

Bryozoans as an estuarine rafting habitat for mobile benthic invertebrates and young finfish in the north-central Gulf of Mexico

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INTRODUCTION

- Bryozoans are sessile suspension-feeders, with some species being considered ephemeral habitats once broken free from the benthos
- Ephemeral habitats provide organisms within a landscape additional foraging sites and predator refuge indicating bryozoan mats could be a valuable, temporary habitat type for small, motile species or early life stages (Rey and Stoner 1984)
- There are relatively few studies describing fauna associated with ephemeral habitats in estuarine systems and especially so for bryozoans (Pederson and Peterson, 2002; Wood et al. 2012)
- Our study aims to determine if the presence of bryozoans in nearshore waters of the north-central GOM will provide additional temporally- and spatially-ephemeral habitat for early life-stages of ecologically, commercially, or recreationally important invertebrates and fishes

MATERIALS AND METHODS

- 7.5 m seine and 4.9 m flat otter trawl was used at fixed and random sites from 2012–2017 to collect samples (Fig. 1)
- Samples with bryozoans generally occurred Sep-Nov (Fig. 2); all analyses focused on data during those months
- Bryozoan species were identified; measured volumetrically to nearest 0.1 L; and categorized into four groups (0, 0.1-1.0, 1.1-10.0, and > 10.0 L).
- All other organisms were identified to species level and we calculated species richness (SR) and Shannon Diversity (SD) for each sample
- Samples were categorized as bryozoans present/absent and compared by gear, month, and habitat type for trawl samples (in channel or out channel)
- We used Kruskal-Wallis tests and pairwise Mann Whitney U-tests determine differences in SR and SD between groups

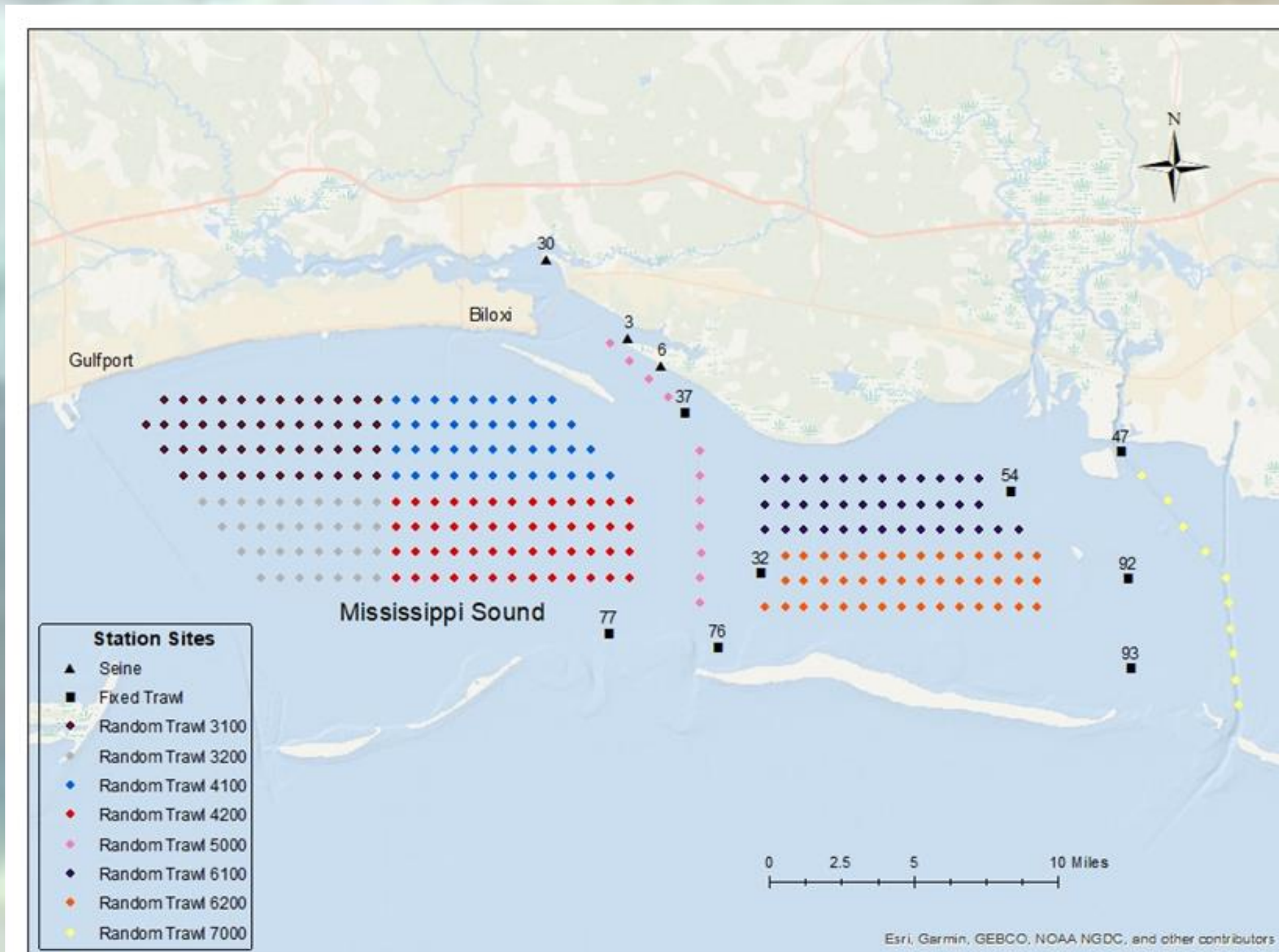


Fig. 1 Fixed and random sampling stations along the Mississippi Gulf Coast. Fixed stations are black and random stations are colored.

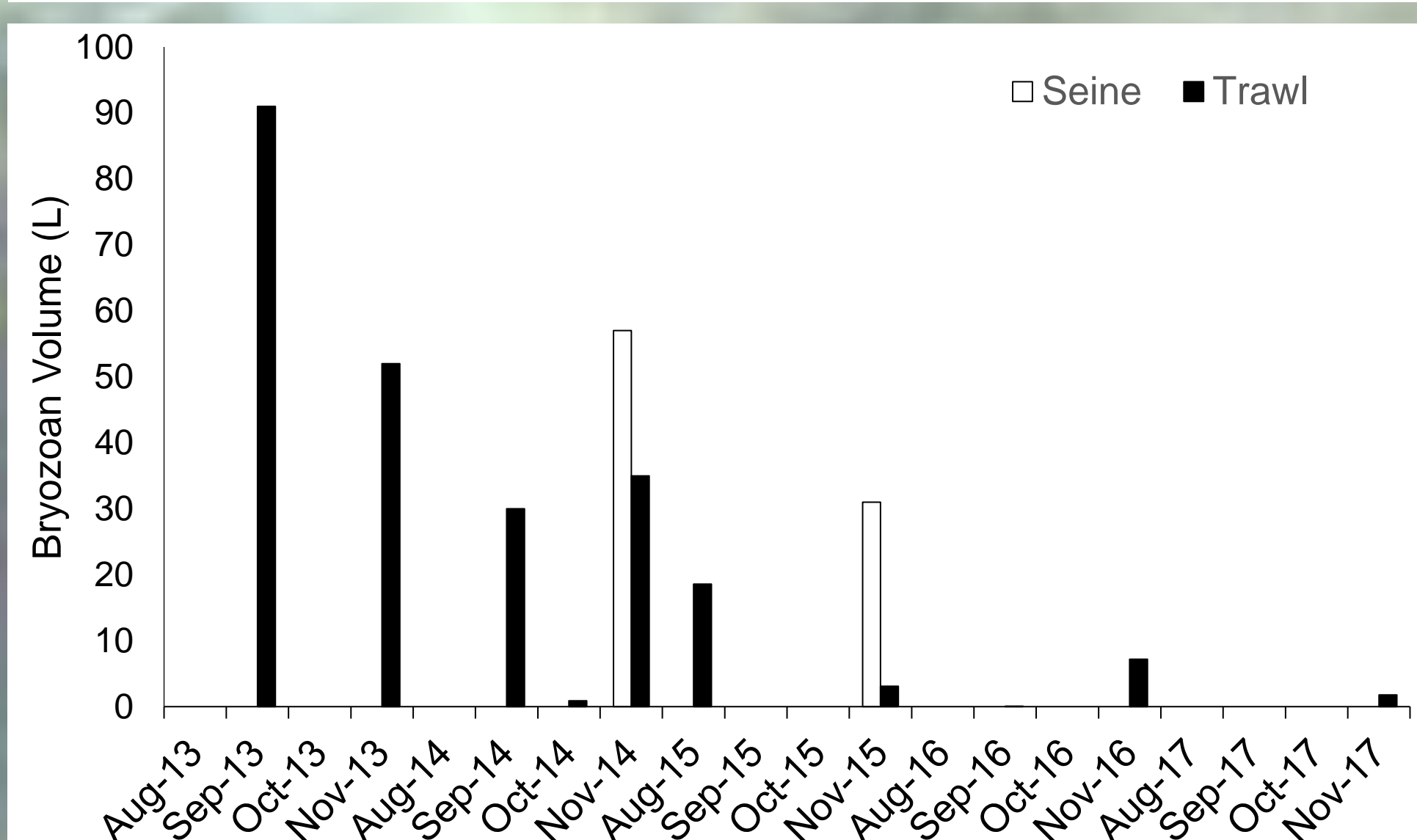


Fig. 2 Monthly pooled bryozoan volumes (L) for seine and trawl sites from August 2013 through November 2017 during study period.

RESULTS

- Amanthia verticillata* was the only bryozoan collected in seines whereas *A. verticillata* dominated all trawl collections but also with lesser amounts of *A. convoluta* and *Bugula neritina*
- Overall we collected: 71 invertebrate taxa in seines and 86 species in trawls, with 39 taxa in common, and 87 vertebrate taxa in seines overall and 74 species in trawls, with 54 taxa in common

Bryozoan volume-diversity relationships

- Species richness for the pooled trawl data was significantly different among bryozoan volumes in November when most bryozoans were collected; SR at bryozoan volume 1 was significantly greater than when bryozoan were not collected (volume = 0) (Fig. 3A)
- Species richness for the pooled seine data was significantly different among bryozoan volumes in November; collections from bryozoan volume 2 were significantly greater than without bryozoan and volume 3 collections were significantly greater than without bryozoan (Fig. 3B)

Pooled-level patterns

- There was a gradual decrease in bryozoan volume during the study period with a peak occurring in September 2013 in trawls and November 2014 in seines, with subsequent reductions in volume thereafter over the course of the study period (Fig. 2)
- Species richness for pooled trawl data was only significantly different among fall months when bryozoans were not collected with collections in November being lower than September and October (Fig. 4A)
- Species diversity between fall collections for pooled trawl data with and without bryozoan's present were not significantly different (Fig. 4B)
- Species richness for pooled seine data was not significantly different among fall months when bryozoans were not collected (Fig. 5A), but SD for pooled seine data was significantly different among fall months when bryozoans were not collected with collections in September being lower than October and November (Fig. 5B)
- Collections for seine data with bryozoans versus without was only significantly different in November for SR and SD, since bryozoans were not collected in September or October (Figs. 5A and B)
- Species richness between collections with bryozoans versus without was significantly different for pooled trawl data from in channel habitat, but not for out channel habitat (Fig. 6A)
- Shannon diversity was also significantly different between collections with bryozoans and without for pooled trawl from in channel habitat, but not out channel habitat (Fig. 6B)

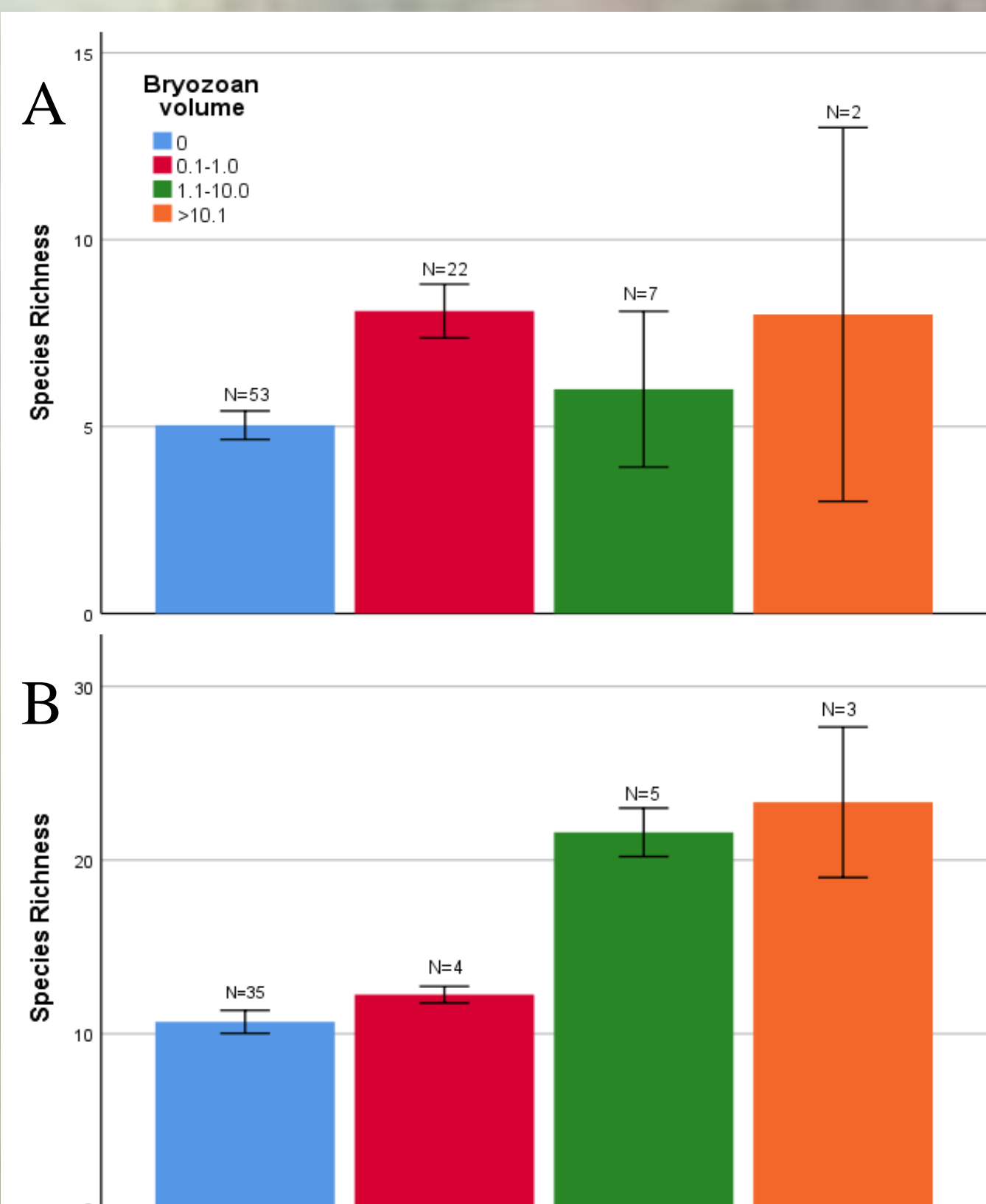


Fig. 3 Species richness by bryozoan volume (L) for pooled trawl (A, 2013-2017) and seine (B, 2012-2017) for November only. N= number of samples.

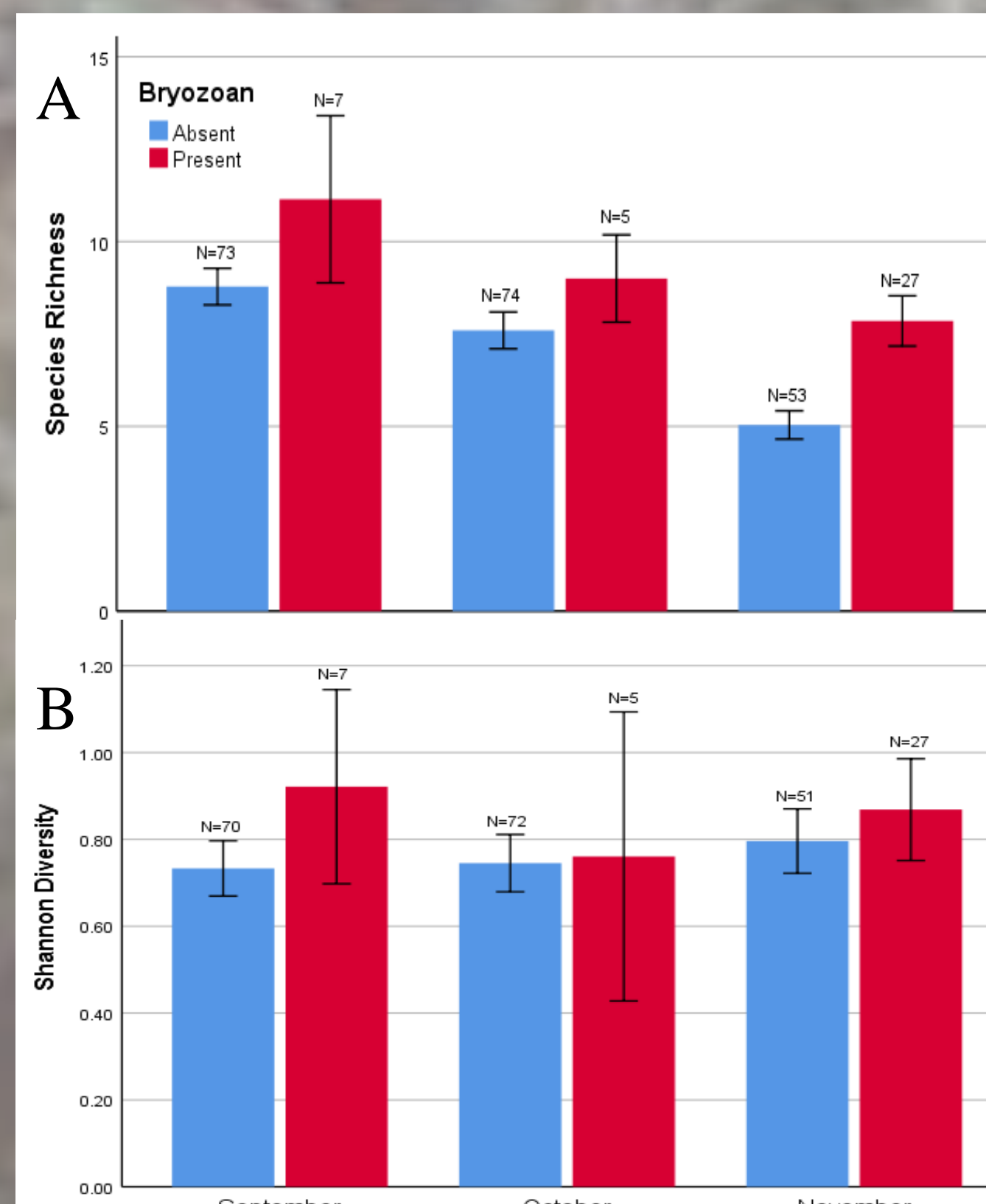


Fig. 4 A Species richness and B species diversity for pooled trawl data by fall months from 2013-2017. N= number of samples.

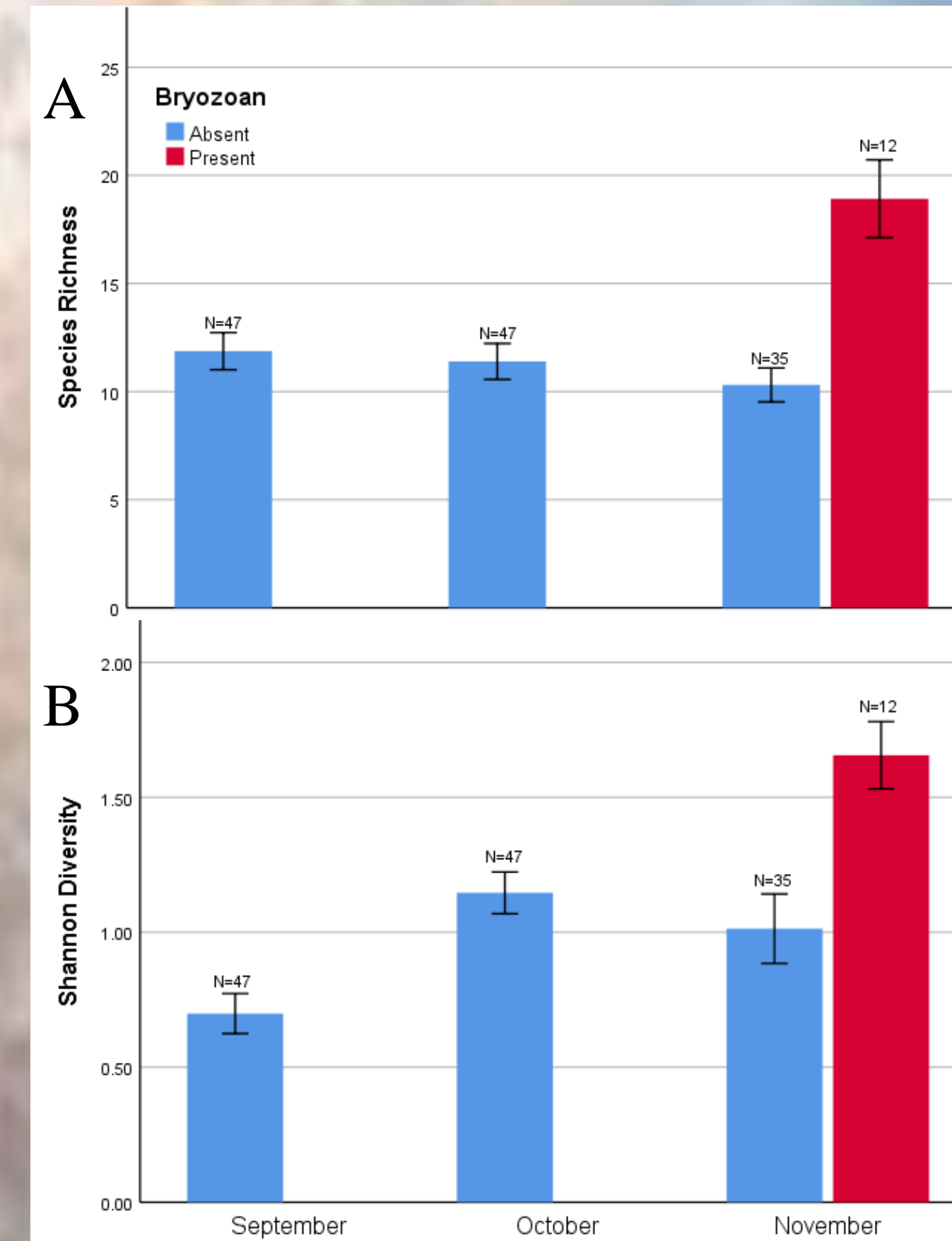


Fig. 5 A Species richness and B species diversity for pooled seine data by fall months from 2013-2017. N= number of samples.

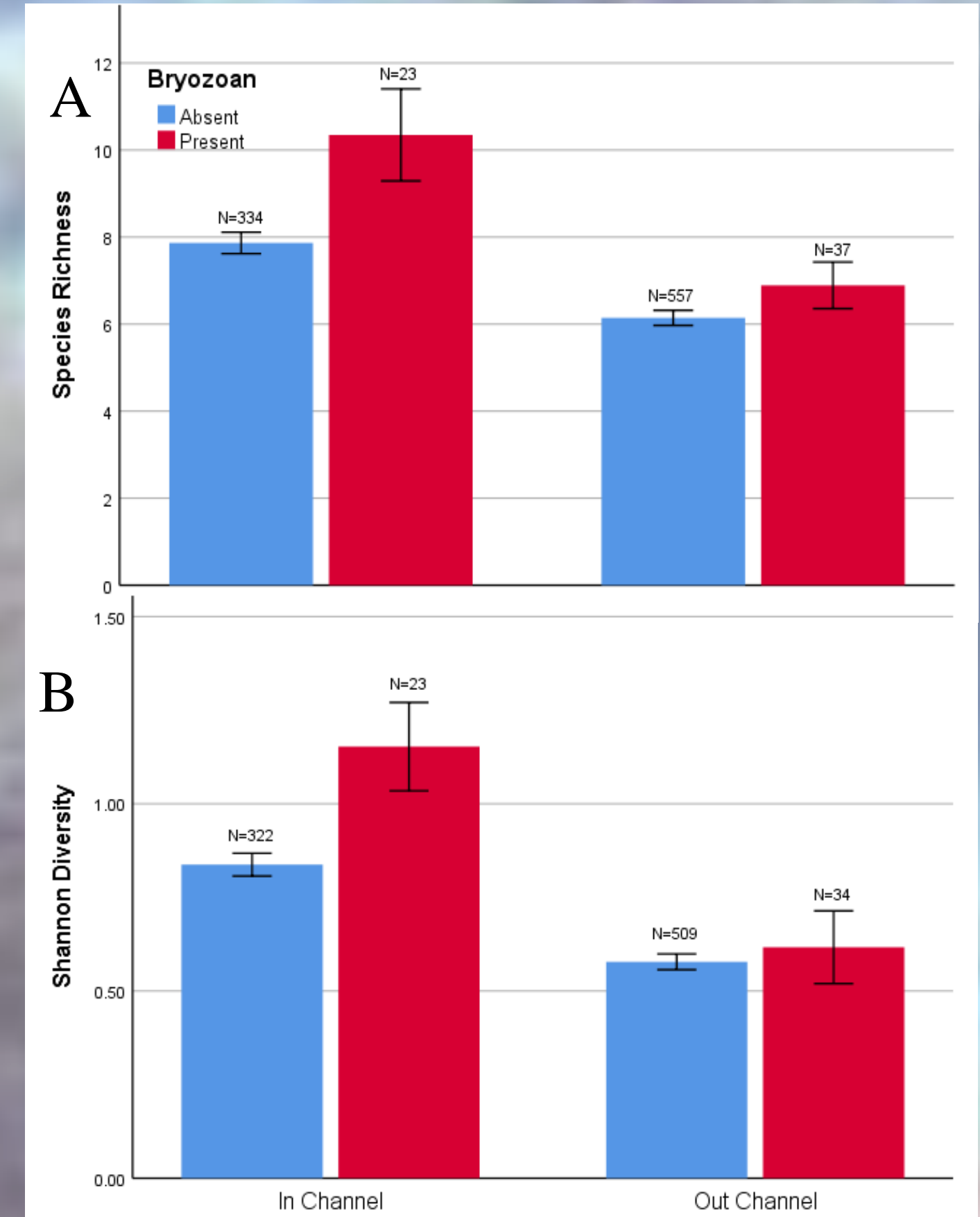


Fig. 6 A Species richness and B species diversity for pooled trawl data in and out of channels from 2013-2017. N= number of samples.

SUMMARY

- We documented various life stages of 158 invertebrate and 160 fish species from our collections, with 93 taxa in common among gear types
- Presence of bryozoan mats varied temporally and spatially across our spatial scale and the sampling period
- SR was significantly higher in trawl and seine samples during peak bryozoan occurrence
- SR and SD were, on average, higher when bryozoans were present than absent with 50% of all possible SR and SD comparisons being significantly higher
- For trawl samples, SR and SD were always higher 'in channel' compared to 'out channel' habitat sites, especially in November
- Ship channels may represent a transport mechanism for drifting bryozoans with their strong tidal currents and consistent SE winds into coastal habitats
- These ephemeral habitats are an ecologically significant in the fall and winter -increasing the organic content, biomass, and structural complexity of the sub- and supra-littoral estuarine zones
- Our results indicate bryozoan mats likely serve as a dispersal mechanism, refugia, and likely a nursery habitat function

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