# Relationships Between Habitat and Fish Assemblages on Louisiana-Texas Shelf-edge Banks

# Relaciones entre el Hábitat y los Ensambles de Peces en los Bancos Fronterizos Louisiana-Texas

# Relations entre L'habitat et les Assemblages de Poissons sur les Berges de Bord de Louisiane et du Texas

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**EXTENDED ABSTRACT**

The banks off the Louisiana-Texas shelf in the northwestern Gulf of Mexico (GOM) provide a diverse collection of habitat zones, each with characteristic fish assemblages. These habitat-assemblage relationships have been shown to be consistent across several banks, but related to additional factors such as depth, bank size, and substrate complexity. Understanding the habitat drivers and associations of the many recreationally and commercially important fish species that inhabit these banks is critical to management. The GOM has been ranked top five globally in species per area, but also top five in threats to biodiversity, making these areas especially important locations to study (Costello et al. 2010). These banks provide most of the 1-3% hard bottom occurring on the otherwise soft bottom on the shelf, serving as critical habitat (Parker et al. 1983, Schmahl et al. 2008). With five of the six sites included in the preferred alternative for expansion of the Flower Garden Banks National Marine Sanctuary, understanding which species utilize habitats on these banks and what factors drive assemblages will directly inform the likely utility of sanctuary expansion and/or the habitats most in need of additional protection. Species, such as those of grouper and snapper, are of particular interest due to their economic importance and management status.

This study investigates the relationships between fish assemblages and habitat zonation to determine what drives abundance and assemblages using underwater video. Video data were recorded at six shelf-edge banks (Rankin, Bright, McGrail, Sidner, Alderdice, and Jakkula) at varying depth and habitat type from July 2015 to June 2016 using a baited remote underwater video (BRUV) array consisting of two stereo pairs of cameras. Four sites of different depths were chosen at each bank, each survey was sampled, in an attempt to capture the habitat zones which are known to vary by depth. Twenty minutes of video from each stereo pair was reviewed in EventMeasure software to identify fish to the lowest possible taxonomic level and measure abundance (calculated as MaxN, the maximum number of a given species in any single frame) as well as record habitat variables. Data was combined for each site, such that the largest MaxN from either camera pair was used as the MaxN for the sites overall. Relationships between fish species assemblages and habitat zones were explored using hierarchical cluster analysis of square root transformed MaxN in R. Identification was limited to genus-level for this analysis.

Seventy camera drops were analyzed at depths ranging from 50 to 157 meters, capturing four habitat zones. Forty-three genera were identified and a total of 2331 fish counted. The most abundant genera were *Choranthias* (n = 419), *Paranthias* (n = 375), *Chromis* (n = 332), and *Seriola* (n = 222), while *Serranus* species (n = 80) were consistently seen along with notable species such as marbled grouper, *Dermatolepis inermis*. Hierarchical cluster analysis (Figure 1) did not show the clear delineations based on habitat zone that were expected and previously seen in Langland (2015).

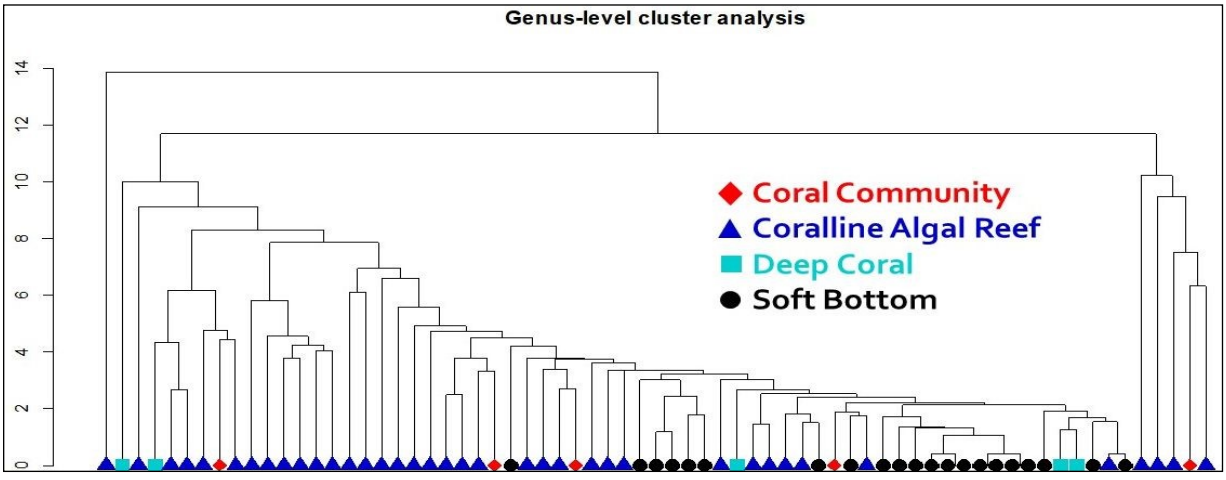


**Figure 1.** Genus-level hierarchical cluster dendrogram.

This is part due to the large proportion of samples on coralline algal reef habitat, which was shown by Langland (2015) to cluster less distinctly than other habitat zones. This abundant data on the coralline algal reef may be helpful to further explore this habitat and determine if and how its community may differentiate from other zones. The lack of clear distinctions based on habitat zone emphasizes the importance of future work incorporating additional criteria including habitat characteristics such as depth, relief, and temperature. Further analysis of the data will include similarity percentages analysis (**SIMPER**) to determine which genera cause divergence between groups, as well as using additional factors to try to model fish assemblage associations.

KEYWORDS: Gulf of Mexico, habitat, fish assemblage, cluster analysis, shelf-edge banks

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