Nags Head Beach 2011 Nourishment Project

Biological Monitoring Post-Year 2 and Final Report

Prepared for:

Town of Nags Head, Dare County, NC

Prepared by:

CZR Incorporated
Wilmington, NC

and

Coastal Science & Engineering, Inc.
Columbia, SC

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Cover Photos: NHB Station 6 view to the north pre-spring 2010 on top and NHB Station 6 view to the north summer post-Y2 2013 on bottom.

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Nags Head Beach 2011 Nourishment Project

Post-Year 2 and Final Report

POST-YEAR 2 AND FINAL REPORT EXECUTIVE SUMMARY

As required by North Carolina Department of Environment and Natural Resources (NCDENR)/North Carolina Department of Coastal Management (NCDCM) Permit 45-10 Beach Nourishment Town of Nags Head, four pre-nourishment and eight post-nourishment (four in post-Year 1 [post-Y1] and four in post-Year 2 [post-Y2]) seasonal benthic and sediment sampling events occurred in the following areas shown on Figure 1:

- Nourished beach – 10 stations at Nags Head
- Control beach- five stations at Kitty Hawk and five stations at Cape Hatteras National Seashore
- Offshore borrow- 10 stations in the permitted borrow areas "2" and "3" within US Army Corps of Engineers (USACE) area S1, and
- Offshore control -10 separate stations in the S1 polygon outside of the designated borrow areas

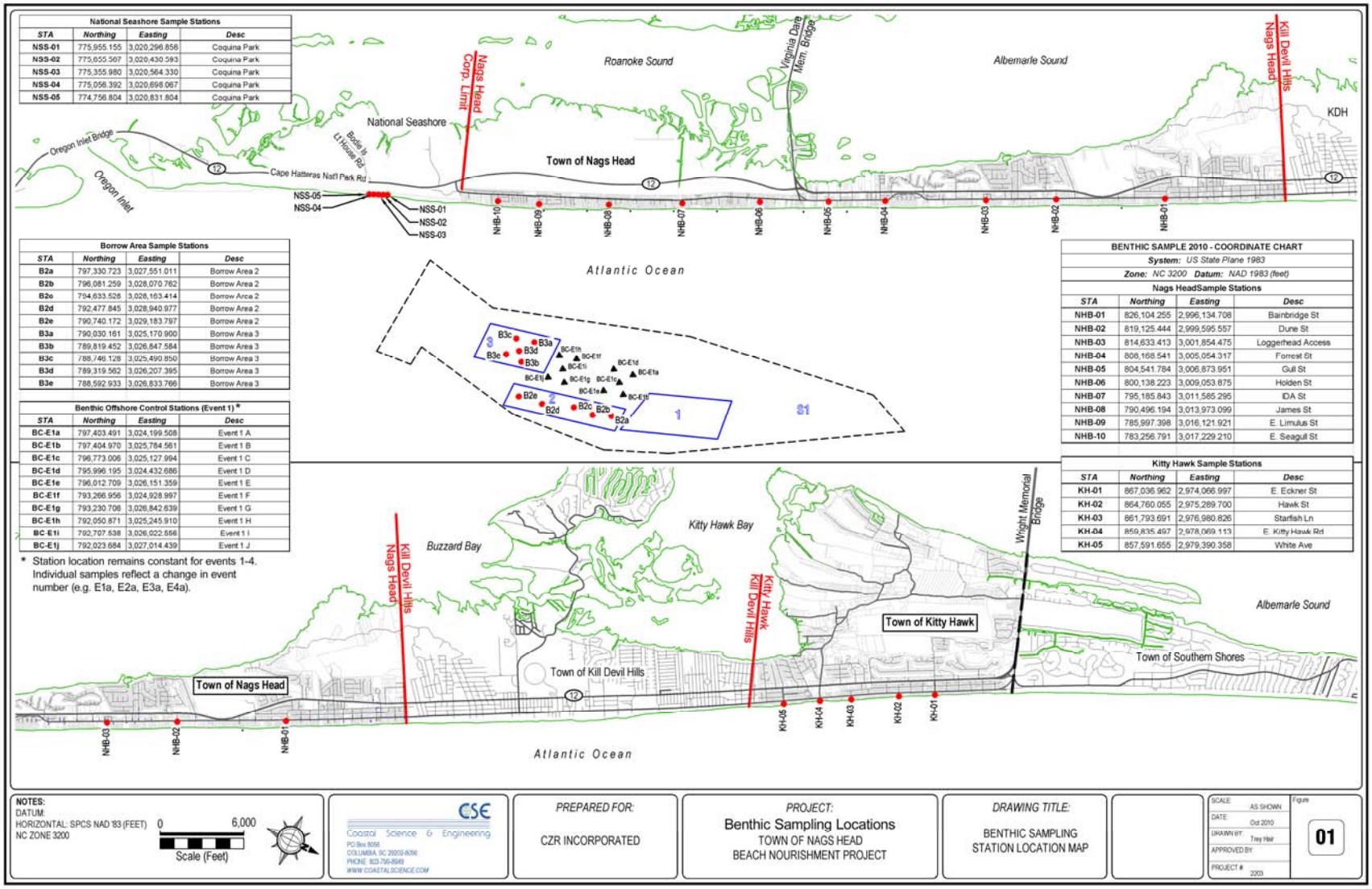
The Nags Head nourished beach (NHB) spans approximately 10 miles. The Kitty Hawk control beach (KH) is located between Kill Devil Hills to the south and Southern Shores to the north and spans approximately 2 miles. The National Seashore control beach (NSS) is located on Bodie Island directly adjacent to the ramp at the Coquina Beach recreation area. The middle NSS sample station is directly adjacent to the Coquina Beach ramp and NSS sampling stations span 0.25-mile.

Each seasonal beach sampling event occurred over a two-day period, during a two-hour window either side of low tide, for a maximum of four hours of possible sample collection. Each beach sample station consisted of an upper-beach swash Zone A and a lower-beach subtidal Zone B. Offshore sample collection was completed in one day with one or two divers deployed from a boat. The weather-dependent nature of safe survey conditions did not always allow for offshore and beach collections to co-occur and the lunar progression of tides did not always allow the eight post-nourishment collection events to occur during the same calendar week as the pre-nourishment events (Table 1).

Table 1. Dates of the 2011 Nags Head Beach Nourishment Project sample events (four pre-nourishment, four post-Y1 (Y1), and four post-Y2 (Y2) seasonal events, E1-E12).

	Spring	Summer	Fall	Winter
Pre-nourishment Events 1 - 4	8-9 June 2010 (E1)	19-20 August 2010 (E2)	17-18 November 2010 (E3)	14-15 April 2011 (E4)
Post-Y1 Events 5 - 8	13-14 & 19 June 2012 (E7)	28-30 August 2012 (E8)	15 December 2011 & 21-22 January 2012 (E5)	6-7 March 2012 (E6)
Post-Y2 Events 9 - 12	4-5 & 12 June 2013 (E11)	20-21 & 22 August 2013 (E12)	27 November & 11-12 December 2012 (E9)	9 April & 26-27 March 2013 (E10)

Figure 1. Benthic and sediment sampling stations for beach and offshore locations with north and easting coordinates for Town of Nags Head beach nourishment project.



GROUP ABUNDANCE

The pie charts of Figure 2 – Figure 7 show the percentage of major taxonomic groups in each event by season and location type (offshore control vs offshore borrow and nourished beach vs control beach) and all seasons combined on an annual basis. Figures 4 and 7 show the pie charts rearranged to compare impact areas (nourished beach and offshore borrow) to their designated controls on a seasonal basis.

OFFSHORE ABUNDANCE

Figure 2 depicts seasonal variability across the offshore control stations as well as variability from before nourishment to post-Y2; however, for most seasons and years, Polychaeta was the dominant group, the exceptions being the first two spring events when Mollusca was dominant. Similar to the offshore control stations, the offshore borrow stations showed a large degree of seasonal variability (Figure 3). Among the offshore borrow stations, post-Y2 spring appears to be the most different from its pre-nourishment counterpart among all post-seasons; at least somewhat due to the large number of razor clams found in the pre-nourishment sample which increased the percent of mollusks for that event. Figure 4 shows a large degree of similarity of dominant groups when the offshore borrow events are compared to offshore controls with a few exceptions: winter pre- (control had no Mollusca); spring post-Y1 (borrow had more Mollusca and less Polychaeta), and winter post-Y1 (control had twice the Polychaeta and almost no Mollusca). However, of particular importance, when all seasons are combined on annual basis, by post-Y2, there was very little difference between dominant groups compared to pre-nourishment.

BEACH ABUNDANCE

Figure 5 depicts seasonal variation across the control beach stations, as well as variation in pre-nourishment and post-Y1 and/or post-Y2 between the same seasons. Pre-nourishment, three fourths of summer and fall groups were from Polychaeta, but those were the only similarities among seasons pre-nourishment. The only similarities among post-Y1 events was that in summer and fall Decapoda were the dominant group at approximately 50 percent; among post-Y2 seasons, the only similarity was between the spring and summer when just over one third of the groups were Amphipoda and just under one fourth were Decapoda. On a seasonal basis across all years for the control beach, post-Y1 and -Y2 fall were similar in Decapoda percentages and pre-winter and post-Y1 winter were similar in Amphipoda percentages. After all seasons are combined, the post-Y2 distribution of species is more evenly distributed than either pre-nourishment or post-Y1. Figure 6 shows seasonal variability across the stations, as well as variability between pre-nourishment, post-Y1, and post-Y2. Slight similarity is shown between summer in both post-years for Decapoda and Amphipoda, but as for the control beach, there is little apparent similarity between either post year for any season compared to pre-nourishment. Figure 7 shows less similarity between NHB and the control beach for the pre-nourishment year than that shown in the offshore groups with two exceptions: NHB had more Decapoda and less Amphipoda in winter (although only slightly so) and spring post-Y1 where both locations were very similar. When all seasons are combined on an annual basis, the two location types (NHB and control) were notably dissimilar pre-nourishment; in fact, only spring post-Y1 was similar when NHB is compared to control beach.

Figure 2. Pie charts of pre-nourishment and post-Y1 and -Y2 abundance by season, group, and percent in offshore control stations.

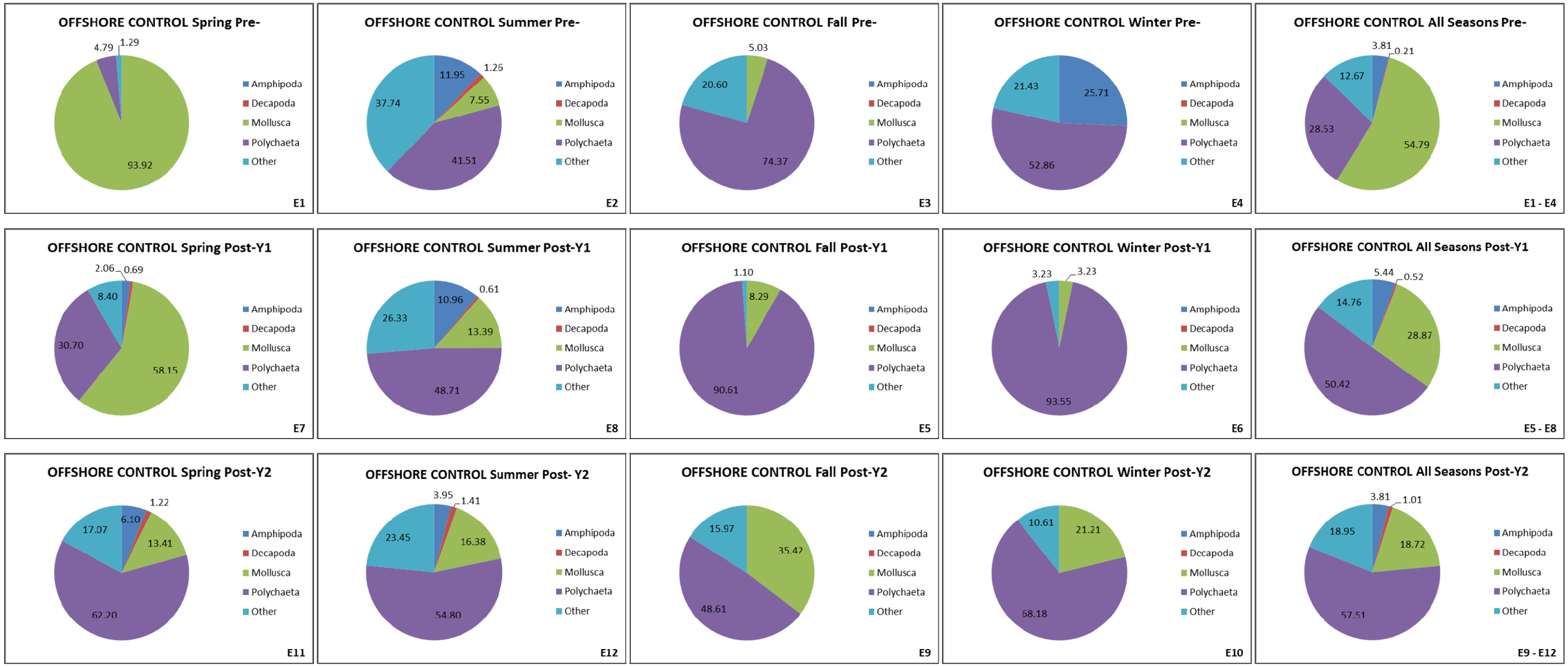


Figure 3. Pie charts of pre-nourishment and post-Y1 and -Y2 abundance by season, group, and percent in offshore borrow stations

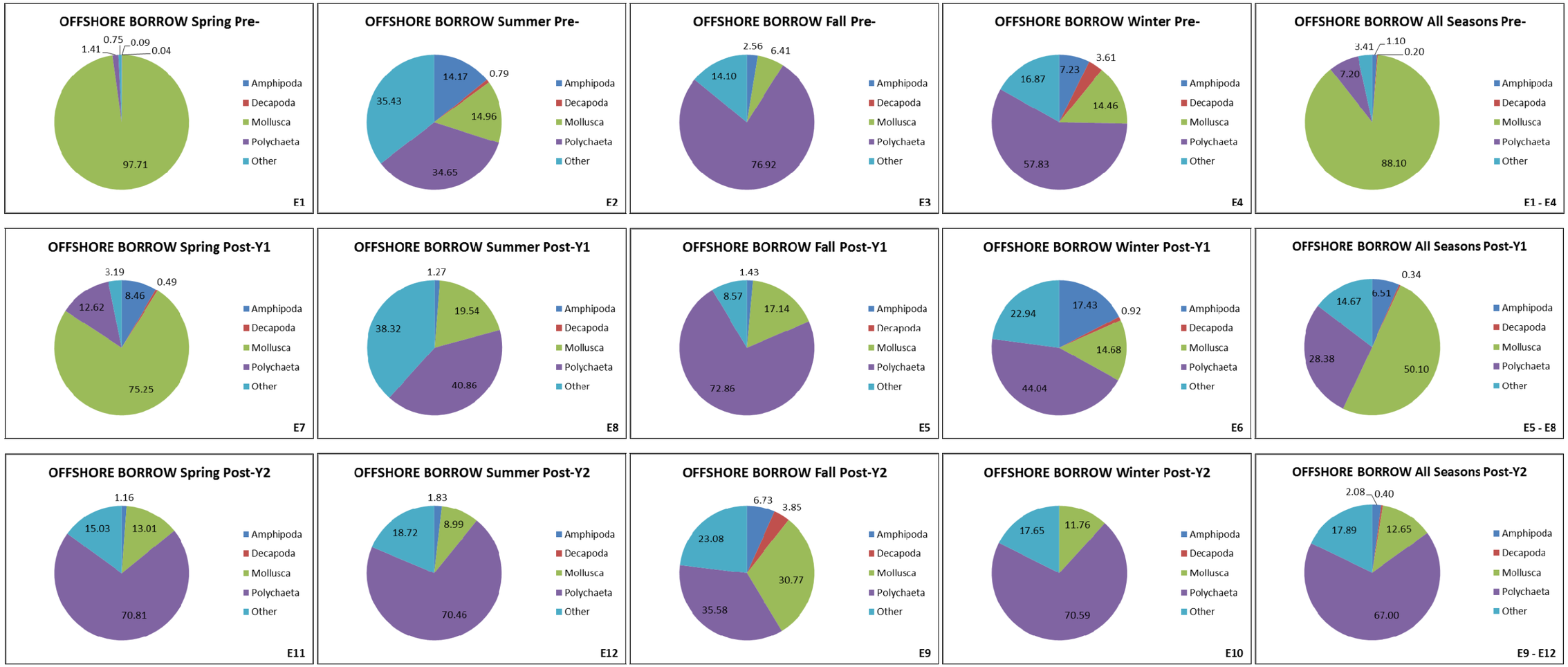


Figure 4. Pie charts of offshore borrow percent abundance by group compared to offshore control percent abundance by group on seasonal event basis and on all seasons combined annual basis.

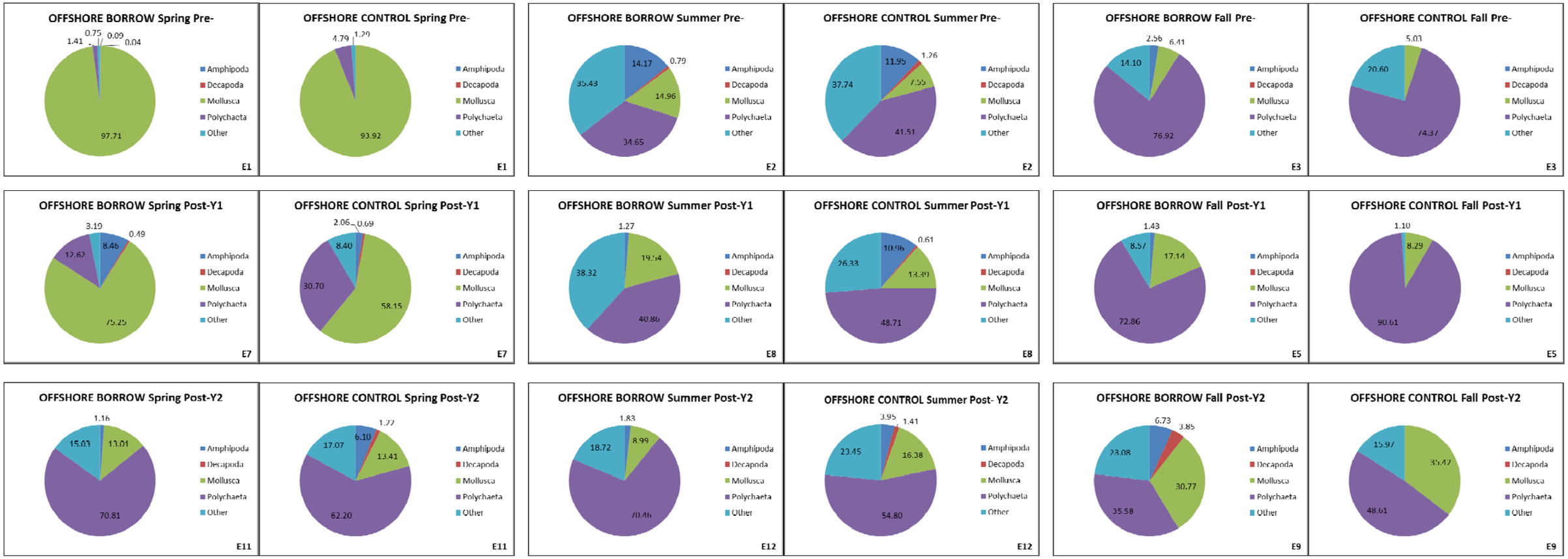
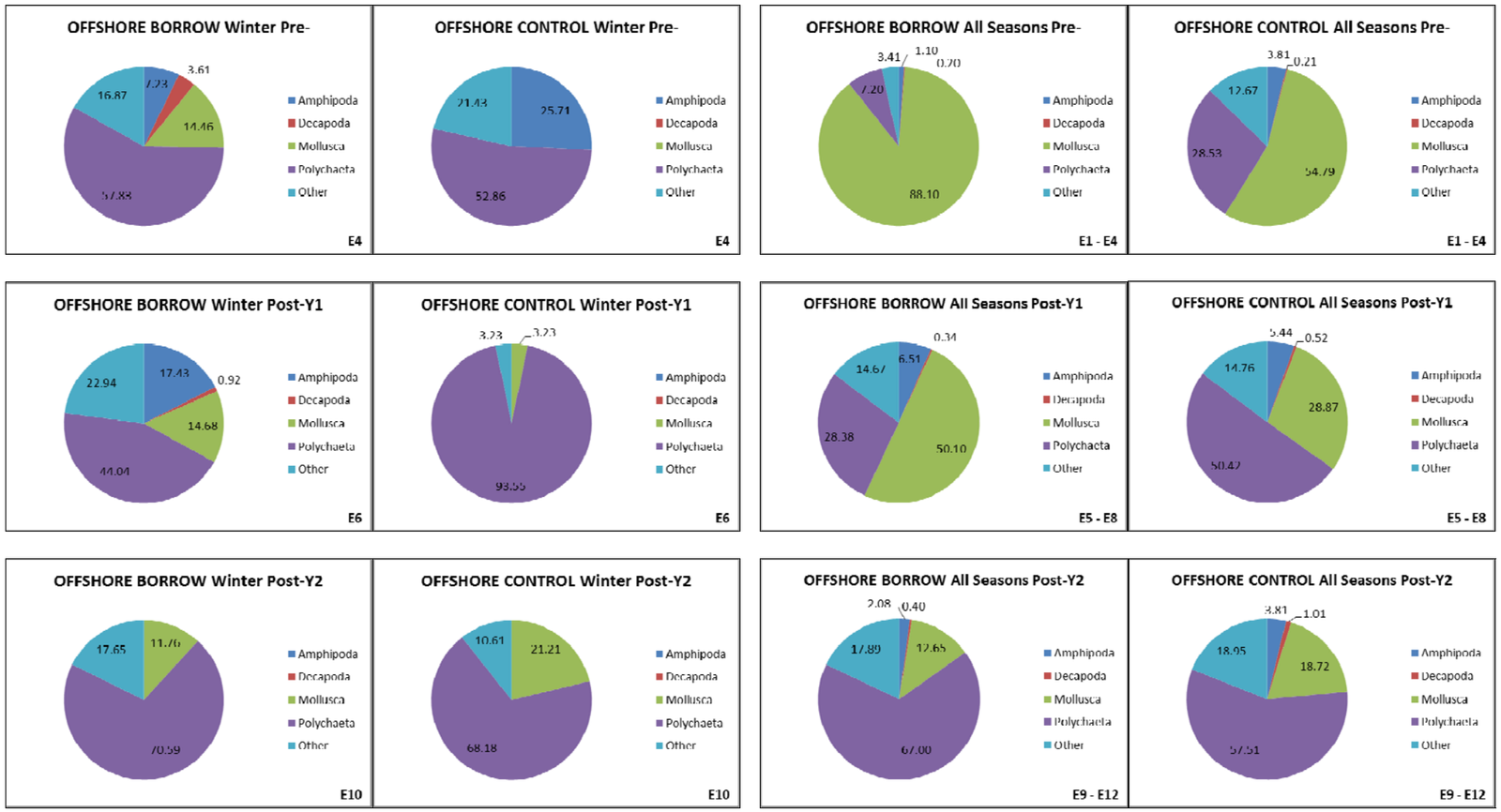



Figure 4. (continued)