



A comparison of nekton abundance, distribution and community structure in four adjacent west central Florida estuaries

Ryan F. Jones, Eric Weather, Timothy C. MacDonald, Robert H. McMichael, Jr.

Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, 100 8th Ave SE, St. Petersburg, FL 33701, 727-896-8626

Ryan.Jones@myfwc.com



INTRODUCTION

- The Florida Fish and Wildlife Conservation Commission's Fisheries-Independent Monitoring (FIM) program sampled nekton populations of the Tampa Bay(TB), Sarasota Bay (SB) and Charlotte Harbor (CH) estuaries between June 2009 and April 2011 and Lemon Bay (LB) from June 2009 and April 2010.
- These four estuaries are relatively close in proximity along the west central coast of Florida but differ in geological classification, with TB and CH being drowned river basins and LB and SB lagoonal systems.
- The Sarasota Bay estuary is a lagoonal system that consists of five embayments and is characterized by heavily developed urban shorelines, a relatively small watershed, and shallow water depths with numerous seagrass beds.
- The focus of this study was to 1) assess nekton populations in Sarasota Bay, and 2) compare nekton populations between Tampa Bay, Sarasota Bay, Lemon Bay and Charlotte Harbor.

OBJECTIVES

- Provide a database of fish and selected invertebrate species that inhabit the Sarasota Bay estuary.
- Examine nekton abundance, distribution, and community structure within the Sarasota Bay estuary (intrabay).
- Compare nekton abundance, distribution, and community structure between four adjacent estuaries along Florida's west central coast (interbay).

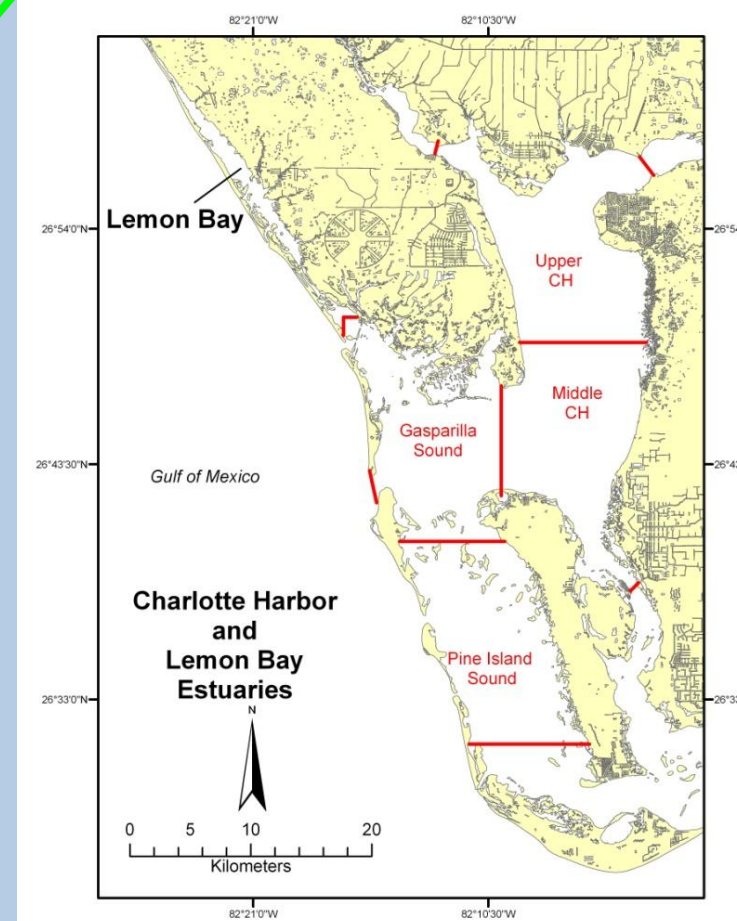
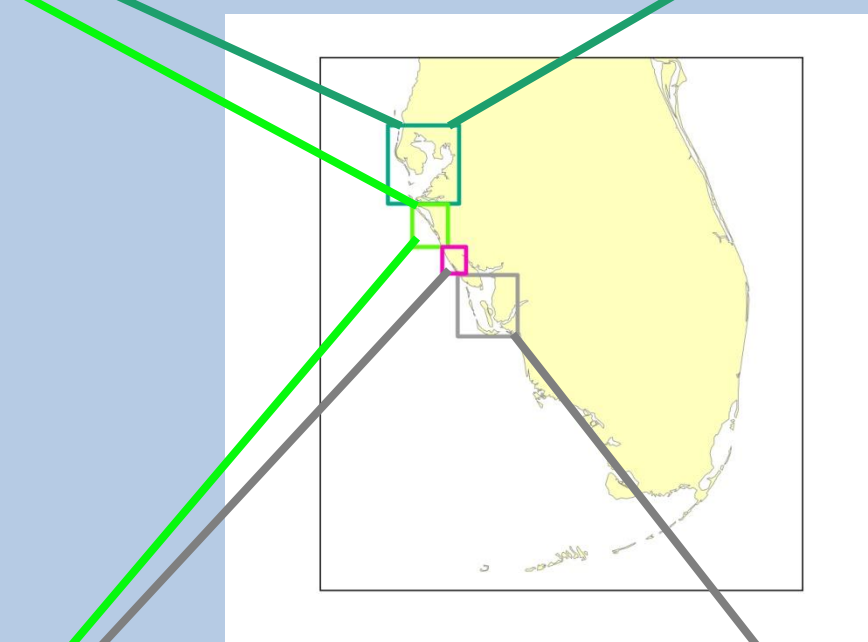
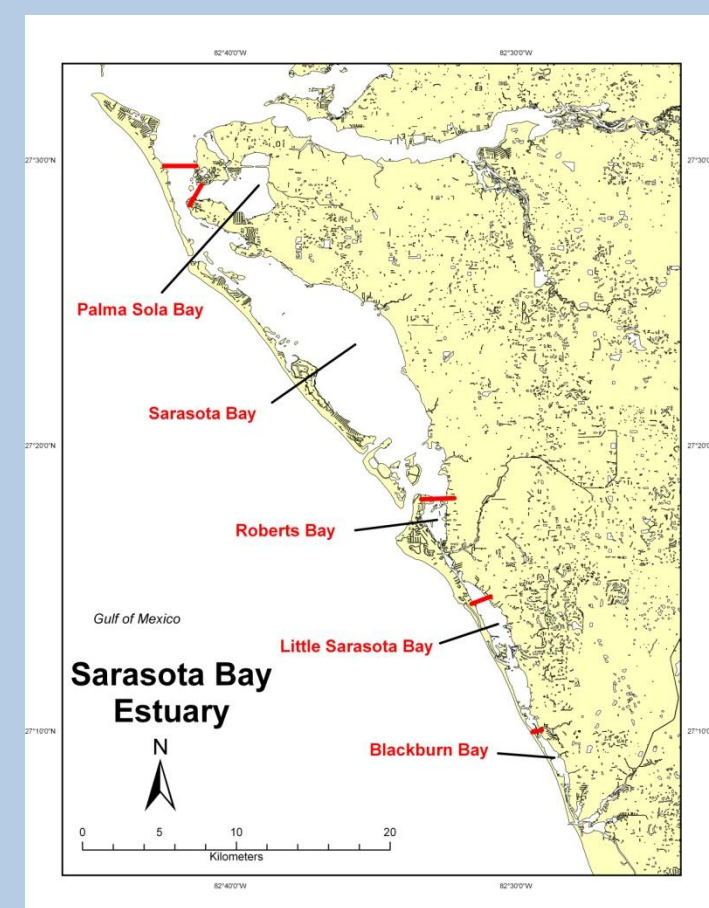
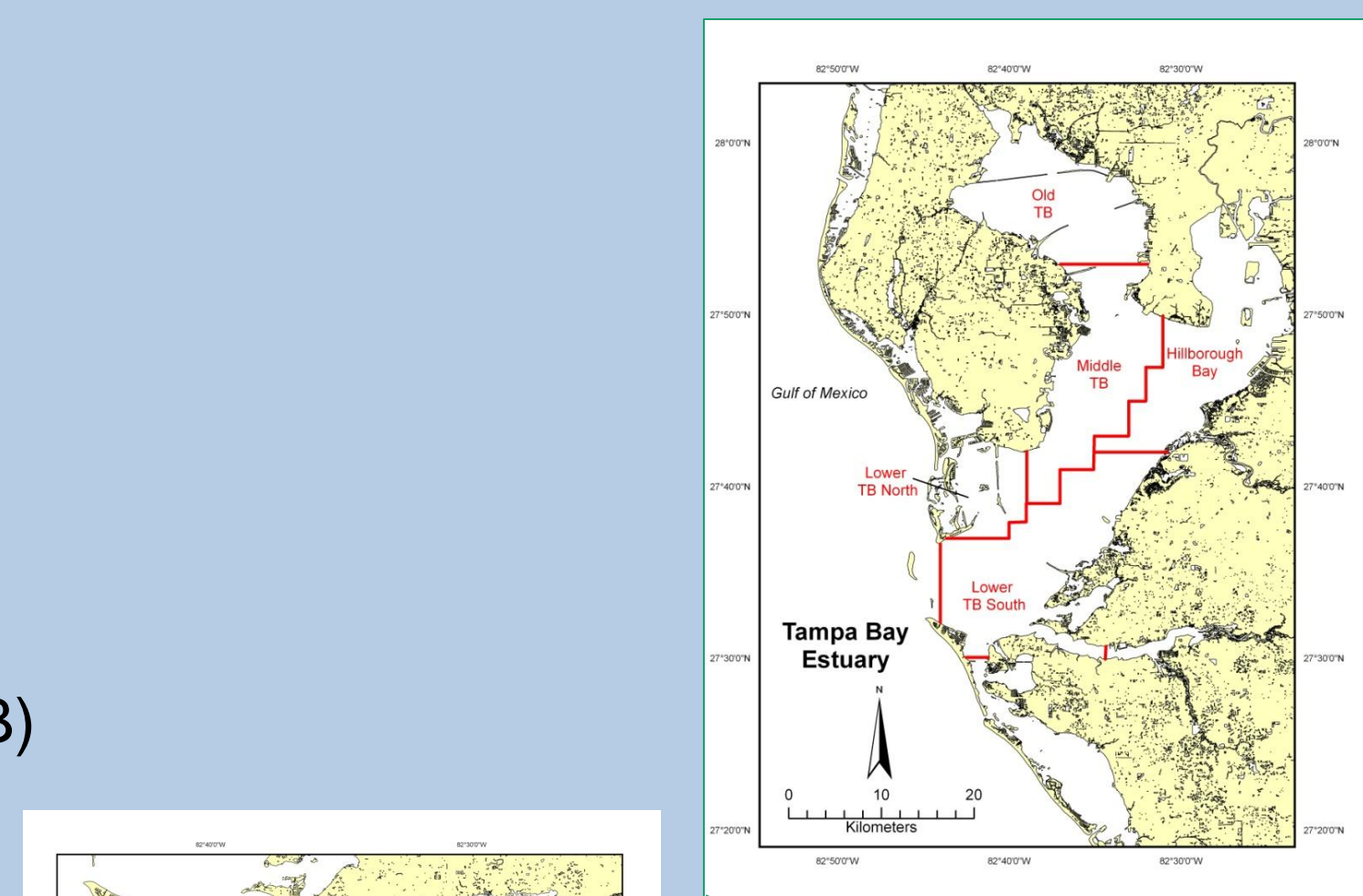
STUDY AREAS

Intrabay Comparison

- Palma Sola Bay (PSB)
- Sarasota Bay (SB)
- Roberts Bay (RB)
- Little Sarasota Bay (LSB)
- Blackburn Bay (BB)

Interbay Comparison

- Tampa Bay
- Sarasota Bay
- Charlotte Harbor
- Lemon Bay



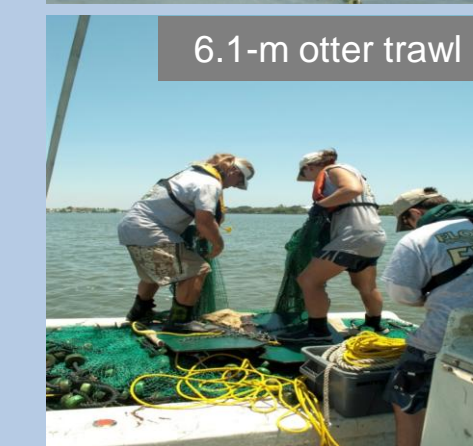
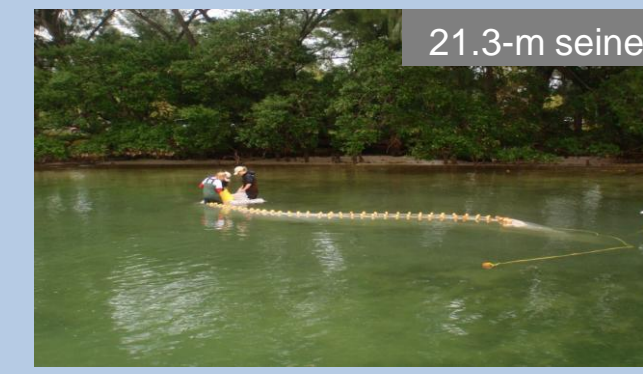
METHODS

Sampling

- Sampling was designed to provide comprehensive data on size-specific, spatial and temporal patterns of abundance:
 - Stratified-random design
 - Multi-gear approach (21.3-m seine, 183-m seine, and 6.1-m otter trawl)
 - Standardized sampling methods and gears

Analytical

- Overall and species-specific abundances compared.
- Nekton community structure was investigated using nonparametric multivariate analyses in PRIMER v6 software.



RESULTS

Intrabay Comparison

- 21.3-m seine: abundance greater in **Little Sarasota Bay** than in other embayments (Figure 1a).
- 183-m seine: abundance greater in **Palma Sola** and **Sarasota** bays than in other embayments (Figure 1b).
- 6.1-m trawl: abundance greater in **Roberts**, **Little Sarasota**, and **Blackburn** bays than in other embayments. (Figure 1c)
- Although different nekton assemblages were sampled by each gear type, the assemblages within each gear type were most similar in **Roberts** and **Little Sarasota** bays (Figure 2).

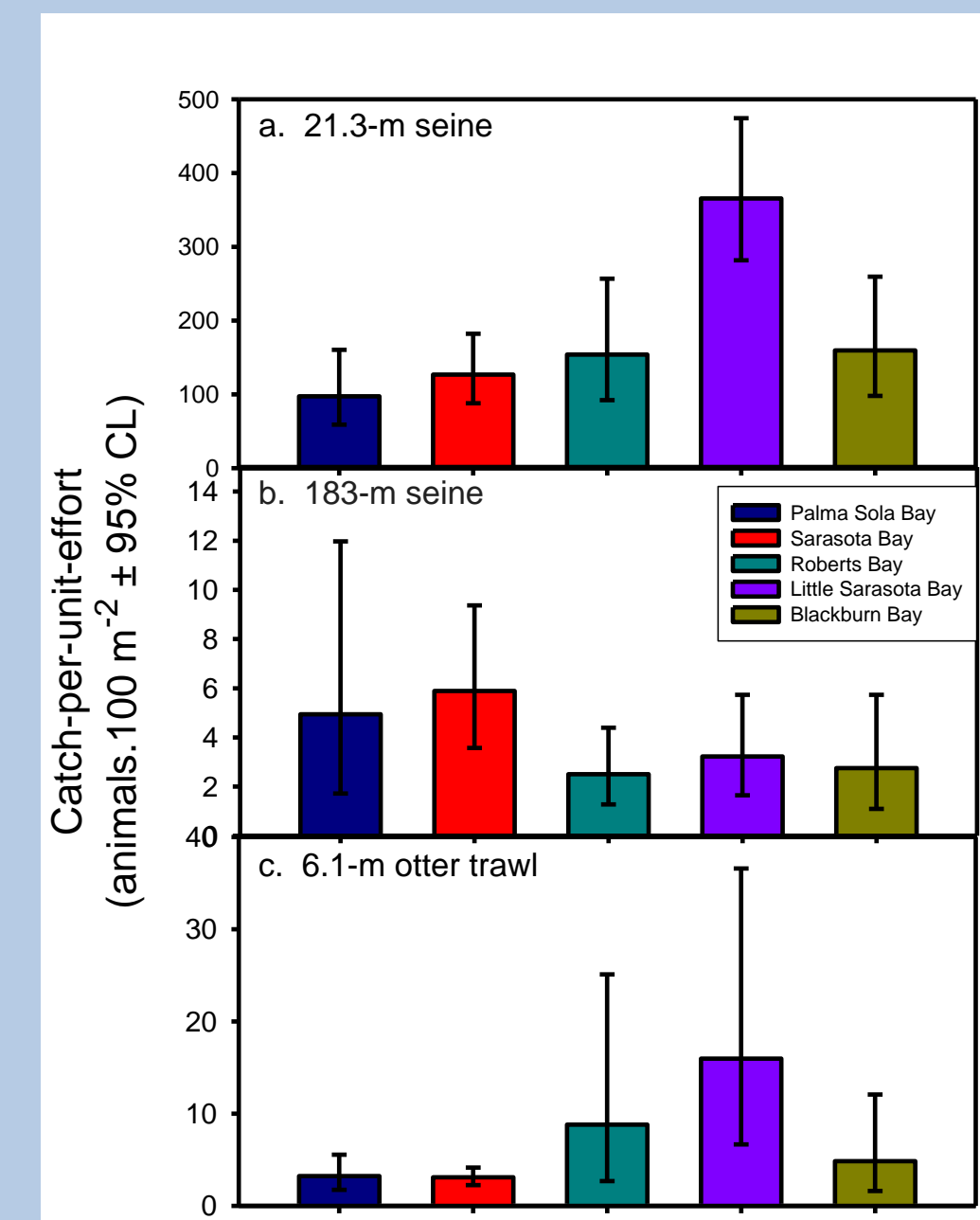


Figure 1. Abundance by embayment for Sarasota Bay estuary.

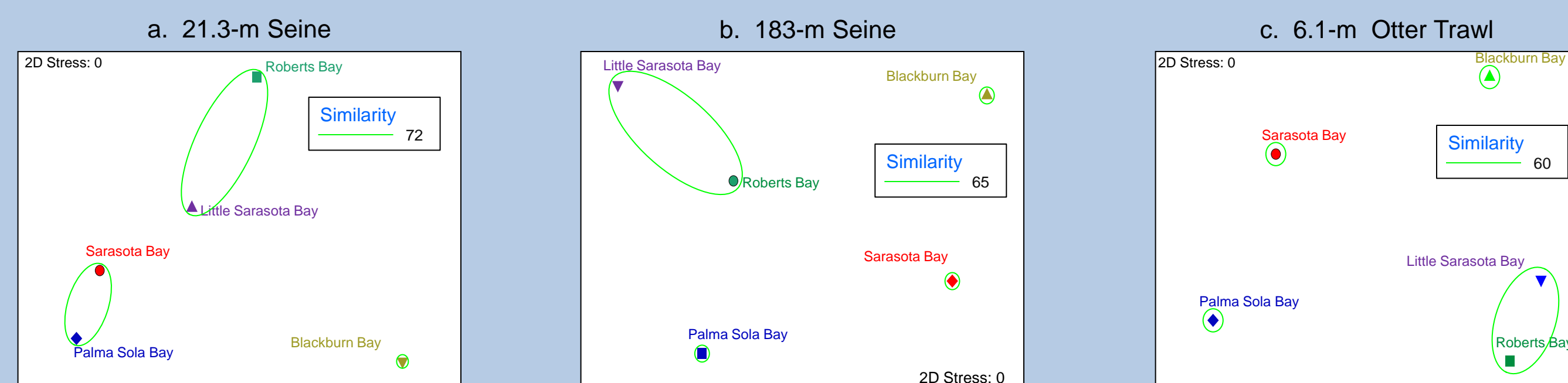


Figure 2. Multi-dimensional scaling plots of intrabay nekton community structure for a) 21.3-m seines, b) 183-m seines, and c) 6.1 otter trawls

Interbay Comparison

- Average monthly temperature and dissolved oxygen were similar between the four estuaries, but salinity tended to be higher in **Lemon** and **Sarasota** bays than in **Tampa** and **Charlotte Harbor**. (Figure 3)
- The “small” estuaries (**Sarasota** and **Lemon** bays) typically had higher overall nekton abundance than the “large” estuaries regardless of gear type. (Figure 4)

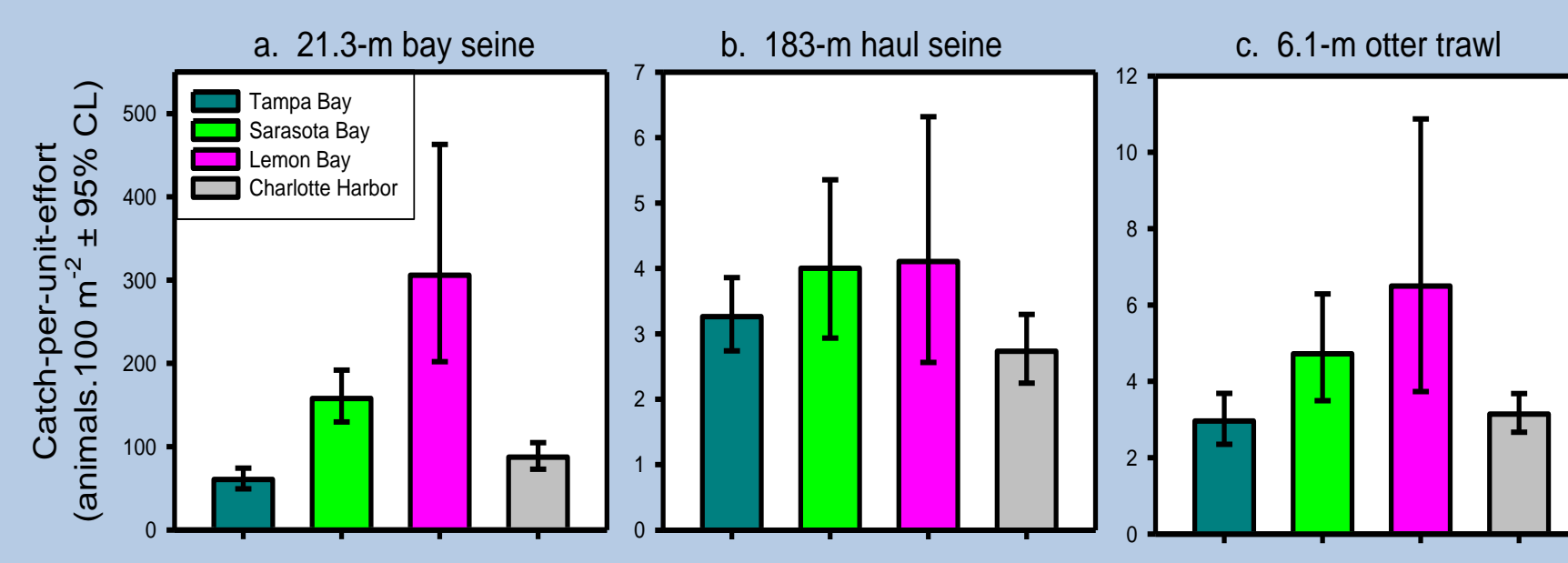


Figure 4. Overall nekton abundance by estuary for a) 21.3-m seines, b) 183-m seines, and c) 6.1-m otter trawls

- Nekton community structure defined three embayment groupings among the four estuaries sampled (Figure 5):

- Group A: Larger estuary segments with higher freshwater inflow and relatively greater distance from Gulf of Mexico.
- Group B: Larger estuary segments with relatively little freshwater inflow and short distance from the Gulf of Mexico.
- Group C & D: Smaller estuary embayments with little freshwater inflow and little or no direct communication with the Gulf of Mexico.

- Species-specific abundance for commercial and recreational species, such as spotted sea trout (21.3-m), common snook (183-m seine), and pink shrimp (6.1-m trawl), indicate that individual taxa utilize the various estuaries and their embayments differently. Thus different estuaries and their embayments should not be treated the same for fishery management purposes. (Figure 6)

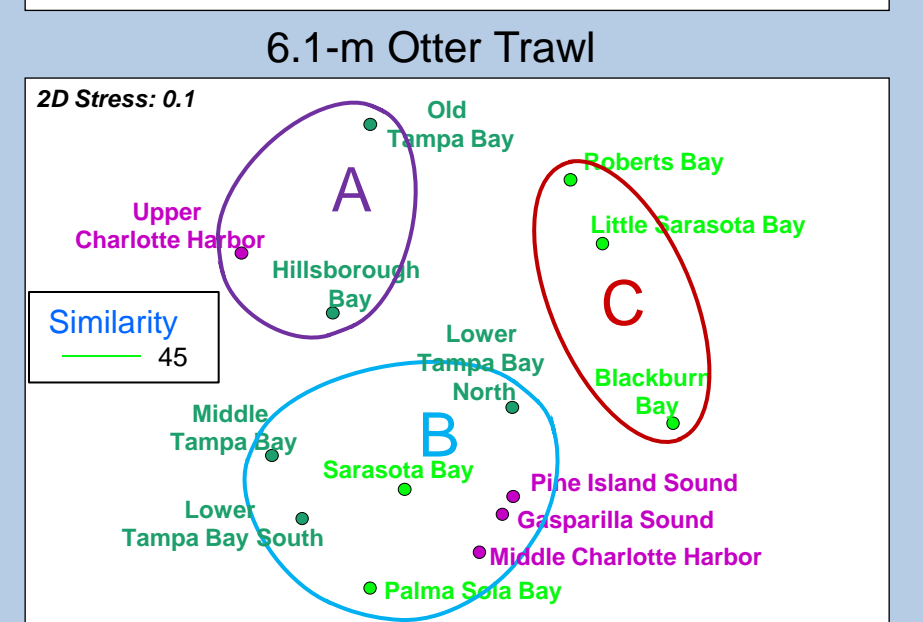
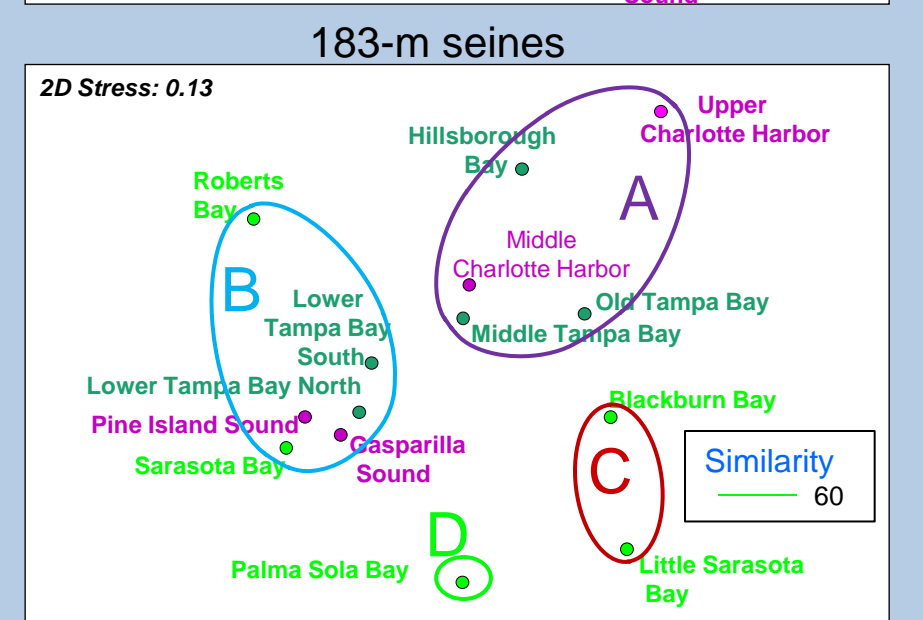
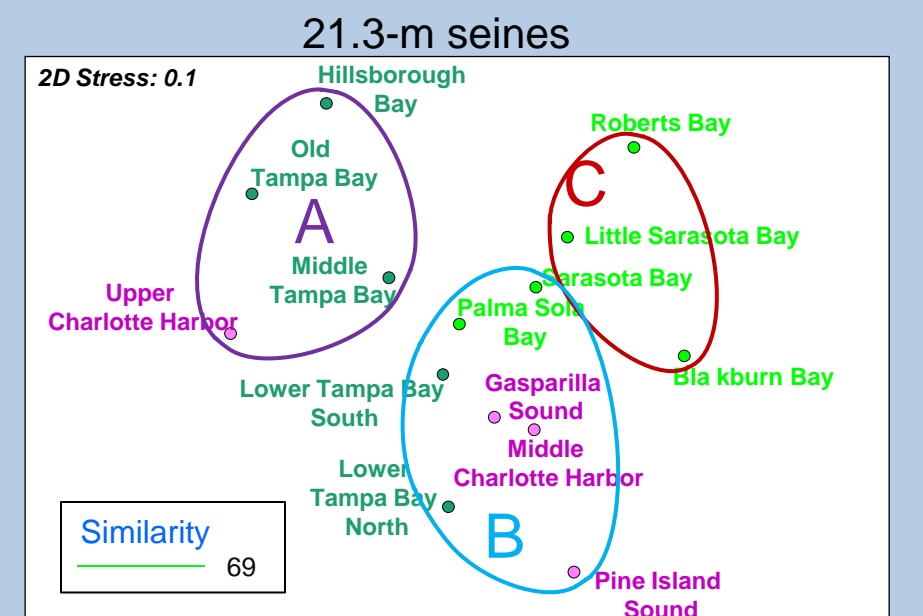


Figure 5. Multi-dimensional scaling plots of interbay nekton community structure for a) 21.3-m seines, b) 183-m seines, and c) 6.1 otter trawls

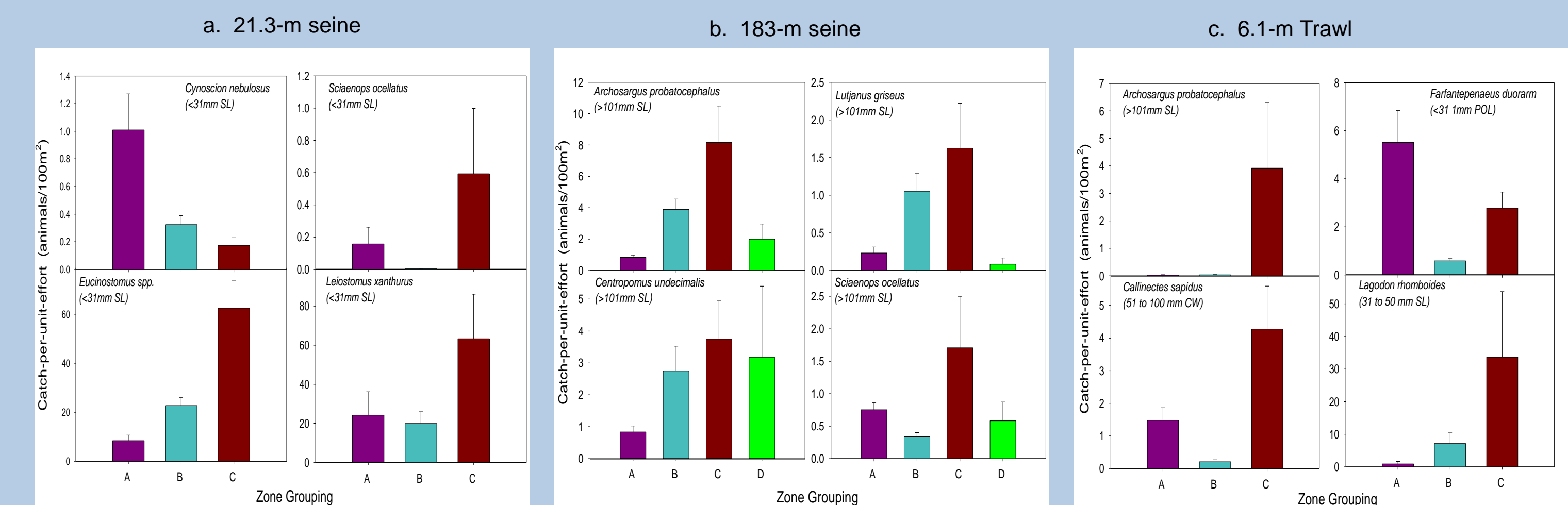


Figure 6. Abundance for a few species that differentiated MDS groupings for a) 21.3-m seines, b) 183-m seines, and c) 6.1 otter trawls

CONCLUSIONS

Intrabay comparison:

- Overall abundance and the abundance for most taxa collected with 21.3-m seines and 6.1-m trawls were higher in the “small” embayments than in the “large” embayments.

- Overall abundance and the abundance of most taxa collected with 183-m seines were greater in Palma Sola and Sarasota bays than in the other three embayments.

- Two of the “small” embayments (Little Sarasota and Roberts bays) had similar nekton assemblages while Palma Sola, Sarasota, and Blackburn bays tended to have nekton assemblages that were very different from each other and these two “small” embayments.

Interbay comparison:

- “Small” estuaries (Sarasota and Lemon bays) tended to have higher abundance than the “large” estuaries (Tampa Bay and Charlotte Harbor).

- Nekton assemblages in the four estuaries tended to be defined by freshwater inflow, proximity to the Gulf of Mexico, and relative surface area.

- Different estuaries and their embayments should not be treated the same because species-specific abundance indicates that individual taxa utilize the various estuaries and their embayments differently.

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