off-shelf, the percent composition ranks were copepods, larvaceans, chaetognaths, small hydromedusae, and doliolids (Daly et al. 2021).

The DWH oil spill started on April 20th and ended on July 15th, 2010. During this time, 4.9 million barrels of crude oil were released into the NEGoM (Lubchenco et al. 2012; McNutt et al. 2012). The DWH oil spill was unique compared to previous oil spills because the depth of the wellhead was 1,500 m below the sea surface, injecting oil throughout the entire water column. Moreover, an unprecedented 2.1 million gallons of dispersants (Corexit EC9500A and EC9527A) were released at the sea surface and in deep water. The DWH oil spill is the largest oil spill to date and much remains to be learned about how the water-column community was impacted by this disturbance. Crude oil and the dispersant Corexit had direct lethal and sublethal effects on zooplankton, resulting in changes in physiology and reproduction (Almeda et al. 2013). It was determined that 39% of the zooplankton community, which occurred between 0 and 20 m in the water column, could have been exposed to high volumes of oil (Daly et al. 2021). Although there was a lack of baseline data in this region, Daly et al. (2021) concluded that dominant zooplankton taxa did not decline or disappear following the DWH oil spill, due to ecosystem connectivity (zooplankton transport into region), their high fecundity and relatively short generation times, as well as taking refuge in deeper depths.

1.3 Biodiversity of zooplankton in the Gulf of Mexico

The term biodiversity was defined in 1986 at the *National Forum on Biodiversity* (Chiarucci et al. 2011). Two measurements of biodiversity are richness and evenness. Richness is the number of species within a community. Evenness is the spatial variation in relative abundance of species/taxa (Bernhard and Leslie 2013). Biodiversity relates to the composition of the community, which has been associated with ecosystem stability and, therefore, ecosystem health. A diverse community appears to improve an ecosystem's ability to respond to and recover from a disturbance (Bernhardt and Leslie 2013). Zooplankton respond quickly to environmental perturbations, because they have high growth rates, high fecundity, and relatively short generation times (National Research Council 2003). Zooplankton community composition and variability needs to be studied, in order to gain a better understanding of the potential impacts of the DWH oil spill on zooplankton communities and the impacts of other large environmental perturbations in the future.

To my knowledge only two papers (Ortner et al. 1989; Daly et al. 2021) have been published on zooplankton diversity in the NEGoM, plus two dissertations (Howey 1976; Minello 1980). Howey (1976) used Shannon-Weiner and Simpson indices to determine the diversity of copepod species (calanoid and non-calanoid) in samples collected in the NEGoM and on the West Florida Shelf. Copepod diversity was highest in oceanic waters and lowest on the continental shelf. Calanoid copepods were most abundant on the continental shelf and least abundant in oceanic waters. Minello (1980) analyzed species diversity of female adult copepods for samples collected at 20 stations off the coast of Texas and western Louisiana (northwest Gulf of Mexico). Samples were collected each month, for three years (1963 – 1965). Species diversity was determined to be highest in the winter at the deepest stations (46 and 73 m), and lowest in the summer. Ortner et al. (1989) reported that Shannon and Pielou indices indicated that zooplankton functional groups had low diversity near the mouth of the Mississippi River, intermediate diversity at Cape San Blas (Florida panhandle), and high diversity in the central Gulf. When only looking at copepod abundance data from the *R/V Researcher* cruise, they found the highest copepod abundance near the mouth of the Mississippi River and lower copepod abundance in the central Gulf (Ortner et al. 1989). Daly et al. (2021) also reported on the spatial, seasonal, and interannual variability of Shannon diversity indices during May, August/September, and February 2010-2014 in the NEGoM, as well as copepod species rank abundance during and after the Deepwater Horizon oil spill. Shannon indices were low nearshore and increased going off-shelf. In general, there were no significant interannual differences within seasons.

1.4 Research goals and questions

The overall goal of my research is to determine patterns of zooplankton biodiversity spatially, seasonally, and interannually in the NEGoM and on the West Florida Shelf. These results will also create a baseline of zooplankton biodiversity using the same zooplankton data reported in Daly et al. (2021) for the NEGoM, as well as additional data from the West Florida Shelf. These regions are important to study because they are highly productive and home to major fisheries (NMFS, 2011). Here I investigate several questions related to the potential impact of the Deepwater Horizon oil spill on zooplankton biodiversity, seasonal differences in diversity, biodiversity gradients with distance from shore, and latitudinal gradients in biodiversity along the Florida shelf.

Research Questions:

1) Environmental disturbances, such as the Deepwater Horizon oil spill in the NEGoM in 2010, often decrease biological diversity. Was zooplankton diversity lower in summer 2010, compared to the following summers? Were there interannual differences in zooplankton biodiversity during winter or spring (2011-2013)?
2) Was zooplankton biodiversity different between seasons, for example higher during the productive summer than in winter?
3) Zooplankton biodiversity is known to be higher off-shelf in the NEGoM. Was there a cross shelf gradient of zooplankton diversity with lower diversity nearshore and higher diversity off-shelf in the NEGoM and on the West Florida Shelf?

4) Was there a latitudinal gradient whereby zooplankton biodiversity was higher in the NEGoM than on the West Florida Shelf for nearshore and off-shelf sites?

Chapter 2: Methods

2.1 Description of study area and station locations

Zooplankton and environmental parameters were collected during 23 research cruises, conducted by Dr. Daly (College of Marine Science/USF) and her research team, in the NEGoM and the West Florida Shelf from July 2010 to August 2014, as part of the Center for Integrated Modeling and Analysis of Gulf Ecosystems (C-IMAGE) project. Zooplankton samples and environmental data collected from May 2005 to September 2009 in both the NEGoM and the West Florida Shelf were also obtained from samples collected by the NOAA Southeast Area Monitoring and Assessment Program (SEAMAP). Assessment of these combined datasets provide a detailed record of zooplankton communities in the NEGoM and West Florida Shelf.

C-IMAGE samples were collected along four transects: two transects in the NEGoM (PCB and DSH; not acronyms) and two transects along the West Florida Shelf (northern and southern transects) (Fig. 1). The PCB transect bottom depths ranged from 25 m (PCB01) to 1220 m (PCB11) (Table A1). The DSH transect bottom depth ranged from 400 m (DSH07) to 2300 m (DSH09) (Table A1). The DSH transect also included a station at the location of the Deepwater Horizon oil spill (DWH), which has a bottom depth of 1540 m (Table A1). The northern transect (NT) bottom depths ranged from 15 m (NT31) to 510 m (NT07) (Table A2). The southern transect (ST) bottom depths ranged from 7 m (ST01) to 860 m (ST24) (Table A2). SEAMAP stations were chosen by selecting the stations closest to the PCB, DSH, NT, and ST stations, so these stations have similar bottom depths to the C-IMAGE samples (Fig. 2; Tables A1 and A2).

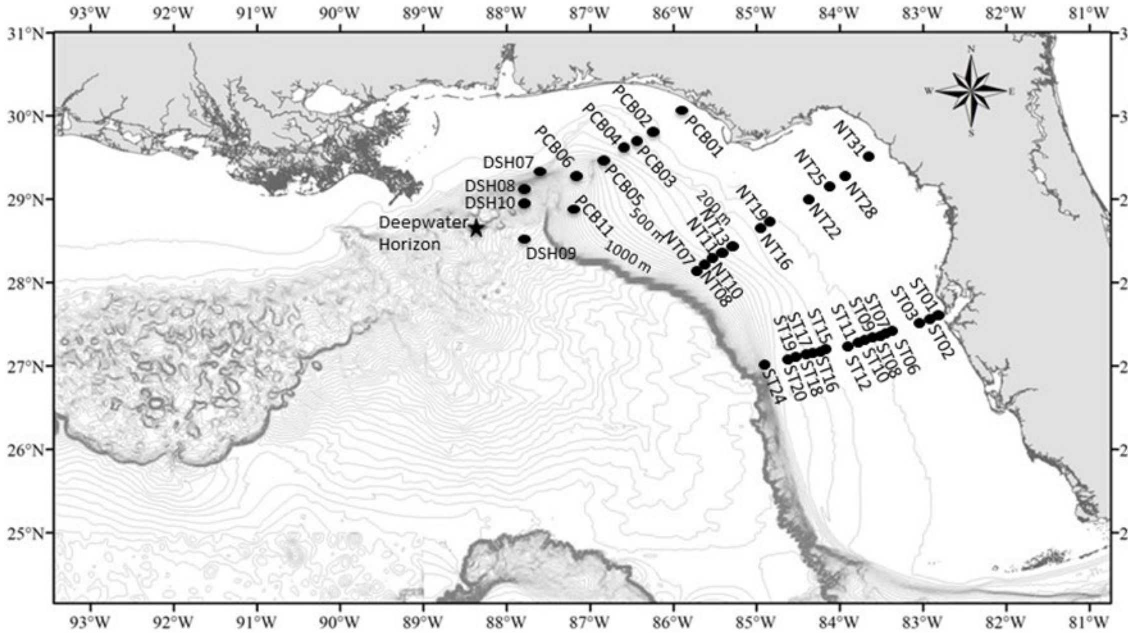

Figure 1. C-IMAGE stations located in the northeast Gulf of Mexico and West Florida Shelf. Zooplankton samples were collected between July 2010 and August 2014

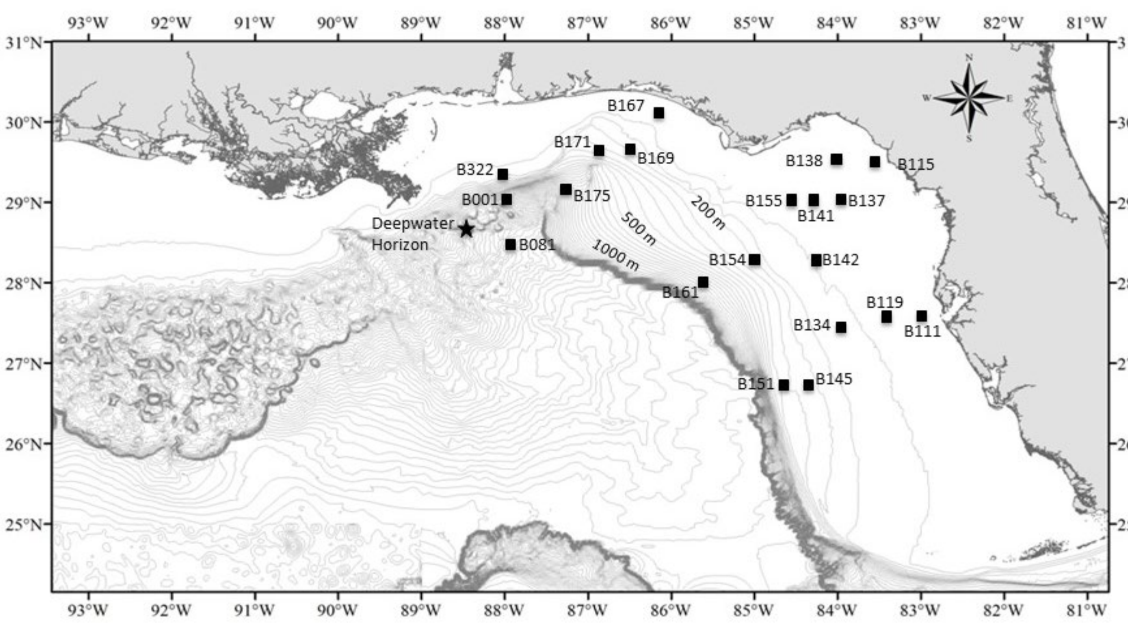

Figure 2. SEAMAP stations located in the northeast Gulf of Mexico and West Florida Shelf. Zooplankton samples were collected between May 2005 and September 2009.

2.2 Zooplankton sample collection methods

All zooplankton samples were collected using the same method. A Bongo net (60 cm diameter opening, with 333 µm mesh) was towed along an oblique path from 200 m (or 2–5 m above the sea floor for shallower stations) to the surface (Hanisko and Lyczkowski-Shultz 2013). SEAMAP samples were preserved in 70% ethanol and C-IMAGE samples were preserved in 10% formalin.

2.3 Sample analyses – Microscopic and Zooscan

2.3 a) Microscopic analyses of C-IMAGE Bongo samples

Large and unique taxa were pulled from each sample, then identified and counted using a dissecting microscope. The remaining sample was then split using a Folsom splitter to yield ~200 calanoid copepods in the final split. The split was then counted and identified using a dissecting microscope. Calanoid copepods were identified to species, when possible. A compound microscope was sometimes used to identify copepods. Other taxa were identified to varying taxonomic levels (Table 1).

C-IMAGE samples were compiled into a single Excel spreadsheet. Total zooplankton abundance was calculated for each station and cruise, by taking the total number of individuals in the aliquot, multiplying times the sample fraction, and then dividing by volume filtered to obtain #/m^3. Raw counts of specimens, pulled from the sample prior to splitting, were standardized and added to the dataset.

Table 1. Zooplankton categories

- Appendicularia (larvaceans)
- Barnacle larvae
- Bivalves
- Cephalopod
- Chaetognath
- Crustacean:
  - Amphipod
  - Unknown copepod
  - Calanoid copepods:
    - *Candacia* spp.
    - *Centropages* spp.
    - *Eucalanus* spp.
    - *Lucicuitia* spp.
    - *Temora* spp.
    - Unknown calanoid
  - Non-calanoid copepods
    - *Corycaeus* spp.
    - Harpacticoid
    - *Oithona* spp.
    - *Oncaea* spp.
    - Sapphrinidae
  - Cladocera
  - Crab larvae stages:
    - Megalopa
    - Zoea
  - Crustacean larvae
  - Crustacean nauplii
  - Cumacean
  - Decapod
- Crustacean cont.:
  - Euphausiid
  - Isopoda
  - *Lucifer*
  - Mysid
  - Ostracod
  - Phyllosome
  - Stomatopod
- Ctenophore
- Cyphonaute
- Doliolid
- Echinoderm larvae
- Eggs
- Fish larvae
- Heteropods (Atlantids, other)
- Hydromedusae
- Misc. Gelatinous
- Pluteus larvae
- Polychaeta
- Protist:
  - Foraminifera
  - *Noctiluca*
  - Radiolarians
- Pteropods (*Limacina*, *Calvolina*, other)
- Salps
- Siphonophores
- Unknown other taxa

2.3 b) Zooscan analyses of SEAMAP Bongo samples

First, a preserved sample was rinsed through a 100 µm sieve using deionized (DI) water. The original preservative was set aside in a jar, to which the sample was returned after it was examined. Large and unique taxa were removed from each sample and scanned using a water-proof scanner, called the Hydroptic ZooScan (Gorsky et al. 2010). The remaining sample was then split using a Folsom splitter to yield ~100 calanoid copepods in the final split, which was also scanned on the Zooscan. When scanning a sample, the organisms were sufficiently dispersed so that no organisms were touching each other or the frame of the Zooscan.

Scanned samples were processed using ZooProcess software (Gorsky et al. 2010). A software program, called Plankton Identifier (PkID), was used to create a training library for the scanned images in the samples. The training set teaches the PkID program to identify zooplankton and separate them into categories. The software program, ZooProcess, was then used to separate any organisms that might be touching each other in the scanned image. The PkID program was used to make predictions on the identification of all the organisms in the scan. This was done for both the large taxa and the split. The sample images (Fig. 3) were then validated by eye, and any organisms not correctly classified by the program were moved to the correct folder. Individual counts and abundances were calculated after validation was complete (Gorsky et al. 2010). Total zooplankton abundance (#/m^3) was calculated for each station and cruise, by taking the total number of individuals in the aliquot, multiplying times the sample fraction, and then dividing by volume filtered. Large and unique taxa counts were divided by the volume filtered to obtain #/m^3 and were then added to the total abundance.

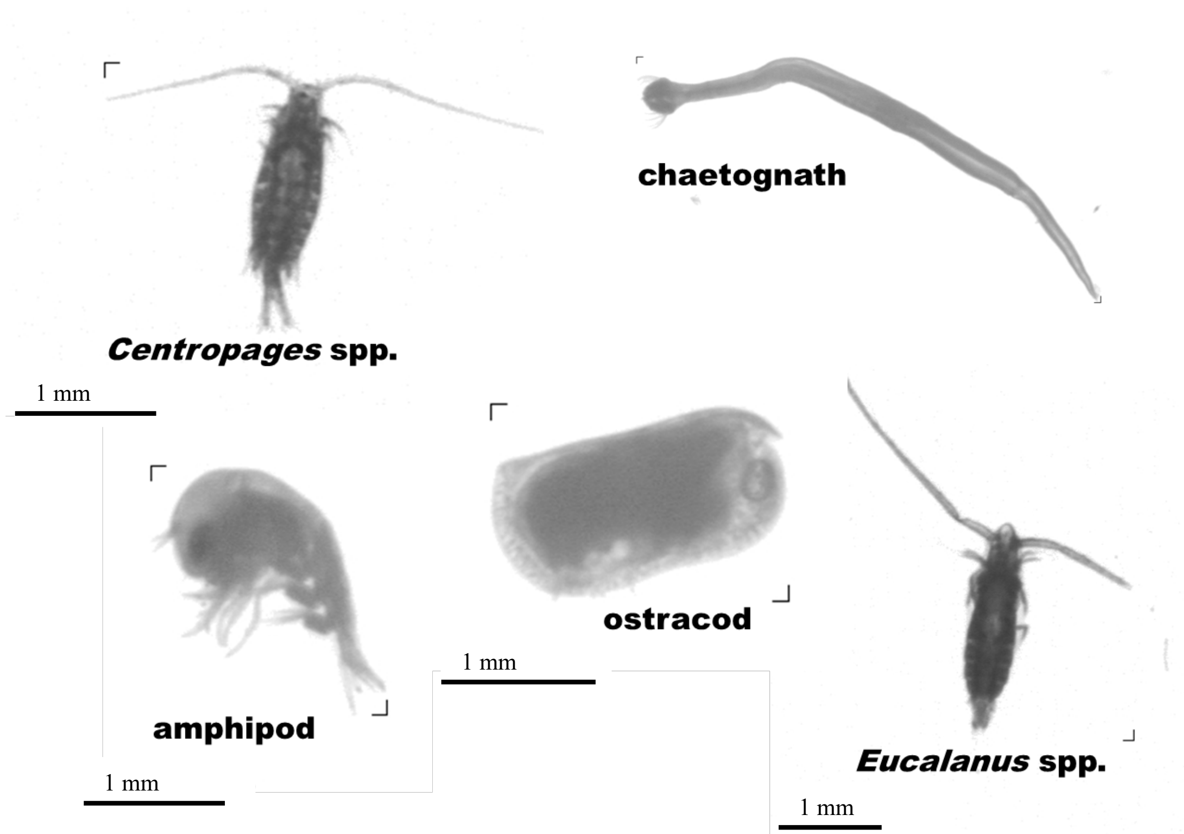

Figure 3. Images of various zooplankton extracted from Zooprocess.

2.4 Data analyses - Biodiversity indices

Biodiversity indices evaluate differences in either the spatial variation of relative abundance of species/taxa (evenness) or in the number of different kinds of organisms (richness), or both. Some properties of an index include: "*nonparametric* and *statistically accurate*; applicable to any community independent of species abundance distribution; should have small bias and sampling variance in samples of moderate size" (Keylock 2005, p.203).

The Shannon Index is widely used in the scientific literature (e.g., Magurran 2004 and references therein). It was developed by Shannon (Shannon and Weaver 1949) and based on communication theory developed by Norbert Wiener. The Shannon Function, H, measures entropy, while making no assumptions about underlying abundances (Spellerberg and Fedor 2003):

$$H = -\sum p_i \ln(p_i),$$

where p is the proportion of the *i*th category (e.g., species). Shannon entropy relates to the number of possible pathways of energy flow in a system. In a system with low biodiversity there is less uncertainty about where any given parcel of energy will flow. The Shannon index measures both evenness and richness. The higher the value of *H*, the higher the diversity of species in a particular community. For most ecological research, Shannon diversity index values usually range from 1.5 to 3.5.

Keylock (2005) recommended both the Shannon and Simpson indices to be the most acceptable indices for measuring species diversity. Simpson diversity is used to measure biodiversity in conservation areas, because small sample sizes can be used with this index (Keylock 2005). However, Magurran (2004) recommended using the Inverse Simpson Index, which provides a measure of the effective number of "units" (e.g., taxa):

$$1/\lambda = 1/\sum p_i^2,$$

Magurran (2004) stated that the Inverse Simpson index was better for small sample sizes, compared to Shannon index. The Inverse Simpson index only measures evenness and, therefore, is less sensitive to the difference in taxa richness than Shannon's index. Higher Inverse Simpson values also indicate higher diversity. The maximum value would occur if there was perfect evenness and would be equal to the number of species.

I measured zooplankton biodiversity using both the Shannon and Inverse Simpson biodiversity indices, which are reported in Tables A3 and A4. The trends of Shannon indices and Inverse Simpson indices were similar, but the plots of the Shannon indices showed biodiversity distribution patterns more clearly. Therefore, in the figures and statistical analyses I focus on the Shannon index, because it is an efficient measure of both richness and evenness, whereas the Inverse Simpson index only measures evenness.

2.5 Statistical analyses

Bongo tows occurred at any time of the day or night. Some zooplankton vertically migrate (Hopkins 1982); therefore, tows in deep water (> 200 m) may have more migrators in the upper 200 m at night and fewer during the day, which could bias the abundance of migrating taxa. Daly et al. (2021) evaluated the Bongo data and determined that there were no significant differences between day/night samples. Consequently, taxa were enumerated from each sample and compiled to determine total abundance (i.e., density, $\#/m^3$) and the total number of taxa per samples (S). These data were then used to calculate the Shannon and Inverse Simpson indices for each station and cruise.

Statistical tests were performed at a significance level of $\alpha = 0.05$. A normality test was run for each comparison group to determine if the data were normally distributed. If the data were normal, then an ANOVA test was run. If the ANOVA test gave a p-value less than or equal to 0.05, then a Tukey test was run to see which samples were significantly different. If the data were not normally distributed, then a Kruskal-Wallis test was run. T-tests were run on data comparing two data groups.

Chapter 3: Results

3.1 C-IMAGE samples

A list of taxa present (Table 1), total abundance (N, #/m^3) (Tables A5 and A6), total number of taxa found (S) (Tables A5 and A6), and Inverse Simpson and Shannon indices (Tables A3 and A4) were compiled for each station from each of the four transects for each of the three months from the years 2010 – 2014 (not all stations were sampled three times each year).

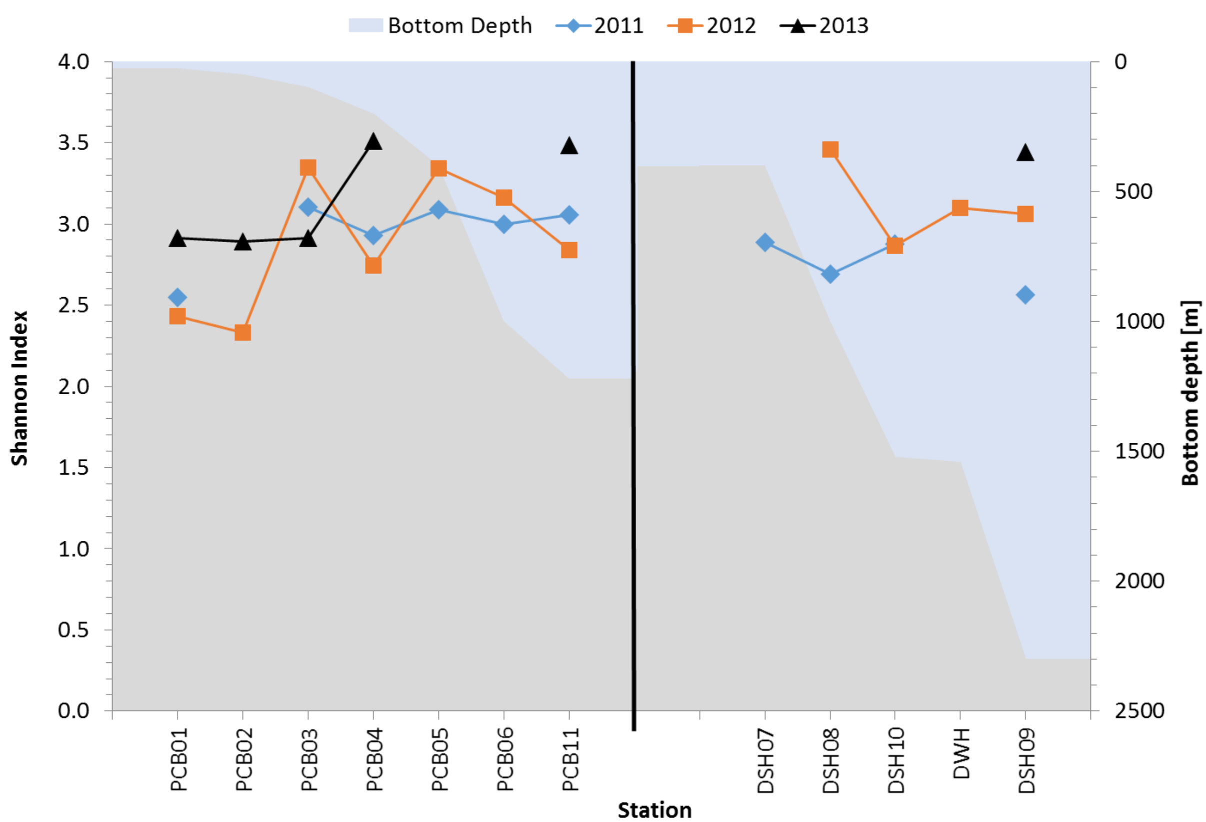

Figure 4. Shannon indices for PCB (left panel) and DSH (right panel) stations in the NE Gulf of Mexico collected in February between 2011 and 2013. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

The Shannon indices were plotted for each PCB and DSH station in the NEGoM for the months: February (Fig. 4), May (Fig. 5), and August (Fig. 6). For samples collected in February, the Shannon index was quite variable between years. In general, the index was lowest (2.43 - 2.91) nearshore (PCB01 and PCB02) and higher/more variable (2.56 - 3.49) from the shelf break (PCB05) to off-shelf sites (DSH09). In some years, PCB03 and PCB04 also had relatively high diversity indices, indicating the presence of off-shelf water. May showed a much stronger trend between low nearshore diversity (1.18 - 2.40) and higher diversity off-shelf, with diversity values ranging from 3.04 to 3.56. August samples also showed a general increase in the Shannon index between nearshore (1.78 - 2.60) and outer/off-shelf sites (2.85 - 3.52), though not as strong as the May pattern.

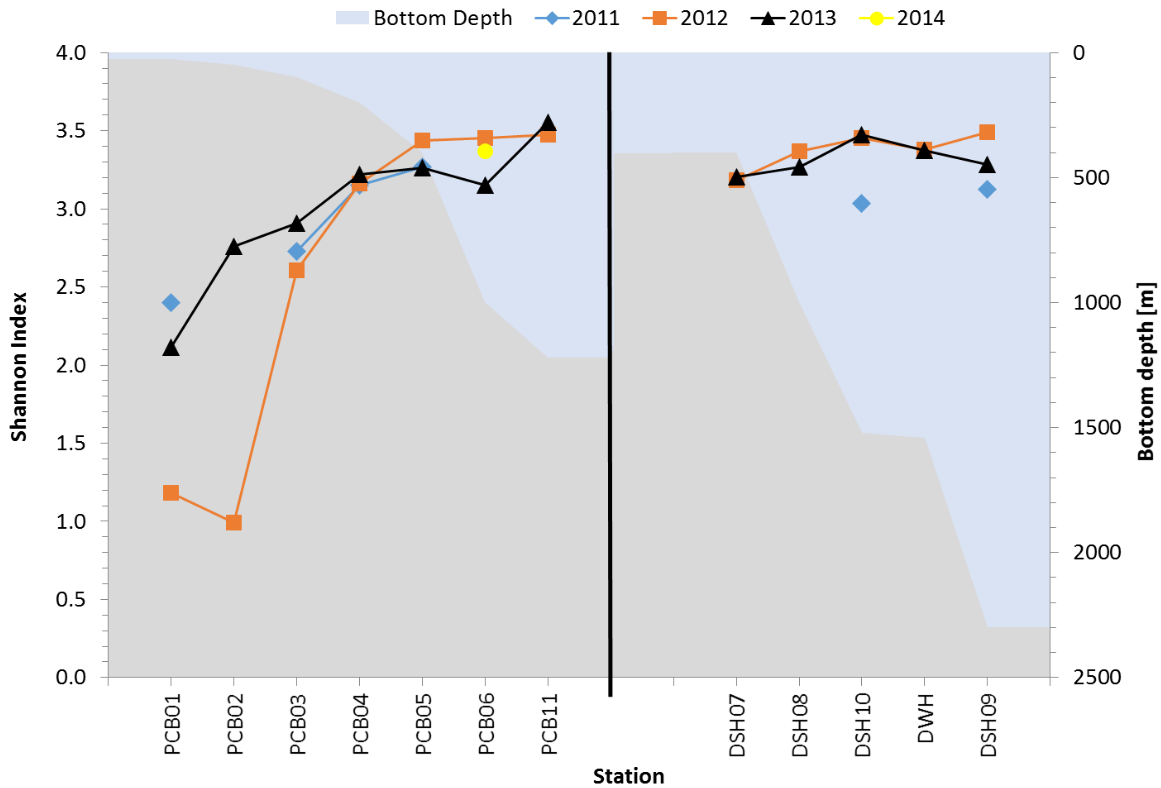

Figure 5. Shannon indices for PCB (left panel) and DSH (right panel) stations in the NE Gulf of Mexico collected in May between 2011 and 2014. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

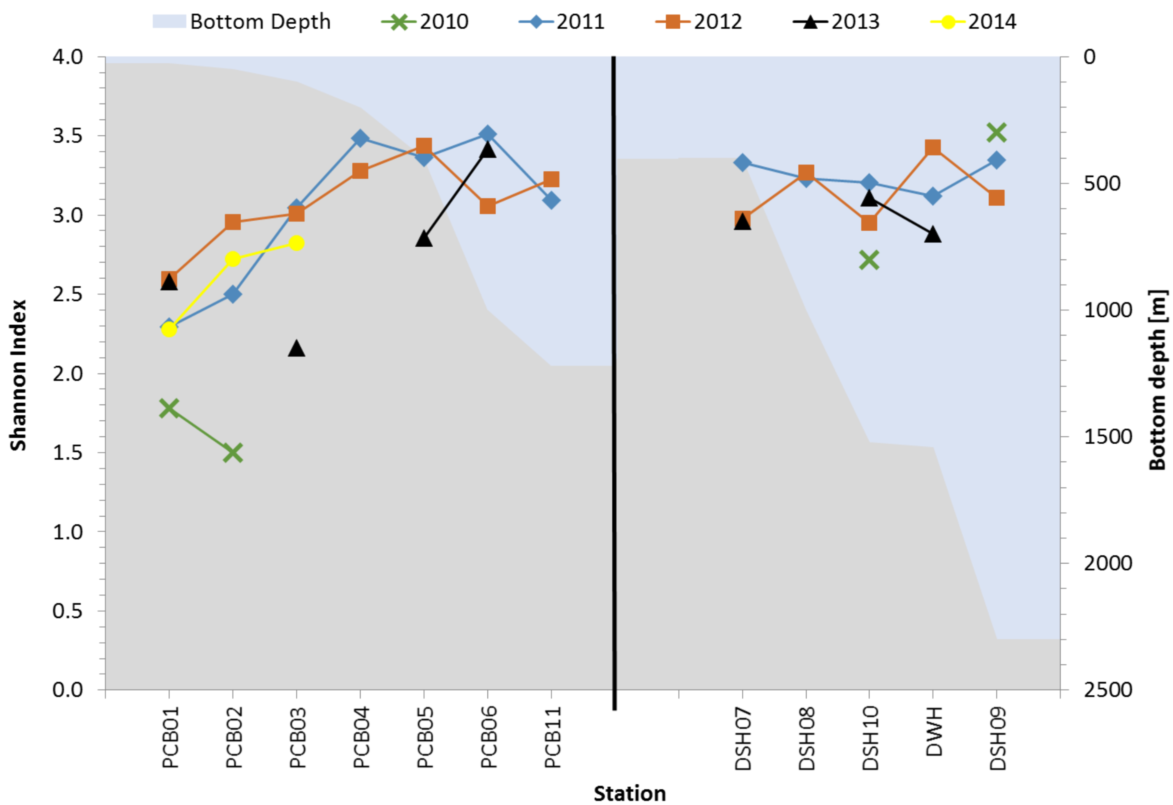

Figure 6. Shannon indices for PCB (left panel) and DSH (right panel) stations in the NE Gulf of Mexico collected in August between 2010 and 2014. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

The Shannon index was also calculated for zooplankton samples on the West Florida Shelf for each NT and ST station for the months: April (Fig. 7), July (Fig. 8), and November (Fig. 9). In April, the Shannon index was again lowest nearshore for both NT (2.59) and ST (2.39) and highest off-shelf for both NT (3.54) and ST (3.33). Similar to April, July and November had a gradient of Shannon indices, with the lowest indices nearshore (1.71, 1.53 consecutively) and highest off-shelf (3.57, 3.70 consecutively) for both NT and ST. July had the strongest gradient of Shannon Indices between nearshore and off-shelf similar to that in May on the PCB transect further north.

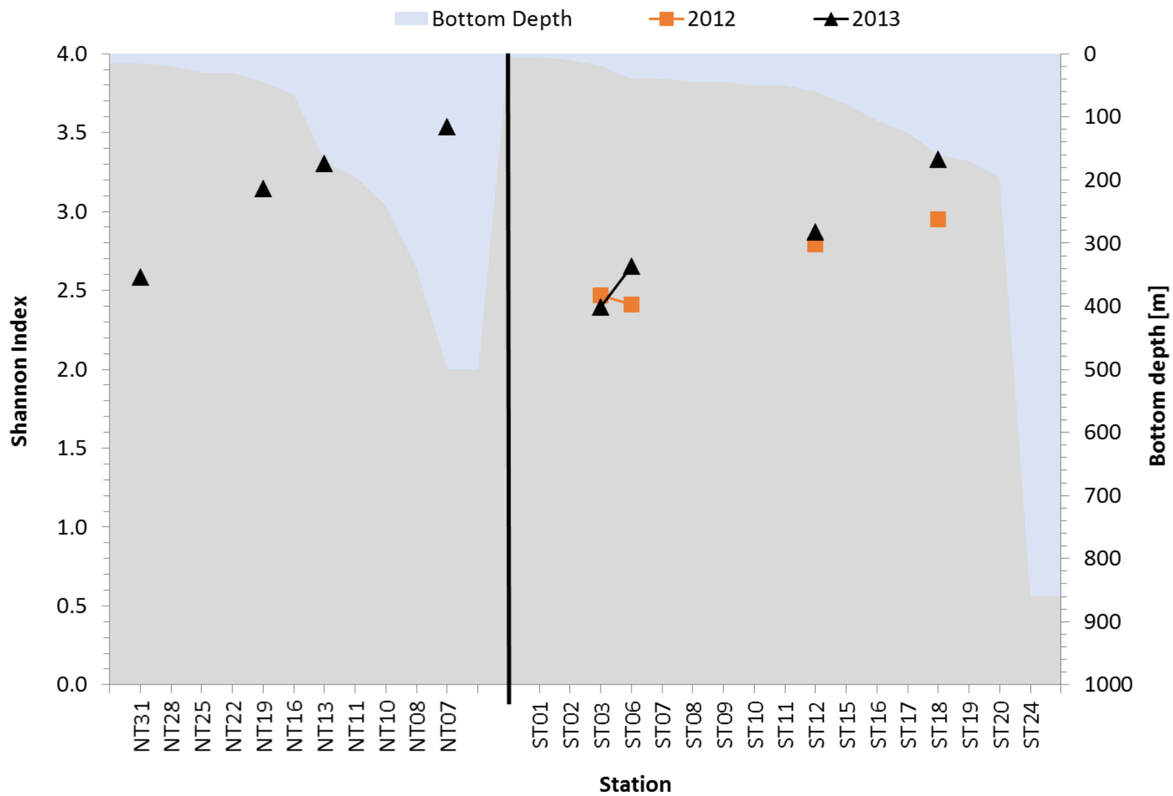

Figure 7. Shannon indices for NT (left panel) and ST (right panel) stations on the West Florida Shelf collected in April between 2012 and 2013. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

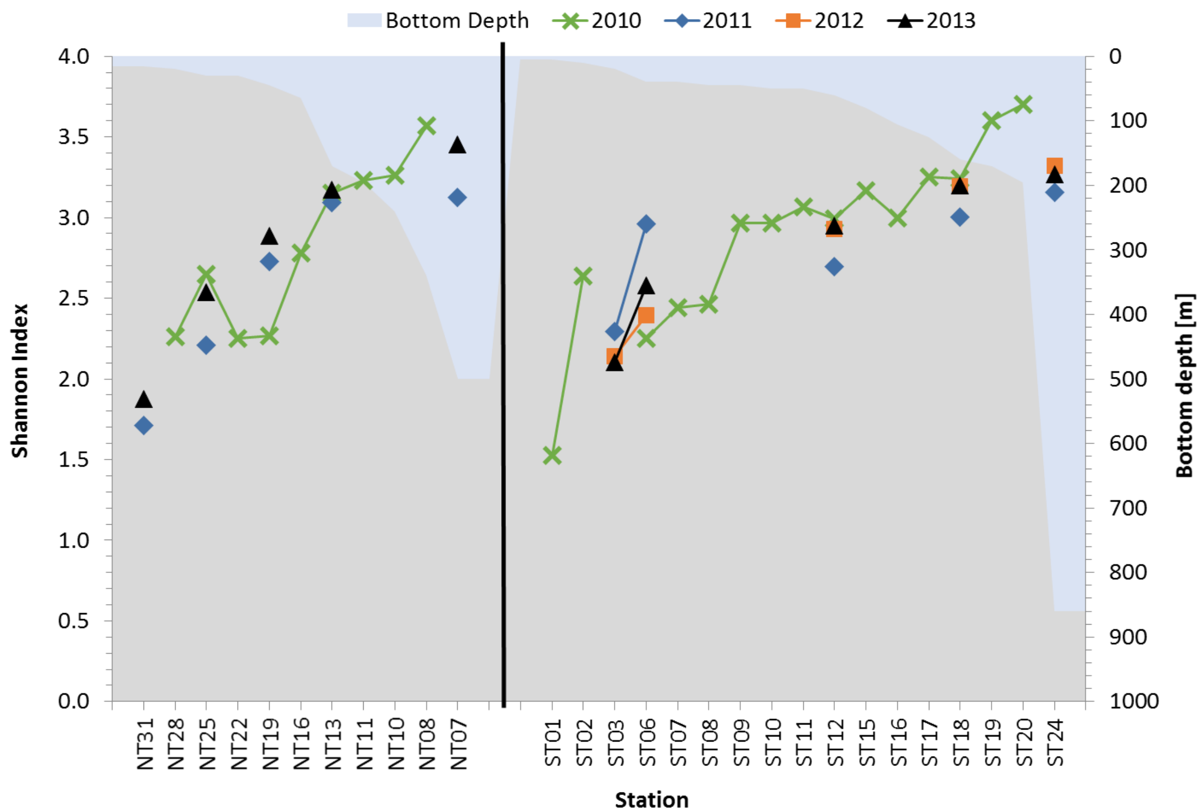

Figure 8. Shannon indices for NT (left panel) and ST (right panel) stations on the West Florida Shelf collected in July between 2010 and 2013. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

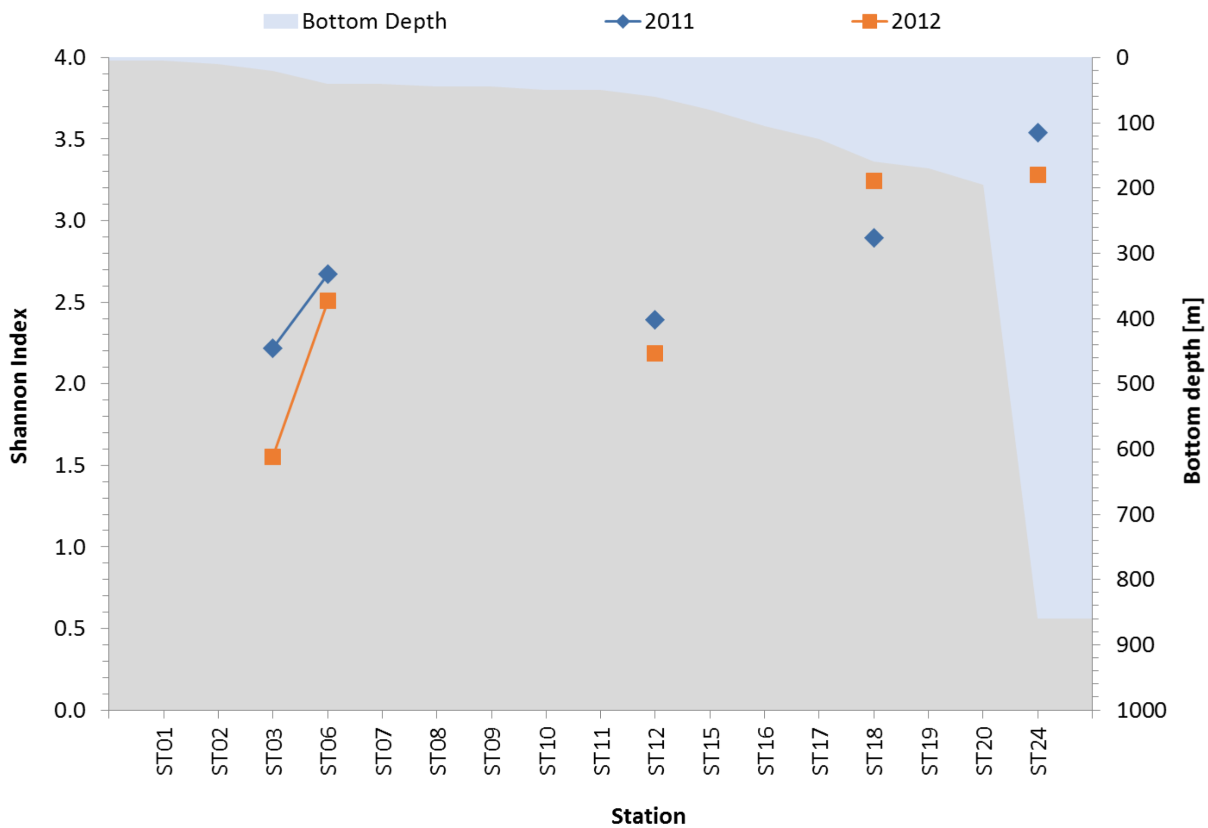

Figure 9. Shannon indices for ST stations on the West Florida Shelf collected in November between 2011 and 2012. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

3.1.1 Research Question 1: Was zooplankton diversity lower in summer 2010 due to the Deepwater Horizon oil spill, compared to the following summers? Were there interannual differences in zooplankton biodiversity during winter or spring (2011-2013)?

To test this question, only off-shelf data in the NEGoM were compared between years for each season, owing to differences in depths over the shelf and, therefore, sampling effort. The ANOVA indicated that February had significantly different Shannon indices between years (Table 2). A subsequent Tukey test showed that 2011 was significantly lower ($p = 0.008$) than 2013, while 2011 vs 2012 and 2012 vs 2013 were not significantly different. For May off-shelf data, 2011 was significantly lower ($p = 0.013$) than 2012, while 2011 vs 2013 and 2012 vs 2013 were not significantly different. For August off-shelf data, Shannon indices were not significantly different from each other for any of the years.

Table 2. NEGoM C-IMAGE comparison of Shannon indices

Description	**Test**	**p-value**
February off-shelf comparison between years (2011-2013)	ANOVA	**0.008**
February off-shelf 2011 vs 2012	Tukey	0.111
February off-shelf 2011 vs 2013	Tukey	**0.008**
February off-shelf 2012 vs 2013	Tukey	0.118
May off-shelf comparison between years (2011-2013)	ANOVA	**0.016**
May off-shelf 2011 vs 2012	Tukey	**0.013**
May off-shelf 2011 vs 2013	Tukey	0.097
May off-shelf 2012 vs 2013	Tukey	0.356
August off-shelf comparison between years (2010-2014)	ANOVA	0.644
Seasonal comparison of off-shelf samples (2010-2014)	ANOVA	**0.002**
Seasonal comparison of off-shelf: February vs May	Tukey	**0.002**
Seasonal comparison of off-shelf: February vs August	Tukey	0.672
Seasonal comparison of off-shelf: May vs August	Tukey	**0.030**
Seasonal comparison of nearshore samples (2010-2014)	ANOVA	0.197
May nearshore vs outer/off-shelf	t-test	**0.029**
May nearshore vs mid-shelf	t-test	0.153
May mid-shelf vs outer/off-shelf	t-test	**0.004**
August nearshore vs outer/off-shelf	t-test	**0.010**
August nearshore vs mid-shelf	t-test	**0.044**
August mid-shelf vs outer/off-shelf	t-test	0.322

3.1.2 Research Question 2: Was zooplankton biodiversity different between seasons, for example higher during the productive summer than in winter?

When comparing seasonal off-shelf data, Shannon indices were significantly higher in spring (May) than in winter (February) ($p = 0.002$) and spring indices also were significantly higher than summer (August) ($p = 0.030$) (Table 2). Shannon indices were not significantly different between winter and summer.

3.1.3 Research Question 3: Was there a cross shelf gradient of zooplankton diversity with lower diversity nearshore and higher diversity off-shelf in the NEGoM and on the West Florida Shelf?

To test this question, Shannon indices were compared for nearshore versus outer/off-shelf, nearshore versus mid-shelf, and mid-shelf versus outer/off-shelf for May and August NEGoM data (Table 2), as well as July West Florida Shelf data (Table 3). Other seasons did not have sufficient nearshore data to test these comparisons. For May NEGoM data, Shannon indices were significantly lower ($p = 0.029$) for nearshore than outer/off-shelf and lower ($p = 0.004$) for mid-shelf than outer/off-shelf. There was no significant difference between nearshore versus mid-shelf. For August NEGoM data, Shannon indices were significantly lower ($p = 0.010$) for nearshore than outer/off-shelf, as well as lower nearshore and mid-shelf ($p = 0.044$). There was not a significant difference between mid-shelf and outer/off-shelf. For July West Florida Shelf data, Shannon indices were significantly lower ($p = <0.001$) for nearshore than outer/off-shelf and significantly lower ($p = 0.002$) for nearshore than mid-shelf. Shannon indices were significantly lower ($p = 0.001$) for mid-shelf than outer/off-shelf.

Table 3. West Florida Shelf C-IMAGE comparison of Shannon indices for July (2010-2013)

Description	Test	p-value
Nearshore vs outer/off-shelf	t-test	**< 0.001**
Nearshore vs mid-shelf	t-test	**0.002**
Mid-shelf vs outer/off-shelf	t-test	**< 0.001**

3.1.4 Research Question 4: Was there a latitudinal gradient whereby zooplankton biodiversity was higher in the NEGoM than on the West Florida Shelf for nearshore and off-shelf sites?

NEGoM and West Florida Shelf Shannon indices were compared for summer (June 2010 – August 2014), for nearshore, mid-shelf, and outer/off-shelf (Table 4). For nearshore samples, Shannon indices were significantly higher ($p = 0.048$) for the NEGoM than the West Florida Shelf. For outer/off-shelf samples, Shannon indices were significantly lower ($p = 0.035$) for the NEGoM than off the West Florida Shelf. For mid-shelf samples, there was no significant difference between NEGoM and West Florida Shelf Shannon indices.

Table 4. NEGoM vs West Florida Shelf CIMAGE comparison of Shannon indices for Summer (June 2010-August 2014)

Description	Test	p-value
Nearshore	t-test	**0.048**
Mid-shelf	t-test	0.124
Outer/off-shelf	t-test	**0.035**

3.2 SEAMAP samples

A list of taxa present (Table 1), abundance (#/m^3) for each taxon (n_i) (Table A7), and total abundance of zooplankton for each station (N) (Tables A8 and A9), total number of taxa found (S) (Tables A8 and A9), and Inverse Simpson and Shannon indices (Tables A10 and A11) have been compiled for each station from each of the four transects for each of the years 2005–2009. Since the data sets for SEAMAP samples are much smaller than for the C-IMAGE data, they could not be used to make statistical comparisons between the two sample groups. Shannon indices were plotted for SEAMAP cruise samples collected in the NEGoM for the months of March (Fig. 10), May (Fig. 11), and September (Fig. 12). The medians and ranges of Shannon indices were also compiled for each month (Table 5).

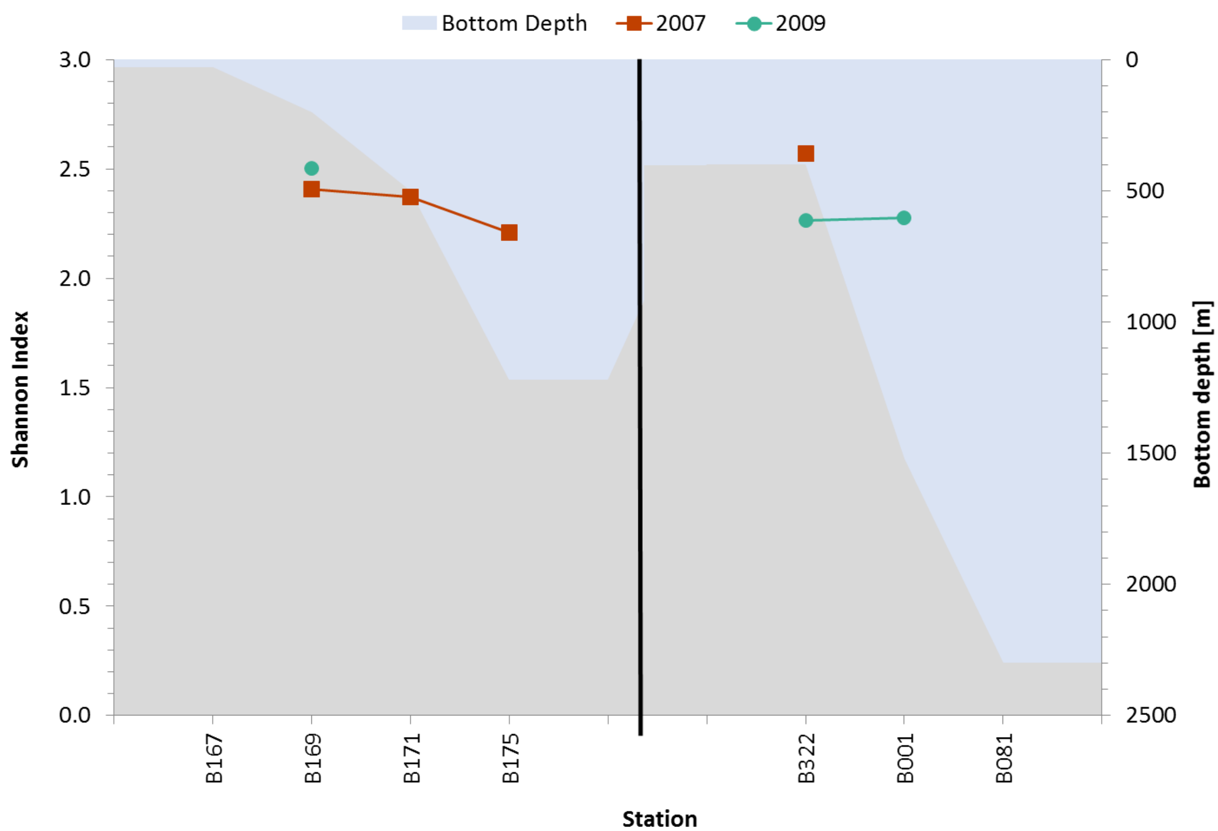

Figure 10. Shannon indices for SEAMAP stations in the NE Gulf of Mexico collected in March 2007 and 2009. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

For March and May NEGoM data, there were no nearshore data available. The Shannon indices for March ranged from 2.21 to 2.50, while Shannon indices for May ranged from 2.38 to 2.60. For September NEGoM data, Station B167, which has a bottom depth of 30 m, ranged from 1.85

to 2.92 between 2006 and 2009. For September in the NEGoM only one sample was collected from the outer/off-shelf stations and the Shannon index was 2.45.

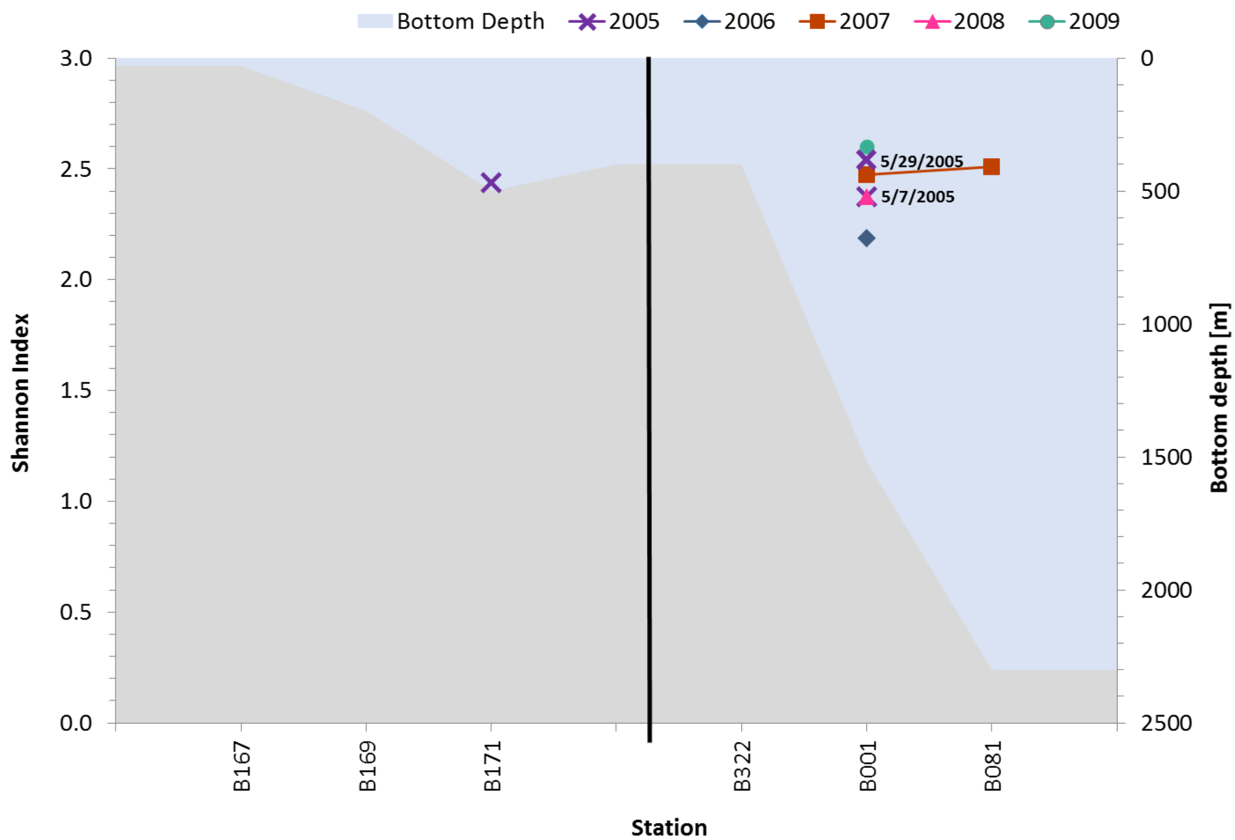

Figure 11. Shannon indices for SEAMAP stations in the NE Gulf of Mexico collected between May 2005 and 2009. In 2005, zooplankton samples were collected from station B001 twice. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

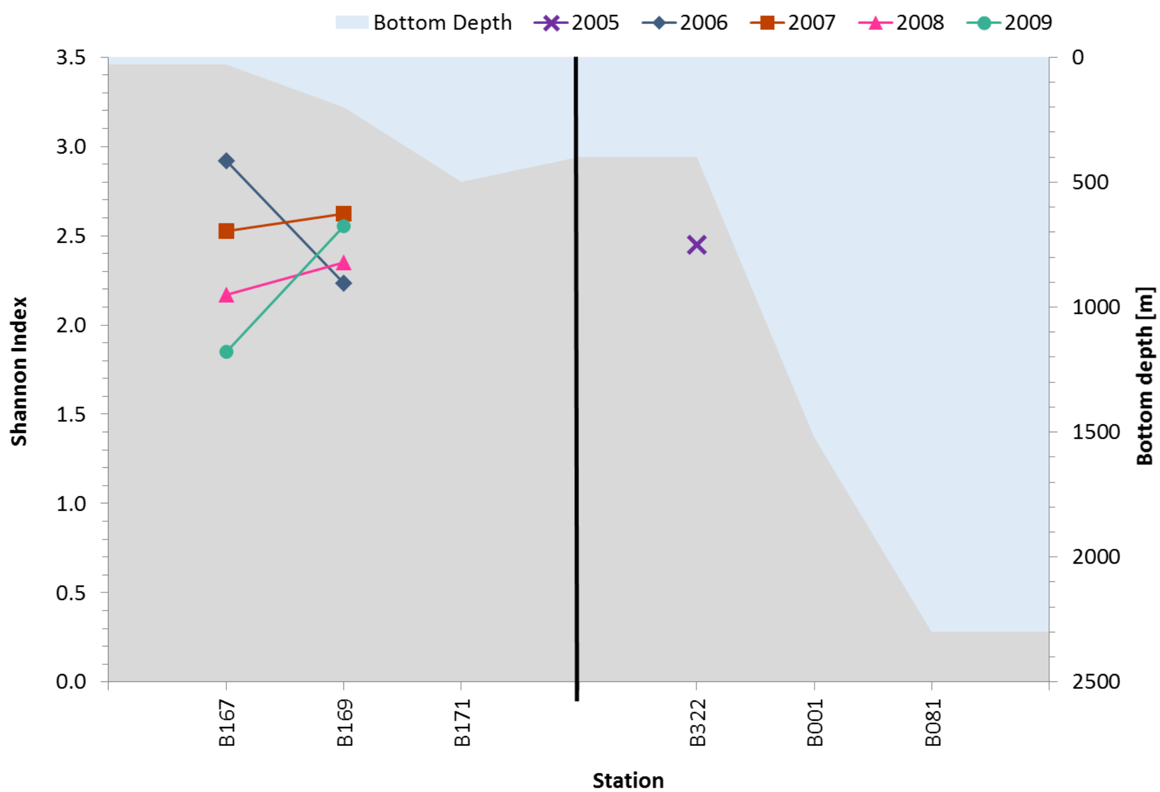

Figure 12. Shannon indices for SEAMAP stations in the NE Gulf of Mexico collected between September 2005 and 2009. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is provided on the right y-axis. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

Table 5. NEGoM SEAMAP median and range of Shannon indices

Date	# of samples (N)	Median	Range
March 2007	4	2.39	2.21 - 2.57
March 2009	4	2.28	2.26 - 2.51
May 2005	3	2.44	2.37 - 2.54
May 2007	2	2.50	2.48 - 2.51
September 2006	2	2.58	2.23 - 2.92
September 2007	2	2.58	2.53 - 2.62
September 2008	2	2.26	2.17 - 2.35
September 2009	2	2.20	1.85 - 2.55

Shannon indices were also plotted for SEAMAP cruise samples collected on the West Florida Shelf for the months of March (Fig. 13) and September (Fig. 14). The medians and ranges Shannon indices were also compiled for each month (Table 6).

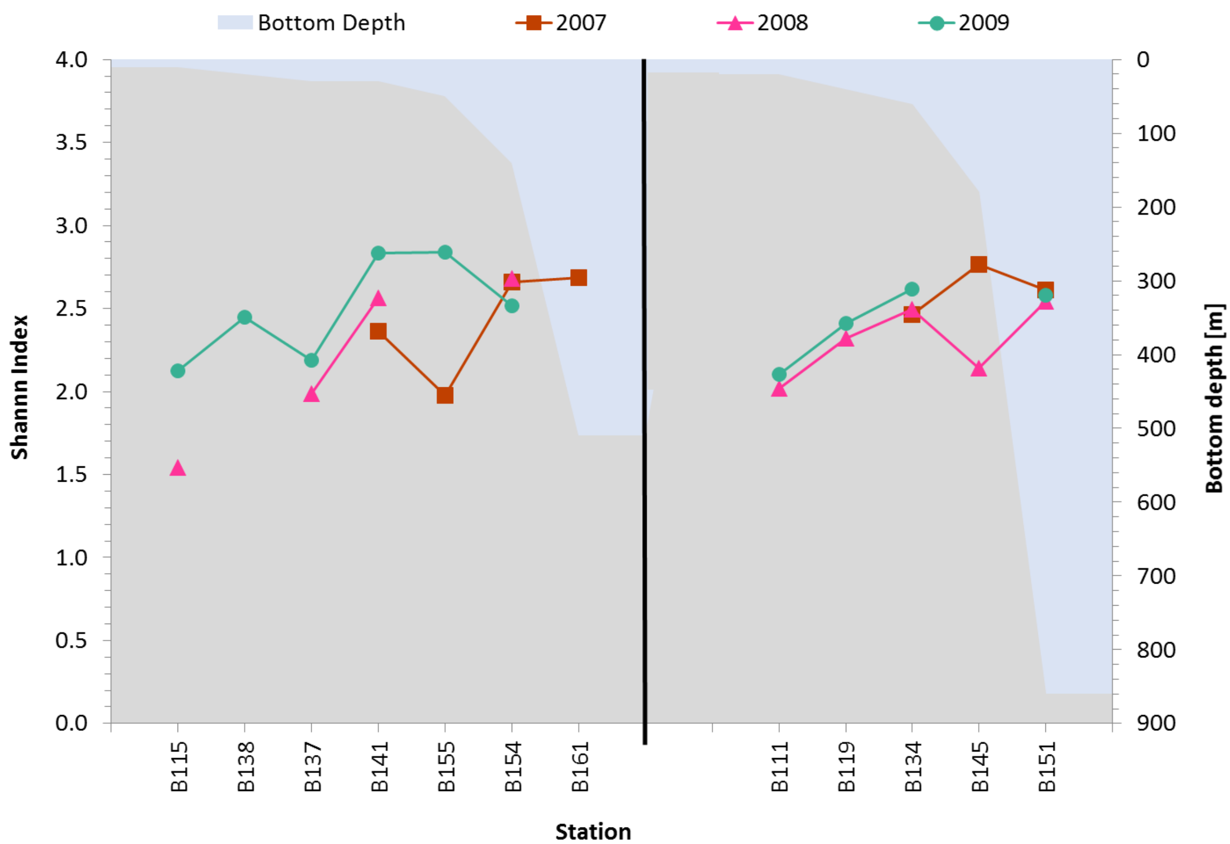

Figure 13. Shannon indices for SEAMAP stations on the West Florida Shelf located near NT and ST stations, collected between March 2007 and 2009. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is also provided. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

For March West Florida Shelf indices, there was a slight biodiversity gradient from nearshore to off-shelf. At Station B115 which had a bottom depth of 10 m, the Shannon indices ranged from 1.54 to 2.13, and For Station B151, which had a bottom depth of 860 m, Shannon indices ranged from 2.54 to 2.61.

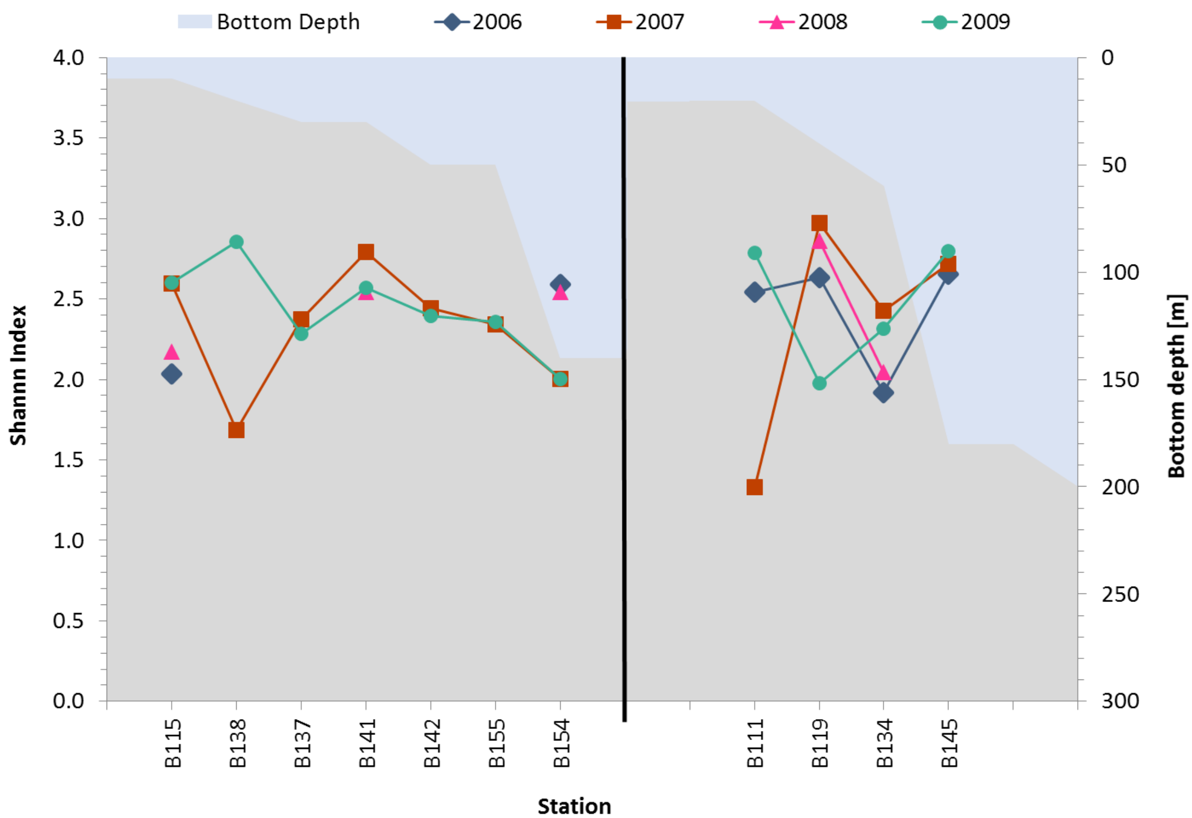

Figure 14. Shannon indices for SEAMAP stations located on the West Florida Shelf near NT and ST stations, collected between September 2006 and 2009. The depth of the water column is in blue, and the depth of the seafloor is in grey. Bottom depth for each station is also provided. In each panel, the nearshore stations are on the left and off-shelf stations to the right.

For September West Florida Shelf indices, there was not a large gradient between nearshore and mid-shelf stations. No samples were collected with bottom depths past 180 meters. At Station B115, which had a bottom depth of 10 m, Shannon indices ranged from 2.04 to 2.60, and at Station B145, with a bottom depth of 180 m, Shannon indices ranged from 2.65 to 2.80.

Table 6. West Florida Shelf SEAMAP median and range of Shannon indices

Date	# of samples (N)	Median	Range
March 2007	7	2.61	1.97 - 2.77
March 2008	9	2.32	1.54 - 2.68
March 2009	10	2.45	2.11 - 2.84
September 2006	6	2.57	1.92 – 2.65
September 2007	11	2.43	1.33 - 2.97
September 2008	5	2.54	2.05 - 2.86
September 2009	11	2.39	1.98 - 2.86

A list of the top five abundant species and percent of total abundance was compiled for all SEAMAP samples (Tables B1 and B2). In the NEGoM, Station B167, which had a bottom depth of 30 m, ostracods were the most abundant organisms in 2006, 2008, and 2009 (14.7%; 44.7%; 57.2% of total abundance, consecutively). In 2007, bivalves were the most abundant organism (23.3% of total abundance) at Station B167. For most of the off-shelf stations, B171, B175, B322, B001, and B081, with bottom depths ranging from 400 to 2300 meters, the most abundant organisms were calanoid copepods. Other groups that made it into the top five most abundant zooplankton were non-calanoid copepods, chaetognaths, siphonophores, *Lucifer* spp. (a pelagic shrimp), larvaceans, crustacean larvae, hydromedusae, salps, and pteropods. On the West Florida Shelf, nearshore stations (B115, B1138, B137, B141, B142, B155, B111, B119, and B134) with bottom depths ranging from 10 to 60 meters, had calanoid copepods, ostracods, and chaetognaths as the most abundant organisms. For the off-shelf stations (B151 and B161) with bottom depths 860 and 510 meters respectively, had calanoid copepods as the most abundant organism. Other groups that made it into the top five most abundant zooplankton were non-calanoid copepods, pteropods, foraminifera, *Lucifer* spp., siphonophores, crustacean larvae, cladocerans, crab zoea, echinoderm larvae, larvaceans, doliolids, bivalves, and eggs.

Chapter 4: Discussion

The first research question posed was, “Was zooplankton diversity lower in summer 2010, compared to the following summers? Were there interannual differences in zooplankton biodiversity during winter or spring (2011-2013)?” There were interannual differences in zooplankton biodiversity for the off-shelf NEGoM C-IMAGE February and May samples (Table 2). Biodiversity was significantly lower during winter 2011 compared to biodiversity of winter 2013. Plankton production in the NEGoM is strongly driven by nutrients introduced by Mississippi River discharge (Daly at al. 2021). Winter 2011 had below average river outflow compared to winter 2012 and 2013, which might have influenced zooplankton abundance and biodiversity in this region (Daly et al. 2021). However, river discharge does not explain why May off-shelf biodiversity in the NEGoM during 2011 was significantly lower ($p = 0.013$) than 2012, since river discharge during May 2011 was much higher than May 2012 river outflow (Daly et al. 2021). In contrast, Shannon indices for interannual comparisons of August NEGoM C-IMAGE samples were not significantly different between 2010 - 2014. These results indicate that although there was interannual variability in zooplankton biodiversity during winter and spring, summer biodiversity was not significantly impacted by the DWH oil spill, in agreement with the results reported in Daly et al. (2021).

The second research question was, “Was zooplankton biodiversity different between seasons, for example higher during the productive summer than in winter?” When comparing off-shelf samples of the NEGoM C-IMAGE data, August (summer) and February (winter) did not have significantly different Shannon indices. However, Shannon indices for May (spring) were significantly higher than February (Table 2). Shannon indices for May also were significantly higher than August. When comparing seasonal changes of nearshore NEGoM C-IMAGE samples, Shannon indices were not significantly different between winter, spring, and summer. In other words, nearshore diversity indices remained similar between seasons, while offshore diversity indices were variable between seasons and highest in spring, when river discharge rates were highest (Daly et al. 2021). The West Florida Shelf C-IMAGE data did not have a large enough sample size to compare seasonal data. There also were not enough samples collected in November, to add fall to the seasonal comparison.

Minello (1980) examined seasonal changes in species richness (number of different species) of adult female copepods collected off the coast of Texas and western Louisiana (northwest Gulf of Mexico). Samples were collected monthly from January 1963 to 1965 between stations at 8 m and the deepest station at 73 m. Species richness was determined by the number of female adult copepod species identified in each sample. This diversity index was highest in the winter at the deepest station (73 m) and lowest in the summer (Minello 1980). This study, however, is not comparable to my current research, since Minello (1980) only looked at the species richness of female adult copepods and not diversity of the entire zooplankton community. He also did not use Shannon or Inverse Simpson diversity indices for his analyses.

The third question examined was, "Was there a cross shelf gradient of zooplankton diversity with lower diversity nearshore and higher diversity off-shelf in the NEGoM and on the West Florida Shelf?" Indeed, summer zooplankton biodiversity indices were significantly higher off-shelf compared to nearshore indices for the NEGoM C-IMAGE May and August samples and for the West Florida Shelf C-IMAGE July samples (Table 2 and 3, respectively). Biodiversity is lower nearshore because there are a few dominant species that are highly abundant. For nearshore NEGoM samples, the dominant zooplankton were *Centropages* spp., *Temora* spp., and ostracods. The dominant zooplankton for nearshore West Florida Shelf samples were calanoid copepods, including *Centropages* spp. and *Temora* spp., and cladocerans. Howey (1976) found similar results when measuring copepod diversity in the NEGoM. Zooplankton samples were collected in August 1971 and copepods from the sample were identified to species. Using the Shannon index, it was determined that copepod diversity was highest in oceanic waters and lowest on the continental shelf (Howey 1976). Ortner et al (1989) reported that Shannon and Pielou indices indicated that zooplankton functional groups had low diversity near the mouth of the Mississippi River (nearshore) and high diversity in the central Gulf (off-shelf). However, this was not the case for spring diversity indices in the NEGoM C-IMAGE samples, where Shannon indices were not significantly different between nearshore and outer/off-shelf samples. There were an insufficient number of April West Florida Shelf samples to be able to do a spring comparison of Shannon indices for nearshore versus outer/off-shelf.

The fourth question asked was, “Was there a latitudinal gradient whereby zooplankton biodiversity was higher in the NEGoM than on the West Florida Shelf for nearshore and off-shelf sites?” For nearshore samples, Shannon indices were significantly higher in the NEGoM than on the West Florida Shelf (Table 4). The NEGoM is the most productive area in the Gulf of Mexico, due to the many rivers that discharge into the region (Okolodkov 2003). For outer/off-shelf samples, Shannon indices were significantly lower in the NEGoM compared to those offshore of the West Florida Shelf. I expected the NEGoM off-shelf biodiversity indices to be higher than those off the West Florida Shelf. One explanation for this, could be the Loop Current. Near surface circulation in the eastern GoM is dominated by the Loop Current, which enters from the Caribbean bringing oceanic species that exchange with GoM species (Biggs and

Ressler 2001). Rathmell (2007) examined zooplankton samples collected from outside of, at the boundary of, and inside of the Loop Current. Zooplankton abundance was significantly higher at the boundary than inside the Loop Current. The boundary and outside the Loop Current had similar levels of zooplankton abundance (Rathmell 2007). Daly et al. (2020) examined presence of the Loop Current and corresponding eddies in the NEGoM in August/September 2010, 2011, and 2013. In August 2010 and 2013, there was an eddy in the NEGoM surrounding the DWH and DSH09 stations; however, September 2011 did not show a similar pattern. In September 2011, the Loop Current was more prominent in the Gulf of Mexico than in 2010 and 2013 (Daly et al. 2020). The presence of these eddies in the NEGoM and the position of the Loop Current off the West Florida Shelf may have contributed to the lower diversity in the NEGoM versus the West Florida Shelf off-shelf samples.

The range of Shannon indices for the SEAMAP samples were similar to the indices from the C-IMAGE NEGoM and West Florida Shelf sites. SEAMAP had a limited number of samples collected in the NEGoM, so nearshore to off-shelf trends could not be detected. March and May samples showed a similar range of Shannon indices between outer shelf and off-shelf stations with no nearshore stations. During September, the range of nearshore station biodiversity indices exceeded the one outer shelf index. For samples collected in March on the West Florida Shelf, there was more of a gradient from lower Shannon indices nearshore and higher Shannon indices off-shelf. In September, samples were not collected off-shelf on the West Florida Shelf. Shannon indices were variable among nearshore and mid-shelf stations. Unfortunately, the SEAMAP data were too limited to determine whether indices were similar or different over the 2006 to 2014 time period.

When looking at the top five abundant organisms for SEAMAP samples in the NEGoM, calanoid copepods were the most abundant taxa at most stations. In September, Station B167 (30 m depth) had ostracods (2006, 2008, and 2009) as the most abundant organism, and bivalves as the most abundant organism in 2007. Daly et al. (2021) found copepods to be the dominant zooplankton group (geometric mean, 54%) at almost all stations in the NEGoM. For most SEAMAP samples collected on the West Florida Shelf, the most abundant organism was calanoid copepods or ostracods. Howey (1976) found similar results, with calanoid copepods making up ~52%, and non-calanoid copepods, ostracods, and chaetognaths making up to 10% or more of all samples. Ortner et al (1989) reported that copepods made up 70-75% of total zooplankton collected from stations in the central Gulf.

Some limitations of this research project were that the sample size for the SEAMAP samples were much lower than the C-IMAGE samples, so a statistical comparison of the two sample sets could not be made. If this project was done again, it would have been better to make sure that the samples chosen had a larger sample size to compare with C-IMAGE samples. It also would have been better if all samples were either identified via dissecting/compound microscope or Zooscan only, not both methods. The Zooscan provides a digital archive of a split of each sample, so you can easily go back to look at the images at any time. The only way one can do this with a microscope is to take pictures of each organism, which we did not have a camera on our microscope. The Zooscan used for processing samples was a first generation, so the quality of the images were not as good as newer versions with higher resolution cameras. With the Zooscan, you can also only see one side of individual zooplankton, depending how it is laying on the scanning bed. This loses some of the details which are needed to identify copepods to species level. With a dissecting microscope, the individual organisms can be viewed from all angles and identified to species.

Chapter 5: Conclusions

This research establishes a baseline of zooplankton biodiversity values for the NEGoM and West Florida shelf. There were interannual differences in biodiversity indices during winter and spring, but not summer. Biodiversity also was significantly higher in spring than winter and summer. Zooplankton biodiversity was higher off-shelf than nearshore, similar to previous findings (Howey 1976; Daly et al. 2021). In addition, Shannon indices were significantly higher for nearshore samples in the NEGoM than West Florida Shelf.

Further research is needed on zooplankton diversity in the Gulf of Mexico. A larger baseline data set would improve assessment of the variability in spatial, seasonal, and interannual zooplankton diversity over a longer period of time and help provide a context for evaluating impacts of climate change and future disturbances of the Gulf of Mexico marine ecosystem.

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Appendix A

Table A1. Station locations of zooplankton collected in the northeast Gulf of Mexico

Cruises	Station	Latitude °N	Longitude °W	Depth (m)
C-IMAGE	PCB01	30 03.3	85 49.6	25
	PCB02	29 50.0	86 11.0	50
	PCB03	29 44.0	86 20.9	100
	PCB04	29 34.0	86 35.0	200
	PCB05	29 26.5	86 47.0	400
	PCB06	29 07.2	87 15.8	1000
	PCB11	28 48.1	87 18.4	1220
	DSH07	29 15.2	87 44.1	400
	DSH08	29 07.4	87 52.1	1000
	DSH10	28 58.6	87 52.1	1520
	DWH	28 44.4	88 23.2	1540
	DSH09	28 38.2	87 52.1	2300
SEAMAP	B167	30 00.1	86 00.7	30
	B169	29 29.3	86 29.4	200
	B171	29 30.0	87 00.0	500
	B175	29 00.3	87 30.9	1220
	B322	29 15.5	88 00.8	400
	B001	29 00.4	88 00.4	1520
	B081	28 30.5	88 00.5	2300

Table A2. Station locations of zooplankton collected on the West Florida Shelf

Cruises	Station	Latitude ºN	Longitude ºW	Depth (m)
C-IMAGE	NT31	29 26.3	83 46.0	15
	NT28	29 16.9	84 01.0	21
	NT25	29 07.4	84 15.8	27
	NT22	28 58.1	84 30.6	35
	NT19	28 48.7	84 45.9	45
	NT16	28 39.3	85 00.1	70
	NT13	28 29.8	85 14.8	168
	NT11	28 23.4	85 24.3	210
	NT10	28 20.3	85 29.5	260
	NT08	28 13.7	85 39.3	400
	NT07	28 10.4	85 43.5	510
	ST01	27 35.0	82 50.0	7
	ST02	27 33.6	82 55.8	14
	ST03	27 32.2	83 01.6	20
	ST06	27 28.3	83 18.8	37
	ST07	27 26.9	83 24.5	40
	ST08	27 25.6	83 30.0	44
	ST09	27 24.2	83 36.0	48
	ST10	27 22.9	83 42.0	51
	ST11	27 21.5	83 47.5	56
	ST12	27 20.1	83 53.0	62
	ST15	27 15.9	84 10.3	89
	ST16	27 14.5	84 16.0	113
	ST17	27 13.1	84 21.8	132
	ST18	27 11.7	84 27.6	158
	ST19	27 10.3	84 33.1	176
	ST20	27 08.9	84 39.0	197
	ST24	27 03.1	85 01.8	860
SEAMAP	B115	29 30.3	83 44.9	10
	B138	29 29.8	84 00.6	20
	B137	29 00.1	84 00.1	30
	B141	29 00.0	84 30.0	30
	B142	28 29.9	84 30.0	50
	B155	29 00.9	84 59.9	50
	B154	28 30.8	85 00.3	140
	B161	28 00.6	83 30.6	510
	B111	27 30.5	82 59.4	20
	B119	27 29.9	83 30.3	40
	B134	27 29.9	84 00.7	60
	B145	26 59.4	84 30.0	180
	B151	26 59.8	84 59.8	860

Table A3. Inverse Simpson and Shannon indices for C-IMAGE cruises in the NEGoM

Month	Year	Station	Inverse Simpson	Shannon
August	**2010**	PCB01	3.53	1.78
		PCB02	2.58	1.50
		DSH10	6.41	2.72
		DSH09	19.4	3.52
February	**2011**	PCB01	7.91	2.55
		PCB03	15.5	3.10
		PCB04	10.9	2.92
		PCB05	15.0	3.09
		PCB06	13.0	3.00
		PCB11	11.8	3.06
		DSH07	10.5	2.89
		DSH08	8.40	2.69
		DSH10	9.67	2.87
		DSH09	7.23	2.56
May	**2011**	PCB01	7.36	2.40
		PCB03	10.5	2.73
		PCB04	12.3	3.15
		PCB05	17.6	3.27
		DSH10	12.5	3.04
		DSH09	15.2	3.13
September	**2011**	PCB01	6.46	2.29
		PCB02	7.23	2.50
		PCB03	13.8	3.04
		PCB04	22.9	3.49
		PCB05	21.6	3.36
		PCB06	22.1	3.51
		PCB11	15.4	3.10
		DSH07	20.7	3.33
		DSH08	15.4	3.23
		DSH10	17.4	3.21
		DWH	15.9	3.12
		DSH09	16.3	3.35

Table A3 (cont.) Inverse Simpson and Shannon indices for C-IMAGE cruise in the NEGoM

Month	Year	Station	Inverse Simpson	Shannon
February	**2012**	PCB01	6.14	2.43
		PCB02	4.48	2.33
		PCB03	21.2	3.35
		PCB04	7.81	2.74
		PCB05	21.4	3.34
		PCB06	13.9	3.16
		PCB11	8.33	2.84
		DSH08	22.4	3.46
		DSH10	6.95	2.87
		DWH	11.4	3.10
		DSH09	10.2	3.06
May	**2012**	PCB01	2.01	1.18
		PCB02	1.52	0.99
		PCB03	7.03	2.61
		PCB04	14.4	3.16
		PCB05	20.4	3.44
		PCB06	19.2	3.45
		PCB11	22.7	3.45
		DSH07	14.7	3.19
		DSH08	17.8	3.37
		DSH10	20.3	3.46
		DWH	21.4	3.38
		DSH09	22.6	3.49
August	**2012**	PCB01	8.78	2.60
		PCB02	12.1	2.96
		PCB03	14.2	3.01
		PCB04	16.5	3.28
		PCB05	21.9	3.44
		PCB06	12.6	3.06
		PCB11	13.8	3.23
		DSH07	11.5	2.98
		DSH08	17.2	3.27
		DSH10	9.59	2.95
		DWH	22.6	3.43
		DSH09	12.8	3.11

Table A3 (cont.) Inverse Simpson and Shannon indices for C-IMAGE cruise in the NEGoM

Month	Year	Station	Inverse Simpson	Shannon
February	**2013**	PCB01	11.5	2.91
		PCB02	11.8	2.89
		PCB03	8.72	2.92
		PCB04	26.7	3.51
		PCB11	25.4	3.49
		DSH09	20.6	3.45
May	**2013**	PCB01	5.05	2.11
		PCB02	10.2	2.76
		PCB03	12.1	2.91
		PCB04	17.5	3.22
		PCB05	16.1	3.27
		PCB06	16.6	3.15
		PCB11	23.1	3.56
		DSH07	17.2	3.20
		DSH08	18.0	3.27
		DSH10	23.1	3.47
		DWH	18.6	3.37
		DSH09	15.6	3.28
August	**2013**	PCB01	7.32	2.58
		PCB03	3.38	2.16
		PCB05	9.64	2.85
		PCB06	18.1	3.41
		DSH07	11.9	2.96
		DSH10	13.3	3.11
		DWH	10.2	2.88
May	**2014**	PCB06	18.5	3.37
August	**2014**	PCB01	6.61	2.28
		PCB02	10.4	2.72
		PCB03	10.1	2.82

Table A4. Inverse Simpson and Shannon indices for C-IMAGE cruises on the West Florida Shelf

Month	Year	Station	Inverse Simpson	Shannon
July	**2010**	NT28	6.59	2.26
		NT25	8.95	2.65
		NT22	4.89	2.25
		NT19	5.60	2.27
		NT16	10.9	2.78
		NT13	14.8	3.15
		NT11	15.2	3.23
		NT10	14.0	3.26
		NT08	24.7	3.57
		ST01	2.92	1.53
		ST02	9.70	2.64
		ST06	6.36	2.25
		ST07	7.50	2.44
		ST08	6.97	2.47
		ST09	13.61	2.97
		ST10	14.1	2.96
		ST11	14.5	3.07
		ST12	13.6	2.99
		ST15	15.0	3.17
		ST16	11.6	3.00
		ST17	17.7	3.25
		ST18	14.7	3.24
		ST19	24.1	3.60
		ST20	30.7	3.70
June	**2011**	NT31	3.49	1.71
		NT25	4.48	2.21
		NT19	9.54	2.73
		NT13	12.4	3.09
		NT07	14.8	3.12
		ST03	5.15	2.29
		ST06	15.5	2.96
		ST12	10.5	2.70
		ST18	11.8	3.00
		ST24	13.2	3.16
November	**2011**	ST03	5.81	2.22
		ST06	11.4	2.67
		ST12	6.24	2.40
		ST18	10.7	2.90
		ST24	24.1	3.54

Table A4 (cont.) Inverse Simpson and Shannon indices for C-IMAGE cruises on the West Florida Shelf

Month	Year	Station	Inverse Simpson	Shannon
April	**2012**	ST03	8.92	2.47
		ST06	6.74	2.41
		ST12	10.07	2.79
		ST18	11.0	2.95
June	**2012**	ST03	6.19	2.14
		ST06	7.48	2.39
		ST12	11.7	2.93
		ST18	15.0	3.20
		ST24	14.9	3.32
November	**2012**	ST03	2.47	1.55
		ST06	6.81	2.51
		ST12	3.90	2.19
		ST18	15.3	3.24
		ST24	13.6	3.28
April	**2013**	NT31	8.47	2.59
		NT19	15.8	3.15
		NT13	16.7	3.31
		NT07	22.2	3.54
		ST03	7.89	2.39
		ST06	10.4	2.65
		ST12	11.4	2.87
		ST18	17.2	3.33
July	**2013**	NT31	3.38	1.87
		NT25	7.87	2.54
		NT19	12.6	2.88
		NT13	16.4	3.17
		NT07	20.3	3.46
		ST03	5.27	2.10
		ST06	8.93	2.58
		ST12	13.0	2.95
		ST18	15.6	3.20
		ST24	13.9	3.27

Table A5. Total abundance of zooplankton and number of taxa for C-IMAGE cruises in the NEGoM

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
August	**2010**	PCB01	1636	25
		PCB02	399	29
		DSH10	147	52
		DSH09	122	66
February	**2011**	PCB01	807	38
		PCB03	542	66
		PCB04	303	52
		PCB05	213	53
		PCB06	138	58
		PCB11	173	66
		DSH07	138	61
		DSH08	114	53
		DSH10	261	67
		DSH09	599	52
May	**2011**	PCB01	4619	36
		PCB03	1640	50
		PCB04	205	70
		PCB05	426	68
		DSH10	174	57
		DSH09	232	58
September	**2011**	PCB01	3276	35
		PCB02	327	35
		PCB03	526	52
		PCB04	418	69
		PCB05	319	63
		PCB06	229	80
		PCB11	191	55
		DSH07	338	62
		DSH08	333	67
		DSH10	726	62
		DWH	435	55
		DSH09	243	72

Table A5 (cont.) Total abundance of zooplankton and number of taxa for C-IMAGE cruises in the NEGoM

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
February	**2012**	PCB01	754	40
		PCB02	1353	45
		PCB03	300	62
		PCB04	980	62
		PCB05	221	51
		PCB06	240	61
		PCB11	141	52
		DSH08	331	62
		DSH10	363	69
		DWH	238	62
		DSH09	297	73
May	**2012**	PCB01	1486	25
		PCB02	910	34
		PCB03	329	46
		PCB04	382	61
		PCB05	315	65
		PCB06	209	64
		PCB11	394	64
		DSH07	487	63
		DSH08	344	63
		DSH10	496	60
		DWH	421	54
		DSH09	385	71
August	**2012**	PCB01	1095	37
		PCB02	617	44
		PCB03	389	48
		PCB04	451	68
		PCB05	202	65
		PCB06	350	63
		PCB11	351	73
		DSH07	326	58
		DSH08	287	65
		DSH10	447	67
		DWH	263	63
		DSH09	220	67

Table A5 (cont.) Total abundance of zooplankton and number of taxa for C-IMAGE cruises in the NEGoM

Month	**Year**	**Station**	**Total Abundance (# of individuals/m^3)**	**Number of Taxa**
February	**2013**	PCB01	482	42
		PCB02	913	50
		PCB03	1000	59
		PCB04	513	58
		PCB11	321	65
		DSH09	169	63
May	**2013**	PCB01	913	31
		PCB02	428	41
		PCB03	348	45
		PCB04	247	57
		PCB05	195	62
		PCB06	174	48
		PCB11	193	69
		DSH07	113	51
		DSH08	151	58
		DSH10	232	67
		DWH	568	62
		DSH09	425	63
August	**2013**	PCB01	784	32
		PCB03	974	48
		PCB05	125	57
		PCB06	153	71
		DSH07	448	55
		DSH10	284	64
		DWH	512	58
May	**2014**	PCB06	108	66
August	**2014**	PCB01	783	26
		PCB02	1024	37
		PCB03	747	55

Table A6. Total abundance of zooplankton and number of taxa for C-IMAGE cruises in the West Florida Shelf

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
July	**2010**	NT28	2026	30
		NT25	927	36
		NT22	1390	42
		NT19	1244	39
		NT16	219	42
		NT13	146	52
		NT11	153	58
		NT10	177	69
		NT08	139	75
		ST01	2072	24
		ST02	2236	30
		ST06	550	29
		ST07	385	36
		ST08	543	35
		ST09	278	42
		ST10	480	40
		ST11	311	48
		ST12	226	42
		ST15	154	47
		ST16	106	49
		ST17	112	47
		ST18	128	63
		ST19	110	80
		ST20	66	69
June	**2011**	NT31	979	21
		NT25	225	33
		NT19	1024	46
		NT13	292	61
		NT07	287	58
		ST03	1722	34
		ST06	454	32
		ST12	404	39
		ST18	300	64
		ST24	222	61
November	**2011**	ST03	190	26
		ST06	536	35
		ST12	664	36
		ST18	240	54
		ST24	160	64

Table A6 (cont.) Total abundance of zooplankton and number of taxa for C-IMAGE cruises in the West Florida Shelf

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
April	**2012**	ST03	169	28
		ST06	794	33
		ST12	536	48
		ST18	213	56
June	**2012**	ST03	1031	26
		ST06	845	32
		ST12	113	46
		ST18	346	65
		ST24	148	67
November	**2012**	ST03	866	26
		ST06	1149	43
		ST12	379	50
		ST18	166	63
		ST24	92	65
April	**2013**	NT31	1303	31
		NT19	498	50
		NT13	402	64
		NT07	272	72
		ST03	731	31
		ST06	588	37
		ST12	421	44
		ST18	266	61
July	**2013**	NT31	31	20
		NT25	155	38
		NT19	1094	42
		NT13	335	54
		NT07	169	67
		ST03	46	21
		ST06	501	35
		ST12	592	46
		ST18	296	58
		ST24	264	69

Table A7. Abundance (#/m^3) for each taxon for each SEAMAP sample

Date	**Station ID**	**Centropages spp.**	***Lucicutia* spp.**	***Temora* spp.**	***Oithona* spp.**	***Oncaea* spp.**
5/7/2005	B001	0.00	11.91	0.99	25.55	9.67
5/11/2005	B171	4.19	0.60	11.36	13.76	9.5457
5/29/2005	B001	0.00	2.69	4.61	21.33	24.03
9/11/2005	B322	1.17	0.59	1.76	12.30	3.32
5/6/2006	B001	0.06	0.36	0.42	3.90	1.74
9/21/2006	B169	2.97	0.81	4.86	4.05	0.54
9/21/2006	B167	20.09	16.37	1.49	8.93	0.74
3/18/2007	B169	5.47	1.26	5.47	28.64	3.37
3/18/2007	B171	0.00	3.83	1.81	6.44	1.21
3/28/2007	B175	0.00	2.89	2.89	9.04	0.36
3/28/2007	B322	0.00	2.69	12.58	45.38	3.60
5/28/2007	B081	0.19	0.56	4.11	15.86	2.05
5/28/2007	B001	0.58	0.12	0.69	8.98	1.38
9/16/2007	B169	0.00	3.73	1.98	7.33	5.36
9/17/2007	B167	2.07	0.00	0.89	1.48	0.30
5/30/2008	B001	0.00	1.34	0.56	9.17	1.01
9/29/2008	B167	32.00	5.16	20.99	7.91	2.41
9/29/2008	B169	0.20	1.20	3.40	12.20	1.00
3/3/2009	B322	0.00	4.15	38.35	20.73	33.17
3/4/3009	B001	0.00	1.95	1.20	24.51	13.22
3/13/2009	B169	1.63	2.29	8.49	32.33	12.73
5/29/2009	B001	26.54	4.71	0.74	24.81	4.22
9/5/2009	B169	0.72	1.17	0.63	18.16	8.54
9/9/2009	B167	43.17	0.00	3.05	77.71	16.76

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

***Corycaeus* spp.**	***Sapphirina* spp.**	***Candacia* spp**	***Eucalanus* spp.**	**Copepod**	**Calanoid**	**Amphipod**
5.95	0.74	0.00	16.37	0.25	68.47	1.99
13.76	0.00	0.60	46.07	7.18	107.07	12.58
16.91	2.31	0.00	13.26	1.54	80.15	2.69
6.63	0.59	0.78	11.32	0.00	33.37	2.15
1.80	0.60	0.00	1.98	2.64	23.79	1.02
2.43	0.81	1.35	14.31	2.70	22.69	3.78
0.00	7.44	0.00	21.58	5.95	59.53	8.19
1.68	1.26	0.42	94.32	5.05	77.05	9.32
3.43	0.40	0.20	36.06	3.62	48.54	2.87
5.42	1.81	0.00	22.06	1.45	67.26	2.23
8.08	2.69	0.00	44.02	3.14	60.18	2.73
7.84	3.73	0.93	6.16	1.68	44.60	1.68
9.67	1.04	0.12	8.06	0.81	30.51	2.20
8.38	2.79	0.58	3.49	1.05	25.60	0.56
0.00	0.00	0.00	2.07	1.78	5.04	0.01
3.24	0.22	0.00	6.38	0.34	19.13	0.56
8.60	1.03	0.00	12.39	1.38	32.00	9.32
5.20	2.20	1.20	4.40	0.80	28.80	1.60
44.57	0.00	2.07	40.42	16.58	295.39	10.38
7.97	0.15	0.45	3.76	2.40	49.14	0.65
11.76	4.57	0.98	57.47	6.20	98.94	1.98
4.96	0.25	0.00	9.67	1.74	50.85	1.49
8.99	0.72	0.18	1.98	0.99	25.80	0.72
34.54	2.03	0.00	77.71	14.73	127.49	19.81

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Cladocera	Crustacean nauplii	Decapod	Crab zoea	Crab megalopa	Phyllosome	*Lucifer* spp.
0.99	0.50	0.25	0.00	0.50	0.00	1.49
0.00	0.00	0.60	3.07	0.70	0.00	21.59
0.38	1.54	0.58	0.38	0.19	0.00	4.61
0.00	0.20	0.00	0.00	0.00	0.00	0.20
0.00	0.00	0.12	0.00	0.00	0.00	0.18
7.83	0.00	0.82	2.97	0.27	0.00	0.54
11.16	0.00	2.98	4.47	0.00	0.00	0.74
0.00	0.00	1.73	1.29	0.05	0.00	2.11
0.00	0.00	0.61	0.00	0.00	0.00	0.00
0.36	0.72	0.00	0.36	0.00	0.00	9.04
0.00	3.14	0.02	0.92	0.00	0.00	1.80
0.19	0.00	0.28	0.19	0.00	0.00	2.05
3.45	0.00	0.47	0.93	0.00	0.00	0.12
0.00	0.00	0.03	0.13	0.07	0.00	0.00
1.48	0.00	0.44	0.51	0.04	0.00	0.89
0.00	0.00	0.91	0.00	0.00	0.00	0.00
0.34	0.00	2.41	4.47	0.69	0.10	3.81
0.60	0.00	0.40	1.40	0.20	0.01	0.20
0.00	19.69	0.01	1.04	0.02	0.00	10.36
0.00	2.40	0.19	0.00	0.02	0.00	0.04
0.00	0.00	0.33	0.98	2.61	0.00	6.20
0.00	0.50	0.00	1.49	0.25	0.00	1.74
1.53	0.00	0.37	0.00	0.00	0.00	0.09
47.24	0.51	0.51	15.24	0.51	0.00	1.52

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Euphausiid	Crustacean larvae	Stomatopod	Mysid	Ostracod
0.01	7.69	0.25	0.50	8.93
0.0.3	10.77	0.05	1.79	7.18
0.38	47.47	0.77	0.00	9.42
0.40	3.51	0.00	0.00	26.15
0.48	1.62	0.00	0.00	2.04
0.54	2.97	0.27	0.00	101.00
0.00	6.70	1.49	0.74	64.00
0.44	2.11	0.00	0.01	10.11
2.34	1.81	0.00	0.00	6.04
0.00	4.70	0.00	0.36	5.42
0.46	6.29	0.00	0.00	5.39
0.56	8.21	0.00	0.00	3.17
0.23	1.61	0.00	0.00	4.95
0.97	1.98	0.01	0.25	8.56
0.00	2.07	0.07	0.00	1.78
0.01	2.46	1.00	0.00	1.68
0.00	3.10	3.85	0.00	356.13
0.20	3.00	0.02	0.00	91.00
0.15	16.59	0.00	0.01	6.22
0.09	1.50	0.00	0.15	5.11
0.00	4.57	0.00	0.00	3.92
0.00	6.95	0.00	0.99	6.95
0.90	1.71	0.00	0.27	5.93
0.00	11.68	1.02	2.03	1004.70

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Echinoderm larvae	**Atlantid**	**Bivalves**	**Pteropod *Limacina***	**Pteropod *Calvolina***
0.74	0.25	0.50	1.24	0.00
0.60	0.05	0.60	1.21	0.00
0.96	0.58	0.19	10.95	0.00
0.20	0.00	1.17	0.78	0.00
0.72	0.06	0.30	0.30	0.00
1.62	1.35	1.62	4.59	0.27
8.19	2.98	16.37	8.19	0.00
1.26	0.44	0.42	0.42	0.02
1.01	0.21	0.41	2.01	0.00
0.36	0.37	0.36	0.72	0.01
2.25	0.45	0.45	2.25	0.01
0.19	0.76	0.56	1.31	0.00
0.35	0.00	0.00	1.73	0.00
1.98	0.00	0.12	0.59	0.01
0.59	0.00	19.56	2.07	0.00
1.01	0.00	0.00	0.11	0.00
15.83	1.38	7.91	14.11	0.00
1.60	1.00	0.40	18.00	0.00
1.04	0.00	0.00	6.22	0.00
1.05	0.00	1.50	4.36	0.00
0.65	0.33	0.98	0.65	0.00
0.25	0.00	0.74	2.48	0.00
5.48	0.00	0.27	1.17	0.00
9.65	1.02	12.19	20.83	0.00

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Pteropod conical	**Misc. Pteropod**	**Cephalopod**	**Cyphonaute**	**Chaetognath**
1.74	0.00	0.00	0.74	23.81
29.31	0.60	0.00	0.00	65.21
4.42	0.00	0.00	0.77	17.49
0.98	0.20	0.20	0.39	6.83
0.18	0.00	0.00	0.12	4.91
1.35	0.00	0.00	0.00	12.69
17.86	0.00	0.00	0.00	37.21
3.85	0.42	0.00	0.00	22.32
5.90	0.00	0.00	0.00	11.28
0.00	0.00	0.00	0.00	8.32
1.80	0.00	0.01	0.45	26.05
3.92	0.00	0.00	0.00	24.63
1.50	0.00	0.00	0.58	14.51
0.94	0.00	0.12	0.12	12.23
0.00	0.59	0.00	0.00	4.74
0.45	0.00	0.00	0.00	17.21
2.08	0.69	0.00	0.00	65.72
0.80	0.80	0.00	1.80	24.00
5.18	2.07	0.00	3.11	19.70
0.31	0.00	0.00	0.30	6.76
2.94	0.33	0.00	0.33	23.18
0.74	0.00	1.30	0.00	13.89
0.00	0.00	0.00	0.72	9.26
6.10	0.00	0.00	3.05	76.70

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Misc. Gelatinous	Siphonophore	Doliolid	Appendicularia	Salps
0.00	3.47	1.24	1.98	0.25
0.00	2.39	0.00	4.19	0.60
0.00	2.50	2.50	5.77	1.92
0.00	2.93	1.56	2.54	1.37
0.00	0.48	0.12	0.42	0.18
0.00	0.81	1.08	1.62	1.08
0.01	9.67	6.70	23.81	17.87
0.00	22.32	3.37	5.05	8.01
0.00	5.03	1.02	0.20	4.63
0.00	0.73	3.25	0.00	1.45
0.00	5.41	5.39	21.56	10.79
0.00	2.43	2.24	2.05	1.68
0.00	1.61	0.12	1.04	0.12
0.00	3.39	0.81	1.40	0.47
0.00	0.00	0.00	2.67	0.30
1.00	3.13	0.23	2.24	0.45
0.72	62.62	2.06	4.13	42.67
0.00	9.40	0.80	7.20	2.60
0.00	7.26	16.58	20.73	8.29
0.00	1.05	0.01	4.36	0.00
0.00	11.46	6.20	8.16	44.73
0.25	5.71	8.93	14.39	0.74
0.00	2.97	0.27	3.42	0.00
0.00	20.83	24.41	19.81	12.19

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Eggs	**Fish larvae**	**Hydromedusae**	**Polychaeta**
1.49	1.24	0.99	0.25
2.39	0.27	0.63	1.20
1.73	1.16	0.20	1.73
0.39	0.21	0.39	1.37
0.60	0.12	0.06	0.24
3.78	2.71	0.28	0.81
4.47	2.27	1.49	2.23
5.47	1.14	3.82	2.62
1.61	0.28	1.02	1.61
3.25	0.79	0.01	1.45
0.90	1.45	0.02	2.25
0.56	1.18	0.20	1.13
1.73	0.21	0.14	1.73
0.47	0.80	0.14	0.74
0.30	0.38	2.67	2.37
0.11	0.34	0.23	0.67
28.56	1.76	0.35	1.47
8.20	1.61	0.22	1.20
0.00	0.11	1.04	4.15
0.90	0.20	0.16	1.50
1.31	1.63	1.31	0.34
3.47	0.50	0.00	0.00
0.90	0.83	0.18	0.45
3.05	1.17	0.52	7.13

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Date	Station ID	Chaetognath	Cladoceran	Copepod	Calanoid
9/1/2006	B145	5.31	0.45	0.00	23.52
9/1/2006	B111	70.49	13.91	0.00	101.10
9/1/2006	B119	15.57	0.86	0.00	22.49
9/1/2006	B154	12.69	12.43	0.00	25.92
9/1/2006	B115	115.56	0.00	0.00	48.00
9/1/2006	B134	19.53	20.36	0.00	44.47
3/1/2007	B134	44.48	0.00	0.00	22.59
3/1/2007	B161	15.44	0.19	0.00	39.18
3/1/2007	B154	26.93	2.49	0.00	67.76
3/1/2007	B155	90.51	0.00	2.59	103.44
3/1/2007	B141	57.94	0.76	0.00	35.81
3/1/2007	B151	13.87	0.59	0.00	37.87
3/1/2007	B145	14.02	0.17	0.00	33.60
9/1/2007	B119	23.40	18.46	0.00	14.77
9/1/2007	B111	2.94	806.43	0.00	8.83
9/1/2007	B141	21.19	28.05	0.00	6.62
9/1/2007	B138	16.91	0.00	4.23	7.85
9/1/2007	B155	39.66	14.86	3.30	12.39
9/1/2007	B134	17.75	5.79	7.95	30.39
9/1/2007	B115	11.95	29.01	0.00	63.15
9/1/2007	B145	14.57	5.63	0.00	28.38
9/1/2007	B137	80.90	0.00	7.13	64.00
9/1/2007	B142	35.44	1.82	4.09	34.51
9/1/2007	B154	29.14	3.83	3.34	45.39

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

***Candacia* spp.**	***Centropages* spp.**	***Eucalanus* spp.**	***Lucicutia* spp.**	***Temora* spp.**	**Harpactacoid**
1.21	0.45	1.36	1.21	2.27	0.15
0.00	211.49	247.65	43.59	67.71	0.00
0.00	34.04	53.62	2.02	6.05	0.00
0.79	2.38	8.73	0.79	8.73	0.00
0.00	16.89	216.89	0.00	143.11	0.00
3.33	9.97	16.21	1.25	17.87	0.00
0.24	15.30	10.59	0.00	4.01	0.00
0.97	0.20	18.12	3.47	2.51	0.00
1.99	0.50	53.80	9.47	2.49	0.50
0.00	46.56	155.16	5.17	10.34	0.00
2.29	63.25	28.95	0.00	3.05	0.00
0.98	0.20	32.78	2.15	8.00	0.39
1.05	0.35	24.31	2.45	9.63	0.00
0.00	16.41	4.11	0.00	6.15	0.00
0.00	4.41	0.00	0.00	23.54	0.00
0.00	17.23	4.64	0.88	6.85	0.00
0.00	1.21	2.42	0.00	419.13	0.00
0.00	11.56	10.74	1.65	9.91	0.00
0.00	3.62	6.87	0.00	4.71	0.00
0.00	0.08	0.00	0.00	32.43	0.00
0.58	45.35	5.63	3.97	4.39	0.25
0.00	5.45	8.00	2.67	334.25	0.00
0.00	2.39	18.61	2.27	1.82	0.00
0.48	229.85	4.78	4.78	4.78	0.00

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Copepod nauplii	*Oithona* spp.	*Corycaeus* spp.	*Oncea* spp.	Sapphirinidae	Cumacean
0.30	3.03	4.09	0.91	0.15	0.00
0.93	0.93	17.62	0.00	0.00	0.00
0.00	25.95	1.15	0.29	3.17	0.00
0.53	1.07	2.91	0.26	1.32	0.00
0.00	0.00	2.67	6.22	0.00	0.00
0.00	15.38	1.25	0.00	2.91	0.00
0.24	22.36	2.12	0.00	0.71	0.00
0.00	8.49	5.60	1.54	0.58	0.00
0.00	29.92	7.47	5.48	1.99	0.00
0.00	31.03	5.18	10.34	0.00	0.00
0.00	25.92	10.67	2.29	0.76	0.00
0.00	11.51	7.80	2.34	0.78	0.00
0.00	5.09	5.95	2.27	0.87	0.00
0.00	13.13	0.42	0.00	0.41	0.00
0.00	0.00	1.47	0.00	0.00	1.48
0.00	2.21	0.00	1.77	2.43	0.00
3.02	0.00	1.21	0.00	0.00	0.00
0.00	16.52	2.48	0.00	2.48	0.00
0.00	37.97	3.98	0.72	3.98	0.00
0.00	22.19	10.24	5.12	0.00	0.00
0.00	15.30	7.20	1.90	1.57	0.00
2.67	3.56	0.00	0.00	1.78	3.56
0.00	81.34	2.27	1.36	1.82	0.00
0.00	29.62	4.30	3.82	1.92	0.48

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Amphipod	**Decapod**	**Euphausiid**	**Isopod**	***Lucifer* spp.**	**Crab megalopa**
1.54	0.47	0.16	0.00	0.00	0.01
0.93	1.86	0.00	0.00	4.64	0.00
0.29	0.00	0.00	0.00	0.00	0.33
1.60	0.04	0.00	0.00	0.00	0.26
0.00	13.33	0.00	0.00	0.89	1.78
2.49	4.57	0.00	0.00	0.83	1.29
3.57	0.97	0.24	0.01	5.88	0.26
1.64	0.97	0.36	0.00	2.70	0.21
3.66	1.05	0.03	0.00	3.99	0.05
13.15	5.22	0.00	0.00	80.16	0.32
5.37	4.80	0.02	0.02	54.10	0.26
2.76	0.40	0.82	0.00	2.93	0.00
2.86	0.18	0.72	0.00	2.45	0.19
4.53	7.96	0.01	0.00	0.44	0.22
0.00	7.37	0.00	0.00	0.00	0.18
1.11	3.79	0.00	0.00	0.00	0.00
0.00	1.84	0.00	0.00	15.09	0.60
3.30	4.13	0.00	0.00	0.84	1.75
3.62	11.72	0.01	0.00	0.80	0.31
0.00	10.35	0.00	0.00	5.16	0.01
4.00	0.83	0.84	0.00	0.09	0.19
2.67	17.94	0.00	0.00	11.57	0.03
1.83	7.26	0.00	0.00	0.45	0.48
5.25	3.83	0.00	0.00	0.00	1.96

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Mysid	Stomatopod	Crustacean larvae	Crab zoea	Ostracod	Phyllosome	Cyphonaute
0.00	0.00	1.67	0.16	9.12	0.00	0.15
0.00	0.93	50.09	15.77	0.00	0.00	0.00
0.01	1.75	4.32	5.25	1.45	0.01	0.00
0.26	0.01	1.06	3.71	39.67	0.00	0.00
0.00	0.06	37.33	10.67	0.89	0.00	0.89
5.82	0.03	6.65	19.13	366.56	0.01	1.66
2.13	0.07	4.47	4.26	63.06	0.00	0.00
0.00	0.00	3.66	0.00	4.44	0.00	0.00
0.00	0.03	4.98	1.54	16.94	0.00	0.00
0.03	0.02	10.34	2.80	664.64	0.00	0.00
1.46	0.05	3.10	5.57	217.17	0.00	0.00
0.00	0.00	1.17	1.18	3.91	0.00	0.00
0.00	0.01	1.57	0.70	3.33	0.00	0.00
5.09	1.11	27.54	9.87	23.80	0.42	0.00
6.09	4.57	19.14	45.63	1.47	0.00	0.00
0.00	1.48	6.19	10.14	2.21	0.08	0.44
1.21	4.92	28.39	28.49	1.81	0.00	0.60
0.00	1.80	4.20	12.50	231.24	0.89	0.83
0.36	0.06	9.77	9.77	230.72	0.00	0.00
0.00	0.19	29.01	5.23	1.71	0.00	3.41
0.02	0.03	1.65	1.57	34.75	0.01	0.99
10.71	1.07	50.68	27.65	1.78	0.03	0.00
0.00	0.56	14.98	5.48	117.57	0.04	0.00
0.00	0.01	7.64	3.35	254.12	0.00	0.48

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Echinoderm larvae	Eggs	Fish larvae	Ctenophore	Doliolid	Hydromedusae	Salp	Siphonophor
1.06	0.76	0.06	0.00	0.61	0.61	0.32	2.28
44.54	2.78	9.23	0.00	30.61	7.42	13.91	25.04
51.06	0.58	2.32	0.00	4.05	1.15	2.59	12.11
3.44	0.53	0.63	0.00	4.50	0.04	1.59	2.38
74.67	1.78	0.95	0.00	0.00	2.67	0.00	5.33
0.42	2.08	3.44	0.00	4.57	0.42	0.42	9.56
0.00	2.35	0.57	0.00	0.71	2.60	0.47	3.76
0.58	1.19	1.11	0.00	0.19	0.60	0.78	4.05
0.00	5.00	1.40	0.00	2.00	1.50	0.00	5.49
2.59	15.52	1.29	0.00	18.10	0.00	0.06	18.12
0.00	10.67	0.86	0.00	2.30	1.52	0.76	31.24
1.17	2.15	0.86	0.00	0.59	0.83	0.59	1.76
0.88	1.57	0.19	0.18	1.23	1.06	0.71	2.80
23.82	5.74	5.76	0.00	2.87	3.69	8.21	50.47
0.00	8.83	5.28	0.00	0.00	1.47	0.00	14.71
9.72	6.40	1.92	0.00	32.92	5.98	46.67	33.33
38.64	6.04	0.03	0.00	0.00	2.03	0.00	0.00
0.83	6.61	1.92	0.00	11.56	3.31	33.86	17.34
4.34	6.51	1.89	0.01	3.62	1.81	13.39	13.02
10.24	5.12	0.04	0.00	0.00	3.44	0.00	0.00
1.08	0.50	0.74	0.00	0.83	0.27	1.16	2.32
15.11	6.22	8.76	0.01	12.44	2.67	8.89	10.68
0.00	5.45	0.80	0.00	2.73	0.46	2.28	10.44
0.00	2.39	1.97	0.00	4.30	0.01	0.48	1.43

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Larvacean	Atlantid	Bivalves	Heteropod	Pteropod	Pteropod *Calvolina*	Pteropod conical	Pteropod *Limacina*
1.21	0.15	0.15	0.00	0.00	0.01	0.92	0.92
10.20	0.00	11.13	0.00	0.00	0.00	21.33	32.46
5.48	0.00	0.86	0.00	0.00	0.03	18.46	1.44
1.06	0.00	0.26	0.00	0.00	0.01	0.26	5.30
5.33	0.00	0.89	0.00	0.00	0.00	0.00	1.78
0.83	1.25	2.08	0.00	0.42	0.03	7.90	14.96
0.24	0.00	0.47	0.00	0.47	0.07	0.71	0.00
2.89	0.02	0.77	0.00	0.00	0.00	1.36	2.32
5.48	0.52	0.50	0.50	0.00	0.05	28.42	0.50
0.00	0.12	25.86	0.00	0.00	0.11	23.34	2.59
0.76	0.12	2.29	0.01	0.76	0.88	9.94	7.62
2.54	0.20	0.39	0.00	0.00	0.00	1.18	0.98
3.85	0.89	0.00	0.00	0.70	0.03	3.67	0.52
2.05	0.03	7.79	0.00	0.00	0.02	42.67	13.55
44.16	0.00	2.94	0.00	0.00	0.00	200.09	14.71
1.10	0.89	2.21	0.01	0.00	0.01	0.01	5.52
3.02	5.43	265.71	0.00	0.00	0.00	0.00	30.79
1.65	0.04	3.30	0.00	0.00	0.05	0.06	10.74
3.25	0.38	0.36	0.00	0.00	0.42	6.87	12.66
69.99	0.00	3.41	0.00	0.00	0.00	0.00	6.83
0.58	0.08	0.25	0.00	0.00	0.01	0.34	2.82
14.25	0.00	11.56	0.00	0.00	0.00	5.33	8.00
2.27	0.45	2.27	0.00	0.45	0.00	2.27	14.99
6.69	0.02	0.96	0.00	0.48	0.54	6.69	10.03

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Squid	Pluteus larvae	Polychaete	Protist	Foraminifera	Noctiluca	Radiolarian	Unknown
0.01	0.00	0.47	1.36	6.83	0.00	0.00	0.00
0.00	0.00	0.93	0.00	6.49	0.00	0.00	0.00
0.00	0.00	0.58	3.75	4.90	0.00	0.00	0.01
0.00	0.00	1.06	1.06	1.85	0.00	0.00	0.26
0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00
0.00	0.00	0.42	0.42	14.55	0.00	0.00	0.00
0.00	0.00	0.00	2.82	6.82	0.00	0.00	0.00
0.00	0.00	0.58	1.73	9.64	1.93	0.00	0.00
0.00	0.00	0.50	0.00	7.48	11.96	0.00	0.03
0.01	0.00	2.62	0.00	2.59	0.00	0.00	2.59
0.00	0.00	0.79	0.00	4.57	0.00	0.00	0.00
0.00	0.00	0.80	0.59	12.88	0.00	0.00	0.39
0.01	0.00	1.41	3.32	7.00	0.00	0.00	0.17
0.04	0.00	0.47	1.23	1.67	0.00	0.00	0.00
0.00	0.00	1.47	0.00	0.00	1.48	0.00	0.00
0.03	0.00	0.22	1.32	3.57	0.00	0.00	0.00
0.00	0.00	0.60	1.81	4.83	0.00	0.00	3.03
0.00	0.00	0.00	37.16	3.30	0.00	0.00	3.30
0.01	0.00	2.18	14.82	35.81	0.00	0.72	16.64
0.00	0.00	3.43	0.00	18.77	0.00	0.00	0.00
0.03	0.00	0.47	3.06	9.85	0.50	0.00	0.83
0.00	0.00	5.33	0.00	0.00	0.00	0.00	24.01
0.01	0.00	0.91	0.00	6.35	0.00	0.00	9.53
0.00	0.00	0.96	0.00	12.42	0.00	0.00	3.34

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Date	Station ID	Chaetognath	Cladoceran	Copepod	Calanoid	*Candacia* spp.	*Centropages spp.*
3/1/2008	B141	165.16	8.26	0.00	287.66	4.13	229.85
3/1/2008	B115	64.05	0.00	0.00	336.25	0.00	55.87
3/12008	B154	52.08	1.45	8.68	188.08	1.45	15.92
3/1/2008	B111	23.51	0.00	0.00	80.33	0.00	12.41
3/1/2008	B119	63.44	0.00	0.00	143.03	0.00	30.61
3/1/2008	B134	48.81	0.00	0.00	71.05	1.63	12.47
3/1/2008	B145	16.33	0.26	0.00	94.02	0.00	0.00
3/1/2008	B151	18.13	0.00	0.00	37.13	1.53	0.44
3/1/2008	B137	78.32	0.00	4.21	42.95	0.00	23.58
9/1/2008	B134	49.45	1.06	0.00	31.74	0.53	3.70
9/1/2008	B119	14.03	0.00	0.00	12.31	0.00	20.21
9/1/2008	B115	80.00	38.40	0.00	39.47	0.00	44.80
9/1/2008	B141	89.73	0.66	0.00	23.75	0.00	17.81
9/1/2008	B154	26.26	0.91	0.00	44.68	1.81	0.30
3/12009	B115	48.00	0.00	0.64	172.80	3.84	33.28
3/1/2009	B138	65.94	0.97	0.00	93.09	0.00	14.55
3/1/2009	B137	105.41	0.94	0.00	112.00	0.94	19.76
3/1/2009	B141	44.31	0.00	1.64	187.08	1.64	3.28
3/1/2009	B155	38.13	0.00	2.04	74.21	4.09	1.36
3/1/2009	B154	86.15	0.00	0.00	246.29	4.85	0.00
3/1/2009	B134	75.30	2.15	0.00	236.64	4.30	2.15
3/1/2009	B151	15.73	0.00	0.00	89.05	2.01	0.91
3/1/2009	B119	59.77	0.00	0.00	82.51	1.06	1.59
3/1/2009	B111	48.00	0.00	0.00	42.35	0.00	51.29

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

***Eucalanus* spp.**	***Lucicutia* spp.**	***Temora* spp.**	**Harpactacoid**	**Copepod nauplii**	***Oithona* spp.**	***Corycaeus* spp.**
90.84	15.14	39.91	0.00	1.38	63.31	110.11
1.02	3.05	0.00	1.02	0.00	0.00	13.21
67.99	7.23	11.57	0.00	4.34	21.69	15.93
5.22	0.00	4.57	0.00	0.00	2.61	64.00
5.57	2.78	23.37	0.00	0.00	23.93	36.17
21.69	2.71	8.68	0.00	2.71	29.29	17.90
11.33	2.63	0.26	0.00	0.00	9.74	3.69
2.84	4.59	0.44	0.00	0.87	6.12	4.37
24.42	1.68	2.53	0.00	0.00	30.32	7.58
0.53	0.53	19.83	0.26	0.26	23.27	5.02
0.00	0.25	35.22	0.00	0.00	8.37	3.94
7.47	2.13	636.80	0.00	0.00	0.00	23.47
0.00	1.32	58.72	0.00	0.00	7.92	3.30
0.00	1.51	3.02	0.00	0.00	14.79	8.75
12.80	0.00	2.56	0.00	0.00	2.56	51.20
30.06	2.91	19.39	0.00	0.00	7.76	77.58
55.53	0.00	1.88	0.00	0.00	32.00	39.53
29.54	4.92	21.33	0.00	16.41	36.10	68.94
26.55	5.45	5.45	1.36	3.40	21.11	16.34
16.99	3.64	6.07	0.00	7.28	31.55	18.20
21.51	8.61	24.74	0.00	1.08	87.13	45.18
10.61	5.12	14.26	0.18	0.00	21.39	13.35
14.81	1.59	4.76	0.00	0.53	95.74	15.34
6.59	0.94	0.47	0.00	0.94	7.53	158.12

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

***Oncaea* spp.**	**Sapphirinidae**	**Cumacean**	**Amphipod**	**Decapod**	**Euphausiid**	**Isopod**	***Lucifer* spp.**	**Crab megalopa**
22.02	6.88	0.00	45.42	6.88	0.00	0.00	97.72	1.38
0.00	0.00	0.00	1.02	1.02	0.00	0.00	0.02	0.00
8.68	13.02	0.00	7.29	1.45	0.01	0.00	1.45	1.54
0.65	0.65	0.00	0.65	0.00	0.00	0.00	2.65	0.00
13.36	0.56	0.00	5.57	2.98	0.00	0.00	5.59	0.57
2.17	0.00	0.00	11.95	2.79	0.01	0.00	21.15	0.54
6.06	1.84	0.00	2.12	0.01	0.00	0.00	0.26	0.00
6.55	0.22	0.00	1.53	0.00	1.31	0.00	0.00	0.00
0.84	0.00	0.00	5.91	0.18	0.01	0.00	3.37	0.11
2.12	2.38	0.00	8.76	3.74	0.79	0.00	0.79	0.53
0.00	0.98	0.00	4.92	3.49	0.00	0.00	0.74	0.98
0.00	2.13	0.00	7.47	26.67	0.00	0.00	84.27	8.53
0.66	0.00	0.00	8.59	2.71	0.00	0.01	1.45	0.02
2.42	3.92	0.00	0.60	1.22	0.00	0.00	0.00	0.00
0.64	0.00	0.00	0.64	1.92	0.00	0.00	0.00	0.00
3.88	1.94	0.00	0.00	1.94	0.00	0.00	0.97	0.97
1.88	5.65	0.00	13.18	0.00	0.00	0.00	0.00	0.00
21.33	6.56	0.00	13.15	0.21	0.01	0.00	3.29	0.00
14.30	0.00	0.00	7.49	3.60	0.68	0.00	2.04	0.03
26.69	3.64	0.00	3.65	1.22	2.43	0.00	8.49	0.00
36.57	1.08	0.00	20.44	9.69	1.08	0.00	1.08	0.01
24.32	1.46	0.00	1.28	0.18	0.93	0.00	0.00	0.00
7.40	0.00	0.00	11.12	0.75	0.57	0.00	1.61	0.01
0.47	0.00	0.00	3.29	4.24	0.00	0.00	0.94	0.00

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Mysid	Stomatopod	Crustacean larvae	Crab zoea	Ostracod	Phyllosome	Cyphonaute	Echinoderm larvae	Eggs
0.00	0.01	115.61	31.66	719.83	0.00	2.75	4.13	50.92
0.00	0.00	9.14	2.03	2.03	0.00	0.00	0.00	1.02
0.00	0.01	8.68	1.47	91.15	0.00	2.89	0.00	0.00
0.00	0.00	3.27	5.22	6.53	0.00	0.00	0.65	0.65
4.46	0.09	16.70	3.34	152.49	0.01	0.00	0.00	4.45
0.54	0.02	27.12	3.80	138.85	0.02	0.54	1.63	9.22
0.00	0.00	0.79	1.32	6.85	0.00	0.26	2.90	3.16
0.00	0.00	0.44	0.44	1.97	0.00	0.00	0.44	3.06
0.00	0.03	18.54	3.45	196.21	0.00	0.00	0.00	0.84
0.53	0.79	3.17	7.93	292.23	0.30	0.53	5.31	23.80
0.98	0.81	3.94	7.88	22.16	0.00	0.25	1.97	2.96
0.00	2.17	185.60	118.40	20.27	0.00	1.07	16.00	1.07
2.88	0.69	6.60	14.52	79.84	0.00	0.00	4.62	5.94
0.00	0.31	3.02	1.81	69.74	0.00	0.30	0.60	1.21
0.00	0.00	5.12	1.92	15.36	0.00	0.00	0.00	1.28
0.00	0.00	4.85	3.88	100.85	0.00	0.00	2.91	1.94
0.00	0.00	4.71	2.82	351.06	0.00	0.00	0.00	5.65
6.58	0.04	14.77	9.85	75.49	0.00	0.00	3.28	4.92
0.01	0.01	10.21	0.68	9.53	0.00	0.00	0.68	2.04
1.21	0.00	7.28	1.21	4.85	0.00	3.64	2.43	2.43
0.00	0.02	16.13	3.23	40.87	0.00	0.00	1.08	4.30
0.00	0.00	2.56	0.55	7.68	0.00	3.47	0.18	3.47
0.06	0.00	5.82	2.64	119.01	0.00	0.00	0.00	16.40
0.00	0.00	13.65	17.41	23.06	0.00	0.00	8.00	3.76

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Fish larvae	**Ctenophore**	**Doliolid**	**Hydromedusae**	**Salp**	**Siphonophore**	**Larvacean**	**Atlantid**	**Bivalve**
5.56	0.01	26.15	9.63	15.14	9.66	26.15	1.38	4.13
0.14	0.00	0.00	2.10	2.03	1.06	15.24	0.00	0.00
1.71	0.00	26.04	1.47	2.89	14.46	65.12	0.05	4.34
0.71	0.00	0.04	0.02	1.31	0.65	0.00	0.00	1.96
0.71	0.00	1.68	3.90	1.67	1.68	1.11	0.01	0.00
0.58	0.00	4.34	0.00	1.63	4.88	0.00	0.00	1.08
0.29	0.00	3.16	0.27	1.32	4.23	0.79	0.00	0.00
0.22	0.00	1.97	0.00	0.44	1.75	3.71	0.00	0.44
0.43	0.00	0.03	0.01	2.53	0.00	7.58	0.00	4.21
0.93	0.00	7.67	0.26	1.32	12.17	8.46	0.26	2.38
1.34	0.00	1.98	1.01	1.98	11.32	0.00	0.74	2.46
16.00	0.00	0.00	29.88	0.00	9.60	30.93	0.00	1.07
3.38	0.00	0.66	1.32	0.00	7.92	77.20	0.66	1.98
0.33	0.00	1.51	0.36	0.91	9.96	7.85	1.21	0.60
1.30	0.00	0.00	1.28	0.00	1.92	8.32	0.00	48.00
1.94	0.00	5.82	3.88	3.88	33.00	2.91	0.97	0.97
0.06	0.00	55.53	0.00	10.37	45.18	0.00	0.94	0.00
1.95	0.00	36.17	4.94	1.64	19.69	59.08	4.92	3.28
0.94	0.00	8.18	0.00	3.41	8.86	34.04	0.01	0.00
1.24	0.00	6.07	2.43	8.49	18.20	15.77	0.00	0.00
2.29	0.00	18.29	2.15	0.00	8.61	8.61	5.38	1.08
0.18	0.00	0.73	1.66	0.57	8.96	6.58	0.00	0.18
0.15	0.00	1.59	0.00	0.53	1.59	11.64	2.12	0.53
0.04	0.00	0.47	2.35	0.00	23.53	5.18	0.00	8.00

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Heteropod	**Pteropod**	**Pteropod C*alvolinia***	**Pteropod conical**	**Pteropod *Limacina***	**Squid**	**Pluteus larvae**	**Polychaete**
0.00	0.00	0.00	8.26	4.13	0.00	0.00	11.02
0.00	0.00	0.00	0.00	166.60	0.00	0.00	1.02
0.00	24.60	0.12	20.67	4.34	0.01	0.00	0.01
0.00	0.00	0.00	1.96	5.22	0.00	0.00	0.65
0.00	0.00	0.00	1.69	7.23	0.00	0.00	1.11
0.00	0.00	0.00	1.63	1.08	0.00	0.00	0.54
0.27	0.00	0.00	1.84	0.26	0.00	0.00	1.59
0.00	0.22	0.00	2.84	0.44	0.00	0.00	0.66
0.00	0.84	0.00	0.00	0.00	0.01	0.00	0.84
0.07	0.00	0.00	1.32	9.52	0.00	0.00	2.92
0.00	0.49	0.00	0.98	14.54	0.00	0.00	0.98
0.00	0.00	0.00	4.27	4.27	0.00	0.00	0.00
0.00	0.00	0.66	3.96	17.81	0.00	0.00	0.66
0.00	1.21	0.00	0.00	8.15	0.01	0.30	0.92
0.00	0.00	0.00	0.64	14.08	0.00	0.00	1.28
0.00	0.00	0.00	2.91	2.91	0.00	0.00	0.97
0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85
0.00	0.00	0.00	8.21	1.64	0.00	0.00	0.05
0.68	0.00	0.02	4.77	2.04	0.00	0.00	3.45
0.00	0.00	0.00	52.17	4.85	0.00	0.00	3.64
0.00	0.00	0.00	15.07	5.38	0.00	0.00	1.08
0.55	0.00	0.00	8.59	2.19	0.00	0.00	0.37
0.00	0.00	0.03	23.27	7.40	0.00	0.00	0.00
0.00	0.00	0.00	0.47	283.29	0.00	0.00	0.94

Table A7 (cont.) Abundance (#/m^3) for each taxon for each

Protist	Foraminfera	Noctiluca	Radiolarian	Unknown
0.00	342.71	19.27	0.00	0.00
0.00	4.06	0.00	0.00	0.00
0.00	7.23	0.00	0.00	7.23
0.00	0.00	0.00	0.00	2.61
2.78	7.79	0.00	0.00	0.00
4.34	7.05	0.54	0.00	0.00
0.00	3.95	3.16	0.00	0.53
0.00	13.98	2.84	0.00	0.00
0.00	0.00	0.00	0.00	0.01
0.00	15.07	0.53	0.00	0.00
0.00	3.45	0.25	0.00	0.00
0.00	9.60	0.00	0.00	2.13
3.30	19.13	0.00	0.00	0.66
4.23	16.30	8.15	0.00	0.60
0.00	5.76	1.28	0.00	0.64
0.00	2.91	0.00	0.00	0.97
2.82	49.88	0.94	0.00	0.94
8.21	31.18	13.13	0.00	1.64
5.45	7.49	2.72	0.00	0.00
2.43	52.17	32.76	0.00	2.43
0.00	33.34	12.91	0.00	2.15
0.00	13.90	2.93	0.00	0.00
0.00	12.69	2.12	0.00	0.53
0.00	27.29	0.00	0.00	0.00

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Date	**Station ID**	**Chaetognath**	**Cladoceran**	**Copepod**	**Calanoid**	***Candacia* spp.**	***Centropages* spp.**
9/1/2009	B145	9.49	2.19	0.00	36.75	0.49	1.22
9/1/2009	B111	49.54	20.00	0.00	4.62	0.00	20.62
9/1/2009	B119	33.60	14.93	0.00	22.40	0.00	16.00
9/1/2009	B134	23.53	15.69	0.00	54.59	1.57	7.22
9/1/2009	B138	64.00	0.00	0.00	51.37	0.84	21.05
9/1/2009	B115	62.00	46.00	0.00	108.00	0.00	131.00
9/1/2009	B137	64.79	1.58	0.00	41.09	0.00	47.41
9/1/2009	B142	63.35	73.37	0.65	93.41	0.00	11.64
9/1/2009	B141	72.96	19.20	0.00	48.64	0.00	28.16
9/1/2009	B155	57.00	43.00	0.00	85.00	0.00	28.00
9/1/2009	B154	35.52	4.59	0.92	111.46	2.14	1.84

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

***Eucalanus* spp.**	***Lucicutia* spp.**	***Temora* spp.**	**Harpactacoid**	**Copepod nauplii**	***Oithona* spp.**	***Corycaeus* spp.**
7.06	1.46	1.46	0.73	0.49	16.30	7.54
0.31	0.31	22.77	0.00	0.00	1.85	8.31
0.00	0.00	35.20	0.00	0.00	61.33	5.87
1.57	6.59	21.33	0.00	0.00	30.43	7.22
28.63	4.21	34.11	0.00	0.42	1.26	26.11
61.00	23.00	21.00	0.00	0.00	0.00	17.00
1.58	20.54	249.68	0.00	0.00	1.58	7.90
4.20	7.11	8.08	2.26	0.00	85.98	19.07
6.40	1.28	120.34	0.00	0.00	43.52	51.20
16.00	0.00	3.00	0.00	0.00	79.00	23.00
1.22	3.06	1.84	0.00	0.00	53.89	8.88

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

***Oncaea* spp.**	**Sapphirinidae**	**Cumacean**	**Amphipod**	**Decapod**	**Euphausiid**	**Isopod**	***Lucifer* spp.**
1.95	0.97	0.00	1.22	0.49	1.95	0.00	0.49
0.00	0.00	0.00	0.62	5.85	0.00	0.00	0.62
1.07	0.00	0.00	7.47	2.13	0.00	0.00	0.00
0.63	2.20	0.00	1.57	1.88	0.31	0.00	1.88
5.05	0.00	0.00	5.89	20.21	0.00	0.00	8.00
1.00	0.00	0.00	1.00	6.00	0.00	0.00	7.00
0.00	0.00	1.58	26.86	6.37	0.00	0.00	1.58
24.89	2.26	0.00	12.61	2.91	0.00	0.00	0.32
30.74	1.28	0.00	15.36	0.00	0.00	0.00	0.00
60.00	2.00	0.00	9.00	1.02	0.00	0.00	3.00
17.45	0.61	0.00	3.67	1.53	0.00	0.00	0.61

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Crab megalopa	Mysid	Stomatopod	Crustacean larvae	Crab zoea	Ostracod	Phyllosome	Cyphonaute
0.25	0.00	0.24	1.46	0.24	6.57	0.01	0.24
0.62	0.00	0.02	8.92	12.00	3.38	0.00	0.00
0.00	0.00	0.05	5.87	9.60	330.13	0.02	0.00
0.00	0.31	0.01	5.33	4.08	171.92	0.01	0.00
1.71	2.11	28.34	60.21	26.53	0.00	0.00	0.00
3.00	0.00	1.06	70.00	30.00	0.00	0.00	0.00
0.00	4.74	1.65	9.48	3.16	34.77	0.02	0.00
0.65	0.00	1.32	3.56	2.91	223.68	0.03	0.00
0.00	1.28	0.00	12.80	19.20	266.24	0.06	0.00
0.00	1.00	0.02	13.00	14.00	329.00	0.03	0.00
0.00	0.00	0.00	3.37	1.53	252.33	0.00	0.92

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Echinoderm larvae	Eggs	Fish larvae	Ctenophore	Doliolid	Hydromedusae	Salp	Siphonophore	Larvacean
2.43	0.73	0.53	0.00	1.46	0.49	1.71	4.87	5.60
0.31	5.85	3.10	0.00	0.62	12.38	0.94	15.69	8.62
9.60	3.20	0.57	0.00	0.53	0.00	1.07	17.60	1.60
4.08	1.25	0.31	0.00	2.82	0.31	0.00	9.41	10.67
34.53	2.11	4.67	0.00	0.00	0.84	0.84	0.00	21.47
8.00	2.00	3.16	0.03	0.00	8.16	2.00	15.00	24.00
0.00	3.16	1.68	0.00	1.58	3.16	53.73	9.48	7.90
7.76	0.97	2.33	0.00	0.00	0.99	12.61	5.17	11.31
25.60	2.56	2.62	0.00	2.56	3.84	29.52	20.48	16.64
201.02	1.00	1.16	0.00	3.00	2.00	9.00	17.00	15.00
0.31	3.37	1.85	0.00	1.84	0.00	0.92	6.43	6.74

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Atlantid	**Bivalve**	**Heteropod**	**Pteropod**	**Pteropod *Calvolinia***	**Pteropod conical**	**Pteropod *Limacina***	**Squid**
0.00	0.00	0.00	0.00	0.00	0.24	1.46	0.00
0.00	1.23	0.00	0.00	0.00	10.19	3.38	0.00
0.53	0.53	0.00	0.00	0.00	3.20	10.13	0.00
0.31	0.00	0.00	0.00	0.00	4.39	8.78	0.00
0.00	10.95	0.00	0.00	0.00	42.53	5.47	0.00
0.00	13.00	0.00	1.00	0.00	0.00	5.00	0.00
0.00	1.58	0.00	0.00	0.00	7.90	0.00	0.00
0.32	0.32	0.00	0.00	0.00	2.91	3.23	0.00
0.00	1.28	0.00	0.00	1.28	2.56	21.76	0.02
2.00	5.00	0.00	0.00	0.00	0.00	9.00	0.00
1.84	0.92	0.00	0.31	0.00	0.61	20.82	0.00

Table A7 (cont.) Abundance (#/m^3) for each taxon for each SEAMAP sample

Pluteus larvae	Polychaete	Protist	Foraminifera	Noctiluca	Radiolarian	Unknown
0.00	0.97	0.00	11.68	1.46	0.00	2.19
0.00	0.92	0.92	15.38	0.00	0.00	0.31
0.00	0.00	0.00	8.53	0.00	0.00	0.00
0.00	0.65	0.00	14.12	0.31	0.00	2.51
0.00	0.84	0.00	1.68	0.00	0.00	2.95
0.00	1.03	0.00	1.00	4.00	0.00	0.00
0.00	0.00	0.00	6.32	0.00	0.00	3.17
0.00	0.97	0.65	12.93	0.65	0.00	0.65
0.00	0.00	1.28	3.84	0.00	0.00	5.12
0.00	0.02	3.00	14.00	0.00	0.00	0.00
0.00	2.76	2.76	5.82	0.00	0.00	3.37

Table A8. Total abundance of zooplankton and number of taxa for SEAMAP cruises in the NEGoM

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
May	**2005**	B171	416	34
		B001	238	35
		B001	324	36
September	**2005**	B322	160	34
May	**2006**	B001	83	31
September	**2006**	B167	435	33
		B169	250	36
March	**2007**	B169	370	38
		B171	186	31
		B175	192	35
		B322	322	37
May	**2007**	B001	136	35
		B081	181	34
September	**2007**	B167	84	27
		B169	134	37
May	**2008**	B001	103	28
September	**2008**	B167	796	36
		B169	278	39
March	**2009**	B169	398	35
		B322	689	34
		B001	173	36
May	**2009**	B001	233	31
September	**2009**	B167	1756	35
		B169	137	32

Table A9. Total abundance of zooplankton and number of taxa for SEAMAP cruises on the West Florida Shelf

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
September	**2006**	B115	709	24
		B154	150	37
		B111	1066	29
		B119	290	36
		B134	628	39
		B145	76	40
March	**2007**	B141	603	39
		B155	1353	34
		B154	315	41
		B161	141	38
		B134	233	36
		B145	143	42
		B151	161	40
September	**2007**	B115	356	25
		B138	901	30
		B137	811	35
		B141	270	37
		B142	401	37
		B155	522	37
		B154	470	39
		B111	1229	24
		B119	352	38
		B134	532	42
		B145	160	46
March	**2008**	B115	684	22
		B137	462	30
		B141	2608	39
		B154	716	41
		B111	229	26
		B119	571	33
		B134	466	36
		B145	188	33
		B151	123	32
September	**2008**	B115	1459	30
		B141	472	35
		B154	251	39
		B119	194	33
		B134	554	43

Table A9 (cont.) Total abundance of zooplankton and number of taxa for SEAMAP cruises on the West Florida Shelf

Month	Year	Station	Total Abundance (# of individuals/m^3)	Number of Taxa
March	**2009**	B115	440	27
		B138	502	32
		B137	927	26
		B141	774	39
		B155	334	39
		B154	698	37
		B111	744	28
		B119	512	34
		B134	766	38
		B151	270	35
September	**2009**	B115	675	30
		B138	519	31
		B137	629	30
		B141	883	33
		B142	711	38
		B155	1049	33
		B154	569	38
		B111	241	33
		B119	631	28
		B134	421	37
		B145	138	42

Table A10. Inverse Simpson and Shannon indices for SEAMAP cruises in the NEGoM

Month	Year	Station	Inverse Simpson	Shannon
May	**2005**	B171	7.21	2.44
		B001	6.22	2.37
		B001	7.66	2.54
September	**2005**	B322	7.12	2.45
May	**2006**	B001	4.20	2.19
September	**2006**	B167	13.1	2.92
		B169	4.06	2.23
March	**2007**	B169	6.44	2.41
		B171	6.01	2.37
		B175	4.61	2.21
		B322	8.70	2.57
May	**2007**	B001	7.09	2.48
		B081	6.95	2.51
September	**2007**	B167	6.79	2.53
		B169	8.61	2.62
May	**2008**	B001	6.81	2.38
September	**2008**	B167	4.09	2.17
		B169	5.45	2.35
March	**2009**	B169	7.53	2.50
		B322	4.46	2.26
		B001	5.54	2.28
May	**2009**	B001	8.69	2.60
September	**2009**	B167	2.81	1.85
		B169	8.28	2.55

Table A11. Inverse Simpson and Shannon indices for SEAMAP cruises on the West Florida Shelf

Month	Year	Station	Inverse Simpson	Shannon
September	**2006**	B115	5.54	2.04
		B154	7.95	2.59
		B111	8.31	2.54
		B119	9.60	2.63
		B134	2.84	1.92
		B145	7.46	2.65
March	**2007**	B141	5.89	2.36
		B155	3.68	1.97
		B154	9.25	2.66
		B161	8.28	2.69
		B134	7.22	2.46
		B145	9.24	2.77
		B151	8.15	2.61
September	**2007**	B115	9.61	2.60
		B138	3.24	1.69
		B137	5.05	2.37
		B141	11.4	2.79
		B142	6.67	2.44
		B155	4.59	2.34
		B154	3.21	2.00
		B111	2.17	1.33
		B119	14.6	2.97
		B134	4.81	2.43
		B145	9.31	2.72
March	**2008**	B115	3.15	1.54
		B137	4.34	1.99
		B141	7.94	2.57
		B154	8.69	2.68
		B111	4.57	2.02
		B119	6.29	2.32
		B134	7.18	2.49
		B145	3.71	2.14
		B151	7.21	2.54
September	**2008**	B115	4.46	2.17
		B141	8.56	2.54
		B154	7.43	2.54
		B119	12.1	2.86
		B134	3.37	2.05

Table A11 (cont.) Inverse Simpson and Shannon indices for SEAMAP cruises on the West Florida Shelf

Month	Year	Station	Inverse Simpson	Shannon
March	**2009**	B115	4.96	2.13
		B138	7.88	2.45
		B137	5.34	2.19
		B141	10.3	2.84
		B155	10.7	2.84
		B154	6.24	2.52
		B111	4.83	2.11
		B119	7.36	2.41
		B134	7.49	2.62
		B151	7.10	2.58
September	**2009**	B115	9.74	2.60
		B138	14.0	2.86
		B137	5.19	2.29
		B141	7.56	2.57
		B142	6.52	2.39
		B155	6.34	2.36
		B154	3.99	2.01
		B111	11.5	2.79
		B119	3.39	1.98
		B134	4.99	2.31
		B145	9.10	2.80

Appendix B

Note: Abundances of C-IMAGE taxa are publicly available through the Gulf of Mexico Research Information and Data Cooperative (GRIIDC): DOI: 10.7266/N73J39XT, DOI: 10.7266/N7319SVT.

Table B1. Abundance of top five zooplankton categories for each SEAMAP sample in the NEGoM

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
May 2005	**B001**	Calanoid copepods	68.5	28.8
		Oithona spp.	25.6	10.8
		Chaetognath	23.8	10.0
		Eucalanus spp.	16.4	6.9
		Lucicutia spp.	11.9	5.0
	B171	Calanoid copepods	107.1	25.8
		Chaetognath	65.2	15.7
		Eucalanus spp.	46.1	11.1
		Pteropod conical	29.3	7.0
		Lucifer spp.	21.6	5.2
	B001	Calanoid copepods	80.1	24.7
		Crustacean larvae	47.5	14.7
		Oncaea spp.	24.0	7.4
		Oithona spp.	21.3	6.6
		Chaetognath	17.5	5.4
September 2005	**B322**	Calanoid copepods	33.4	20.9
		Ostracod	26.1	16.3
		Oithona spp.	12.3	7.7
		Eucalanus spp.	11.3	7.1
		Chaetognath	6.83	4.3
May 2006	**B001**	Calanoid copepods	23.8	28.8
		Chaetognath	4.91	6.0
		Oithona spp.	3.90	4.7
		Copepods	2.64	3.2
		Ostracod	2.04	2.5
September 2006	**B169**	Ostracod	101	40.4
		Calanoid copepods	22.7	9.1
		Eucalanus spp.	14.3	5.7
		Chaetognath	12.7	5.1
		Cladocera	7.83	3.1

Table B1 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample in the NEGoM

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2006	**B167**	Ostracod	64.0	14.7
		Calanoid copepods	59.5	13.7
		Chaetognath	37.2	8.6
		Larvacean	23.8	5.5
		Eucalanus spp.	21.6	5.0
March 2007	**B169**	*Eucalanus* spp.	94.3	25.5
		Calanoid copepods	77.1	20.8
		Oithona spp.	28.6	7.7
		Chaetognath	22.3	6.0
		Siphonophore	22.3	6.0
	B171	Calanoid copepods	48.5	26.0
		Eucalanus spp.	36.1	19.4
		Chaetgonath	11.3	6.1
		Oithona spp.	6.44	3.5
		Ostracod	6.04	3.2
	B175	Calanoid copepods	67.3	35.0
		Eucalanus spp.	22.1	11.5
		Lucifer spp.	9.04	4.7
		Oithonia spp.	9.04	4.7
		Chaetognath	8.32	4.3
	B322	Calanoid copepods	60.2	18.7
		Oithona spp.	45.4	14.1
		Eucalanus spp.	44.0	13.7
		Chaetognath	26.0	8.1
		Larvacean	21.6	6.7
May 2007	**B081**	Calanoid copepods	44.6	24.6
		Chaetognath	24.6	13.6
		Oithona spp.	15.9	8.8
		Crustacean larvae	8.21	4.5
		Corycaeus spp.	7.84	4.3
	B001	Calanoid copepods	30.5	22.4
		Chaetognath	14.5	10.6
		Corycaeus spp.	9.67	7.1
		Oithona spp.	8.98	6.6
		Eucalanus spp.	8.06	5.9

Table B1 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample in the NEGoM

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2007	**B169**	Calanoid copepods	25.6	19.1
		Chaetognath	12.2	9.1
		Ostracod	8.56	6.4
		Corycaeus spp.	8.38	6.2
		Oithona spp.	7.33	5.5
	B167	Bivalves	19.6	23.3
		Calanoid copepods	5.04	6.0
		Chaetognath	4.74	5.6
		Hydromedusae	2.67	3.2
		Larvacean	2.67	3.2
May 2008	**B001**	Calanoid copepods	19.1	18.5
		Chaetognath	17.2	16.7
		Oithona spp.	9.17	8.9
		Euclanus spp.	6.38	6.2
		Corycaeus spp.	3.24	3.1
September 2008	**B167**	Ostracod	356.1	44.7
		Chaetognath	65.7	8.3
		Siphonophore	62.6	7.9
		Salp	42.7	5.4
		Centropages spp./Calanoid copepods	32.0	4.0
	B169	Ostracod	91.0	32.7
		Calanoid copepods	28.8	10.4
		Chaetognath	24.0	8.6
		Pteropod lima	18.0	6.5
		Oithona spp.	12.2	4.4
March 2009	**B322**	Calanoid copepods	295	42.8
		Corycaeus spp.	44.6	6.5
		Eucalanus spp.	40.4	5.9
		Temora spp.	38.3	5.6
		Oncaea spp.	33.2	4.8
	B001	Calanoid copepods	49.1	28.3
		Oithona spp.	24.5	14.1
		Oncaea spp.	13.2	7.6
		Corycaeus spp.	7.97	4.6
		Chaetognath	6.76	3.9

Table B1 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample in the NEGoM

March 2009	**B169**	Calanoid copepods	98.9	24.9
		Eucalanus spp.	57.5	14.5
		Salp	44.7	11.2
		Oithona spp.	32.3	8.1
		Chaetognath	23.2	5.8
May 2009	**B001**	Calanoid copepods	50.9	21.8
		Centropages spp.	26.5	11.4
		Oithona spp.	24.8	10.6
		Larvacean	14.4	6.2
		Chaetognath	13.9	6.0
September 2009	**B169**	Calanoid copepods	25.8	18.8
		Oithona spp.	18.2	13.3
		Chaetognath	9.26	6.7
		Corycaeus spp.	8.99	6.5
		Oncaea spp.	8.54	6.2
	B167	Ostracod	1005	57.2
		Calanoid copepods	128	7.3
		Eucalanus spp.	77.7	4.4
		Oithona spp.	77.7	4.4
		Chaetognath	76.7	4.4

Table B2. Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2006	**B145**	Calanoid copepods	23.5	31.2
		Ostracod	9.12	12.1
		Foraminifera	6.83	9.0
		Chaetognath	5.31	7.0
		Corycaeus spp.	4.09	5.4
	B111	*Eucalanus* spp.	248	23.3
		Centropages spp.	211	19.8
		Calanoid copepods	101	9.5
		Chaetognath	70.5	6.6
		Temora spp.	67.7	6.4
	B119	*Eucalanus* spp.	53.6	18.5
		Echinoderm larvae	51.1	17.6
		Centropages spp.	34.0	11.7
		Oithona spp.	26.0	9.0
		Calanoid copepods	22.5	7.8
	B154	Ostracod	39.7	26.5
		Calanoid copepods	25.9	17.3
		Chaetognath	12.7	8.5
		Cladoceran	12.5	8.3
		Temora spp./*Eucalanus* spp.	8.73	5.8
	B115	*Eucalanus* spp.	217	30.6
		Temora spp.	143	20.2
		Chaetognath	116	16.4
		Echinoderm larvae	74.7	10.5
		Calanoid copepods	48	6.8
	B134	Ostracod	367	58.4
		Calanoid copepods	44.5	7.1
		Cladoceran	20.4	3.2
		Chaetognath	19.5	3.1
		Crab zoea	19.1	3.0

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
March 2007	**B134**	Ostracod	63.1	27.1
		Chaetognath	44.5	19.1
		Calanoid copepods	22.6	9.7
		Oithona spp.	22.4	9.6
		Centropages spp.	15.3	6.6
	B161	Calanoid copepods	39.2	27.8
		Eucalanus spp.	18.1	12.8
		Chaetognath	15.4	10.9
		Foraminifera	9.64	6.8
		Oithona spp.	8.49	6.0
	B154	Calanoid copepods	67.8	21.5
		Eucalanus spp.	53.8	17.1
		Oithona spp.	29.9	9.5
		Pteropod conical	28.4	9.0
		Chaetognath	26.9	8.5
	B155	Ostracod	665	49.2
		Eucalanus spp.	155	11.5
		Calanoid copepods	103	7.6
		Chaetognath	90.5	6.7
		Lucifer spp.	80.2	5.9
	B141	Ostracod	217	36.0
		Centropages spp.	63.3	10.5
		Chaetognath	57.9	9.6
		Lucifer spp.	54.1	9.0
		Calanoid copepods	35.8	5.9
	B151	Calanoid copepods	37.9	23.5
		Eucalanus spp.	32.8	20.3
		Chaetognath	13.9	8.6
		Foraminifera	12.9	8.0
		Oithona spp.	11.5	7.1
	B145	Calanoid copepods	33.6	23.5
		Eucalanus spp.	24.3	17.0
		Chaetognath	14.0	9.8
		Temora spp.	9.63	6.7
		Foraminifera	7.00	4.9

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2007	**B119**	Siphonophore	50.5	14.3
		Pteropod conical	42.7	12.1
		Crustacean larvae	27.5	7.8
		Ostracod	23.8	6.8
		Echinoderm larvae	23.8	6.8
	B111	Cladoceran	806	65.6
		Pteropod conical	200	16.3
		Crab zoea	45.6	3.7
		Larvacean	44.2	3.6
		Temora spp.	23.5	1.9
	B141	Salp	46.7	17.3
		Siphonophore	33.3	12.3
		Doliolid	32.9	12.2
		Cladoceran	28.0	10.4
		Chaetognath	21.2	7.8
	B138	*Temora* spp.	419	46.5
		Bivalve	266	29.5
		Echinoderm larvae	38.6	4.3
		Pteropod *Limacina* spp.	30.8	3.4
		Crab zoea	28.5	3.2
	B155	Ostracod	231	44.2
		Chaetognath	39.7	7.6
		Protist	37.2	7.1
		Salp	33.9	6.5
		Siphonophore	17.3	3.3
	B134	Ostracod	231	43.4
		Oithona spp.	38.0	7.1
		Foraminifera	35.8	6.7
		Calanoid copepods	30.4	5.7
		Chaetognath	17.8	3.3
	B115	Larvacean	70.0	19.7
		Calanoid copepods	63.1	17.7
		Temora spp.	32.4	9.1
		Cladoceran	29.0	8.2
		Crustacean larvae	29.0	8.2

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2007	**B145**	Ostracod	34.7	21.6
		Calanoid copepods	28.4	17.7
		Oithona spp.	15.3	9.5
		Chaetognath	14.6	9.1
		Foraminifera	9.85	6.1
	B137	*Temora* spp.	334	41.2
		Chaetognath	80.9	10.0
		Calanoid copepods	64	7.9
		Crustacean larvae	50.7	6.2
		Centropages spp.	45.3	5.6
	B142	Ostracod	118	29.4
		Oithona spp.	81.3	20.2
		Chaetognath	35.4	8.8
		Calanoid copepods	34.5	8.6
		Eucalanus spp.	18.6	4.6
	B154	Ostracod	254	54.0
		Calanoid copepods	45.4	9.7
		Oithona spp.	29.6	6.3
		Chaetognath	29.1	6.2
		Foraminifera	12.4	2.6
March 2008	**B141**	Ostracod	720	27.6
		Foraminifera	343	13.2
		Calanoid copepods	288	11.0
		Centropages spp.	230	8.8
		Chaetognath	165	6.3
	B115	Calanoid copepods	336	49.1
		Pteropod lima	167	24.4
		Chaetognath	64.0	9.4
		Centropages spp.	55.9	8.2
		Larvacean	15.2	2.2
	B154	Calanoid copepods	188	26.3
		Ostracod	91.1	12.7
		Eucalanus spp.	68.0	9.5
		Larvacean	65.1	9.1
		Chaetognath	52.1	7.3

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
March 2008	**B111**	Calanoid copepods	80.3	35.1
		Corycaeus spp.	64.0	28.0
		Chaetognath	23.5	10.3
		Centropages spp.	12.4	5.4
		Ostracod	6.53	2.9
	B119	Ostracod	152	26.6
		Calanoid copepods	143	25.0
		Chaetognath	63.4	11.1
		Corycaeus spp.	36.2	6.3
		Centropages spp.	30.6	5.4
	B134	Ostracod	139	29.9
		Calanoid copepods	71.1	15.3
		Chaetognath	48.8	10.5
		Oithona spp.	29.3	6.3
		Crustacean larvae	27.1	5.8
	B145	Calanoid copepods	94.0	50.0
		Chaetognath	16.3	8.7
		Eucalanus spp.	11.3	6.0
		Oithona spp.	9.74	5.2
		Ostracod	6.85	3.6
	B151	Calanoid copepods	37.1	30.2
		Chaetognath	18.1	14.7
		Foraminifera	14.0	11.4
		Oncaea spp.	6.55	5.3
		Oithona spp.	6.12	5.0
	B137	Ostracod	196	42.5
		Chaetognath	78.3	17.0
		Calanoid copepods	42.9	9.3
		Oithona spp.	30.3	6.6
		Eucalanus spp.	24.4	5.3
September 2008	**B134**	Ostracod	292	52.7
		Chaetognath	49.5	8.9
		Calanoid copepods	31.7	5.7
		Eggs	23.8	4.3
		Oithona spp.	23.3	4.2

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2008	**B119**	*Temora* spp.	35.2	18.2
		Ostracod	22.2	11.5
		Centropages spp.	20.2	10.4
		Pteropod *Limacina* spp.	14.5	7.5
		Chaetognath	14.0	7.2
	B115	*Temora* spp.	637	43.7
		Crustacean larvae	186	12.7
		Crab zoea	118	8.1
		Lucifer spp.	84.3	5.8
		Chaetognath	80.0	5.5
	B141	Chaetognath	89.7	19.0
		Ostracod	79.8	16.9
		Larvacean	77.2	16.4
		Temora spp.	58.7	12.4
		Calanoid copepods	23.8	5.0
	B154	Ostracod	69.7	27.8
		Calanoid copepods	44.7	17.8
		Chaetognath	26.3	10.5
		Foraminifera	16.3	6.5
		Oithona spp.	14.8	5.9
March 2009	**B115**	Calanoid copepods	173	39.3
		Corycaeus spp.	51.2	11.6
		Chaetognath	48.0	10.9
		Bivalve	48.0	10.9
		Centropages spp.	33.3	7.6
	B138	Ostracod	101	20.1
		Calanoid copepods	93.1	18.5
		Corycaeus spp.	77.6	15.4
		Chaetognath	65.9	13.1
		Siphonophore	33.0	6.6
	B137	Ostracod	351	37.9
		Calanoid copepods	112	12.1
		Chaetognath	105	11.3
		Eucalanus spp.	55.5	6.0
		Doliolid	55.5	6.0

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

March 2009	**B141**	Calanoid copepods	187	24.2
		Ostracod	75.5	9.8
		Corycaeus spp.	68.9	8.9
		Larvacean	59.1	7.6
		Chaetognath	44.3	5.7
	B155	Calanoid copepods	74.2	22.2
		Chaetognath	38.1	11.4
		Larvacean	34.0	10.2
		Eucalanus spp.	26.6	8.0
		Oithona spp.	21.1	6.3
	B154	Calanoid copepods	246	35.3
		Chaetognath	86.2	12.4
		Pteropod conical	52.2	7.5
		Foraminfera	52.2	7.5
		Noctiluca	32.8	4.7
	B134	Calanoid copepods	237	30.9
		Oithona spp.	87.1	11.4
		Chaetognath	75.3	9.8
		Corycaeus spp.	45.2	5.9
		Ostracod	40.9	5.3
	B151	Calanoid copepods	89.1	33.0
		Oncaea spp.	24.3	9.0
		Oithona spp.	21.4	7.9
		Chaetognath	15.7	5.8
		Temora spp.	14.3	5.3
	B119	Ostracod	119	23.2
		Oithona spp.	95.7	18.7
		Calanoid copepods	82.5	16.1
		Chaetognath	59.8	11.7
		Pteropod conical	23.3	4.6
	B111	Pteropod *Limacina* spp.	283	38.0
		Corycaeus spp.	158	21.2
		Centropages spp.	51.3	6.9
		Chaetognath	48.0	6.5
		Calanoid copepods	42.4	5.7

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2009	**B154**	Ostracod	252	44.3
		Calanoid copepods	111	19.5
		Oithona spp.	53.9	9.5
		Chaetognath	35.5	6.2
		Pteropod *Limacina* spp.	20.8	3.7
	B155	Ostracod	329	31.3
		Echinoderm larvae	201	19.2
		Calanoid copepods	85.0	8.1
		Oithona spp.	79.0	7.5
		Oncaea spp.	60.0	5.7
	B141	Ostracod	260	29.4
		Temora spp.	120	13.6
		Chaetognath	73.0	8.3
		Corycaeus spp.	51.2	5.8
		Calanoid copepods	48.6	5.5
	B142	Ostracod	224	31.5
		Calanoid copepods	93.4	13.1
		Oithona spp.	86.0	12.1
		Cladoceran	73.4	10.3
		Chaetognath	63.4	8.9
	B137	*Temora* spp.	250	39.7
		Chaetognath	64.8	10.3
		Salp	53.7	8.5
		Centropages spp.	47.4	7.5
		Calanoid copepods	41.1	6.5
	B115	*Centropages* spp.	131	19.4
		Calanoid copepods	108	16.0
		Crustacean larvae	70.0	10.4
		Chaetognath	62.0	9.2
		Eucalanus spp.	61.0	9.0
	B138	Chaetognath	64.0	12.3
		Crustacean larvae	60.2	11.6
		Calanoid copepods	51.4	9.9
		Pteropod conical	42.5	8.2
		Echinoderm larvae	34.5	6.6

Table B2 (cont.) Abundance of top five zooplankton categories for each SEAMAP sample on the West Florida Shelf

Date	Station	Zooplankton	Abundance (# of individuals/m^3)	% of total abundance
September 2009	**B134**	Ostracod	172	40.9
		Calanoid copepods	54.6	13.0
		Oithona spp.	30.4	7.2
		Chaetognath	23.5	5.6
		Temora spp.	21.3	5.1
	B119	Ostracod	330	52.3
		Oithona spp.	61.3	9.7
		Temora spp.	35.2	5.6
		Chaetognath	33.6	5.3
		Calanoid copepods	22.4	3.6
	B111	Chaetognath	49.5	20.5
		Temora spp.	22.8	9.5
		Centropages spp.	20.6	8.5
		Cladoceran	20.0	8.3
		Siphonophore	15.7	6.5
	B145	Calanoid copepods	36.7	15.2
		Oithona spp.	16.3	11.8
		Foraminifera	11.7	8.5
		Chaetognath	9.49	6.9
		Corycaeus spp.	7.54	5.5