Year 3 Data Summary Report:
Nekton of Sarasota Bay and a Comparison of Nekton Community Structure in Adjacent Southwest Florida Estuaries

T.C. MacDonald; R.F. Jones; E. Weather; R.H. McMichael, Jr.

Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute
100 Eighth Avenue Southeast
St. Petersburg, Florida 33701-5095

Prepared for

Sarasota Bay Estuary Program
111 S. Orange Avenue, Suite 200W
Sarasota, Florida 34236

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SUMMARY

The Sarasota Bay Estuary Program's (SBEP) Comprehensive Conservation Management Plan stresses the importance of restoring and protecting juvenile fish habitats. Sarasota Bay's estuarine habitats have been subjected to increased urbanization since the 1950's. Understanding the distribution, abundance and habitat use of nekton (fish and macroinvertebrates) within these habitats is critical to protecting and restoring these estuarine areas.

The Florida Fish and Wildlife Conservation Commission's (FWCC) Fisheries-Independent Monitoring (FIM) program has been monitoring nekton assemblages in Tampa Bay and Charlotte Harbor, estuaries that are adjacent to Sarasota Bay, since 1989. The goal of the FIM program is to provide timely, accurate, and consistent fisheries-independent data and analyses to fisheries managers for the conservation and protection of Florida's fisheries. The sampling design and data collected are intended not only to assess fishery stocks, but to also describe habitat utilization, biodiversity, nekton communities, and to document changes within Florida's estuarine systems.

The general objectives of this study were to describe the nekton habitat utilization and community structure within Sarasota Bay, to compare nekton community structure between three adjacent estuaries (Tampa Bay, Sarasota Bay and Charlotte Harbor), and to assess mercury concentrations in edible fish tissues. Specifically, this study was designed to: 1) provide a database of fish and selected invertebrate species that inhabit Sarasota Bay; 2) examine spatial differences in species composition and relative abundance within Sarasota Bay; 3) examine spatial differences in species composition and relative abundance between three estuaries along Florida's Southwest Coast; and

4) develop baseline data on mercury content in fish from Sarasota Bay and to compare those data to adjacent estuaries.

The FIM program used a stratified-random sampling design to select sampling sites within each of the five Sarasota Bay embayments as defined by the Sarasota Bay Estuary Program. Bi-monthly samples were collected between June 2009 and April 2012 with 21.3-m seines, 183-m haul seines, and 6.1-m otter trawls. Water chemistry parameters (salinity, water temperature, dissolved oxygen and pH) and habitat assessments (bottom type, presence of submerged aquatic vegetation, shore habitat) were taken in association with each net deployment. The gear-specific nekton catch summary portion of this report has been limited to the third year of sampling (June 2011 to April 2012), while the analysis portions (meteorological patterns, community structure, species profiles, and total mercury concentrations) include data from all three years of the study.

Meteorological patterns during the three years of this study generally followed the 30-year trend from 1979 to 2008, but monthly average temperatures and total rainfall tended to deviate to extreme values. Monthly average air temperature during January to March 2010 and December 2010 to January 2011 were lower than the 30-year average, with the extreme lows of winter 2010 resulting in cold kills of many nekton species. In the third year of the study (June 2011 to April 2012), average monthly temperatures were higher than the historical average in all months except October. Total rainfall rarely achieved the long-term monthly totals during this study, with spring periods either wetter (May 2009 and March to May 2010) or drier (March to May 2012) than normal. Similarly, the normally rainy period had months that were both drier (September 2009, 2010, and

2011) and wetter (July 2009, August 2010 and 2011) than average. The water temperatures and salinities observed during this study probably do not reflect the long-term average condition in Sarasota Bay.

This year 125,292 animals were collected in three sampling gear types, 21.3-m seines, 183-m haul seines and 6.1-m otter trawls. The majority (n=108,641) of the nekton were captured in 21.3-m seines. *Anchoa mitchilli* (bay anchovy), *Lagodon rhomboides* (pinfish), and *Eucinostomus* spp. (eucinostomus mojarra) represented almost 80% of the total catch in the 21.3-m seine and over 70% of the total catch from all gear types. *Lagodon rhomboides* (pinfish) were the dominant taxon collected in the 183-m haul seine (56.9%) and 6.1-m otter trawl (18.3%). Other estuarine dependent species such as spot (*Leiostomus xanthurus*), silver jenny (*Eucinostomus gula*), silver perch (*Bairdiella chrysoura*), and pigfish (*Orthopristis chrysoptera*) were relatively abundant across all gear types as well.

We completed analyses of community structure on both *intra*bay (five embayments of Sarasota Bay) and *inter*bay (bay segments of three Southwest Florida estuaries) segments. Nekton community structure, regardless of gear type, tended to differentiate into three groupings: 1) small Sarasota embayments, 2) larger bay segments closely linked to the Gulf of Mexico and receiving little direct freshwater inflow, and 3) larger bay segments not link closely to the Gulf and receiving relatively large amounts of freshwater inflow. The taxa that discriminated between the groupings tended to have higher abundance in “smaller” rather than in “larger” estuarine segments for both the *intra*bay and *inter*bay analyses. The most obvious morphological differences between the small Sarasota embayment grouping and the other bay segment groupings is their 1) relatively small surface area; 2) freshwater inflow (from Phillippi Creek); and 3) proximity, but no direct connection, to the Gulf of Mexico. The smaller Sarasota Bay embayments are closer to the Gulf than are the larger bay segments that have significant freshwater influence (Upper Charlotte Harbor, Hillsborough Bay and Lower Tampa Bay South), possibly indicating that proximity to the Gulf of Mexico and/or embayment size were more important in determining nekton composition in these smaller Sarasota Bay embayments than was freshwater inflow.

Mercury is a toxic element that bio-accumulates in fish tissues with concentrations tending to increase with fish size, age and trophic level. Tissue samples for total mercury content analysis in Sarasota Bay were taken from 627 individuals representing 28 taxa. To date, 83% (n=519) of the tissue samples collected from the Sarasota Bay estuary have been analyzed for total mercury concentration. Sample sizes and the size range sampled are not yet adequate to analyze mercury concentrations for individual taxa within the Sarasota Bay estuary. Combining the Sarasota Bay estuary specimens with data from adjacent estuaries (Tampa Bay and Charlotte Harbor), however, provided an adequate sample size and size range for several taxa (n=11) with some opportunity for *inter*bay comparisions. The results of the mercury content analysis indicated that fish from Sarasota Bay had similar concentrations and accumulation rates to fish collected in Tampa Bay and Charlotte Harbor.

INTRODUCTION

Sarasota Bay is an urbanized coastal lagoon system located on Florida's Southwest Coast. Since the early 1900s, dredge and fill activities have resulted in significant losses of ecologically important habitats, and historically semi-isolated tidal current regimes within embayments have been joined through the construction of an Intracoastal Waterway (ICW) channel that hydrologically links the embayments. Intense development occurred throughout the system starting in the late 1950's resulting in much of the natural shoreline being replaced by seawalls to retain dredge-and-fill material for housing sites and other construction projects. Mosquito ditching and significant channelization of tidal creeks has altered historical patterns of surface water runoff to the bay and further exacerbated the problem of wetland habitat loss (*Sarasota Bay National Estuary Program 2003*). A thorough understanding of the ecology of local nekton assemblages is imperative if the consequences of further anthropogenic or environmental changes are to be determined (*Poulakis et. al. 2004*). In addition, the development of a baseline database documenting habitat use, recruitment and biodiversity can provide a broader understanding of the status of fish populations found within an estuary and help to guide the protection of estuarine-based fisheries and associated habitats (*Paperno et. al. 2001*).

The Sarasota Bay Estuary Program (SBEP) Comprehensive Conservation Management Plan (CCMP) stressed the importance of restoring and protecting juvenile fish habitat as well as the need to maintain fish populations while pursuing restoration efforts (*Sarasota Bay National Estuary Program 1995*). The objectives of this study are to: 1) provide a database of fish and selected invertebrate species that inhabit Sarasota

Bay; 2) examine spatial differences in species composition and relative abundance within Sarasota Bay; 3) examine spatial differences in species composition and relative abundance between three estuaries along Florida's Southwest Coast; and 4) develop baseline data on mercury content in fish from Sarasota Bay and compare those data to adjacent estuaries.

METHODS

Study Area

Sarasota Bay is a coastal lagoon, located on the southwest coast of Florida, which stretches from Anna Maria Sound to the Venice Inlet. The bay is comprised of five embayments (Palma Sola, Sarasota, Roberts, Little Sarasota and Blackburn bays) which were formed behind a barrier island complex. This system is connected to the Gulf of Mexico through five inlets; Anna Maria Sound, Longboat Pass, New Pass, Big Sarasota Pass and Venice Inlet. Freshwater inflow enters the estuary through a series of creeks, bayous, and unnamed drainage ditches (*Roat and Alderson 1990*). The main tributaries and receiving water bodies are Bowlees Creek and Whitaker and Hudson bayous (Sarasota Bay proper), Phillippi Creek (Roberts Bay), Clower and Catfish creeks (Little Sarasota Bay) and South Creek (Blackburn Bay). Shoreline vegetation consists largely of mangroves and marsh grasses, and bottom substrates are typically characterized as sand, mud, oysters, or a combination thereof (*Flannery 1989*). Seagrass meadows are the dominant, submerged vegetative cover in Sarasota Bay and are widely distributed throughout the estuary (*Haddad 1989*).

Sampling Design

The FIM program utilized a stratified-random sampling (SRS) design and a multi-gear approach to collect data on nekton (fish and select invertebrates) from a wide range of habitats and life history stages. This sampling design provides comprehensive data on size-specific, spatial and temporal patterns of abundance for individual species of direct economic importance and for the entire nekton community. Specimens collected during this sampling are used for various assessments, such as fish health, mercury content, diet, age/growth, and reproduction. Three sampling gears (*Table 1*) were used: 1) 21.3-m seines; 2) 183-m haul seines; and 3) 6.1-m otter trawls. The data gathered from seine hauls document habitat use by shallow-water organisms (≤1.5m deep for 21.3-m seine and ≤2.5-m deep for 183-m seine) whereas the data collected from trawls document habitat use in deeper areas (1.8 to 7.6m deep). The 21.3 m seine is deployed in two different methods; 1) offshore set, where net is at least 5m from the shoreline; and 2) shoreline set, where one seine wing is against shore. The dominant catch for the 21.3-m seine and 6.1-m otter trawl is juvenile nekton, although subadults and adults of smaller-bodied nekton species are also commonly collected. The 183-m haul seine typically catches larger sub-adult and adult nekton.

The FIM program sampling design divided the Sarasota Bay estuary into zones representing the five embayments designated by the Sarasota Bay Estuary Program (Zone A - Palma Sola Bay, Zone B - Sarasota Bay proper, Zone C - Roberts Bay, Zone D - Little Sarasota Bay and Zone E - Blackburn Bay; *Figure 1*). Each zone was further subdivided into 1-nm^2 grids. Within each grid, habitat and depth strata were identified, thereby designating the gear types that could be deployed in each. The number of samples designated for collection in each zone with each gear was proportional to the number of grids in the zone that could be sampled with a particular gear. Randomly selected locations within randomly selected grids were designated as sampling sites to be visited during each sampling event. A single deployment with the designated gear was made at each selected site. Thirty primary samples consisting of six 183-m haul seines, eight 6.1-m otter trawls and sixteen 21.3-m seines were collected during each sampling event. Nine to 12 additional 21.3-m seine samples were collected at randomly selected sites during each sampling event as time allowed.

Sampling events were completed with a bi-monthly periodicity in the Sarasota Bay estuary. Sampling began in June 2009 and is ongoing with sampling currently scheduled to end in April 2014. This report summarizes the data collected during year three of the study (June 2011 to April 2012), and analyses species distributions and abundance, and community structure from all three years (June 2009 to April 2012).

Table 1. Description of sampling gears used during the Sarasota Bay stratified random sampling, June 2011 – April 2012. A more detailed description of each gear can be found in the FIM program's Procedure Manual.

Gear	Mesh Size (mm)	Area Sampled Estimate (m^2)	Description of use
21.3-m seine	3.2	140	used in areas ≤ 1.5-m deep
183-m haul seine	38.1	4,120	used along shorelines ≤ 2.5-m deep
6.1-m otter trawl	38.1 (3.2-mm bag liner)	1,440	used in areas from 1.8-m to 7.6-m deep

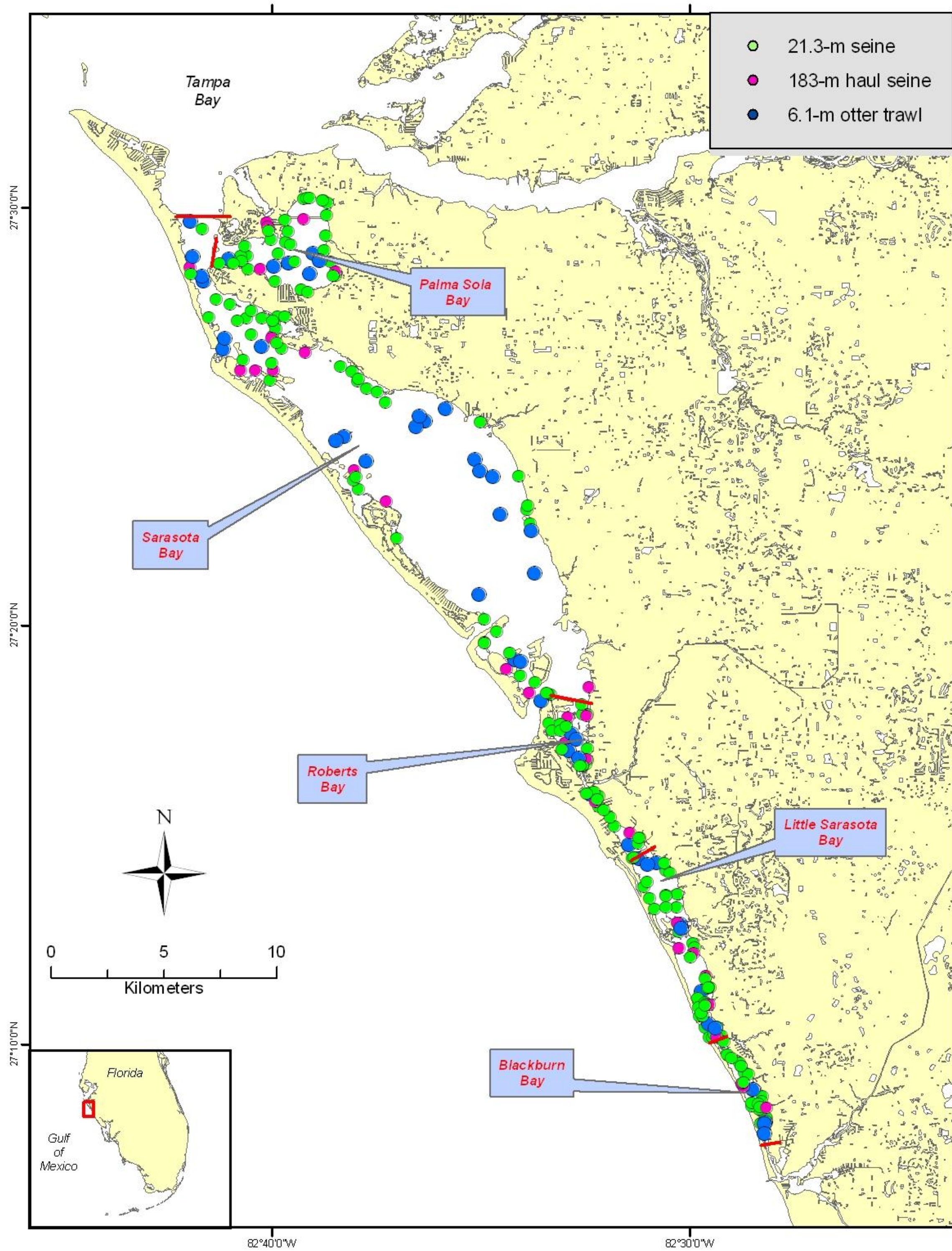

Figure 1. Stations sampled (dots) between June 2011 and April 2012 (Year 3), and geographic strata (solid lines) in Sarasota Bay.

Gear Specifications and Deployment

The gear type used to collect smaller nekton associated with shorelines and on offshore flats (>5 m from shore) was a 21.3-m center-bag seine with 3.2-mm mesh and leads spaced every 150 mm. The 21.3-m seine was pulled, with a crewmember on each wing, for a distance of 9.1 m with the net wings separated by 15.5 m. The seine was deployed into the current and was landed by collapsing the seine around a pivot pole to close the wings and force the catch into the center bag. Each 21.3-m seine deployment sampled an estimated 140 m^2. Sampling sites for the 21.3-m seine were pre-stratified into one of three categories: 1) >5-m from the shore and bottom vegetation present, 2) >5-m from the shore and bottom vegetation absent, and 3) against a shoreline.

The 183-m haul seine targeted larger sub-adult and adult nekton associated with relatively shallow (≤2.5-m), nearshore habitats. Deployment of this gear occurred from the back of a boat in a standard rectangular shape. Both net wings were simultaneously hauled along the shoreline, keeping the lead lines close to the bottom, forcing the catch into the center bag portion of the gear. Each 183-m haul seine set enclosed an area of approximately 4,120 m^2. In Sarasota Bay proper, where two 183-m haul seine sets were collected during each sampling event, sites were pre-stratified by the presence or absence of overhanging shoreline vegetation (i.e., mangroves). The number of 183-m haul seine hauls collected in Palma Sola, Roberts, Little Sarasota and Blackburn bays during each sampling event were too small to pre-stratify by the presence or absence of overhanging shoreline vegetation.

Juvenile and adult nekton that inhabit relatively deeper waters (1.0 – 7.6-m) were collected in the 6.1-m otter trawl which had a 38-mm stretch mesh with a 3.2-mm mesh cod-end liner. The trawl was towed from the back of a boat for 10 minutes. Tow speeds averaged 0.6-m/s; start and end locations for each trawl were marked using a global positioning system (GPS) so that the distance fished could be estimated. Each trawl deployment sampled an area of approximately 1,440 m^2.

Salinity, temperature, pH, and dissolved oxygen were measured at the surface and at 1-m intervals to the bottom in association with each gear deployment. A variety of qualitative habitat assessments were also made, such as characteristics of the shoreline (e.g., vegetation type, inundation), substrate (e.g., sediment type, presence of submerged aquatic vegetation), and bycatch (i.e., total volume, type, and composition). All sampling was conducted during daylight hours (one hour after sunrise to one hour before sunset). Additional sampling details and habitat assessment procedures are described in the FIM program's Procedure Manual (*FWC-FWRI 2012*).

Sample Processing

Sample work-up was similar for all gear deployments. All fish and selected invertebrate species captured were identified to the lowest practical taxonomic level, generally species. Representative samples (three individuals of each species from the 21.3-m seines and 6.1-m otter trawls on each sampling trip) were brought back to the FWC-FWRI laboratory to confirm field identification. Species for which field identification was uncertain were also brought back to the laboratory. A maximum of 20 measurements (mm) were made per taxon, unless distinct cohorts were identifiable, in which case a maximum of 20 measurements were taken from each cohort; for certain economically valuable fish species (Selected Taxa, *Appendix A*), 40 individuals were measured. Standard length (SL) was recorded for teleost fish, total length (TL) for seahorses, precaudal length for sharks (PL), disk width (DW) for rays, post-orbital head length (POHL) for shrimp, and carapace width (CW) for crabs. Animals that were not measured were identified and counted. When large numbers of individuals (>1,000) were captured, the total number was estimated by fractional expansion of a sub-sampled portion of the total catch that had been split with a modified Motoda box splitter (*Winner and McMichael 1997*). Animals that did not require further laboratory examination were returned to the water. Additional details concerning sample work-up are described in the FIM program's Procedure Manual (*FWC-FWRI 2012*).

Due to frequent hybridization and/or extreme difficulty in the identification of smaller individuals, members of several abundant species complexes were not identified to species. Species of menhaden (*Brevoortia* spp.) were not identified to species. *Brevoortia patronus* and *B. smithi* frequently hybridize and juveniles of the hybrids and the parent species are difficult to identify (*Dahlberg 1970*). Two abundant silverside species (*Menidia beryllina* and *M. peninsulae*) tend to hybridize, form all-female clones, and occur in great abundance that renders identification to species impractical due to the nature of the diagnostic characters (*Duggins et al. 1986*; *Echelle and Echelle 1997*; Chernoff, personal communication), so they are represented in this report as *Menidia* spp. Species-level identification of mojarras (genus *Eucinostomus*) was limited to individuals ≥40 mm SL due to great difficulty in separating *E. gula* and *E. harengulus* below this size (Matheson, personal observation). The term "eucinostomus mojarras" is used for these small specimens. Species-level identification of gobies of the genus *Gobiosoma* (i.e., *G. robustum* and *G. bosc*) was limited to individuals ≥20 mm SL for the same reason; smaller individuals are hereafter referred to as “gobiosoma gobies”. Similarly, needlefishes (*Strongylura* spp.), other than *S. notata*, were only identified to species at lengths ≥100 mm SL.

Gear-specific data summary tables for the numerically dominant and economically important taxa (Selected Taxa, *Appendix A*) were prepared with data from the third year of this study (June 2011 to April 2012). Summaries of all taxa collected by sampling event, gear and habitat, and embayment (sampling zone) were prepared using just the third year of the study period (*Appendices B*, *C*, and *D*, respectively). *Appendices E*, *F* and *G* contain catch summaries for all taxa collected with 21.3-m seines, 183-m haul seines, and 6.1-m otter trawls during all three years of the study (June 2009 – April 2012). Gear-specific catch overview plots (*Appendices H*, *I*, and *J*) for relatively abundant (≥175 animals collected) and commonly collected (≥15% occurrence) taxa and species profiles for specific taxa were prepared using the three completed years of the study (June 2009 to April 2012).

Nekton Community Analysis

Nekton community structure was investigated using nonparametric multivariate analyses in PRIMER v6 software (Plymouth Routines in Multivariate Ecological Research; *Clarke and Warwick 2001*). Analyses pooled samples by averaging over zones (embayments and bay segments) to investigate spatial patterns. Data from each gear deployment method (21.3-m shoreline seines, 21.3-m offshore seines, 183-m haul seines, and 6.1-m otter trawl) were treated separately. *Intra*bay analyses were conducted to compare nekton assemblages in each of Sarasota Bay’s embayments

(*Figure 1*). Broader-scale geographic analyses (*inter*bay analysis) were conducted to compare nekton assemblages in adjacent bay systems along the southwest coast of Florida (Tampa Bay, Sarasota Bay and Charlotte Harbor; *Figure 2*). All nekton taxa collected, including species complexes (e.g., *Eucinostomus* spp. and *Menidia* spp.) and invertebrates were included in the community analyses. Taxa were subdivided into distinct size classes ('pseudo-species') to address ontogenetic habitat shifts, immigration/emigration and mortality.

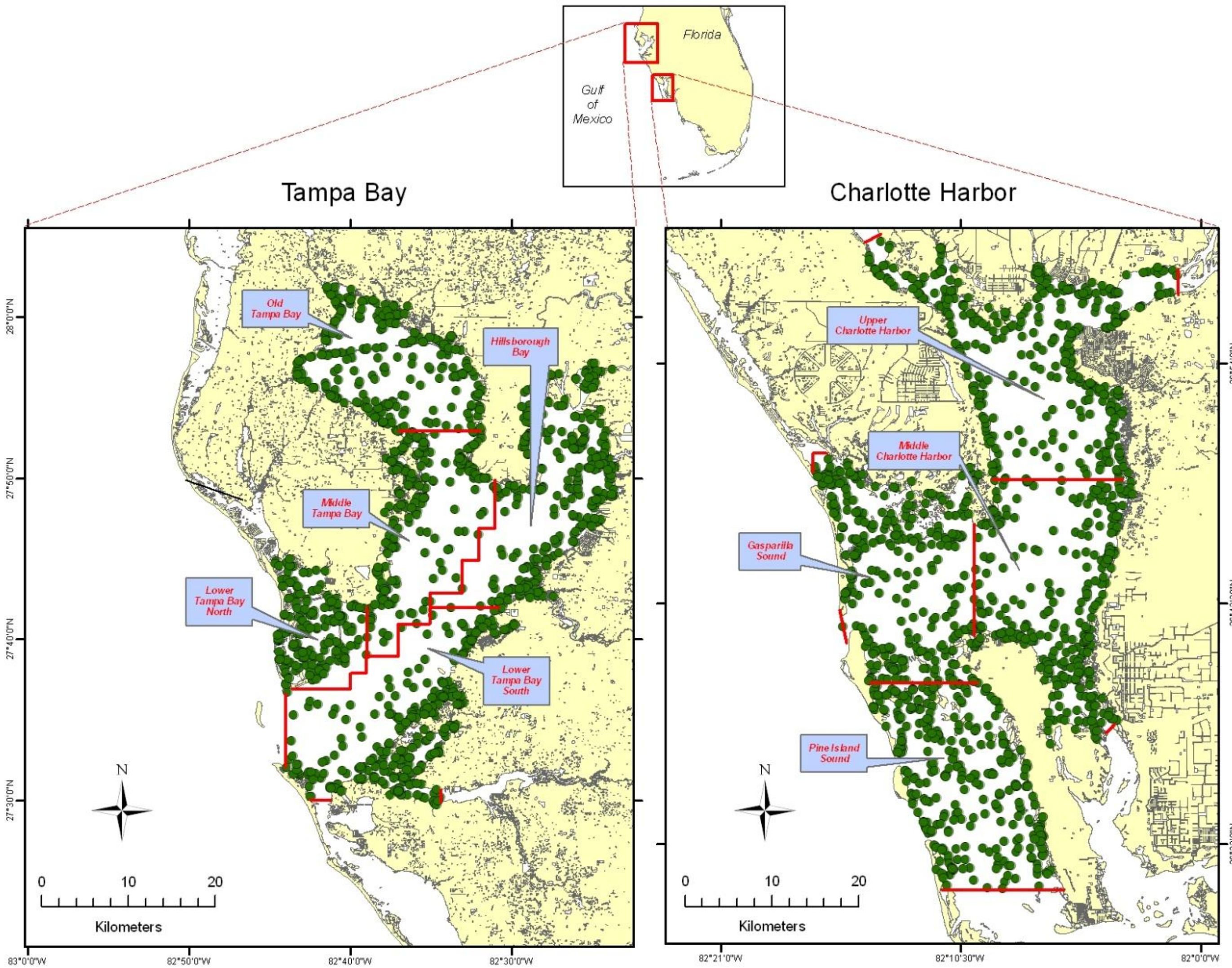

Figure 2. Stations sampled (dots) between June 2009 and April 2012, and geographic strata (solid lines) in Tampa Bay and Charlotte Harbor.

Bray-Curtis similarity calculation

The basis of the multivariate analyses was an assessment of similarity in nekton community structure, calculated according to the method of *Bray and Curtis (1957)*:

$$S_{jk} = 100\left\{1 - \frac{\sum_{i=1}^{p}\left|y_{ij} - y_{ik}\right|}{\sum_{i=1}^{p}\left(y_{ij} + y_{ik}\right)}\right\}$$

where S_{jk} is the Bray-Curtis similarity coefficient, y_{ij} is the abundance of the *i*th species in the *j*th sample and y_{ik} is the abundance of the same *i*th species in the *k*th sample. Abundance was standardized to number•haul^{-1} for both seine types, and to number•100m^{-2} to account for varying tow lengths. Abundance data were square root-transformed prior to analysis to reduce the influence of highly abundant taxa.

Non-metric multidimensional scaling (MDS) and Similarity Percentage Analysis (SIMPER)

In order to provide a visual depiction of differences in nekton community structure non-metric multidimensional scaling (MDS) of the initial Bray-Curtis similarity matrices was conducted. This technique generates two-dimensional plots of 'distances' between samples on the basis of their similarity in community structure (*Clarke 1993*). The MDS analysis uses an iterative procedure to attempt to map similarity of samples as closely as possible to the rank order of similarities from the input Bray-Curtis similarity matrix. The adequacy of this representation is judged by a 'stress' value, for which zero is perfect representation, and values below ~0.2 offer appropriate results for interpretation (*Clarke and Warwick 2001*). MDS-plot axes do not have units, so the important information in these plots is the relative distances between samples; samples close together on the plots are more similar in community structure than samples that are further apart. The MDS plots included ‘samples’ that were averages of all data collected by embayment or bay segment. Similarity percentage analysis (SIMPER; *Clarke and Warwick 2001*) was used to identify pseudo-species representative of dissimilarities between groups determined from MDS.

Mercury Content Analysis

Fish for mercury content analysis were placed directly on ice and returned to the laboratory, where standard length (SL) and sex were recorded. A clean stainless-steel knife was used to remove axial muscle tissue samples from the left dorsal area above the lateral line and anterior to the origin of the first dorsal fin for each fish. White muscle tissue taken from this region is representative of the portion of fish consumed by humans (*Adams and McMichael 2001*). Care was taken to assure that the sample did not contact the outer layer of the specimen, blood, scales, or other surrounding surfaces during the extraction process. Tissue samples were immediately placed in sterile polyethylene vials and frozen at -20° C until analyzed.

Total mercury concentration (THg) of each tissue sample was determined by EPA Method 7473 (*Direct Mercury Analysis by Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrometry* [DMA], *USEPA 2007*). Frozen tissue samples were thawed until ice crystals were no longer present on or within the sample, and approximately 0.20 g of clean unexposed muscle tissue was then excised with sterilized stainless steel instruments from the interior portion of the sample. The tissue sample was placed directly into a clean quartz sampling vessel, weighed to 0.0001 g, and analyzed for total mercury by FWC-FWRI with a calibrated DMA-80 Direct Mercury Analyzer (Milestone Inc., Shelton, CT). Quality control included analysis of laboratory method blanks, duplicate or triplicate tissue samples, and certified fish-tissue reference material (CRM; TORT-2, DOLT-4, obtained from the National Research Council of Canada) for each group of 10 or fewer fish samples analyzed. Matrix spike samples were processed for every 40 samples analyzed in a group. If CRM results were not within 10% of their certified value, all samples run subsequent to the last acceptable CRM result were re-analyzed. All total mercury levels were measured and reported as milligrams per kilogram (mg/kg) wet weight, rounded to three decimal points (0.001).

Linear regression was used to describe the relationship between fish length and total mercury concentration. There were not enough animals for individual species collected for total mercury analyses were from the Sarasota Bay estuary to do an estuary-specific analysis, so data from Sarasota Bay, Tampa Bay and Charlotte Harbor were combined. Total mercury concentrations, from Tampa Bay and Charlotte Harbor, prior to 2006 were analyzed by EPA Method 245.6 (*Determination of Mercury in Tissues by Cold Vapor Atomic Absorption Spectrometry* [CVAAS]; *USEPA 1991*), which provides similar but not identical results to the DMA method. Therefore, THg values for all DMA-analyzed fish were converted into CVAAS values using equations developed by FWC from 1,566 split samples that were analyzed by both methods. Total mercury data were log transformed to approximate the normality and homoscedasticity requirements prior to regression analysis. Only species with at least 100 total animals collected, and at least 10 from Sarasota Bay, were analyzed using linear regression.

RESULTS and DISCUSSION

Physiochemical conditions

Monthly average air temperature and total rainfall measured at Tampa International Airport during this three-year study period (June 2009 – April 2012) and during a 30-year historical period (January 1979 to December 2008) were compared. Generally, the monthly average temperature during this study period followed the 30-year historical trend, but with extreme cold and warm values during some months (*Figure 3*). The monthly average temperature tended to be slightly higher from May to September 2010 than during the historical period (*Figure 3*). With the exception of October 2011, average monthly temperatures between May 2011 and April 2012 were higher than the historical period (*Figure 3*). The average temperature was lower than the historic record from December 2010 to March 2010 and from December 2010 to January 2011. Differences from the 30-year historic record for rainfall were also apparent (*Figure 3*). Rainfall totals in the spring were either higher than historic totals (May 2009 and March to May 2010) or much lower (March to May 2012). Totals during the summer and fall tended to follow the normal trend, but with both very wet (July 2009, August 2010 and 2011) and dry (September 2009, 2010, and 2011) months.

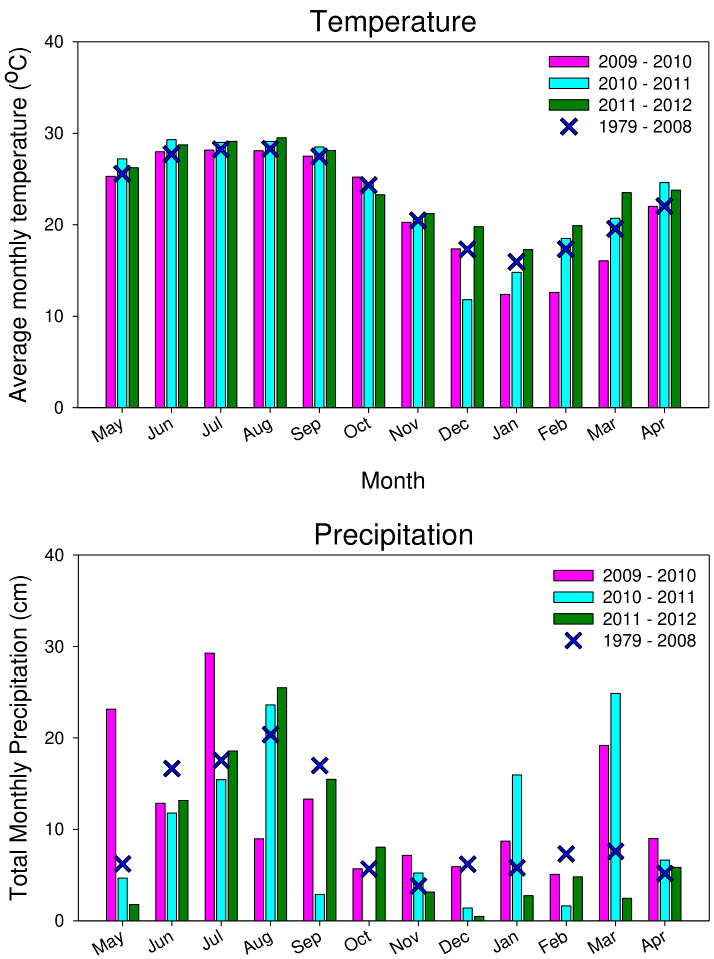

Figure 3. Temperature and total rainfall during the three years of the study (2009 - 2012) and during a thirty-year historical reference period (January 1979 to December 2008). Data are from Tampa International Airport (GHCND:USW00012842) and were downloaded from the National Climatic Data Center ((http://www.ncdc.noaa.gov/cdo-web/search

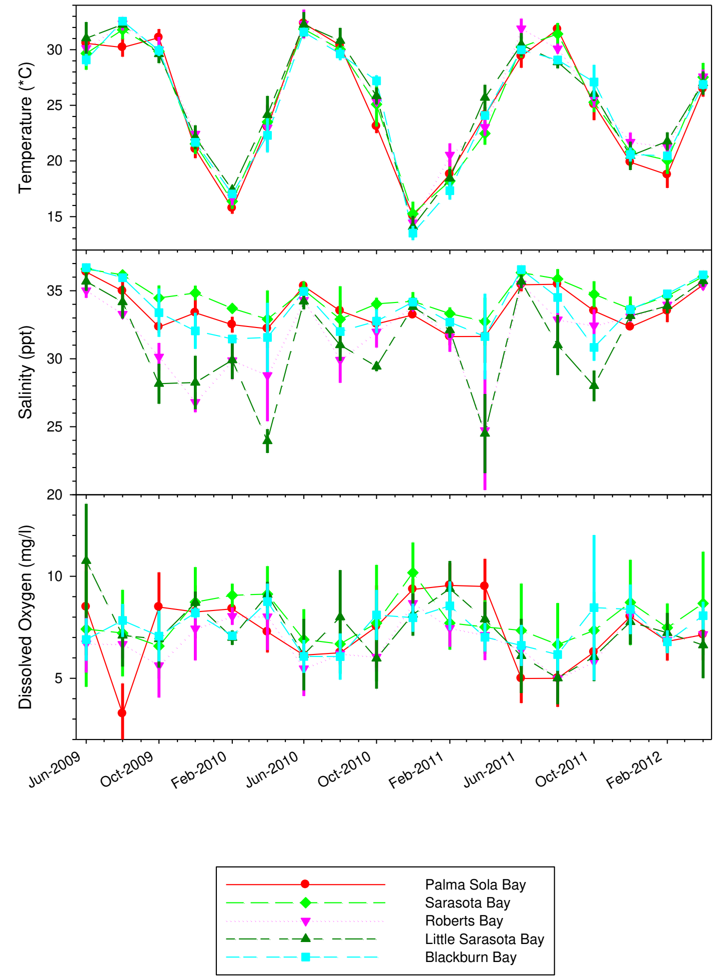

Figure 4. Mean (±standard deviation) water temperature, salinity, and dissolved oxygen (water column average) by embayment, from the nekton sampling in Sarasota Bay, June 2009-April 2012.

Throughout the three years of this study, average monthly water temperature in each of the five embayments showed very similar trends with little difference between embayments (*Figure 4*). Water temperature followed the typical Florida pattern, with the warmest temperatures during the summer months, decreasing temperatures during the fall and winter, and rising temperatures in the spring.

Each of the five embayments had similar salinity trends (*Figure 4*) but Little Sarasota and Roberts bays had a more obvious freshwater influence during each of the three years than the other three embayments. Salinity maxima occurred in June 2009, 2010 and 2011 in each of the embayments with average salinity values ranging from 34.3 to 37.0 ppt. In April of 2012, salinity was higher for all embayments than the previous two study years. Salinity was lowest in each embayment during April of 2010 and 2011, with two of the embayments (Roberts and Little Sarasota bays) having lower average salinity (<29 ppt) than the other three embayments (>31 ppt). In the third year of the study, salinity was lowest for Blackburn Bay and Little Sarasota Bay in October 2011 while the other three embayments had the lowest salinity in December 2011. Salinity minima occurring in April is not typical of Southwest Florida estuaries, in which salinity usually reaches its maximum annual values toward the end of the dry season (April – May). Rainfall totals, however, were unseasonably high in March of both 2010 and 2011 (*Figure 3*), with more than double the long-term average rainfall occurring each year. This unseasonably high rainfall is responsible for this atypical salinity pattern. In March 2012, rainfall totals were unseasonably low, seven to ten times lower than March 2010 and 2011 respectively and three times lower than the long-term average rainfall. These low rainfall totals resulted in higher salinity values during April 2012.

Water column average dissolved oxygen was above 5 mg/l in each of the embayments during the sampling period (*Figure 4*), except for Palma Sola Bay in August 2009 (3.3 mg/l). The highest average dissolved oxygen concentration (10.76 mg/l) occurred in Little Sarasota Bay in June 2009.

The climatic and physiochemical conditions experienced during this three-year study of Sarasota Bay were not typical compared to the longer-term average condition for Southwest Florida. January, February, and December 2010 had colder than average temperatures, with fish kills reported throughout Florida in January 2010. Unseasonably heavy winter/spring precipitation was experienced during both 2010 and 2011, likely resulting in lower than average salinity values in the study area during April of 2010 and 2011. The third year of the study had temperature averages closer to the long-term average and considerably less rainfall totals throughout the year.

Composition of overall nekton community

A total of 125,292 fishes (106 taxa) and selected invertebrates (5 taxa) were collected from 245 samples collected during the third year of this study (June 2011 and April 2012; *Table 2*). Species lists with the number of animals collected during year three of the study are provided by sampling event, gear and habitat strata, and embayment in *Appendix B*, *C*, and *D*, respectively. Sampling in Palma Sola Bay accounted for 17.1% of the total sampling effort, yet accounted for almost a third of the total number of animals collected (32.6%) during the third year of the study; more than half of the total catch in this embayment was bay anchovy collected during a single sampling event in October 2011. Sarasota Bay proper, in which almost 33% of the sets were made, accounted for 36.1% of the total animals collected during the study period (*Table 2*). The fewest number of animals (n=9,414, 7.5% of total catch) were collected in Roberts Bay.

Table 2. Summary of catch and effort for Sarasota Bay nekton sampling, June 2011 to April 2012.

	21.3-m seine		183-m haul seine		6.1-m otter trawl		Totals	
Bay Segment (Zone)	Animals	Hauls	Animals	Hauls	Animals	Hauls	Animals	Hauls
Palma Sola Bay (A)	38,701	30	1,886	6	207	6	40,794	42
Sarasota Bay (B)	38,626	46	5,059	12	1,483	24	45,168	82
Roberts Bay (C)	7,909	28	830	6	675	6	9,414	40
Little Sarasota Bay (D)	14,866	30	3,028	6	2,016	6	19,910	42
Blackburn Bay (E)	8,539	27	985	6	482	6	10,006	39
Totals	108,641	161	11,788	36	4,863	48	125,292	245

Bay anchovy (*Anchoa mitchilli*, n=61,714) was the most numerous taxon collected, representing 49.3% of the total catch (*Appendix B*, *C*, and *D*). Pinfish (*Lagodon rhomboides,* n=18,375) was the second most abundant taxon collected, accounting for an additional 14.7% of the total catch. These two taxa accounted for 63.9% of the total catch in Sarasota Bay. The 24 Selected Taxa (n=4,761 animals) that were collected comprised 3.8% of the total catch. Pink shrimp (*Farfantepenaeus duorarum,* n=1,988, 1.6% of total catch) and sand seatrout (*Cynoscion arenarius,* n=379, 0.3% of total catch) were the two most abundant Selected Taxa collected.

Shallow water habitats sampled with 21.3-m seines

A total of 108,641 animals, representing 86.7% of the overall catch, were collected from Sarasota Bay with 21.3-m seines (n=161 hauls; *Table 2*). Bay anchovy (*A. mitchilli*, n=61,307) was the most abundant taxon collected, accounting for 48.9% of the 21.3-m seine catch (*Table 3*). The taxa most frequently collected by 21.3-m seines were eucinostomus mojarra (*Eucinostomus* spp.*,* 81.4% occurrence) and pinfish (*L. rhomboides*, 69.6% occurrence). Animals collected by 21.3-m seines tended to be relatively small, ranging in length from 3 to 167 mm, with the mean length for each of the 10 dominant taxa ranging from 8 to 55 mm.

A total of 2,658 animals from 15 Selected Taxa were collected, representing 2.4% of the entire 21.3-m seine catch (*Table 4*). Pink shrimp (*F. duorarum,* n=1,917) was the most abundant Selected Taxon, accounting for 41.8% of the Selected Taxa collected by this gear and were the most frequently collected Selected Taxa (60.9% occurrence).

Table 3. Catch statistics for 10 dominant taxa collected in 161 21.3-m bay seine samples during Sarasota Bay stratified-random sampling, 2012. Percent (%) is the percent of the total catch represented by that taxon; percent occurrence (% Occur) is the percentage of samples in which that taxon was collected; CV is the coefficient of variation of the mean. Taxa are ranked in order of decreasing mean density.

Species	Number		% Occur	Catch-per-unit-effort (animals•100m^{-2})				Standard Length (mm)			
	No.	%		Mean	Stderr	CV	Max	Mean	Stderr	Min	Max
Anchoa mitchilli	61,307	56.4	19.9	271.99	120.88	563.91	15,405.71	32	0.02	20	57
Eucinostomus spp.	14,757	13.6	81.4	65.47	8.11	157.22	680.00	25	0.06	8	40
Lagodon rhomboides	10,778	9.9	69.6	47.82	7.37	195.67	631.43	38	0.16	11	167
Lucania parva	8,107	7.5	35.4	35.97	12.95	456.71	1,689.29	24	0.04	12	36
Menidia spp.	2,586	2.4	18.6	11.47	4.27	472.64	537.14	41	0.24	18	80
Farfantepenaeus duorarum	1,917	1.8	60.9	8.50	2.99	445.53	459.29	8	0.09	3	27
Bairdiella chrysoura	1,788	1.6	24.2	7.93	2.63	420.94	319.29	54	0.42	5	158
Eucinostomus gula	1,289	1.2	62.1	5.72	0.78	173.52	77.86	55	0.35	40	105
Orthopristis chrysoptera	1,190	1.1	27.3	5.28	1.51	361.85	152.86	35	0.39	15	116
Microgobius gulosus	877	0.8	42.9	3.89	1.10	359.44	135.00	29	0.21	11	51
Subtotal	104,596	96.3	.	.	.	.	.	.	.	3	167
Totals	**108,641**	**100.0**	**.**	**481.99**	**124.76**	**328.45**	**15,640.71**	**.**	**.**	**3**	**394**

Table 4. Catch statistics for Selected Taxa collected in 161 21.3-m bay seine samples during Sarasota Bay stratified-random sampling, 2012. Percent (%) is the percent of the total catch represented by that taxon; percent occurrence (% Occur) is the percentage of samples in which that taxon was collected; CV is the coefficient of variation of the mean. Taxa are ranked in order of decreasing mean density.

Species	Number		% Occur	Catch-per-unit-effort (animals•100m^{-2})				Standard Length (mm)			
	No.	%		Mean	Stderr	CV	Max	Mean	Stderr	Min	Max
Farfantepenaeus duorarum	1,917	1.8	60.9	8.50	2.99	445.53	459.29	8	0.09	3	27
Cynoscion nebulosus	148	0.1	19.9	0.66	0.16	301.37	15.00	43	1.66	15	142
Sciaenops ocellatus	126	0.1	8.7	0.56	0.30	677.90	40.71	25	2.14	12	237
Leiostomus xanthurus	116	0.1	13.0	0.51	0.20	489.29	24.29	34	2.24	15	193
Mugil gyrans	104	0.1	2.5	0.46	0.42	1,149.57	67.14	66	1.63	16	86
Lutjanus griseus	63	0.1	14.9	0.28	0.10	452.82	13.57	45	5.52	11	230
Archosargus probatocephalus	42	0.0	10.6	0.19	0.09	605.38	13.57	48	10.01	13	250
Lutjanus synagris	40	0.0	4.3	0.18	0.11	761.08	14.29	36	2.06	17	58
Callinectes sapidus	33	0.0	12.4	0.15	0.04	304.28	2.86	33	5.69	8	175
Mugil cephalus	24	0.0	5.6	0.11	0.05	567.30	5.71	47	15.24	20	296
Paralichthys albigutta	18	0.0	8.1	0.08	0.02	360.48	1.43	118	18.40	18	228
Cynoscion arenarius	18	0.0	1.9	0.08	0.07	1,131.37	11.43	37	3.14	21	89
Trachinotus falcatus	5	0.0	1.2	0.02	0.02	912.34	2.14	76	15.10	42	110
Centropomus undecimalis	3	0.0	1.2	0.01	0.01	943.38	1.43	234	106.91	31	394
Elops saurus	1	0.0	0.6	0.00	0.00	1,268.86	0.71	245	.	245	245
Totals	**2,658**	**2.5**	**79.5**	**11.79**	**3.24**	**348.76**	**487.14**	**.**	**.**	**3**	**394**

Nearshore habitats sampled with 183-m haul seines

A total of 11,788 animals were collected with 183-m haul seines (n=36 hauls), representing 9.4% of the overall catch (*Table 2*). Pinfish (*L. rhomboides*, n=6,707) was the most abundant taxon collected, accounting for 56.9% of the total catch (*Table 5*). Pinfish were also the most frequently collected taxon, occurring in 94.4% of 183-m haul seine sets. Animals collected with 183-m haul seines tended to be much larger (mean size 182.2 mm) than those collected with either 21.3-m seines (34.1 mm) or 6.1-m otter trawls (52.4 mm).

A total of 1,214 animals from 20 Selected Taxa were collected, representing 10.3% of the entire 183-m haul seine catch (*Table 6*). Common snook (*Centropomus undecimalis)* (n=281) was the most abundant Selected Taxon, accounting for 23.1% of the Selected Taxa collected by this gear. Common snook (*C. undecimalis*) and sheepshead (*Archosargus probatocephalus*) were the most frequently collected Selected Taxa (60.1% occurrence) followed by ladyfish (*Elops saurus*) and spot (*Leiostomus xanthurus*), which occurred in 50% and 41.7% of the hauls respectively.

Table 5. Catch statistics for 10 dominant taxa collected in 36 183-m haul seine samples during Sarasota Bay stratified-random sampling, 2012. Percent (%) is the percent of the total catch represented by that taxon; percent occurrence (% Occur) is the percentage of samples in which that taxon was collected; CV is the coefficient of variation of the mean. Taxa are ranked in order of decreasing mean catch-per-unit-effort.

Species	Number		% Occur	Catch-per-unit-effort (animals/haul)				Standard Length (mm)			
	No.	%		Mean	Stderr	CV	Max	Mean	Stderr	Min	Max
Lagodon rhomboides	6,707	56.9	94.4	186.31	45.03	145.02	1,399.00	103	0.38	51	192
Orthopristis chrysoptera	1,271	10.8	58.3	35.31	23.19	394.05	834.00	134	0.64	62	219
Bairdiella chrysoura	511	4.3	38.9	14.19	8.02	338.92	272.00	127	0.65	62	183
Eucinostomus gula	406	3.4	77.8	11.28	2.78	147.87	74.00	81	0.44	50	121
Opisthonema oglinum	324	2.7	8.3	9.00	8.42	561.01	303.00	144	0.71	87	155
Centropomus undecimalis	281	2.4	61.1	7.81	1.89	145.13	41.00	419	6.55	138	826
Diplodus holbrookii	247	2.1	11.1	6.86	5.31	464.19	186.00	74	0.54	50	105
Ariopsis felis	196	1.7	47.2	5.44	2.01	221.65	62.00	259	4.41	126	520
Elops saurus	174	1.5	50.0	4.83	2.80	347.21	99.00	261	2.85	109	410
Archosargus probatocephalus	161	1.4	61.1	4.47	1.05	140.66	21.00	220	4.11	62	340
Subtotal	10,278	87.2	.	.	.	.	.	.	.	50	826
Totals	**11,788**	**100.0**	**.**	**327.44**	**70.95**	**130.00**	**1,907.00**	**.**	**.**	**15**	**826**

Table 6. Catch statistics for Selected Taxa collected in 36 183-m haul seine samples during Sarasota Bay stratified-random sampling, 2012. Percent (%) is the percent of the total catch represented by that taxon; percent occurrence (% Occur) is the percentage of samples in which that taxon was collected; CV is the coefficient of variation of the mean. Taxa are ranked in order of decreasing mean catch-per-unit-effort.

Species	Number		% Occur	Catch-per-unit-effort (animals/haul)				Standard Length (mm)			
	No.	%		Mean	Stderr	CV	Max	Mean	Stderr	Min	Max
Centropomus undecimalis	281	2.4	61.1	7.81	1.89	145.13	41.00	419	6.55	138	826
Elops saurus	174	1.5	50.0	4.83	2.80	347.21	99.00	261	2.85	109	410
Archosargus probatocephalus	161	1.4	61.1	4.47	1.05	140.66	21.00	220	4.11	62	340
Leiostomus xanthurus	143	1.2	41.7	3.97	1.18	177.96	27.00	151	3.59	71	222
Mugil cephalus	83	0.7	58.3	2.31	0.57	148.75	15.00	333	6.08	135	420
Mugil curema	83	0.7	47.2	2.31	0.94	243.78	29.00	231	3.76	118	294
Mugil gyrans	53	0.4	22.2	1.47	0.84	343.48	29.00	203	6.01	98	266
Lutjanus griseus	43	0.4	30.6	1.19	0.50	250.62	11.00	153	5.97	96	235
Cynoscion nebulosus	43	0.4	33.3	1.19	0.52	261.57	16.00	208	10.86	66	422
Paralichthys albigutta	32	0.3	44.4	0.89	0.26	175.89	8.00	229	14.70	90	473
Pogonias cromis	29	0.2	22.2	0.81	0.37	274.90	12.00	259	11.04	171	445
Sciaenops ocellatus	28	0.2	27.8	0.78	0.33	257.35	10.00	367	20.04	52	615
Lutjanus synagris	20	0.2	5.6	0.56	0.39	420.37	11.00	105	2.59	88	130
Micropogonias undulatus	15	0.1	11.1	0.42	0.24	346.01	7.00	221	6.45	168	271
Callinectes sapidus	13	0.1	25.0	0.36	0.13	210.93	3.00	108	8.67	40	147
Menticirrhus americanus	4	0.0	2.8	0.11	0.11	600.00	4.00	213	16.36	170	242
Farfantepenaeus duorarum	3	0.0	8.3	0.08	0.05	336.37	1.00	21	4.70	15	30
Trachinotus carolinus	3	0.0	5.6	0.08	0.06	442.07	2.00	272	26.34	231	321
Scomberomorus maculatus	2	0.0	2.8	0.06	0.06	600.00	2.00	310	68.00	242	378
Cynoscion arenarius	1	0.0	2.8	0.03	0.03	600.00	1.00	180	.	180	180
Totals	**1,214**	**10.3**	**100.0**	**33.72**	**6.48**	**115.24**	**212.00**	**.**	**.**	**15**	**826**

Deeper-water habitats sampled with 6.1-m otter trawls

A total of 4,863 animals were collected in 6.1-m otter trawls (n=48 hauls), representing 3.9% of the overall catch (*Table 2*). Pinfish (*L. rhomboides*, n=890, 18.3% of total catch) was the most abundant taxon collected (*Table 7*). The taxon most frequently collected with 6.1-m otter trawls was also pinfish (*L. rhomboides*), which occurred in over 77.1% of the trawl samples. Trawl collected animals tended to be similar in size to those collected with 21.3-m seines and smaller than those collected with 183-m haul seines.

Eleven Selected Taxa (889 animals, 18.3% of the entire trawl catch) were collected with 6.1-m otter trawls (*Table 8*). Sand seatrout (*C. arenarius* n = 360) accounted for 40.5% of the Selected Taxa collected. Blue crab (*Callinectes sapidus,* n=200, 22.5% occurrence) was the second most abundant taxon. The Selected Taxon most frequently collected was stone crab (*Menippe* spp.) which occurred in almost 50% of the trawl collections.

Table 7. Catch statistics for 10 dominant taxa collected in 48 bay 6.1-m otter trawl samples during Sarasota Bay stratified-random sampling, 2012. Percent (%) is the percent of the total catch represented by that taxon; percent occurrence (% Occur) is the percentage of samples in which that taxon was collected; CV is the coefficient of variation of the mean. Taxa are ranked in order of decreasing mean density.

Species	Number		% Occur	Catch-per-unit-effort (animals•100m^{-2})				Standard Length (mm)			
	No.	%		Mean	Stderr	CV	Max	Mean	Stderr	Min	Max
Lagodon rhomboides	890	18.3	77.1	1.33	0.45	235.73	17.54	81	0.98	14	184
Bairdiella chrysoura	728	15.0	14.6	1.03	0.92	619.19	44.32	64	0.69	29	197
Orthopristis chrysoptera	574	11.8	58.3	0.86	0.33	264.13	11.67	76	1.59	20	197
Eucinostomus spp.	510	10.5	27.1	0.73	0.34	322.77	13.29	28	0.26	12	39
Anchoa mitchilli	407	8.4	6.3	0.60	0.50	576.56	23.43	38	0.18	33	52
Cynoscion arenarius	360	7.4	6.3	0.51	0.50	680.38	23.88	64	1.46	20	222
Eucinostomus gula	200	4.1	43.8	0.31	0.10	217.11	3.51	76	0.90	41	111
Callinectes sapidus	200	4.1	45.8	0.29	0.12	287.57	5.46	52	2.62	8	198
Menippe spp.	104	2.1	50.0	0.16	0.04	156.71	1.08	32	1.86	7	91
Farfantepenaeus duorarum	68	1.4	35.4	0.10	0.04	317.93	1.75	13	0.50	6	23
Subtotal	4,041	83.1	.	.	.	.	.	.	.	6	222
Totals	**4,863**	**100.0**	**.**	**7.13**	**2.14**	**208.13**	**84.59**	**.**	**.**	**6**	**453**

Table 8. Catch statistics for Selected Taxa collected in 48 bay 6.1-m otter trawl samples during Sarasota Bay stratified-random sampling, 2012. Percent (%) is the percent of the total catch represented by that taxon; percent occurrence (% Occur) is the percentage of samples in which that taxon was collected; CV is the coefficient of variation of the mean. Taxa are ranked in order of decreasing mean density.

Species	**Number**		**% Occur**	**Catch-per-unit-effort (animals•100m^{-2})**				**Standard Length (mm)**			
	No.	**%**		**Mean**	**Stderr**	**CV**	**Max**	**Mean**	**Stderr**	**Min**	**Max**
Cynoscion arenarius	360	7.4	6.3	0.51	0.50	680.38	23.88	64	1.46	20	222
Callinectes sapidus	200	4.1	45.8	0.29	0.12	287.57	5.46	52	2.62	8	198
Menippe spp.	104	2.1	50.0	0.16	0.04	156.71	1.08	32	1.86	7	91
Farfantepenaeus duorarum	68	1.4	35.4	0.10	0.04	317.93	1.75	13	0.50	6	23
Paralichthys albigutta	57	1.2	47.9	0.08	0.02	151.04	0.54	179	7.20	85	314
Leiostomus xanthurus	36	0.7	12.5	0.05	0.03	383.51	1.14	153	3.55	94	190
Archosargus probatocephalus	19	0.4	8.3	0.03	0.02	377.16	0.63	157	11.81	24	219
Lutjanus synagris	16	0.3	14.6	0.02	0.01	374.86	0.57	95	8.61	27	134
Cynoscion nebulosus	15	0.3	8.3	0.02	0.02	550.88	0.81	98	16.81	41	257
Lutjanus griseus	7	0.1	6.3	0.01	0.01	497.67	0.34	148	19.98	39	207
Menticirrhus americanus	7	0.1	6.3	0.01	0.01	451.76	0.28	115	34.55	26	295
Totals	**889**	**18.3**	**89.6**	**1.29**	**0.67**	**361.07**	**32.31**	**.**	**.**	**6**	**314**

Species Profiles

The following sections provide profiles on various abundant and frequently occurring species in terms of annual and seasonal abundance, sizes collected, spatial distribution, and bottom habitat preference. Species included in these profiles are numerically dominant or economically important (i.e., recreationally or commercially fished species, such as spotted seatrout [*Cynoscion nebulosus*], common snook [*C. undecimalis*] and pink shrimp [*Farfantepenaeus duorarum]).* Summary statistics of catch for the three completed years of this study are included in *Appendices E*, *F* and *G* for the 21.3-m seines, 183-m haul seines and 6.1-m otter trawls, respectively. Summary graphs for all taxa that were identified to species, had at least a 15% occurrence, and for which 175 or more individuals were collected during bi-monthly sampling in Sarasota Bay between June 2009 and April 2012 are provided in *Appendices H*, *I* and *J*. The abundance and size distribution results presented in these appendices and in the following species profiles are based on a limited time series (three years of bi-monthly sampling) with a relatively small sample size, so there is considerable variability in the data.

Pink shrimp, *Farfantepenaeus duorarum*

Pink shrimp range from the Chesapeake Bay to the Yucatan Peninsula and are of great commercial importance, especially in the Gulf of Mexico (*Carpenter 2002*). Catches in Florida were valued at nearly $21M in 2005 (FWRI, unpublished data). They spawn offshore and enter estuaries as postlarvae (*Allen et al. 1980*). They probably use selective tidal stream transport (i.e., ascend into the water column on flood tides and descend towards the substrate on ebb tides [*Hughes 1969*]) to recruit to nursery grounds. Different life stages of pink shrimp exhibit a broad range of salinity tolerance, although salinities from approximately 12 to 45 ppt seem to be preferred (*Pattillo et al. 1997*).

Pink shrimp did not comprise a large proportion of the catch in the 183-m haul seines (*Appendix F*) but were commonly collected in 21.3-m seines (54.9% of the hauls, *Appendix E*) and collected occasionally in 6.1-m otter trawls (35.4%, *Appendix G*). Pink shrimp collected in 21.3-m seines tended to be smaller (mean post-orbital head length of 8 mm; *Figure 5*) than those collected in 6.1-m otter trawls (13 mm; *Figure 6*). In the shallow water habitats sampled with the 21.3-m seine abundance of pink shrimp was higher during June and October than in the other months (*Figure 5*). Pink shrimp in shallow water habitats were more abundant in the vegetated areas of Little Sarasota and Blackburn bays (*Figure 5*). Although mean abundance in the deeper water sampled with 6.1-m otter trawls was higher in February, June and October, and in Roberts and Little Sarasota bays, variability in the abundance estimates was too high to discern any real trends (*Figure 6*).

Farfantepenaeus duorarum (pink shrimp)
21.3-m seine

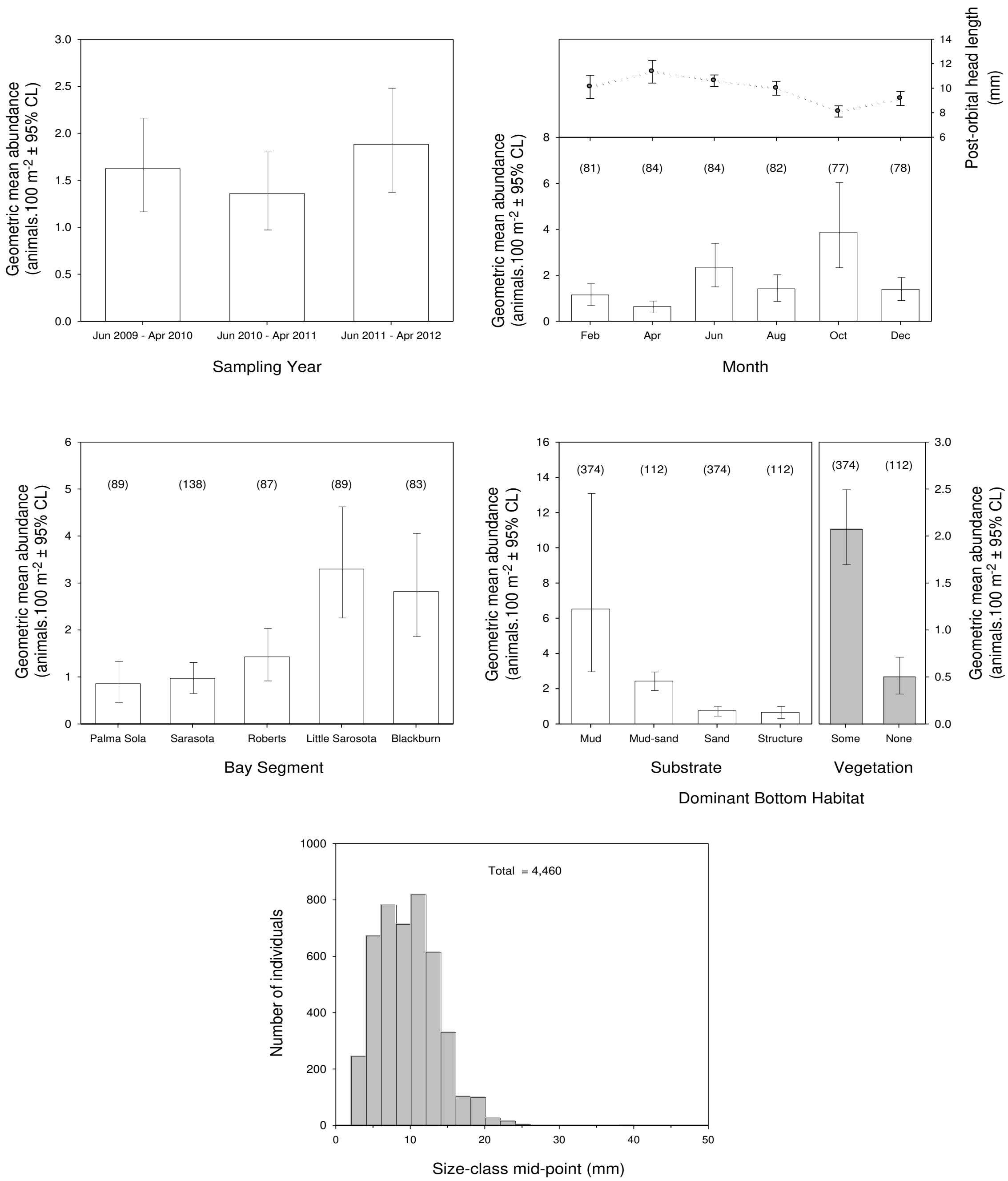

Figure 5. Relative abundance and length-frequency distribution of pink shrimp collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Farfantepenaeus duorarum (pink shrimp)
6.1-m otter trawl

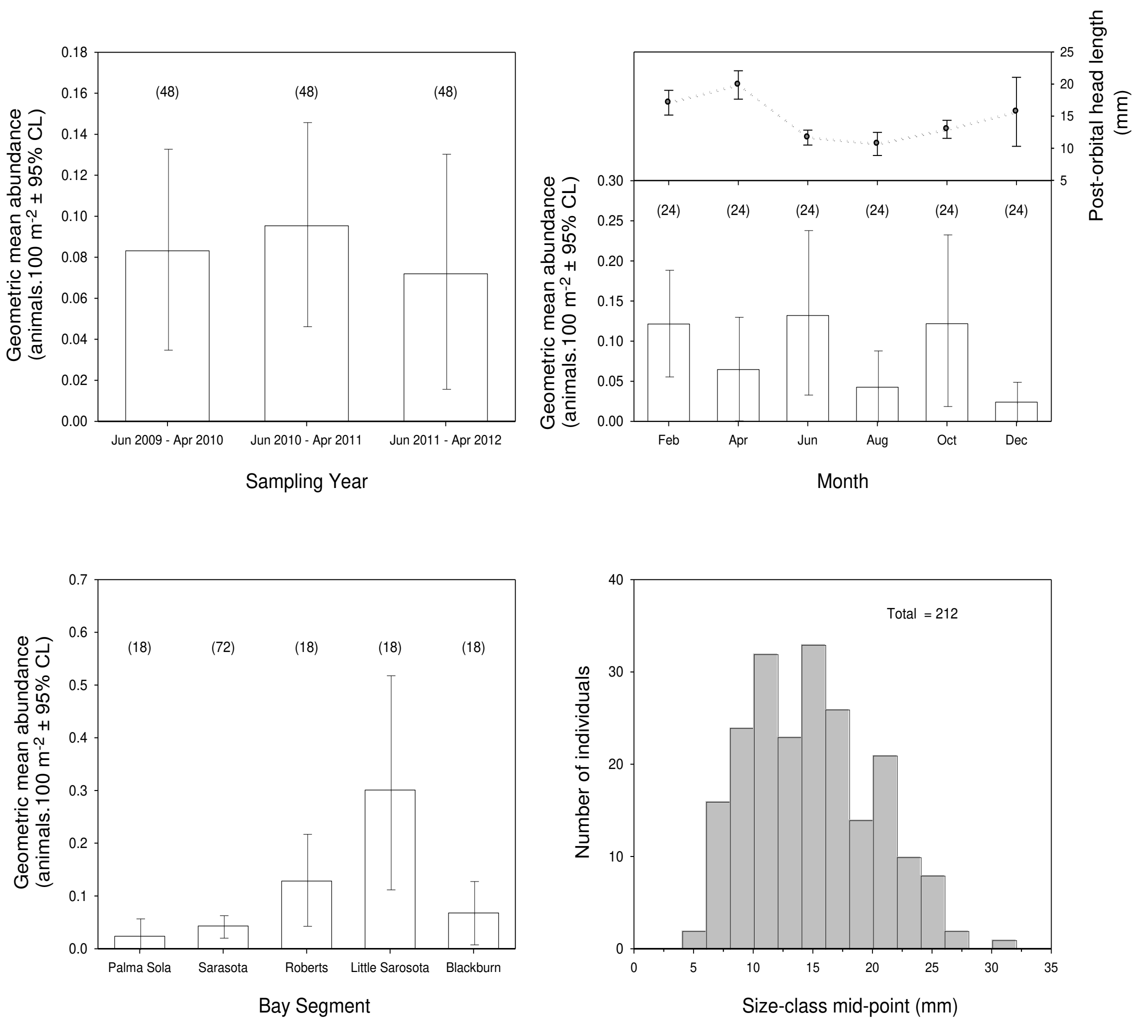

Figure 6. Relative abundance and length-frequency distribution of pink shrimp collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Blue crab, *Callinectes sapidus*

Blue crabs occur in the western Atlantic from Canada to Argentina, including Bermuda and the Antilles, and have been successfully introduced in Europe and Japan (*Carpenter 2002*). This species supports large commercial fisheries in Florida, valued at nearly $12M in 2005 (FWRI, unpublished data), and is an important predator and prey species in inshore waters (*Steele and Bert 1994*). Blue crabs are transients in estuaries: spawning and larval development occur in marine waters, but juveniles and adults spend most of their time in estuaries (*Steele and Bert 1994*). Larval blue crabs recruiting into the estuary and adult females leaving the estuary to spawn use selective tidal stream transport (*Olmi 1994*; *Tankersley et al. 1998*). Chemical cues emanating from estuarine and freshwater watersheds promote settlement by triggering metamorphosis in larvae (*Wolcott and De Vries 1994*; *Forward et al. 1994* and *1997*). Blue crabs tolerate salinities from freshwater to at least 50 ppt. Optimal salinities differ among life-history stages: 12–36 ppt for larvae, 2–21 ppt for juveniles, less than 10 ppt for adult males, and 23–33 ppt for egg-bearing females (*Pattillo et al. 1997*).

Blue crabs were collected in all three gear types deployed during this study (*Appendix E*, *F*, and *G*), but were only commonly collected and abundant in collections made with the 6.1-m otter trawl (*Appendix G*). In deeper-water habitats sampled with 6.1-m otter trawls, blue crabs had their highest abundance in February with a relatively steady decline through the remainder of the year (*Figure 7*). Blue crabs were collected from each of the embayments sampled with the 6.1-m otter trawl but were more abundant in Little Sarasota Bay and least abundant in Sarasota Bay proper. Sizes captured with 6.1-m otter trawls ranged from 8 mm to 198 mm carapace width (CW) with a mean of 52mm CW.

Callinectes sapidus (blue crab)
6.1-m otter trawl

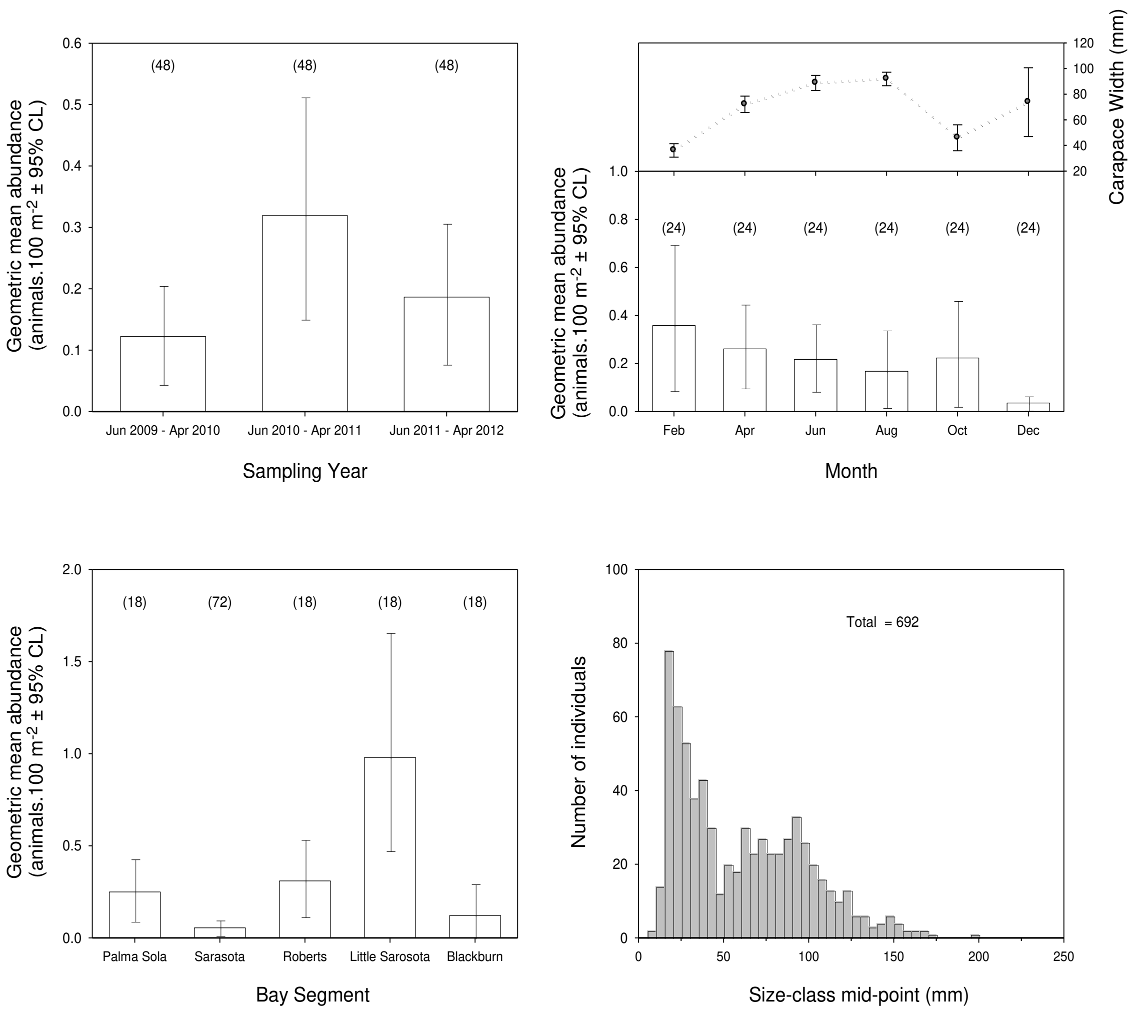

Figure 7. Relative abundance and length-frequency distribution of blue crab collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Ladyfish, *Elops saurus*

Ladyfish inhabit estuarine and nearshore waters throughout Florida. Larval and juvenile ladyfish can be found in a variety of nearshore habitats, including coastal beaches, canals, rivers, and mosquito impoundments (*Gilmore et al. 1982*; *McBride et al. 2001*). Length-frequency analysis suggests that ladyfish grow to 200 – 300 mm standard length by age 1. Their diet consists mainly of fish with decapod crustaceans being of secondary importance (*Darnell 1958*; *Sekavec 1974*). Florida landings were just over 1 million pounds in 2007 with over 75% being landed by the commercial fishery (*FWC-FWRI 2008*).

Ladyfish were captured with both 21.3-m and 183-m haul seines during this study (*Appendices E* and *F*, respectively). They were only common and abundant, however, in the larger seine where they comprised 6.9% of the total catch (n=357) and occurred in 45.8% of the hauls (*Appendix F*. The majority of captured ladyfish were between 225 and 300 mm SL (*Figure 8*), with the largest ladyfish collected measuring 410 mm SL. Variability in abundance data was too high to discern spatial or temporal patterns.

Elops saurus (ladyfish)
183-m haul seine

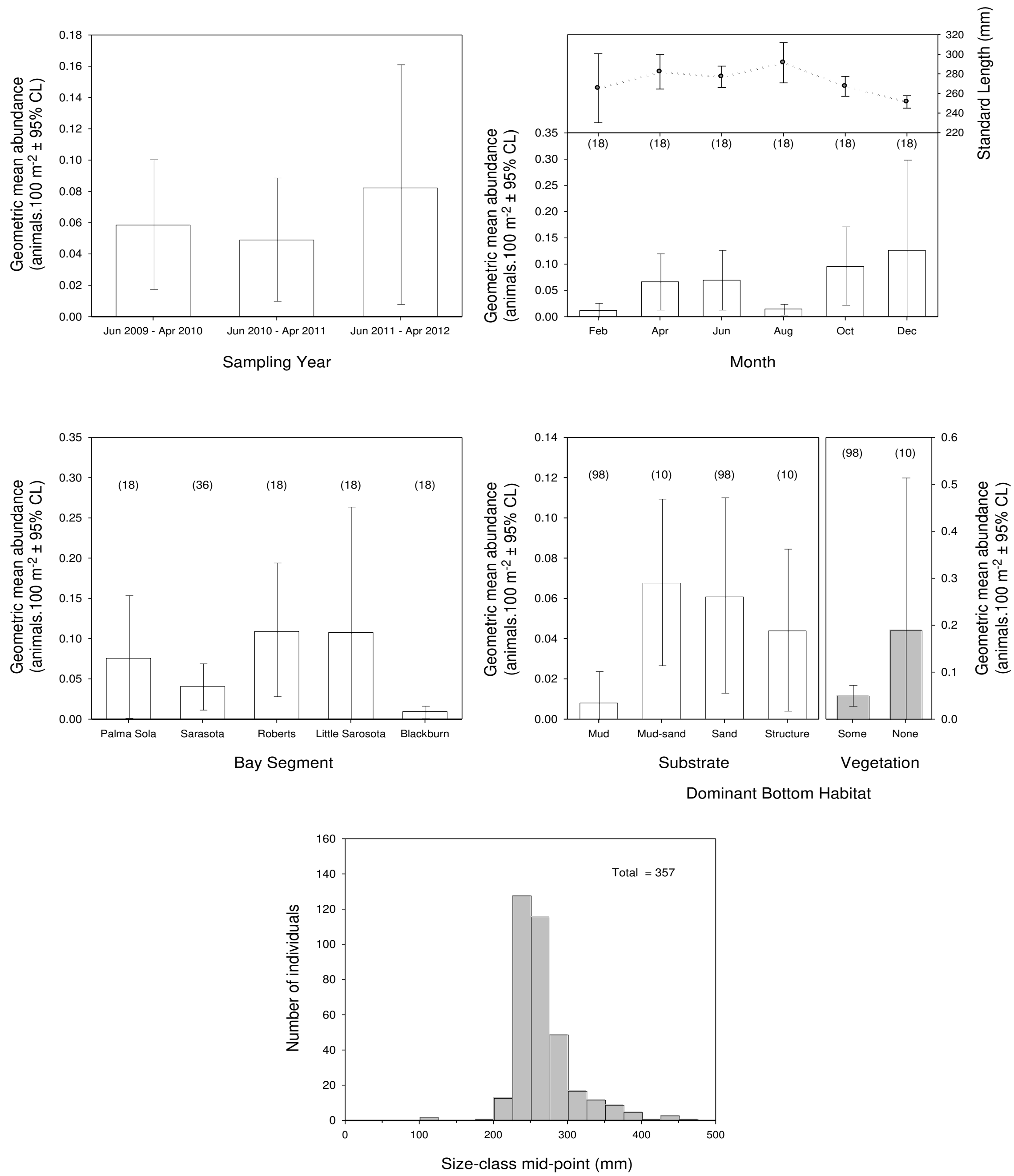

Figure 8. Relative abundance and length-frequency distribution of ladyfish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Bay anchovy, *Anchoa mitchilli*

Bay anchovies range from Maine to the Yucatan Peninsula and are of great importance in estuarine food chains due to their trophic position, small size, and extreme abundance (*Pattillo et al. 1997*; *Carpenter 2002*). They spawn in nearshore marine waters and estuaries (*Peebles et al. 1996*; *Pattillo et al. 1997*). Larvae use selective tidal stream transport to travel to upstream nursery areas (*Schultz et al. 2003*). Although each life stage of bay anchovy exhibits a broad range of salinity tolerance (*Pattillo et al. 1997*), each tends to distribute differently in relation to salinity: spawning adults, eggs, and newly hatched larvae are found at higher salinities than are later-stage larvae and juveniles (*Peebles et al. 1991*).

Bay anchovies were collected in 21.3-m seine and 6.1-m otter trawl hauls (*Appendices E* and *G*, respectively), but not in 183-m haul seines (*Appendix F*). They were only abundant and frequently collected in 21.3-m seine hauls in which they comprised 40.6% (n= 132,610) of the total catch and were present in 27.8% of hauls (*Appendices E*). Monthly abundance and lengths of bay anchovies collected from shallow water 21.3-m seine hauls were very consistent with the exception of February, which had the smallest mean length (27.2 mm SL) and lowest abundance (0.478 animals•100m^{-2}) of any sampled month (*Figure 9*). Bay anchovies were less abundant in Palma Sola, Sarasota, and Blackburn bays than in Roberts and Little Sarasota bays. Bay anchovies collected in 21.3-m seines ranged in size from 20 to 57 mm SL, with a mean at 32 mm SL.

Anchoa mitchilli (bay anchovy)
21.3-m seine

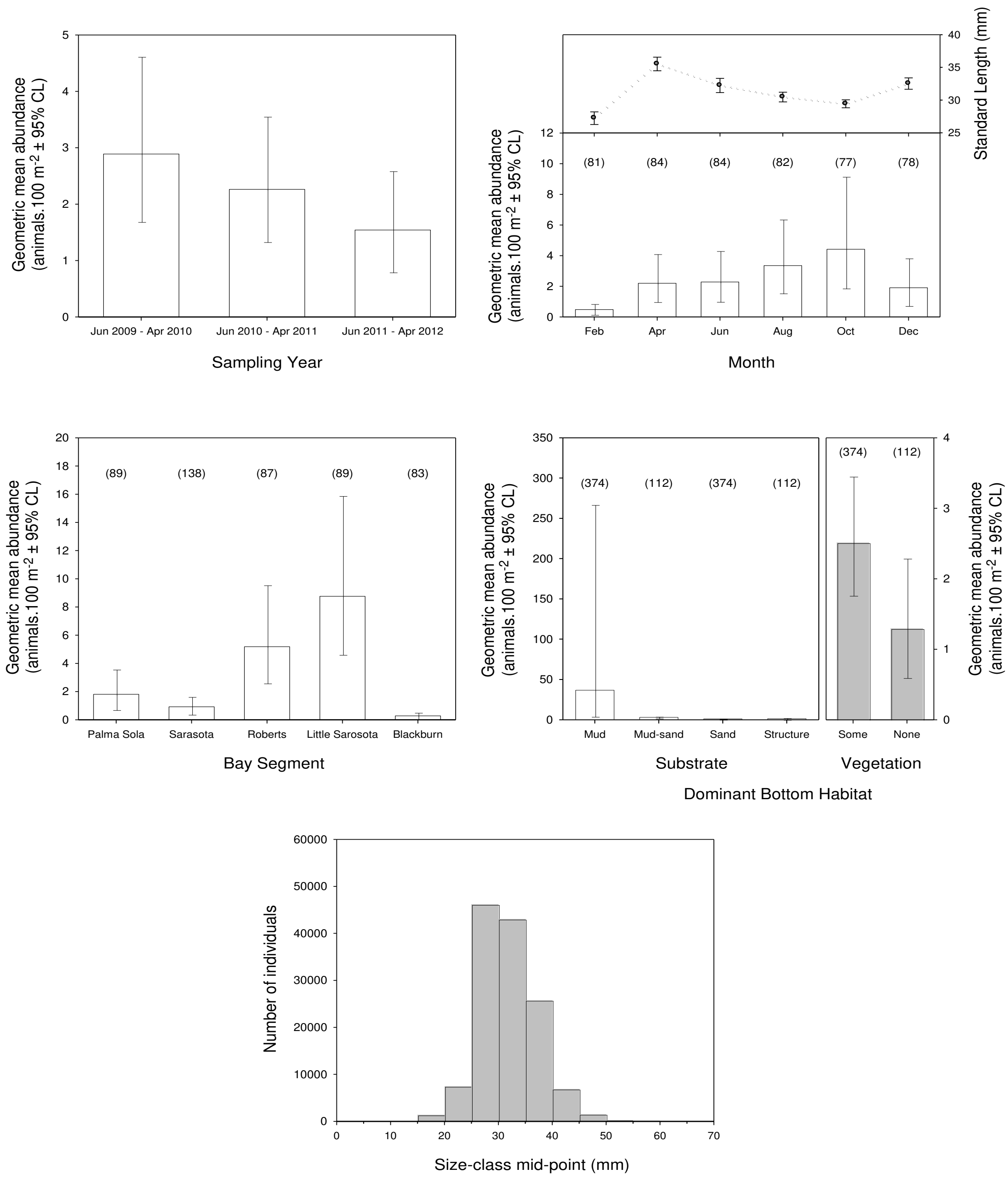

Figure 9. Relative abundance and length-frequency distribution of bay anchovy collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Common snook, *Centropomus undecimalis*

Common snook occur in tropical and subtropical estuarine systems of the western Atlantic (*Rivas 1986*). In Florida, they occur principally from Cape Canaveral on the Atlantic coast southward around the peninsula to Cedar Key on the Gulf of Mexico coast (*Taylor et al. 2000*). Common snook are popular sport fish that support a large recreational fishery throughout much of coastal south and central Florida (*Muller and Taylor 2002*). Spawning occurs primarily in ocean passes and secondary embayments (*Taylor et al. 1998*). Small juveniles are found in quiet shallow-water creeks, canals, and lagoons in both low-salinity (riverine) and high-salinity (mangrove and saltmarsh) environments (*McMichael et al. 1989*; *Peters et al. 1998*). As juvenile common snook grow to about 150 mm SL, marked changes in their tolerance of high temperature and low dissolved oxygen occur (*Peterson and Gilmore 1991*), and juveniles are no longer abundant at the sites described above. Larger juveniles and adult common snook are found in a wide variety of estuarine habitats.

Common snook were not collected in 6.1-m otter trawls (*Appendix G*), were rarely collected in 21.3-m seines (*Appendix E*), but were encountered in 50.0% of the 183-m haul seine sets (*Appendix F*). There were no obvious seasonal trends in common snook abundance (*Figure 10*) probably the result of low sample size (6 hauls per sampling event). Common snook had slightly higher abundance in samples over seagrass, but the number of hauls over unvegetated bottom types was very low. Common snook collected in 183-m haul seines ranged in size from 138 to 826 mm SL with a mean at 419 mm SL.

Centropomus undecimalis (common snook)
183-m haul seine

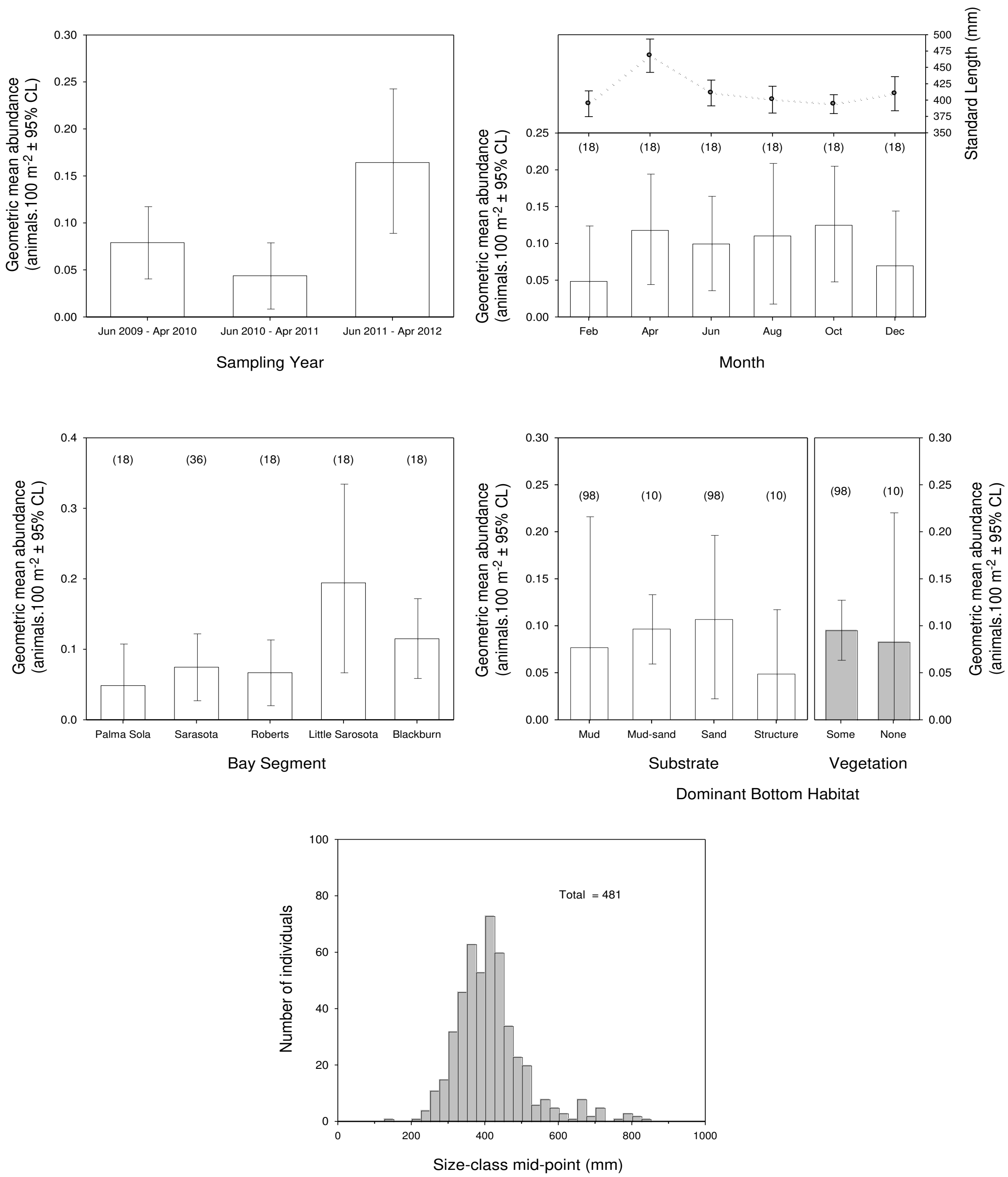

Figure 10. Relative abundance and length-frequency distribution of common snook collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Gray snapper, *Lutjanus griseus*

Gray snapper are a reef species found along the western Atlantic from Massachusetts south to Rio de Janeiro, Brazil. Adults spawn during summer (June–September) near areas of bottom structure in offshore waters (*Stark 1971*; *Domeier and Colin 1997*). Juvenile gray snapper recruit to estuarine areas including seagrass beds and mangrove shorelines (*Nagelkerken et al. 2000*; *Cocheret de la Moriniere et al. 2002*; *Serafy et al. 2003*; *Whaley et al. 2007*; *Faunce and Serafy 2008*) where they typically spend the first year or two of their lives. Juvenile gray snapper feed primarily on penaeid shrimp and crabs (*Rutherford et al.1989*) and adults feed on fish, shrimp, and crabs (*Harrigan et al. 1989*; *Hettler 1989*). Gray snapper are an economically important species with Florida landings totaling 2,230,737 pounds in 2007 (*FWC-FWRI 2008*).

Gray snapper were collected in all three gear types deployed in Sarasota Bay, but were more frequently collected by 21.3-m (17.5%; *Appendix E*) and 183-m (30.6%; *Appendix F*) seines than with the 6.1-m otter trawl (8.3%; *Appendix G*). The 21.3-m seine collected smaller gray snapper (mean at 45 mm SL; *Figure 11*) than did the 183-m haul seine (mean at 153 mm SL; *Figure 12*). Gray snapper were absent from collections made with both seine types in February, and were present in very low abundance during April. With both seine types, gray snapper were less abundant in Palma Sola Bay than any of the other embayments and had much higher abundance in collections at sites with some bottom vegetation.

Lutjanus griseus (gray snapper)
21.3-m seine

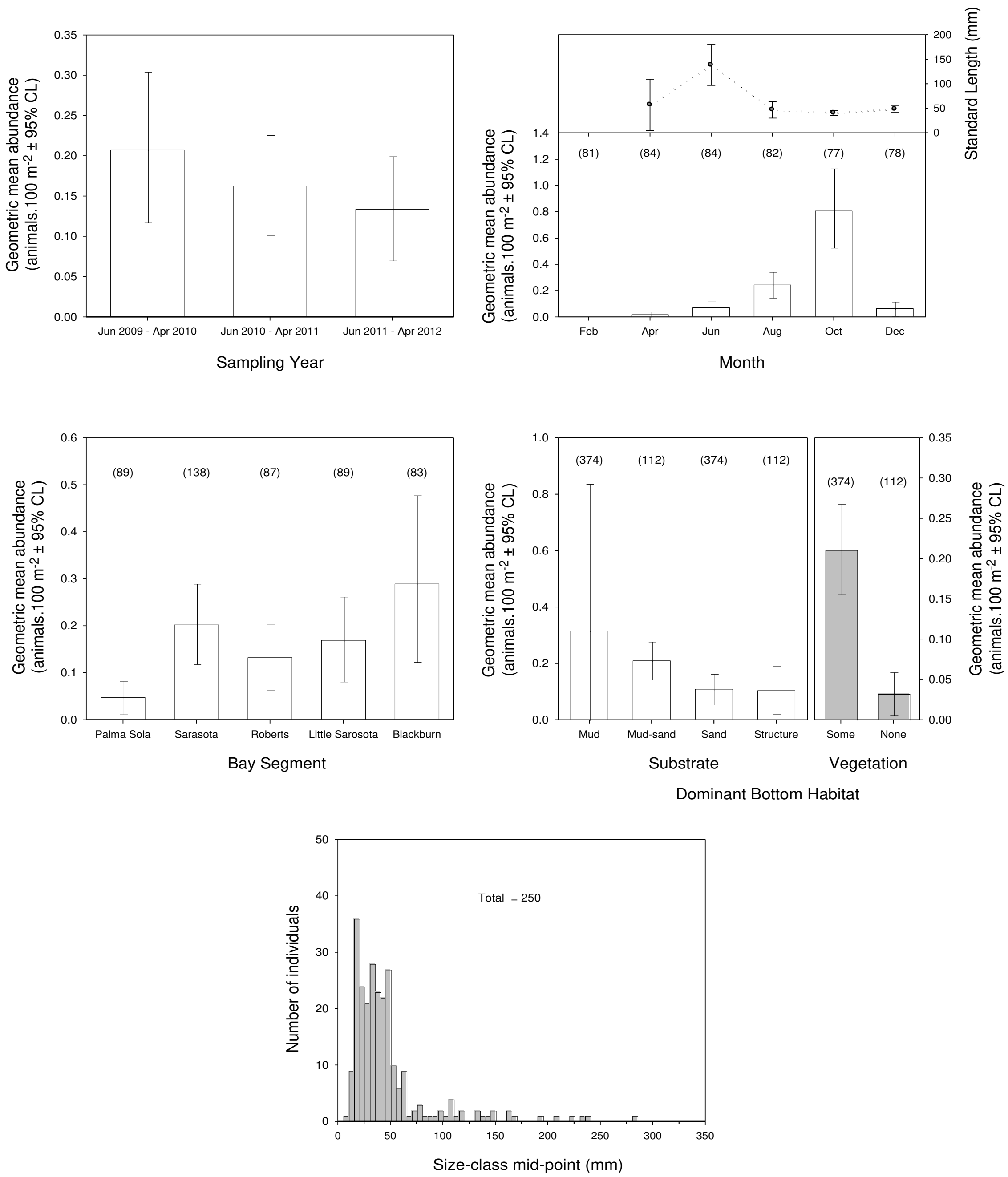

Figure 11. Relative abundance and length-frequency distribution of gray snapper collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lutjanus griseus (gray snapper)
183-m haul seine

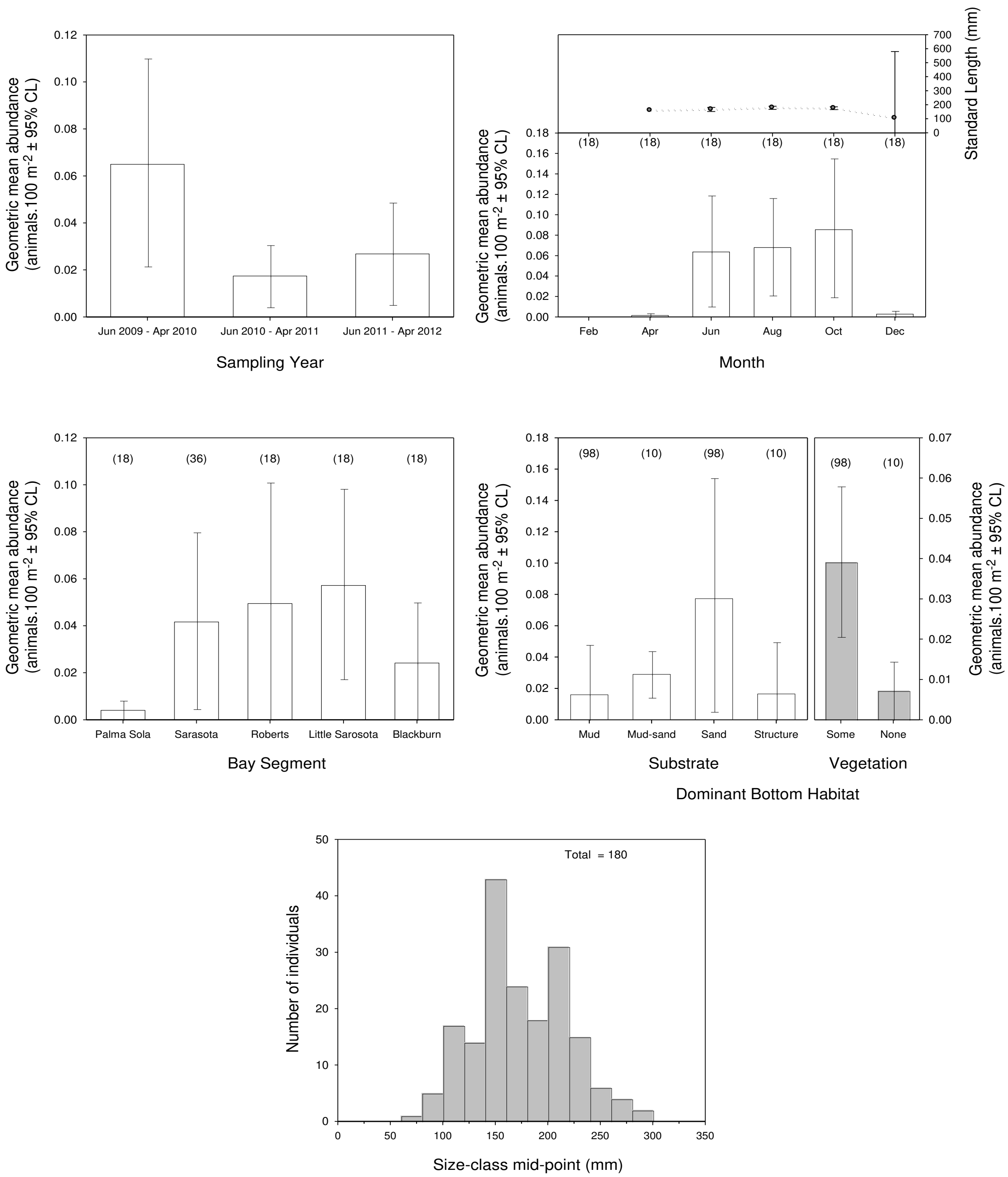

Figure 12. Relative abundance and length-frequency distribution of gray snapper collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Pinfish, *Lagodon rhomboides*

Pinfish range from Cape Cod to the Yucatan Peninsula, including Bermuda and northern Cuba. They are most abundant from Cape Hatteras through the northern Gulf of Mexico (*Pattillo et al. 1997*; *Carpenter 2002*). Florida's pinfish landings in 2007 were 2,022,492 pound with 96% of the total being landed by recreational fisherman and 83% coming from the gulf coast (FWRI-FWC 2008). Their high abundance in estuaries and their trophic placement have led some to suggest that they play a more important role in structuring epibenthic communities (*Pattillo et al. 1997*) than they do in the fishery. Spawning occurs offshore and larvae use selective tidal stream transport to travel to nursery areas (*Pattillo et al. 1997*; *Forward et al. 1998*). Pinfish have been recorded in salinities ranging from 0 to >40 ppt, but may avoid the lower end of this range (*Pattillo et al. 1997*).

Pinfish were one of the two most abundant taxa collected in each of the three gear types, comprising 20.0%, 56.2%, and 25.1% of the total catch in 21.3-m seines, 183-m haul seines, and 6.1-m otter trawls, respectively (*Appendices E*, *F*, and *G*, respectively). Pinfish were also one of the most commonly collected taxa, occurring in over 75% of the samples collected with each gear type. Pinfish collected in 21.3-m seine (mean at 32 mm SL, range 11 to 167 mm; *Figure 13*) and 6.1-m otter trawl (mean at 81 mm SL, range 11 to 163 mm; *Figure 15*) samples were smaller than those collected in 183-m haul seines (mean at 103 mm SL, range 51 to 192 mm; *Figure 14*).

Pinfish were most abundant in the winter and spring (February to April) for 21.3-m seines (*Figure 13*). For 6.1-m otter trawl collections, pinfish were most abundant winter through early summer (February, April and June) (*Figure 15*), and were most abundant in 183-m haul seine hauls from August to October (*Figure 14*). Pinfish did not show any strong distributional trends among the five embayments for any of the gear types. Pinfish were more abundant in 21.3-m seine collections that sampled some seagrass (*Figure 13*), whereas pinfish collected in 183-m haul seines did not show an abundance trend related to bottom vegetation (*Figure 14*).

Lagodon rhomboides (pinfish)
21.3-m seine

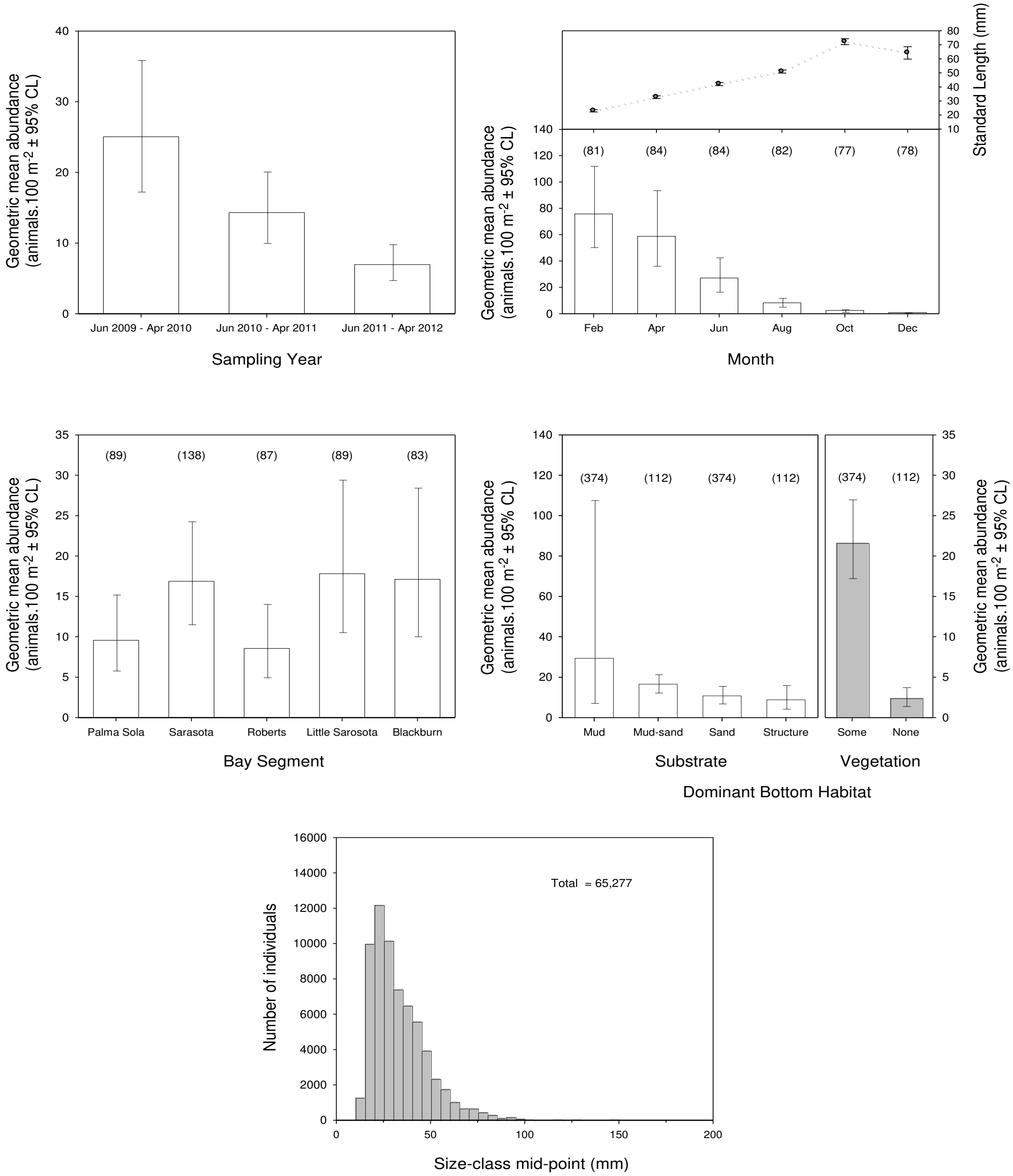

Figure 13. Relative abundance and length-frequency distribution of pinfish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lagodon rhomboides (pinfish)
183-m haul seine

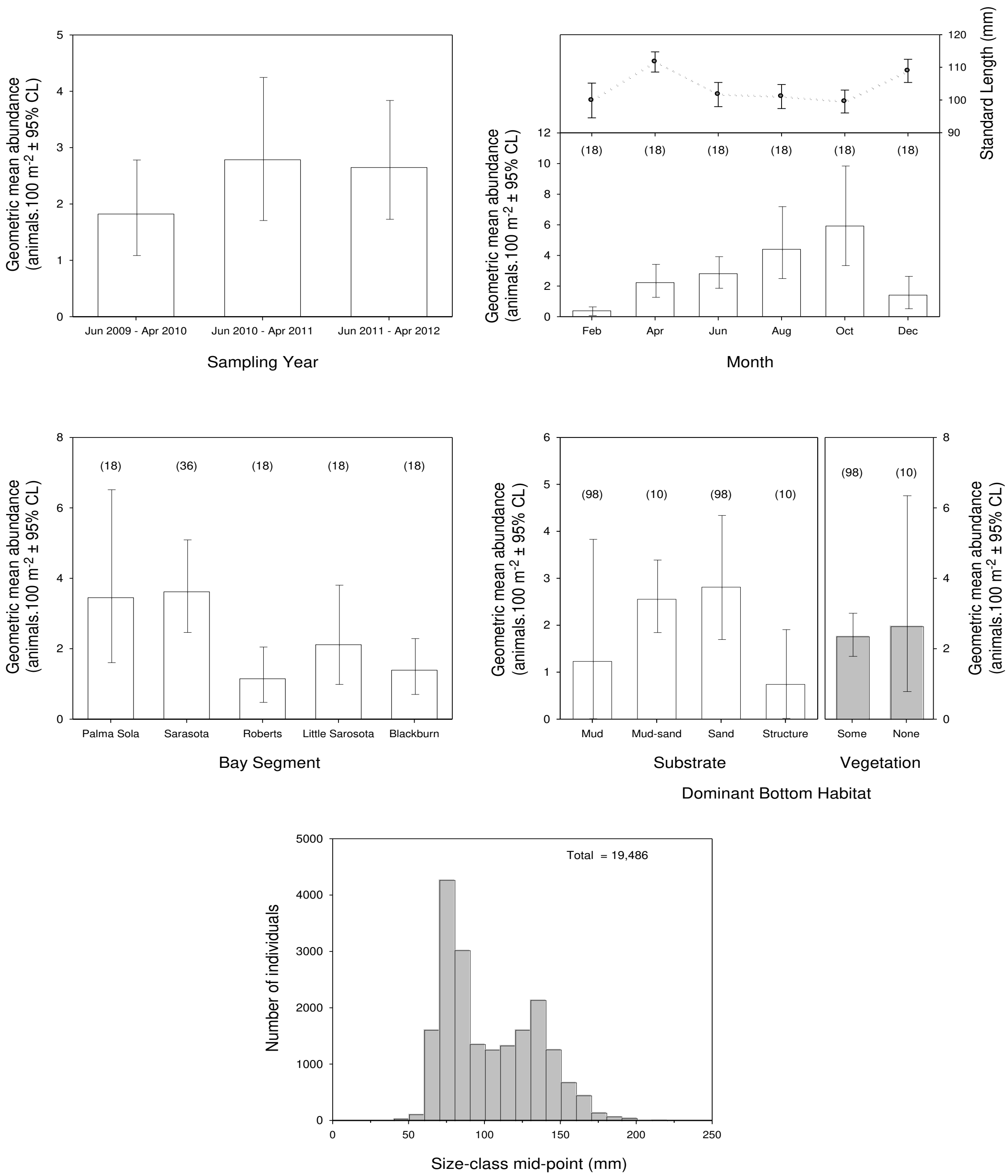

Figure 14. Relative abundance and length-frequency distribution of pinfish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lagodon rhomboides (pinfish)
6.1-m otter trawl

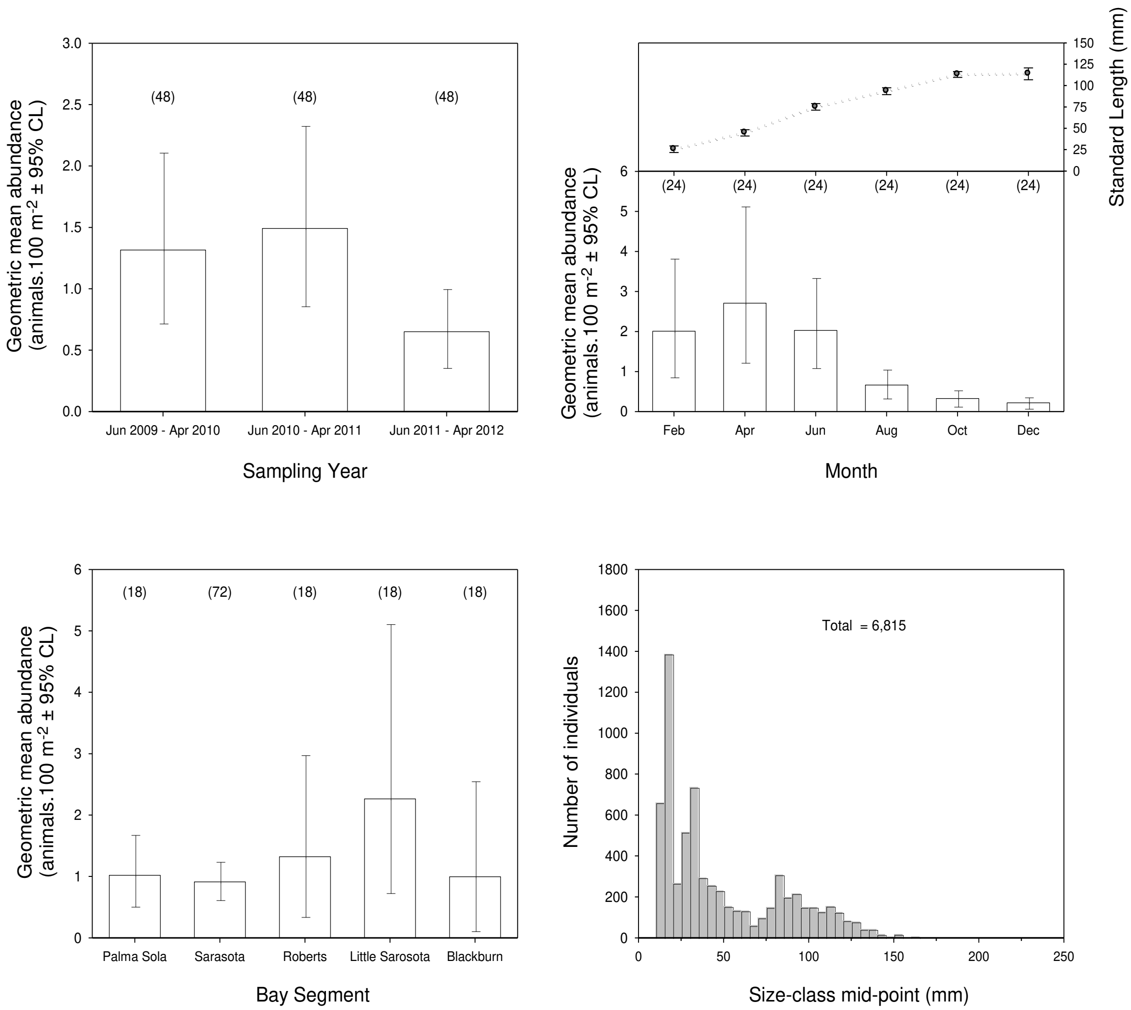

Figure 15. Relative abundance and length-frequency distribution of pinfish collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Sheepshead, *Archosargus probatocephalus*

Sheepshead, *Archosargus probatocephalus*, are found in coastal estuarine and inner- to mid-shelf waters from Cape Cod to Brazil (*Jennings 1985*). Larval sheepshead are pelagic and metamorphose into juveniles at about 8 mm (*Parsons and Peters 1989*; *Tucker and Alshuth 1997*). Juvenile sheepshead are most abundant in grass flats and over mud bottoms (*Springer and Woodburn 1960*, *Odum and Heald 1972*, *Jennings 1985*). In late summer, juvenile sheepshead begin to congregate with adults around stone jetties, breakwaters, piers, wrecks, and bulkheads (*Jennings 1985*). Recreational and commercial fishermen commonly harvest sheepshead, with the recreational fishery accounting for almost 90% of the total pounds landed in recent years (*Munyandorero et al. 2006*).

Sheepshead were collected in 65.7% of the hauls made with 183-m haul seines (*Appendix F*). Sheepshead collected in 21.3-m seines and 6.1-m otter trawls did not meet the abundance criteria for inclusion (n<175 and <15% occurrence) in this section. Sheepshead collected by 183-m haul seine tended to be subadult and adult animals (mean at 220 mm SL, range 62 to 340 mm SL; *Figure 16*). There were no obvious seasonal trends for sheepshead collected with 183-m haul seines (*Figure 16*). Abundance of sheepshead collected in 183-m haul seines was highest in Little Sarasota Bay and from collections that sampled at least some bottom vegetation (*Figure 16*).

Archosargus probatocephalus (sheepshead)
183-m haul seine

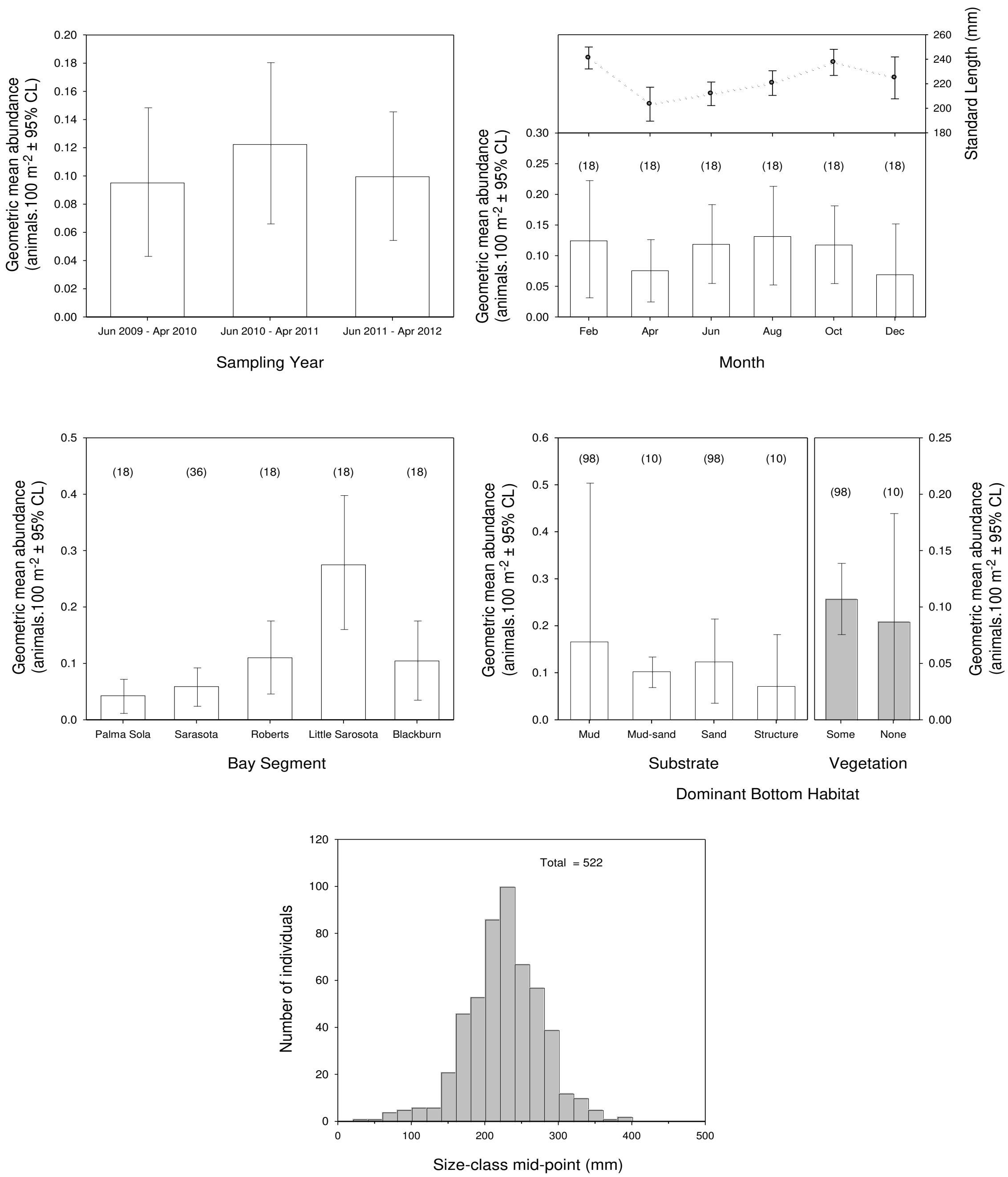

Figure 16. Relative abundance and length-frequency distribution of sheepshead collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Spotted Seatrout, *Cynoscion nebulosus*

Spotted seatrout occur along the U.S. east coast from New York south to Florida and in the Gulf of Mexico from Florida to Laguna Madre (*Carpenter 2002*). Over much of its range, spotted seatrout are the target of important recreational and commercial fisheries (*Bortone 2003*). Spawning occurs within estuaries or near passes into estuaries (*Brown-Peterson, 2003*). Spotted seatrout have been collected at salinities ranging from 0 to 75 ppt, but juveniles may prefer 8-25 ppt, with 20-25 ppt possibly representing the physiological optimum for larger juveniles and adults (*Pattillo et al. 1997*).

Spotted seatrout were collected in each of the gear types (*Appendix E*, *F*, and *G*), but were only abundant (n=407) and frequently collected (20.4% of samples) in 21.3-m seine hauls. The 21.3-m seine tended to collect small-sized seatrout (mean 43 mm SL; range 15 to 142 mm SL; *Figure 17*), which represent early young-of-the-year animals. Abundance was higher during the summer and fall months (June, August and October; *Figure 17*) than during other months (February, April and December). They were most abundant in collections that sampled some bottom vegetation and although present in all embayments, the mean abundance was slightly higher in Roberts and Little Sarasota bays (*Figure 17*) than in the other three embayments of the Sarasota Bay estuary.

Cynoscion nebulosus (spotted seatrout)
21.3-m seine

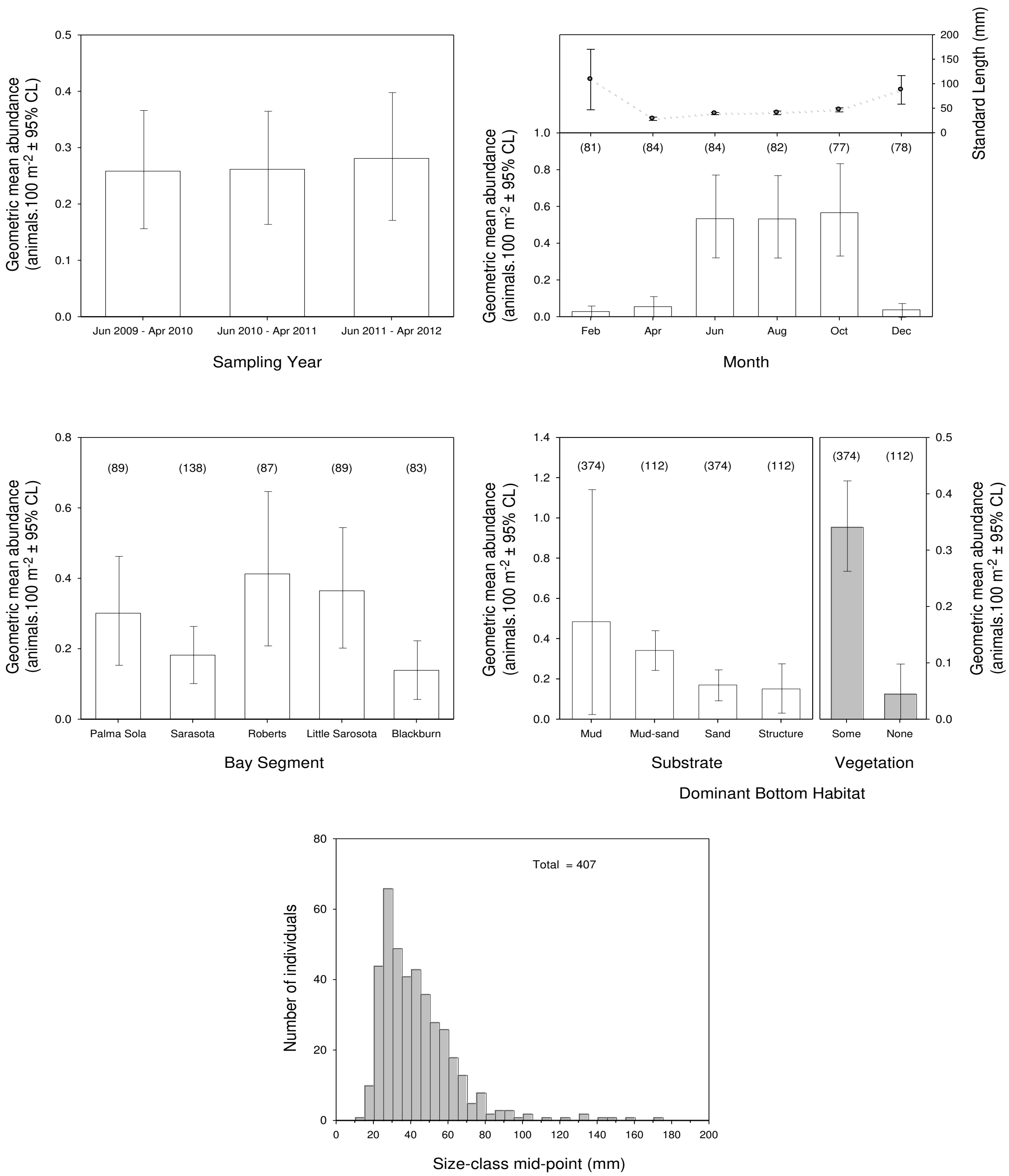

Figure 17. Relative abundance and length-frequency distribution of spotted seatrout collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Striped mullet, *Mugil cephalus*

Striped mullet are a cosmopolitan species; in the Western Atlantic, they range from Nova Scotia to Argentina (*Carpenter 2002*). This species supports large fisheries in many areas, including Florida. Landings in Florida were valued at over $5M in 2005; this value was less than half of the value in 1994 (FWRI, unpublished data), the year before the constitutional restriction on entangling nets was initiated. Striped mullet are a major prey item for many fishes and birds (*Pattillo et al. 1997*; *Withers and Brooks 2004*; *Bacheler et al. 2005*; *Blewett et al. 2006*). They spawn on the continental shelf and recruit to estuaries as slender, silvery pelagic juveniles (*Pattillo et al. 1997*; *McDonough and Wenner 2003*). Recruiting juveniles are strong swimmers capable of traversing long distances to locate nursery habitats, perhaps aided by olfactory cues (*Etnier and Starnes 1993*; Peters and Matheson, pers. obs.). Juvenile and adult striped mullet exhibit a broad range of salinity tolerance and can be extremely abundant in tidal rivers (*Pattillo et al. 1997*; *Paperno and Brodie 2004*; *Idelberger and Greenwood 2005*). Adults sometimes move hundreds of miles inland in major river systems such as the Mississippi, but juveniles are most common at salinities higher than freshwater (*Etnier and Starnes 1993*; *Boschung and Mayden 2004*).

Striped mullet were not collected in 6.1-m otter trawls (*Appendix G*), but were relatively abundant in 21.3-m seines (*Appendix E*) and 183-m haul seines (*Appendix F*). Frequency of occurrence, however, was only high enough (45.4%) to assess trends from 183-m haul seine collections. Striped mullet collected had a mean length of 333 mm SL and range from 135 to 420; *Figure 18*). Seasonally, striped mullet were more abundant during the winter (December and February) than during the summer (June and August) months. There were no obvious embayment or habitat trends in abundance for striped mullet collected in 183-m haul seine samples.

Mugil cephalus (striped mullet)
183-m haul seine

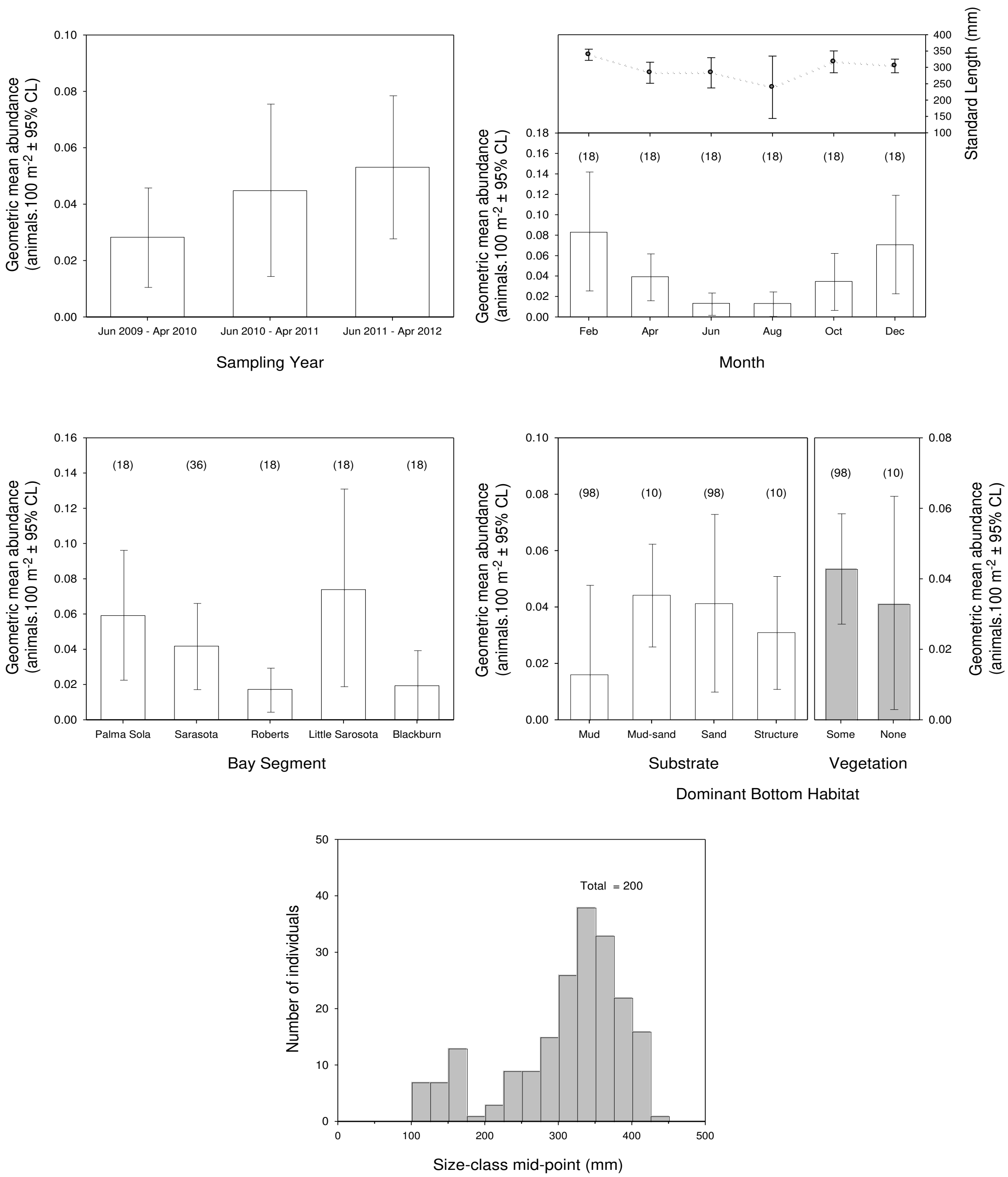

Figure 18. Relative abundance and length-frequency distribution of striped mullet collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Nekton Community Structure

Intrabay Comparison

Significant differences in abundance (Analysis of Variance) between embayments were identified for nekton sampled with 21.3-m offshore seines and 6.1-m otter trawls but no significant differences were found for nekton collected with 21.3-m shoreline seines or 183-m haul seines (*Table 9*). Nekton abundance estimated from both 21.3-m offshore seines and 6.1-m otter trawls was highest in Little Sarasota Bay, with significant abundance differences between Little Sarasota Bay and Palma Sola, Sarasota, and Roberts bays for 21.3- offshore seine catches (Tukey post-hoc test) and between Little Sarasota Bay and Palma Sola and Sarasota bay proper for 6.1-m otter trawl catches (*Figure 19*).

The non-metric multi-dimensional scaling (MDS) analysis indicated that nekton community structures were at least 50% similar across all embayments for each of the three seine gears, but only 35% similar for the 6.1-m otter trawl (*Figure 20*). At higher levels of similarity, each of the gear types had distinct groupings of embayment. Two of the embayment groupings (Little Sarasota\Roberts bays and Palma Sola\Sarasota bays) paired together for three of the four gear types (2.13-m shoreline seine, 183-m haul seine, and 6.1-m otter trawl). Blackburn Bay did not consistently group with any other embaymnets; it was distinctly different from the other embayments for 21.3-m shoreline seines (70% similarity) and 6.-1-m otter trawls (50% similarity), grouped with Little Sarasota Bay for 21.3-m offshore seines, and with Little Sarasota and Roberts bays for 183-m haul seines.

Table 9. Analysis of Variance comparing nekton abundance within the five embayments of the Sarasota Bay estuary. Significant differences (p<0.05) were explored with a Tukey post-hoc test to determine embayments which were significantly different from each other.

	Model		Error				
Gear	*df*	*Sum of Squares*	*df*	*Sum of Squares*	*F Value*	*p*	
21.3-m shoreline seine	4	11.584	172	363.778	1.37	0.2466	
21.3-m offshore seine	4	64.749	304	1075.998	4.57	0.0013	[1]
183-m haul seine	4	8.601	103	93.575	2.37	0.0576	
6.1-m otter trawl	4	24.705	139	167.561	5.12	0.0007	[2]

Tukey Post-hoc Test (P<0.05)

[1] 21.3-m offshore seine	Little Sarasota Bay significantly different from Palma Sola Bay, Sarasota Bay, and Roberts Bay
[2] 6.1-m otter trawl	Little Sarasota Bay significantly different from Palma Sola Bay and Sarasota Bay

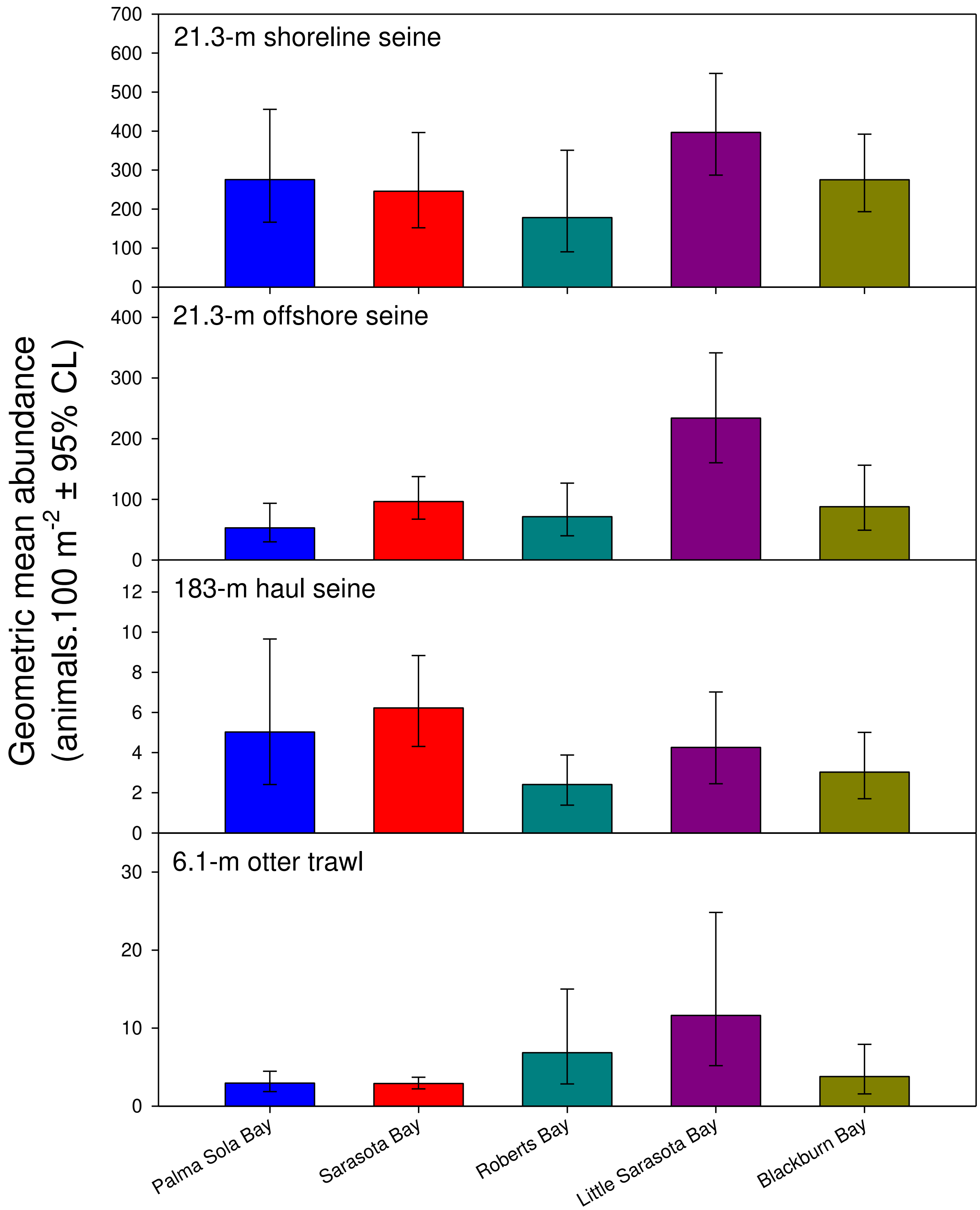

Figure 19. Geometric mean abundance, by gear type, for nekton collected from each of the five embayments of Sarasota Bay during nekton sampling, June 2009 – April 2012. A map depicting embayments can be found in *Figure 1* for the Sarasosta Bay estuary.

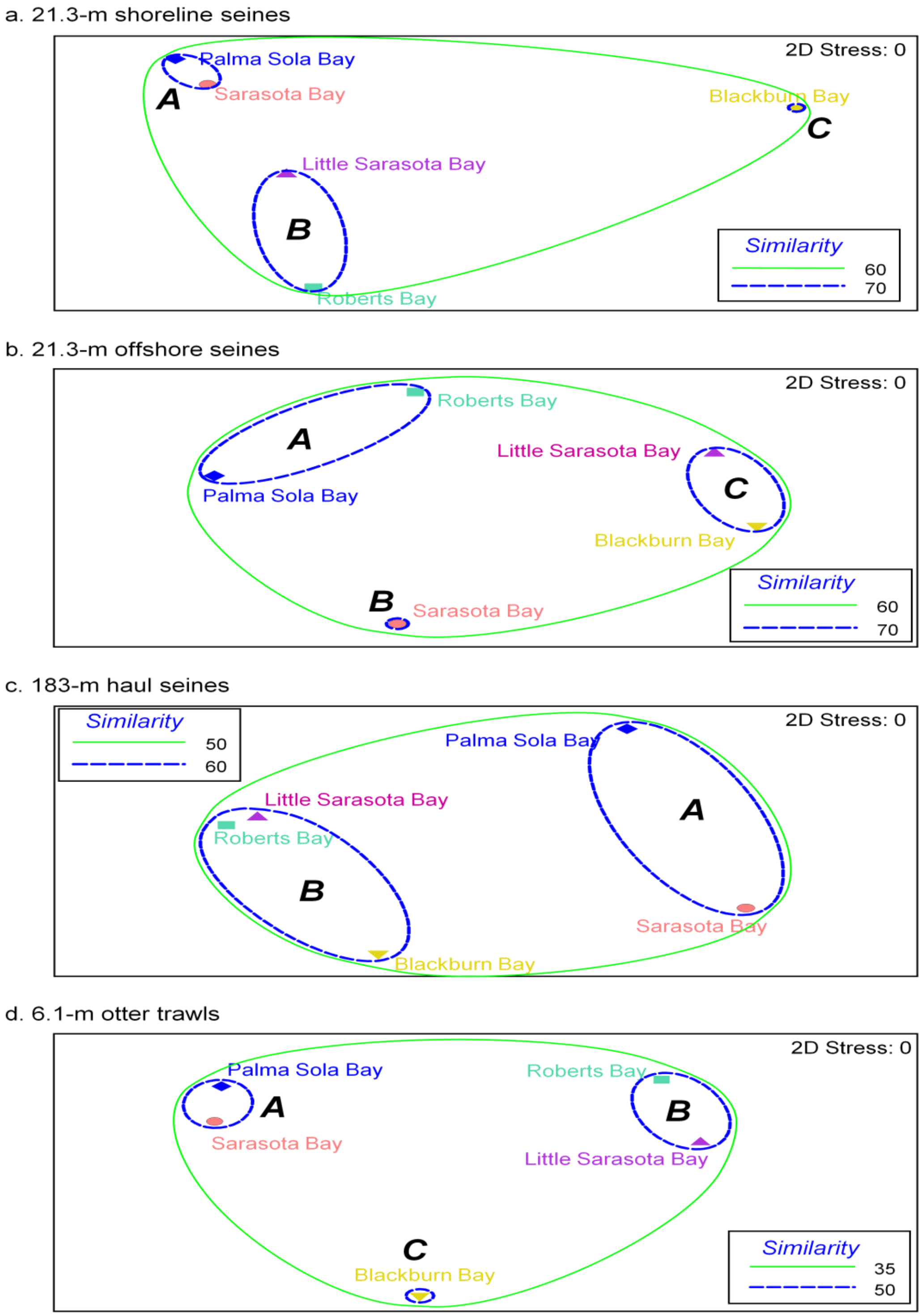

Figure 20. Non-metric Multidimensional Scaling (MDS) ordination plot of nekton community structure in five embayments within Sarasota Bay for each gear type deployed during nekton sampling, June 2009 – April 2012. Blue and green ellipses group embayments that had similar nekton communities as determined by Bray-Curtis from hierarchical agglomerative cluster analysis. Blue ellipses are designated with capital letters (A, B, and C) used in Similarity Percentage (SIMPER) analysis to determine taxonomic differences between embayment groupings. A map depicting embayments for the Sarasosta Bay estuary can be found in *Figure 1*.

Similarity percentage analyses (SIMPER) on the 21.3-m shoreline seine data indicated that differences in abundance, not taxa, determined differences in community structure; none of the top 25 pseudo-species that determined community structure between embayment groupings was unique to a specific group embayment grouping (*Table 10*). Peak abundances among the top 25 pseudo-species were evenly distributed among the embayment groupings (A with 7, B with 10, and C with 8). Four of the top 25 pseudo-species were Selected Taxa, with three having their highest abundance in Blackburn Bay (*L. xanthurus*, 20-39mm SL; *L. xanthurus*, <20mm SL; and *F. duorarum*, <20mm POH) and the fourth (*M. cephalus*, 20-39mm SL) being more abundant in embayment Group A (Palma Sola Bay and Sarasota Bay proper).

Differences in nekton abundance also distinguished the embayment groupings identified from 21.3-m offshore seine collections (SIMPER analysis; *Table 11*). The majority of the top 25 pseudo-species that differentiated community structure (68%) between embayment groupings were more abundant in Group C (Little Sarasota and Blackburn bays) than in the other embayment groupings. Embayment Group C also had the highest abundance for the three Selected Taxa that occurred in the top 25 pseudo-species (*F. duorarum*, <20mm POH; *L. xanthurus*, 20-39mm SL; and *L. xanthurus*, <20mm SL).

Opisthonema oglinum (150-199mm SL) and *Nicholsina usta* (100-149mm SL) were unique to embayment Group A (Palma Sola and Sarasota bays) for 183-m haul seine collections (*Table 12*), but the majority of the differences between the two embayment groupings were accounted for by differences in abundance between similar species. Of the six Selected Taxa represented in the top 25 pseudo-species that differentiated community structure, five (*A. probatocephalus*, 200-249mm SL and 250-299mm SL; *C. undecimalis*, 300-399mm SL and 400-499mm SL; and *E. saurus*, 200-249mm SL) had higher abundance in Group B (Little Sarasota, Roberts, and Blackburn bays) than in Gropu A.

Selected Taxa comprised almost half (45.8%) of the pseudo-species in the top 25 that differentiated embayment groupings for 6.1-m otter trawl collections (*Table 13*). The majority of the Selected Taxa (7) had higher abundance in Group B (Little Sarasota and Roberts bays) than in either Group A (Palma Sola and Sarasota bays) or C (Blackburn Bay). Two of the top 25 pseudo-species that differentiated the three embayment groupings were only collected in Group B (*L. xanthurus*, 20-39mm SL and 40-59mm SL) while a third was unique to Group C (*O. chrysoptera*, 0-19mm SL). Several other pseudo-species were not present in Group A (*L. xanthurus*, 0-19mm SL and *A. probatocephalus*, 150-199mm SL and 200-249mm SL) or Group B (*O. chrysoptera*, 30-39mm SL and 40-59mm SL)

Table 10. Similarity percentage (SIMPER) analysis for Sarasota Bay embayment groupings identified in the MDS ordination for 21.3-m shoreline seine collections (*Figure 20*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Palma Sola and Sarasota bays; Group B included Roberts and Little Sarasota bays; and Group C consisted of Blackburn Bay. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

Scientific name	Common name	Size Class (mm)	Group Abundance $(animals \cdot 100m^{-2})^{1/2}$ A	B	C	Group Dissimilarity % contribution A - B	A - C	B - C
Anchoa mitchilli	Bay anchovy	20-39	6.91	8.36	0.13	4.82	17.93	21.74
Lucania parva	Rainwater killifish	20-39	3.20	1.01	1.01	6.36	5.86	2.17
Eucinostomus spp.	Eucinostomus mojarra	20-39	4.61	5.93	7.24	3.67	6.89	3.51
Eucinostomus spp.	Eucinostomus mojarra	0-19	1.98	1.13	3.20	2.46	3.18	5.50
Anchoa mitchilli	Bay anchovy	40-59	1.43	1.84	0.07	2.76	3.55	4.64
Lagodon rhomboides	Pinfish	20-39	3.61	3.57	4.84	2.03	3.30	3.45
Menidia spp.	Menidia silversides	40-59	1.98	0.78	1.97	3.46	1.24	3.18
Lagodon rhomboides	Pinfish	40-59	2.83	3.21	2.56	2.67	2.45	1.68
Leiostomus xanthurus [1]	Spot	20-39	2.20	1.70	2.88	1.81	1.78	3.15
Microgobius gulosus	Clown goby	20-39	0.68	1.53	0.37	2.40	0.86	3.10
Harengula jaguana	Scaled sardine	40-59	0.09	1.18	0.70	3.16	1.60	1.37
Harengula jaguana	Scaled sardine	20-39	0.06	0.54	1.20	1.41	3.00	1.71
Farfantepenaeus duorarum [1]	Pink shrimp	0-19	1.70	2.15	2.52	1.72	2.11	1.66
Leiostomus xanthurus [1]	Spot	0-19	1.03	0.99	1.88	0.59	2.26	2.35
Floridichthys carpio	Goldspotted killifish	20-39	1.06	0.23	0.67	2.36	1.02	1.18
Menidia spp.	Menidia silversides	20-39	0.90	0.99	0.42	1.48	1.40	1.57
Eucinostomus gula	Silver jenny	40-59	1.29	2.07	1.90	2.27	1.65	0.46
Anchoa cubana	Cuban anchovy	20-39	0.00	0.72	0.07	2.13	0.19	1.99
Eucinostomus harengulus	Tidewater mojarra	40-59	0.76	1.03	0.27	0.83	1.32	2.05
Floridichthys carpio	Goldspotted killifish	40-59	0.94	0.21	0.48	2.09	1.21	0.73
Mugil cephalus [1]	Striped mullet	20-39	1.14	0.46	0.85	1.92	0.78	1.01
Lagodon rhomboides	Pinfish	80-99	0.83	0.20	0.13	1.80	1.82	0.00
Lagodon rhomboides	Pinfish	60-79	1.36	1.21	1.20	1.63	1.51	0.26
Lagodon rhomboides	Pinfish	0-19	1.46	1.50	1.77	1.24	1.16	0.84
Eucinostomus gula	Silver jenny	60-79	0.26	0.76	0.83	1.46	1.47	0.21

[1] Species of direct economic importance (Selected Taxa).

Table 11. Similarity percentage (SIMPER) analysis for Sarasota Bay embayment groupings identified in the MDS ordination for 21.3-m offshore seine collections (*Figure 20*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Palma Sola and Roberts bays; Group B included Sarasota Bay; and Group C consisted of Little Sarasota and Blackburn bays. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

Scientific name	Common name	Size Class (mm)	Group Abundance $(animals \cdot 100m^{-2})^{1/2}$ A	B	C	Group Dissimilarity % contribution A - B	A - C	B - C
Anchoa mitchilli	Bay anchovy	20-39	3.94	2.25	2.63	8.90	9.83	9.47
Eucinostomus spp.	Eucinostomus mojarra	20-39	2.72	3.71	5.02	5.29	10.34	6.02
Lagodon rhomboides	Pinfish	20-39	2.79	4.09	4.81	6.89	8.91	3.18
Lucania parva	Rainwater killifish	20-39	0.82	2.37	0.51	8.15	1.72	8.55
Eucinostomus spp.	Eucinostomus mojarra	0-19	0.92	1.54	2.09	3.29	5.24	2.52
Farfantepenaeus duorarum [1]	Pink shrimp	0-19	0.80	0.70	1.70	1.42	3.96	4.47
Leiostomus xanthurus [1]	Spot	20-39	0.91	0.26	1.27	3.41	1.75	4.45
Lagodon rhomboides	Pinfish	40-59	1.50	2.36	2.48	4.60	4.39	0.52
Microgobius gulosus	Clown goby	20-39	0.58	0.09	1.05	2.60	2.57	4.09
Anchoa mitchilli	Bay anchovy	40-59	0.72	0.03	0.92	3.62	1.83	3.78
Bairdiella chrysoura	Silver perch	40-59	0.62	0.27	1.01	1.80	1.97	3.23
Lagodon rhomboides	Pinfish	0-19	1.44	1.17	1.56	2.04	1.67	1.68
Leiostomus xanthurus [1]	Spot	0-19	0.79	0.57	1.16	1.18	1.48	2.45
Harengula jaguana	Scaled sardine	20-39	0.14	0.52	0.29	2.06	0.75	1.16
Orthopristis chrysoptera	Pigfish	20-39	0.24	0.42	0.64	0.96	1.77	0.98
Gobiosoma robustum	Code goby	20-39	0.36	0.23	0.64	0.74	1.19	1.77
Harengula jaguana	Scaled sardine	40-59	0.22	0.56	0.32	1.81	0.57	1.15
Bairdiella chrysoura	Silver perch	60-79	0.32	0.13	0.52	0.97	0.86	1.63
Lucania parva	Rainwater killifish	0-19	0.50	0.63	0.30	0.69	0.95	1.56
Lagodon rhomboides	Pinfish	60-79	0.65	0.84	0.96	1.02	1.51	0.66
Syngnathus scovelli	Gulf pipefish	100-149	0.21	0.35	0.07	1.00	0.88	1.29
Gobiosoma spp.	Gobiosoma gobies	0-19	0.24	0.10	0.44	0.74	0.98	1.44
Eucinostomus harengulus	Tidewater mojarra	40-59	0.19	0.22	0.49	0.58	1.29	1.21
Lagodon rhomboides	Pinfish	80-99	0.27	0.46	0.30	1.18	1.02	0.78
Anchoa mitchilli	Bay anchovy	0-19	0.23	0.23	0.03	1.08	0.99	0.89

[1] Species of direct economic importance (Selected Taxa).

Table 12. Similarity percentage (SIMPER) analysis for Sarasota Bay embayment groupings identified in the MDS ordination for 183-m haul seine collections (*Figure 20*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Palma Sola and Sarasota bays; Group B included Roberts, Little Sarasota and Blackburn bays. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

Scientific name	***Common name***	***Size Class (mm)***	***Group Abundance (animals•100m^{-2})$^{1/2}$***		***Group Dissimilarity % contribution***
			A	***B***	***A - B***
Lagodon rhomboides	Pinfish	100-149	1.18	0.68	9.18
Lagodon rhomboides	Pinfish	80-99	0.89	0.47	5.39
Lagodon rhomboides	Pinfish	60-79	0.90	0.53	4.57
Brevoortia spp.	Menhaden	80-99	0.13	0.05	2.92
Bairdiella chrysoura	Silver perch	100-149	0.29	0.09	2.69
Archosargus probatocephalus [1]	Sheepshead	200-249	0.07	0.23	2.45
Lagodon rhomboides	Pinfish	150-199	0.30	0.39	2.25
Harengula jaguana	Scaled sardine	100-149	0.17	0.07	1.67
Harengula jaguana	Scaled sardine	80-99	0.15	0.10	1.61
Orthopristis chrysoptera	Pigfish	100-149	0.25	0.19	1.50
Opisthonema oglinum	Atlantic thread herring	100-149	0.10	0.01	1.46
Centropomus undecimalis [1]	Snook	300-399	0.07	0.17	1.44
Centropomus undecimalis [1]	Snook	400-499	0.09	0.15	1.28
Ariopsis felis	Hardhead catfish	300-399	0.03	0.11	1.27
Diplodus holbrookii	Spottail pinfish	60-79	0.12	0.01	1.21
Archosargus probatocephalus [1]	Sheepshead	250-299	0.05	0.14	1.18
Ariopsis felis	Hardhead catfish	200-249	0.05	0.13	1.17
Orthopristis chrysoptera	Pigfish	80-99	0.18	0.12	1.10
Eucinostomus gula	Silver jenny	80-99	0.17	0.17	1.08
Nicholsina usta	Emerald parrotfish	100-149	0.10	0.00	1.06
Brevoortia spp.	Menhaden	100-149	0.04	0.07	0.88
Opisthonema oglinum	Atlantic thread herring	150-199	0.05	0.00	0.88
Ariopsis felis	Hardhead catfish	250-299	0.04	0.10	0.86
Mugil cephalus [1]	Striped mullet	300-399	0.09	0.07	0.80
Elops saurus [1]	Ladyfish	200-249	0.05	0.08	0.76

[1] Species of direct economic importance (Selected Taxa).

Table 13. Similarity percentage (SIMPER) analysis for Sarasota Bay embayment groupings identified in the MDS ordination for 6.1-m otter trawls (*Figure 20*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Palma Sola and Sarasota bays; Group B included Roberts and Little Sarasota bays; and Group C consisted of Blackburn Bay. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

Scientific name	Common name	Size Class (mm)	Group Abundance $(\text{animals} \cdot 100\text{m}^{-2})^{1/2}$ A	B	C	Group Dissimilarity % contribution A - B	A - C	B - C
Lagodon rhomboides	Pinfish	20-39	0.06	0.33	0.75	3.08	7.58	2.08
Leiostomus xanthurus[1]	Spot	0-19	0.00	0.80	0.03	6.37	0.26	5.84
Leiostomus xanthurus[1]	Spot	20-39	0.00	1.20	0.00	6.35	0.00	5.96
Lagodon rhomboides	Pinfish	0-19	0.06	0.70	0.02	5.14	0.64	5.27
Lagodon rhomboides	Pinfish	100-149	0.53	0.42	0.13	1.86	5.16	1.64
Lagodon rhomboides	Pinfish	40-59	0.06	0.03	0.38	2.08	3.83	2.19
Eucinostomus spp.	Eucinostomus mojarra	20-39	0.16	0.24	0.51	2.20	4.70	1.19
Orthopristis chrysoptera	Pigfish	20-39	0.01	0.00	0.41	0.45	4.63	2.69
Anchoa mitchilli	Bay anchovy	20-39	0.07	0.24	0.02	3.06	0.45	3.19
Lagodon rhomboides	Pinfish	80-99	0.45	0.15	0.13	2.27	3.32	0.16
Eucinostomus gula	Silver jenny	60-79	0.08	0.48	0.09	2.70	0.23	2.39
Archosargus probatocephalus[1]	Sheepshead	150-199	0.00	0.05	0.28	0.30	3.09	1.75
Orthopristis chrysoptera	Pigfish	0-19	0.00	0.00	0.24	0.15	2.73	1.65
Farfantepenaeus duorarum[1]	Pink shrimp	0-19	0.07	0.21	0.12	1.90	0.71	1.33
Eucinostomus gula	Silver jenny	80-99	0.16	0.37	0.10	1.23	0.86	1.72
Leiostomus xanthurus[1]	Spot	40-59	0.00	0.31	0.00	1.94	0.00	1.83
Callinectes sapidus[1]	Blue crab	80-99	0.02	0.21	0.11	1.73	0.93	1.02
Menippe spp. [1]	Stone crabs	20-39	0.23	0.04	0.10	1.58	1.58	0.45
Archosargus probatocephalus[1]	Sheepshead	200-249	0.00	0.02	0.19	0.14	2.09	1.24
Callinectes sapidus[1]	Blue crab	100-149	0.04	0.21	0.08	1.63	0.39	1.38
Gobiosoma robustum	Code goby	20-39	0.13	0.08	0.01	0.74	1.91	0.56
Callinectes sapidus[1]	Blue crab	20-39	0.05	0.08	0.02	1.07	0.81	1.22
Orthopristis chrysoptera	Pigfish	40-59	0.06	0.00	0.17	0.46	1.57	0.90
Callinectes sapidus[1]	Blue crab	40-59	0.05	0.06	0.02	0.92	0.92	1.00
Menippe spp. [1]	Stone crabs	0-19	0.16	0.03	0.20	0.86	0.69	1.26

[1] Species of direct economic importance (Selected Taxa).

The nekton community sampled with the 6.1-m otter trawl had obvious differences in the taxa and pseudo-species that differentiated embayment groupings while seine gears had similar taxa and pseudo-speices with abundance differences defining embayment groupings. Gear types that target smaller-bodied nekton (21.3-m seines and 6.1-m otter trawl) had a higher percentage of the top 25 pseudo-species with peak abundance in the embayment group that included Little Sarasota and Roberts bays, while 183-m haul seine collections had a higher percentage of pseudo-species with peak abundance in Sarasota Bay proper.

Little Sarasota and Roberts bays grouped together for three of the four gear types. Little Sarasota and Roberts bays are geographically smaller than Palma Sola Bay and Sarasota Bay proper and are not directly linked to the Gulf of Mexico through a pass as is Sarasota Bay proper. Little Sarasota and Roberts bays also receive more freshwater inflow, from Phillippi Creek, than the other three embayments and experienced lower salinities than the other embayments during the study period (*Figure 4*). It is likely that embayment size, freshwater inflow, and connectivity to the Gulf of Mexico are important factors in determining the nekton community structure within the Sarasota Bay estuary.

Interbay Comparison

Analysis of variance (ANOVA) identified significant abundance differences (*P*<0.0001) between bay segments with each of the four gears used (*Table 14*). Regardless of gear type, the bay segment with the highest abundance was located in the Sarasota Bay estuary: Little Sarasota Bay for both 21.3-m seine methods (shoreline and offshore) and 6.1-m otter trawl and Sarasota Bay proper for the 183-m haul seine (*Figure 21*). The geometric mean abundance for the two 21.3-m seine methods and the 6.1-m otter trawl in Little Sarasota Bay was at least two times greater than the highest geometric mean abundance from any bay segment in Charlotte Harbor or Tampa Bay. Even the smallest geometric mean abundance from 21.3-m shoreline seines in the Sarasota Bay estuary (178.3 number•100m^{-2}, Roberts Bay) was greater than the maximum geometric mean abundance from any bay segment in Tampa Bay (176.5 number•100m^{-2}, Lower Tampa Bay North) or Charlotte Harbor (156.2 number•100m^{-2}, Pine Island Sound).

Bay segments for Sarasota Bay (*Figure 1*), and Tampa Bay and Charlotte Harbor (*Figure 2*) were included in the nekton community structure analyses the non-metric multi-dimensional scaling (MDS) plots produced similar groupings of bay segments regardless of the gear type (*Figure 22*). Little Sarasota and Roberts bays grouped together (Group C) for three of the four gear types (21.3-m shorleine seine, 183-m haul seine, and 6.1-m otter trawls). Old Tampa Bay, Hillsborough Bay and Upper Charlotte Harbor grouped together (Group A) for three of the four gear types, but Upper Charlotte Harbor (Group D) grouped alone for the 183-m haul seines. With the exception of 6.1-m otter trawls, the bay segments with passes to the Gulf of Mexico (Gasparilla Sound, Pine Island Sound, Sarasota Bay proper and Lower Tampa Bay North and South; Group B) grouped together with Middle Charlotte Harbor. Palma Sola Bay grouped with the lower Tampa Bay and Charlotte Harbor bay segments (Group B) for the 21.3-m shoreline seines, 183-m haul seines, and 6.1-m otter trawls but grouped with Middle Tampa Bay and Roberts Bay for the 21.3-m offshore seines. Blackburn Bay demonstrated no consistent pattern between gear types, appearing with the lower bay segments (Group B) for 21.3-m shoreline seines, joining with Little Sarasota Bay for 21.3-m offshore seines and 183-m haul seines (Group C), and forming its own group for 6.1-m otter trawls (Group D).

Table 14. Analysis of Variance comparing nekton abundance between bay segments of the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Results of Tukey post-hoc test to determine embayments that were significant different (*P*<0.05) from each other can be found in *Appendix K*.

	Model		Error			
Gear	*df*	*Sum of Squares*	*df*	*Sum of Squares*	*F Value*	*p*
21.3-m shoreline seine	13	232.299	720	1780.018	7.23	<.0001
21.3-m offshore seine	13	398.597	962	3721.028	7.93	<.0001
183-m haul seine	13	104.018	760	646.303	9.41	<.0001
6.1-m otter trawl	13	97.069	832	853.817	7.28	<.0001

** Tukey Post-hoc Test (P<0.05) can be found in Appendix K*

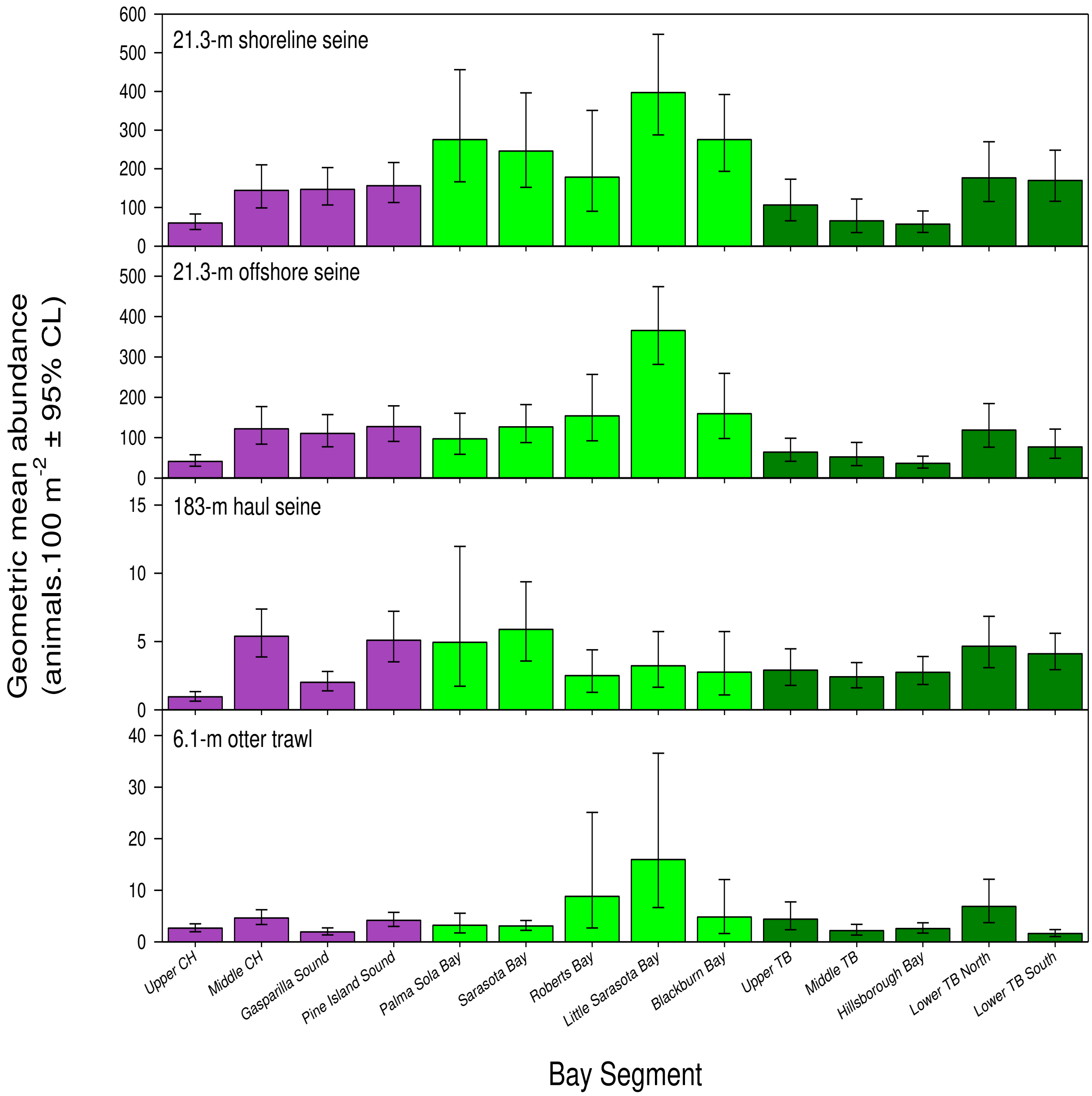

Figure 21. Geometric mean abundance, by gear type, for nekton collected from each bay segment in the Charlotte Harbor (purple), Sarasota Bay (light green) and Tampa Bay (dark green) estuaries during nekton sampling, June 2009 – April 2012. Embayments, within each estuary, are generally presented from North to South and East to West starting on the left. Significant differences (*P*<0.05) between embayments, identified by ANOVA with Tukey post-hoc test, can be found in *Appendix K*. Maps depicting bay segments can be found in *Figure 1* for the Sarasosta Bay estuary and in *Figure 2* for Tampa Bay and Charlotte Harbor estuaries.

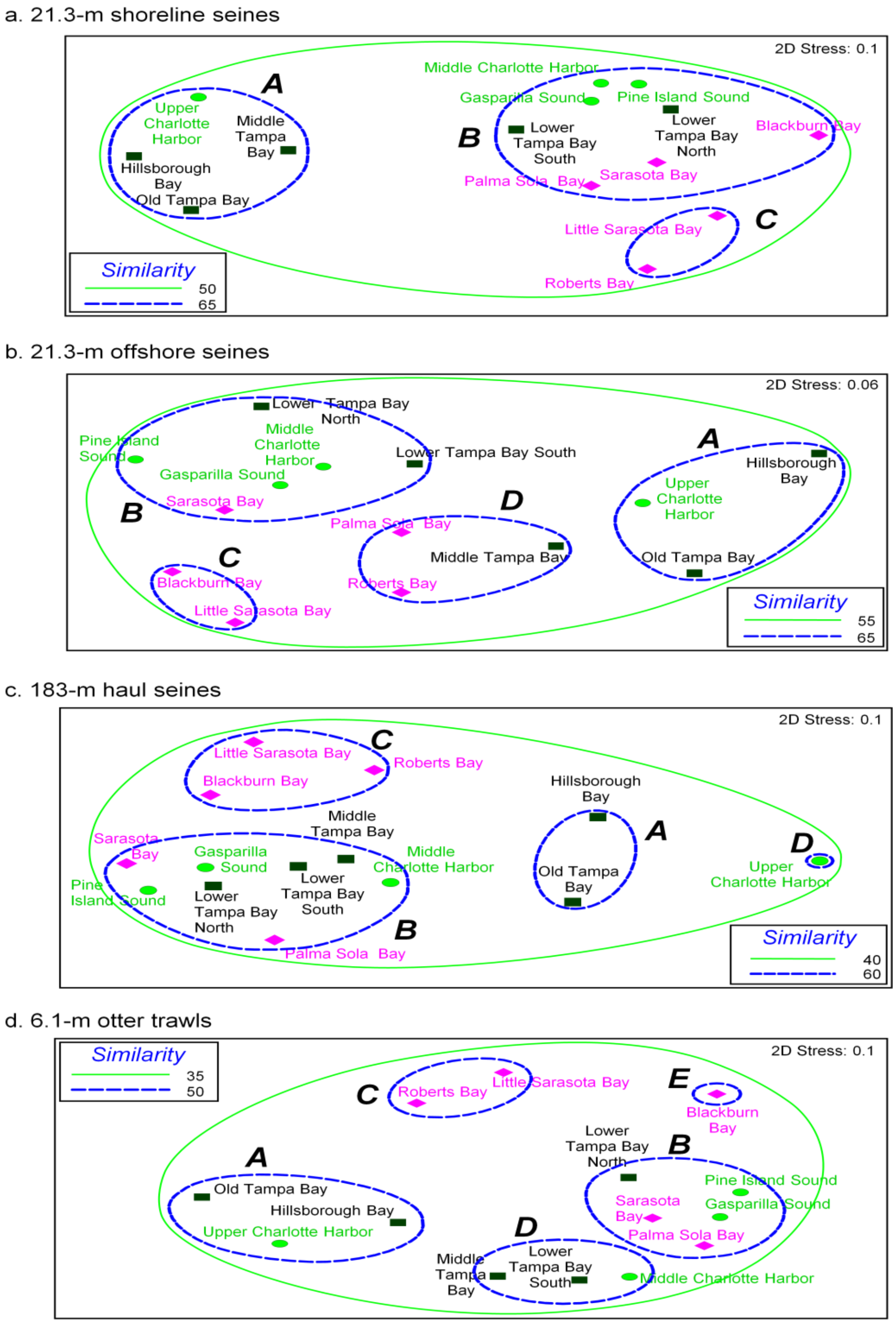

Figure 22. Non-metric Multidimensional Scaling (MDS) ordination plot of nekton community structure in bay segments of three eastern Gulf of Mexico estuaries (Tampa Bay, Sarasota Bay and Charlotte Harbor) for each of gear type deployed during nekton sampling, June 2009 – April 2012. Blue ellipses are designated with capital letters (A, B, C, etc.) used in Similarity Percentage (SIMPER) analysis to determine taxonomic differences between embayment groupings. Maps depicting bay segments can be found in *Figure 1* for the Sarasota Bay estuary and in *Figure 2* for Tampa Bay and Charlotte Harbor estuaries.

Each of the top 25 pseudo-species that determined community structure differences between embayment groupings (SIMPER analysis; *Table 15*) for the 21.3-m shoreline seine were collected in each of the bay segment groupings, indicating that groupings were determined by differences in abundance rather than by taxonomic differences. Fifteen of the top 25 pseudo-species were more abundant in Group C (Little Sarasota and Roberts bays) than in the other two embayment groupings. Four of the top 25 pseudo-species were Selected Taxa, with two having their highest abundance in embayment Group C (*F. duorarum*, 0-19mm POH; and *L. xanthurus*, 0-19mm SL) and one each in Group A (*M. cephalus*, 20-39mm SL) and Group B (*L. xanthurus*, 20-39mm SL.

Differences in abundance of similar pseudo-species were more important in defining bay segment groupings than were taxonomic differences for the 21.3-m offshore seines (*Table 16*). Only one of the top 25 pseudo-species (*Anchoa hepsetus*. 20-39mm SL) was not collected from each of the embayment groupings defined for the 21.3-m offshore seine. Sixteen of the top 25 psuedo-species had higher abundance in Group C (Little Sarasota and Blackburn bays) than in the other three embayment groupings, while none of the top 25 psuedo-species had their highest abundance in Group A (Upper Charlotte Harbor, Old Tampa Bay and Hillsborough Bay). Each of the three Selected Taxa in the top 25 (*F. duorarum*, 0-19mm POH; and *L. xanthurus*, 0-19mm SL and 20-39mm SL) had their highest abundance in Group C.

Brevoortia spp (100-149mm SL) was the only pseudo-species in the top 25 that did not occur in all four embayment groupings identified for the 183-m haul seines (*Table 17*). Thirteen of the top 25 pseudo-species were more abundant in Group C

(Little Sarasota, Roberts and Blackburn bays) than in the other three groupings of embayments. Selected taxa were only represented in the top 25 pseudo-species for Group A (*L. xanthurus*, 80-99mm SL and 100-149mm SL; and *Elops saurus*, 200-249mm SL and 250-299mm SL) and Group C (*A. probatocephalus*, 150-199mm SL, 200-249mm SL, and 250-299mm SL; and *C. undecimalis*, 300-399mm SL and 400-499mm SL).

The differences between the five embayment groupings identified for the 6.1-m otter trawl nekton community were characterized more by differences in taxa and pseudo-species that were present than any of the other gear types (*Table 18*). *Orthopristis chrysoptera* (0-19mm SL and 20-39mm SL) and *A. probatocephalus* (150-199mm SL), for instance, were absent or nearly absent from Groups A, B, C, and D but relatively abundant in Group E (Blackburn Bay). Six Selected Taxa were present in the top 25 pseudo-species that differentiated the segment groupings for the 6.1-m otter trawl. Five of the six Selected Taxa were distributed amongst Groups A (*F. duorarum*, 9-19mm SL), C (*Menippe* spp., 20-39mm CW), D (*L. xanthurus*, 40-59mm SL; and *C. sapidus*, 80-99mm CW), and E (*A. probatocephalus*, 150-199mm SL), with the remaining pseudo-species (*Menippe* spp. 0-19mm CW) having the same abundance in both Groups C and E.

Table 15. Similarity percentage (SIMPER) analysis for Tampa Bay, Sarasota Bay, and Charlotte Harbor segment groupings identified in the MDS ordination for 21.3-m shoreline seine collections (*Figure 22*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Upper Charlotte Harbor, Hillsborough Bay, Old Tampa Bay and Middle Tampa Bay; Group B included Gasparilla Sound, Middle Charlotte Harbor, Pine Island Sound, Sarasota Bay proper, Palma Sola Bay, Blackburn Bay and Lower Tampa Bay (North and South); and Group C consisted of Roberts and Little Sarasota bays. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

		Size Class	Group Abundance $(animals \bullet 100m^{-2})^{1/2}$			Group Dissimilarity % contribution		
Scientific name	**Common name**	**(mm)**	**A**	**B**	**C**	**A - B**	**A - C**	**B - C**
Anchoa mitchilli	Bay anchovy	20-39	2.54	2.05	8.36	6.21	13.30	16.66
Eucinostomus spp.	Eucinostomus mojara	20-39	1.96	4.52	5.93	7.76	9.03	4.44
Lagodon rhomboides	Pinfish	20-39	0.95	3.81	3.57	8.29	5.90	2.21
Lagodon rhomboides	Pinfish	40-59	0.79	2.99	3.21	5.97	5.41	1.85
Lucania parva	Rainwater killifish	20-39	0.57	2.57	1.01	5.44	1.80	4.41
Farfantepenaeus duorarum [1]	Pink shrimp	0-19	0.55	1.48	2.15	2.96	3.67	2.07
Anchoa mitchilli	Bay anchovy	40-59	0.94	0.54	1.84	1.94	2.10	3.72
Eucinostomus gula	Silver jenny	40-59	0.63	1.39	2.07	2.11	3.16	1.92
Lagodon rhomboides	Pinfish	0-19	0.45	1.34	1.50	2.50	2.36	1.09
Menidia spp.	Menidia silversides	40-59	1.49	1.33	0.78	2.03	1.96	1.83
Harengula jaguana	Scaled sardine	40-59	0.37	0.27	1.18	0.94	2.13	2.59
Eucinostomus spp.	Eucinostomus mojara	0-19	0.65	1.53	1.13	2.70	1.08	1.43
Microgobius gulosus	Clown goby	20-39	0.73	0.70	1.53	0.72	1.90	2.46
Leiostomus xanthurus [1]	Spot	20-39	1.50	1.72	1.70	2.17	0.93	1.95
Menidia spp.	Menidia silversides	20-39	1.42	1.18	0.99	2.12	1.45	1.25
Lagodon rhomboides	Pinfish	60-79	0.52	1.22	1.21	2.17	1.59	1.01
Leiostomus xanthurus [1]	Spot	0-19	0.69	0.96	0.99	1.76	0.85	1.47
Floridichthys carpio	Goldspotted killifish	20-39	0.54	0.63	0.23	1.44	1.10	1.32
Mugil cephalus [1]	Striped mullet	20-39	0.91	0.67	0.46	1.36	0.97	1.51
Anchoa cubana	Cuban anchovy	20-39	0.01	0.01	0.72	0.00	1.73	2.10
Harengula jaguana	Scaled sardine	20-39	0.07	0.18	0.54	0.66	1.19	1.41
Eucinostomus harengulus	Tidewater mojarra	40-59	0.59	0.55	1.03	0.63	1.05	1.34
Bairdiella chrysoura	Silver perch	40-59	0.11	0.22	0.65	0.50	1.23	1.27
Lucania parva	Rainwater killifish	0-19	0.12	0.43	0.57	0.94	1.02	0.98
Eucinostomus gula	Silver jenny	60-79	0.24	0.44	0.76	0.85	1.07	0.93

[1] Species of direct economic importance (Selected Taxa).

Table 16. Similarity percentage (SIMPER) analysis for Tampa Bay, Sarasota Bay, and Charlotte Harbor segment groupings identified in the MDS ordination for 21.3-m offshore seine collections (*Figure 22*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Upper Charlotte Harbor, Hillsborough Bay, and Old Tampa Bay; Group B included Gasparilla Sound, Middle Charlotte Harbor, Pine Island Sound, Sarasota Bay proper, and Lower Tampa Bay (North and South); Group C consisted of Blackburn and Little Sarasota bays; and Group D consisted of Palma Sola Bay, Roberts Bay, and Middle Tampa Bay. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

			Group Abundance (animals•100m^{-2})$^{1/2}$				***Group Dissimilarity % contribution***					
Scientific name	***Common name***	***Size Class (mm)***	***A***	***B***	***C***	***D***	***A - B***	***A - C***	***A - D***	***B - C***	***B - D***	***C - D***
Anchoa mitchilli	Bay anchovy	20-39	2.79	1.11	4.54	3.46	5.13	6.85	10.39	8.34	14.41	9.05
Eucinostomus spp.	Eucinostomus mojara	20-39	1.31	2.59	3.99	2.33	5.87	13.40	6.67	10.89	4.29	11.73
Lagodon rhomboides	Pinfish	20-39	1.69	3.82	3.89	2.83	10.82	11.85	6.78	4.45	6.26	9.71
Lagodon rhomboides	Pinfish	40-59	0.81	2.69	2.01	1.48	9.04	6.23	3.74	1.25	7.01	5.04
Eucinostomus spp.	Eucinostomus mojara	0-19	0.43	0.95	1.38	1.00	2.22	5.83	2.19	5.05	1.87	5.73
Lucania parva	Rainwater killifish	20-39	0.39	1.59	0.56	1.13	5.46	0.84	2.97	4.06	3.73	1.28
Farfantepenaeus duorarum [1]	Pink shrimp	0-19	0.80	0.62	1.42	0.53	1.69	2.55	2.06	4.54	1.47	4.24
Leiostomus xanthurus [1]	Spot	20-39	0.72	0.36	1.32	0.70	1.54	2.30	2.61	3.58	2.49	1.68
Microgobius gulosus	Clown goby	20-39	0.67	0.31	1.19	0.36	1.83	1.69	1.76	2.82	1.48	2.39
Lagodon rhomboides	Pinfish	60-79	0.53	1.12	0.79	0.57	3.32	2.02	1.39	1.11	2.58	1.52
Leiostomus xanthurus [1]	Spot	0-19	0.30	0.45	1.15	0.80	1.01	2.72	2.14	2.71	1.41	1.80
Lagodon rhomboides	Pinfish	0-19	0.99	1.52	1.40	1.81	2.40	1.94	1.89	1.46	2.16	1.74
Anchoa mitchilli	Bay anchovy	40-59	0.64	0.37	1.15	0.48	1.52	1.75	2.02	2.26	1.91	1.67
Eucinostomus gula	Silver jenny	40-59	0.56	0.79	1.04	0.68	1.61	1.99	2.10	1.15	1.26	1.35
Bairdiella chrysoura	Silver perch	40-59	0.48	0.41	1.08	0.32	0.56	1.63	1.26	2.36	1.18	1.98
Anchoa hepsetus	Striped anchovy	20-39	0.05	0.39	0.05	0.00	1.85	0.42	0.71	1.59	1.89	0.17
Gobiosoma robustum	Code goby	20-39	0.16	0.27	0.52	0.49	0.47	1.45	0.79	1.48	0.76	1.44
Orthopristis chrysoptera	Pigfish	20-39	0.29	0.40	0.44	0.26	0.83	1.39	0.43	1.07	0.82	1.47
Lagodon rhomboides	Pinfish	80-99	0.14	0.46	0.23	0.50	1.42	0.47	0.90	0.88	1.48	0.85
Harengula jaguana	Scaled sardine	40-59	0.12	0.43	0.36	0.17	1.53	0.75	0.84	1.05	1.25	0.52
Lucania parva	Rainwater killifish	0-19	0.13	0.38	0.37	0.61	1.22	0.68	1.69	0.59	0.96	0.72
Eucinostomus harengulus	Tidewater mojarra	40-59	0.11	0.12	0.44	0.09	0.34	1.34	0.59	1.53	0.53	1.34
Bairdiella chrysoura	Silver perch	20-39	0.50	0.27	0.52	0.42	1.17	0.62	1.08	1.06	0.58	0.73
Harengula jaguana	Scaled sardine	60-79	0.09	0.36	0.19	0.19	1.17	0.34	0.58	1.30	1.10	0.51
Menidia spp.	Menidia silversides	40-59	0.25	0.19	0.31	0.11	0.81	0.80	1.09	0.81	0.78	0.67

[1] Species of direct economic importance (Selected Taxa).

Table 17. Similarity percentage (SIMPER) analysis for Tampa Bay, Sarasota Bay, and Charlotte Harbor segment groupings identified in the MDS ordination for 183-m haul seine collections (*Figure 22*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Hillsborough Bay and Old Tampa Bay; Group B included Gasparilla Sound, Middle Charlotte Harbor, Pine Island Sound, Sarasota Bay proper, Palma Sola Bay, Middle Tampa Bay and Lower Tampa Bay (North and South); and Group C consisted of Roberts, Little Sarasota, and Blackburn bays; Group D consisted of Upper Charlotte Harbor. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

Scientific name	Common name	Size Class (mm)	Group Abundance (animals•100m^{-2})$^{1/2}$				Group Dissimilarity % contribution					
			A	B	C	D	A - B	A - C	A - D	B - C	B - D	C - D
Lagodon rhomboides	Pinfish	100-149	0.40	0.93	0.68	0.17	9.37	4.31	6.45	5.54	13.59	8.33
Lagodon rhomboides	Pinfish	80-99	0.38	0.85	0.47	0.20	7.45	1.96	4.96	6.19	10.69	4.49
Lagodon rhomboides	Pinfish	60-79	0.45	0.87	0.53	0.26	6.56	2.17	5.30	5.66	9.97	4.58
Lagodon rhomboides	Pinfish	150-199	0.05	0.21	0.39	0.04	2.64	5.31	0.35	3.01	2.91	5.65
Leiostomus xanthurus [1]	Spot	80-99	0.21	0.07	0.07	0.01	2.35	2.37	5.67	0.60	1.15	1.01
Leiostomus xanthurus [1]	Spot	100-149	0.19	0.06	0.07	0.02	2.62	2.58	4.93	0.64	0.75	0.81
Archosargus probatocephalus [1]	Sheepshead	200-249	0.01	0.06	0.23	0.01	0.69	3.35	0.19	2.78	0.83	3.56
Orthopristis chrysoptera	Pigfish	100-149	0.03	0.13	0.19	0.02	1.82	2.54	0.22	1.64	1.96	2.73
Eucinostomus gula	Silver jenny	80-99	0.07	0.11	0.17	0.02	0.92	1.79	1.32	1.50	1.53	2.65
Eucinostomus gula	Silver jenny	60-79	0.12	0.12	0.17	0.03	0.69	1.10	2.31	1.10	1.60	2.37
Eucinostomus harengulus	Tidewater mojarra	80-99	0.18	0.06	0.05	0.10	2.07	2.20	2.35	0.65	0.87	0.84
Bairdiella chrysoura	Silver perch	100-149	0.04	0.18	0.09	0.03	2.17	0.85	0.57	1.69	2.35	0.97
Elops saurus [1]	Ladyfish	200-249	0.16	0.06	0.08	0.07	1.76	1.84	2.61	0.88	0.30	0.80
Centropomus undecimalis [1]	Snook	300-399	0.02	0.05	0.17	0.02	0.52	2.32	0.45	2.01	0.48	2.38
Orthopristis chrysoptera	Pigfish	80-99	0.03	0.13	0.12	0.02	1.68	1.45	0.38	0.95	1.95	1.73
Centropomus undecimalis [1]	Snook	400-499	0.02	0.07	0.15	0.02	0.77	2.13	0.00	1.53	0.81	2.22
Archosargus probatocephalus [1]	Sheepshead	250-299	0.01	0.05	0.14	0.01	0.59	1.95	0.16	1.45	0.68	2.10
Ariopsis felis	Hardhead catfish	300-399	0.10	0.03	0.11	0.03	1.24	0.84	1.96	1.30	0.26	1.22
Harengula jaguana	Scaled sardine	80-99	0.07	0.10	0.10	0.06	0.74	1.44	0.30	1.69	0.87	1.44
Harengula jaguana	Scaled sardine	100-149	0.11	0.12	0.07	0.07	0.87	1.13	0.94	1.41	0.98	1.00
Elops saurus [1]	Ladyfish	250-299	0.14	0.08	0.10	0.09	1.11	1.24	1.73	0.83	0.32	0.82
Orthopristis chrysoptera	Pigfish	150-199	0.02	0.09	0.11	0.02	1.21	1.47	0.00	0.41	1.24	1.50
Ariopsis felis	Hardhead catfish	200-249	0.05	0.03	0.13	0.05	0.48	1.33	0.74	1.56	0.25	1.34
Archosargus probatocephalus [1]	Sheepshead	150-199	0.02	0.06	0.11	0.01	0.62	1.32	0.28	0.76	0.81	1.53
Brevoortia spp.	Menhaden	100-149	0.04	0.02	0.07	0.00	0.64	1.03	1.14	0.96	0.44	1.00

[1] Species of direct economic importance (Selected Taxa).

Table 18. Similarity percentage (SIMPER) analysis for Tampa Bay, Sarasota Bay, and Charlotte Harbor segment groupings identified in the MDS ordination for 6.1-m otter trawls (*Figure 22*). Mean abundance (Group Abundance) and percent contribution to dissimilarity between groups (Group Dissimilarity) for the top 25 pseudo-species that distinguished embayment groupings are listed. Group A included Upper Charlotte Harbor, Hillsborough Bay, and Old Tampa Bay; Group B included Gasparilla Sound, Pine Island Sound, Sarasota Bay proper, Palma Sola Bay, and Lower Tampa Bay North; Group C consisted of Roberts and Little Sarasota bays; Group D consisted of Middle Tampa Bay, Middle Charlotte Harbor, and Lower Tampa Bay South; and Group E consisted of Blackburn Bay. Taxa are listed in decreasing order of relative contribution to overall differences between groups.

			Group Abundance (animals•100m^{-2})$^{1/2}$					***Group Dissimilarity % contribution***									
Scientific name	***Common name***	***Size Class (mm)***	***A***	***B***	***C***	***D***	***E***	***A - B***	***A - C***	***A - D***	***A - E***	***B - C***	***B - D***	***B - E***	***C - D***	***C - E***
Lagodon rhomboides	Pinfish	20-39	0.06	0.18	0.09	0.33	0.75	1.30	3.40	1.09	6.74	2.35	1.97	6.28	3.07	2.23
Leiostomus xanthurus [1]	Spot	20-39	0.10	0.00	0.00	1.20	0.00	1.58	5.52	2.36	1.41	5.99	0.00	0.00	6.23	5.98
Leiostomus xanthurus [1]	Spot	0-19	0.07	0.00	0.00	0.80	0.03	0.92	5.72	1.37	0.86	6.00	0.00	0.26	6.21	5.82
Lagodon rhomboides	Pinfish	100-149	0.10	0.46	0.54	0.42	0.13	5.06	1.92	3.03	0.92	1.86	4.82	4.82	0.83	1.61
Eucinostomus spp.	Eucinostomus mojara	20-39	0.05	0.13	0.07	0.24	0.51	0.92	2.44	0.95	4.24	1.84	1.87	4.12	2.80	1.12
Lagodon rhomboides	Pinfish	80-99	0.15	0.55	0.58	0.15	0.13	4.55	0.54	1.95	0.64	3.38	5.24	4.70	0.90	0.18
Lagodon rhomboides	Pinfish	0-19	0.03	0.05	0.01	0.70	0.02	0.36	5.60	0.34	0.00	5.02	0.61	0.35	5.43	5.25
Lagodon rhomboides	Pinfish	40-59	0.01	0.11	0.09	0.03	0.38	1.02	2.19	0.37	3.54	1.97	1.44	2.91	2.11	2.12
Anchoa mitchilli	Bay anchovy	20-39	0.22	0.04	0.04	0.24	0.02	1.76	1.83	2.28	1.86	2.90	2.12	0.54	2.50	3.16
Orthopristis chrysoptera	Pigfish	20-39	0.00	0.05	0.01	0.00	0.41	0.37	0.44	0.17	3.92	0.43	0.51	4.03	0.43	2.77
Lagodon rhomboides	Pinfish	60-79	0.06	0.28	0.29	0.05	0.20	2.49	1.13	0.70	1.31	1.48	3.70	1.46	1.00	1.01
Eucinostomus gula	Silver jenny	60-79	0.06	0.15	0.17	0.48	0.09	1.14	2.38	1.27	0.71	1.83	1.78	0.94	2.80	2.37
Prionotus scitulus	Leopard searobin	100-149	0.14	0.18	0.36	0.03	0.05	0.97	0.71	2.78	0.72	1.05	2.37	1.33	2.03	0.16
Orthopristis chrysoptera	Pigfish	100-149	0.07	0.30	0.30	0.23	0.15	2.86	1.52	1.52	0.67	0.94	2.92	2.13	0.79	0.88
Farfantepenaeus duorarum [1]	Pink shrimp	0-19	0.22	0.06	0.04	0.21	0.12	1.93	0.68	3.18	1.11	1.78	0.35	0.68	1.95	1.29
Eucinostomus gula	Silver jenny	80-99	0.05	0.17	0.26	0.37	0.10	1.60	1.98	1.00	0.61	0.79	2.19	1.36	1.85	1.70
Archosargus probatocephalus [1]	Sheepshead	150-199	0.00	0.00	0.00	0.05	0.28	0.00	0.38	0.00	2.69	0.32	0.00	2.95	0.35	1.80
Leiostomus xanthurus [1]	Spot	40-59	0.08	0.00	0.00	0.31	0.00	1.38	1.45	2.09	1.24	1.83	0.00	0.00	1.91	1.83
Anchoa mitchilli	Bay anchovy	40-59	0.20	0.01	0.03	0.12	0.00	1.80	0.64	2.41	1.73	1.01	0.46	0.14	0.88	1.11
Menippe spp. [1]	Stone crabs	0-19	0.02	0.15	0.20	0.03	0.20	1.45	0.00	1.18	1.74	0.95	1.18	0.68	0.47	1.30
Orthopristis chrysoptera	Pigfish	80-99	0.02	0.17	0.13	0.05	0.02	1.79	1.04	0.55	0.00	0.91	2.15	1.77	0.74	0.94
Callinectes sapidus [1]	Blue crab	80-99	0.06	0.01	0.00	0.21	0.11	0.44	1.50	0.63	0.51	1.72	0.27	1.01	1.76	0.99
Menippe spp. [1]	Stone crabs	20-39	0.02	0.16	0.19	0.04	0.10	2.06	0.21	0.79	0.82	1.28	2.35	1.13	0.20	0.47
Orthopristis chrysoptera	Pigfish	0-19	0.00	0.01	0.00	0.00	0.24	0.00	0.15	0.00	2.26	0.15	0.00	2.51	0.15	1.69
Orthopristis chrysoptera	Pigfish	150-199	0.01	0.06	0.05	0.29	0.13	0.73	1.52	0.33	1.15	0.97	0.87	0.55	1.36	0.93

[1] Species of direct economic importance (Selected Taxa).

Nekton community analyses that included the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries (*inter*bay) identified three main bay segment groupings (Groups A, B, and C) for each gear type. Group A typically included bay segments in Tampa Bay and Charlotte Harbor that did not have direct linkages to the Gulf of Mexico and that received freshwater inflow from riverine sources. Bay segments in Group B typically lacked riverine freshwater inflow and tended to be directly linked to the Gulf of Mexico through passes. Although Group C tended to included Little Sarasota and Roberts bays, it occasionally included Blackburn Bay (21.3-m offshore seines and 183-m haul seines) and excluded Roberts Bay (21.3-m offshore seines). Middle Tampa Bay and Middle Charlotte Harbor grouped with either Group A (21.3-m shoreline seine, and 183-m haul seines) or Group B (6.1-m otter trawl). Palma Sola Bay occurred in Group B (low freshwater inflow; direct connectivity to the Gulf of Mexico) for two gear types (21.3-m shoreline seines and 183-m haul seines), but with Group D for both 21.3-m offshore seines (Roberts Bay and Middle Tampa Bay) and 6.1-m otter trawls (Lower Tampa Bay South and Middle Charlotte Harbor).

The nekton community structure for Little Sarasota and Roberts bays tended to group together in both the *intra*bay (Group B) and *inter*bay (Group C) analyses for three of the four gear deployment methods (21.3-m shoreline seine, 183-m haul seine, and 6.1-m otter trawl). While other groupings in the *inter*bay analysis included segments from all three estuaries, groupings that included Little Sarasota Bay did not included bay segments outside of the Sarasota Bay estuary. Higher abundance for a majority of the top 25 pseudo-species that defined the dissimilarity between bay segment groupings, tended to occur in the group that included these two embayments for both the *intra*bay and *inter*bay analyses. Little Sarasota, Roberts, and Blackburn bays are the smallest embayments in the study, are relatively close to the Gulf of Mexico but lack direct linkages to the gulf, and receive some freshwater inflow, either directly or indirectly, from Phillippi Creek. In the *inter*bay analyses for each gear type, the grouping that included Little Sarasota and Roberts bays was most dissimilar to Group A (larger bay segments, freshwater influence, no direct connectivity to the Gulf of Mexico), an indication that the bay segment size and/or proximity to the Gulf may have more influence on their nekton community structure than does the freshwater inflow.

Mercury Content Analysis

Tissue samples for mercury content analysis were collected from 627 individuals representing 28 taxa (*Table 19*). Nekton collected for mercury analysis ranged in size from 63 to 782 mm SL. To date, almost 83% of the tissue samples (n=519) collected from Sarasota Bay have been analyzed for total mercury concentrations. Of the samples analyzed, 63 individual animals (12.1%), representing seven taxa (*Caranx hippos,* jack crevalle [n=2]; *Centropomus undecimalis*, common snook [n=41]; *Chaetodipterus faber*, spadefish [n=1]; *Cynoscion nebulosus*, spotted seatrout [n=6]; *Elops saurus*, ladyfish [n=3]; *Menticirrhus americanus*, Southern kingfish [n=1]; *Scomberomorus maculatus*, Spanish mackerel [n=4]; and *Strongylura marina*, Atlantic needlefish [n=5]), had mercury concentrations above 0.3 mg/kg, a guidance level adopted by the U.S. EPA to protect public health (*USEPA 2001*). Regression analyses were run on eleven taxa (*E. saurus*, ladyfish; *C. undecimalis*, common snook;

Mycteroperca microlepis, gag; *Lutjanus griseus*, gray snapper; *L. rhomboides*, pinfish; *A. probatocephalus*, sheepshead; *C. nebulosus*, spotted seatrout; *Pogonias cromis*, black drum; *S. ocellatus*, red drum; *M. cephalus*, striped mullet; and *Paralichthys albigutta* ,gulf flounder) which had a large enough sample size in Sarasota Bay (≥10) and from the gulf coast of Florida between Tampa Bay and Charlotte Harbor (≥50). Interbay comparisons of lengths and mercury concentrations were made for eight of the eleven analyzed taxa for which more than 100 animals were collected and at least 10 animals were collected within each of the three estuaries.

Table 19. Summary of the number of fish, sizes, and mercury levels for fish tissue samples analyzed from the fisheries-independent sampling of Sarasota Bay. Min = minimum, Max = maximum, Analyzed = number of fish that have been processed for mercury concentration, and Total = total number of fish collected for mercury content analysis. Linear regressions of Hg concentration against length were conducted for animals with at least 50 individuals analyzed with Charlotte Harbor, Tampa Bay, and Sarasota Bay combined ("A" in Anal.). Mercury concentrations and sizes were compared between adjacent estuaries for species with 100 or more total animals analyzed from all three estuaries ("B" in Anal.). Species are listed in alphabetical order.

	Sizes (mm)			*Hg Concentration (mg/kg)*			*Number*		
Species	*Mean*	*Min*	*Max*	*Mean*	*Min*	*Max*	*Analyzed*	*Total*	Anal.
Ancylopsetta quadrocellata	153.5	149	158	0.056	0.052	0.060	2	2	
Archosargus probatocephalus	240.2	131	358	0.102	0.032	0.211	81	101	A,B
Caranx hippos	242.2	233	253	0.451	0.286	0.601	3	6	
Centropomus undecimalis	387.2	183	782	0.255	0.022	0.952	129	156	A,B
Chaetodipterus faber	278.5	252	312	0.205	0.114	0.340	4	4	
Cynoscion nebulosus	277.1	118	434	0.215	0.031	0.520	20	28	A,B
Elops saurus	263.1	209	480	0.173	0.041	0.748	45	54	A,B
Epinephelus morio	101.0	101	101	0.027	0.027	0.027	1	1	
Eugerres plumieri	222.80	203	235	0.185	0.063	0.269	5	5	
Lachnolaimus maximus	163.5	139	188	0.041	0.041	0.041	1	2	
Lagodon rhomboides	110.3	63	151	0.058	0.023	0.160	59	59	A
Lutjanus griseus	186.7	115	240	0.075	0.031	0.168	46	52	A,B
Lutjanus synagris	125.3	120	133	0.059	0.051	0.070	3	3	
Menticirrhus americanus	262.4	204	308	0.167	0.040	0.316	6	8	
Micropogonias undulatus	271.0	271	271	0.034	0.034	0.034	1	1	
Mugil cephalus	262.5	135	379	0.006	0.005	0.008	10	10	A
Mugil curema	125.7	112	135	0.011	0.007	0.016	3	3	
Mycteroperca microlepis	235.4	153	403	0.080	0.054	0.147	13	17	A,B
Orthopristis chrysoptera	95.0	91	99	0.045	0.038	0.053	2	2	
Paralichthys albigutta	249.9	194	368	0.116	0.038	0.270	13	21	A,B
Pogonias cromis	255.4	171	348	0.079	0.018	0.291	10	16	A
Sciaenops ocellatus	403.6	224	592	0.096	0.019	0.188	40	54	A,B
Scomberomorus maculatus	347.0	242	410	0.378	0.202	0.515	6	6	
Sphyraena barracuda	448.0	448	448	0.130	0.130	0.130	1	1	
Strongylura marina	414.0	324	480	0.541	0.210	0.763	6	6	
Synodus foetens	175.0	128	222	0.083	0.048	0.118	2	2	
Trachinotus carolinus	251.6	215	321	0.136	0.048	0.282	5	5	
Trachinotus falcatus	267.0	264	270	0.067	0.060	0.073	2	2	
Total	279.9	63	782	0.152	0.005	0.952	519	627	

Ladyfish, *Elops saurus*

Ladyfish that were collected in Sarasota Bay for mercury analysis ranged in size from 209 to 480 mm SL (*Table 19*). Forty-five ladyfish from Sarasota Bay had a mean total mercury level of 0.173 mg/kg, ranging from 0.041 to 0.748 mg/kg. There was a significant (P<0.0001), positive linear relationship between total mercury concentration and standard length for ladyfish collected from Tampa Bay and Charlotte Harbor (*Figure 23*), indicating a tendency for mercury concentrations to increase over time as ladyfish grow. Ladyfish collected for mercury analysis from Sarasota Bay were smaller on average (251.6 mm SL, n=45) than those collected in the Tampa Bay and Charlotte Harbor estuaries (290.8 and 281.4 mm SL, respectively; *Figure 24*). Total mercury concentrations tended to be lower for ladyfish analyzed from Sarasota Bay (0.173) than those from either the Tampa Bay (0.297, n=213) or Charlotte Harbor (0.238, n=141) estuaries.

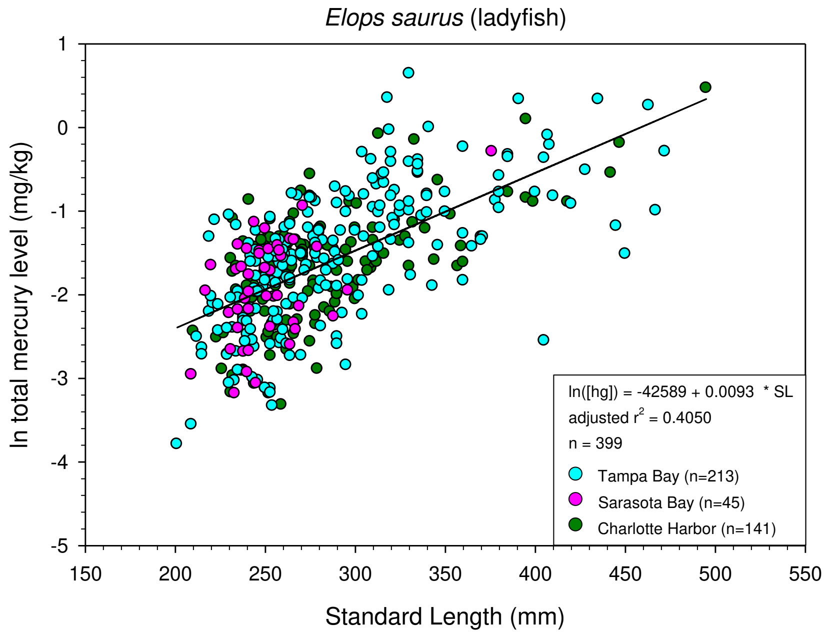

Figure 23. Relationship between natural log transformed (ln) total mercury concentration (mg/kg) and standard length (mm) for ladyfish collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

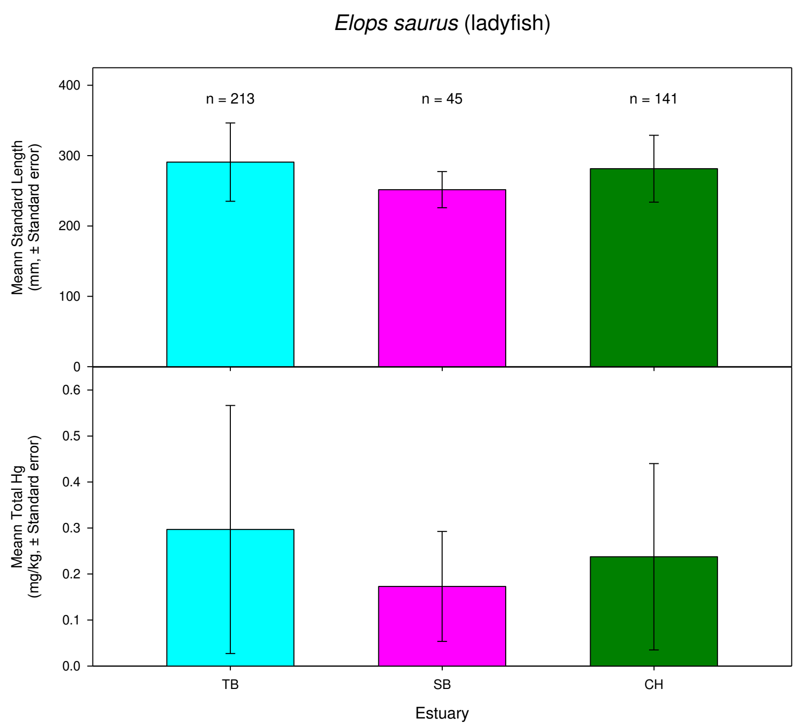

Figure 24. Comparison of sizes and total mercury concentration for ladyfish in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Common Snook, *Centropomus undecimalis*

One hundred and twenty-nine of the 156 common snook collected for mercury analysis from Sarasota Bay have been processed (*Table 19*). Common snook collected for mercury analysis from Sarasota Bay range in size from 183 to 782 mm SL (mean of 387.2 mm). The mean total mercury concentration for common snook in Sarasota Bay was 0.255 mg/kg ranging from 0.022 to 0.952 mg/kg.

Common snook from Tampa Bay and Charlotte Harbor had a significant (P<0.0001) positive linear relationship between total mercury concentration and standard length (*Figure 25*). On average, common snook collected for mercury analysis from Sarasota Bay had a smaller average size and had lower average mercury concentrations (387.2 mm SL, 0.255 mg/kg, n=129) than those tested from either the Tampa Bay (460 mm SL, 0.346 mg/kg, n=1,295) or Charlotte Harbor (513 mm SL, 0.346 mg/kg, n=433) estuaries (*Figure 26*).

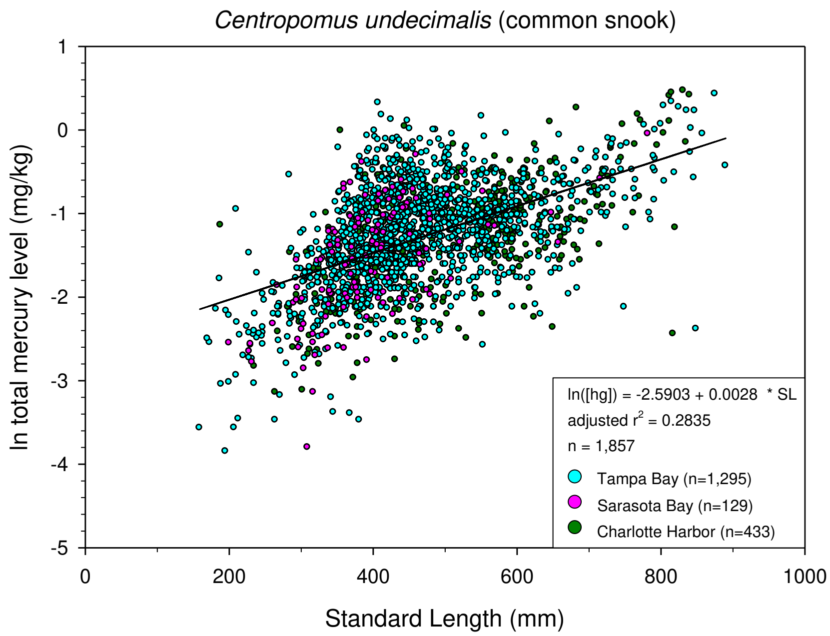

Figure 25. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for common snook collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

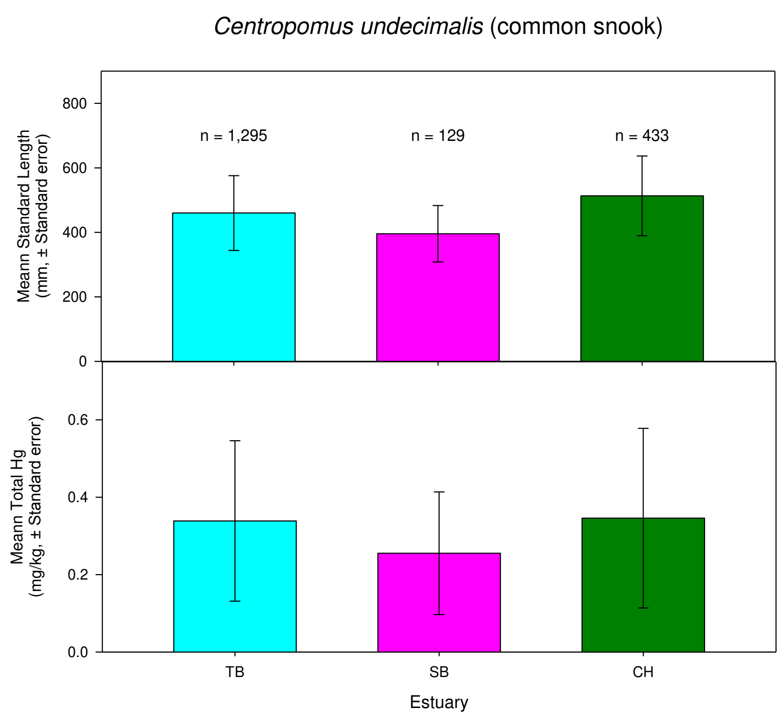

Figure 26. Comparison of sizes and total mercury concentration for common snook collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Gag, *Mycteroperca microlepis*

Thirteen gag, ranging in size from 153 to 403 mm SL, have been collected and analyzed for total mercury concentrations from Sarasota Bay (*Table 19*). The mean total mercury level for gag collected from Sarasota Bay was 0.080 mg/kg (range 0.054 to 0.147 mg/kg). Gag from estuarine waters of Tampa Bay and Charlotte Harbor had a significant (P<0.0001) and positive linear relationship between size and total mercury concentration, such that total mercury increased as gag grew and aged (*Figure 27*). Although gag over 450mm SL were only collected for mercury analysis from within the Tampa Bay estuary, the average sizes collected for mercury analysis in all three estuaries were very similar (210.8 to 218.9 mm SL; *Figure 28*). Average total mercury concentrations for gag were slightly lower in Sarasota Bay (0.080 mg/kg) than in either the Tampa Bay (0.115 mg/kg) or Charlotte Harbor (0.139 mg/kg) estuaries.

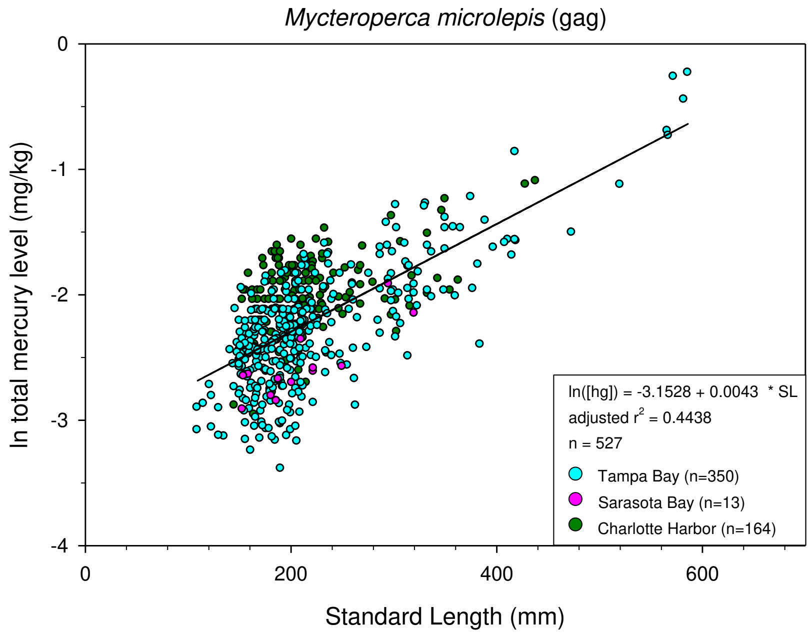

Figure 27. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for gag collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

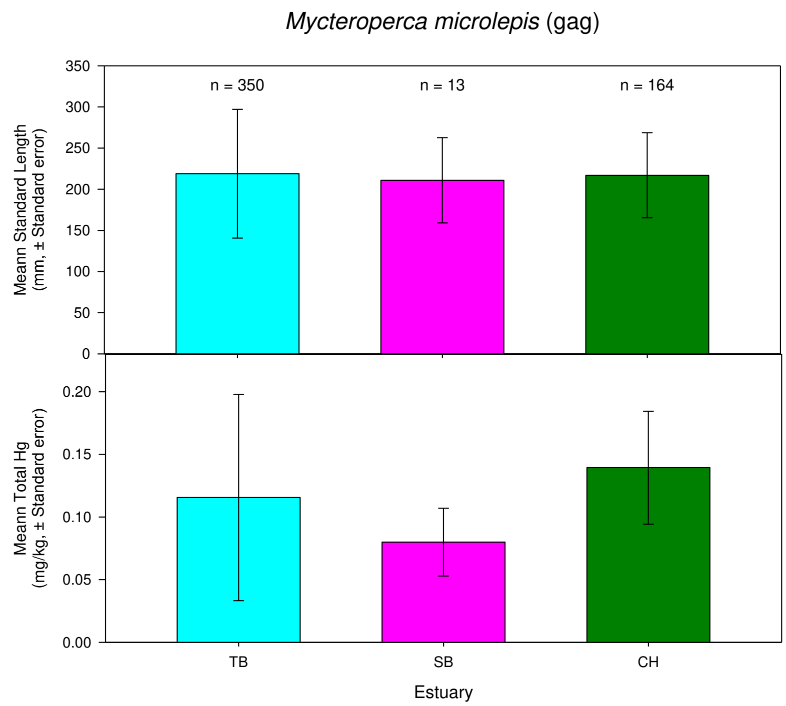

Figure 28. Comparison of average sizes and total mercury concentration for gag collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Gray Snapper, *Lutjanus griseus*

Almost 90% of the gray snapper collected for mercury analysis (n=46) from Sarasota Bay have been processed (*Table 19*). Gray snapper collected for mercury analysis from Sarasota Bay ranged in size from 115 to 240 mm SL (mean of 186.7 mm). The average total mercury level for gray snapper in Sarasota Bay was 0.075 mg/kg (range 0.031 to 0.168 mg/kg).

Total mercury concentration for gray snapper from estuarine waters along the gulf coast of Florida between Tampa Bay and Charlotte Harbor had a significant (P<0.0001) positive linear relationship with size, indicating that mercury concentrations increased as gray snapper grew (*Figure 29*). The average sizes of gray snapper collected for mercury analysis in Tampa Bay and Sarasota Bay estuaries were very similar (189.3 and 186.9 mm SL, respectively) while gray snapper from Charlotte Harbor tended to be slightly larger (211.3 mm SL; *Figure 30*). Average total mercury concentrations for gray snapper were lower in Sarasota Bay (0.075 mg/kg, n=46) than in either the Tampa Bay (0.106 mg/kg, n=289) or Charlotte Harbor (0.123 mg/kg, n=358) estuaries (*Figure 30*).

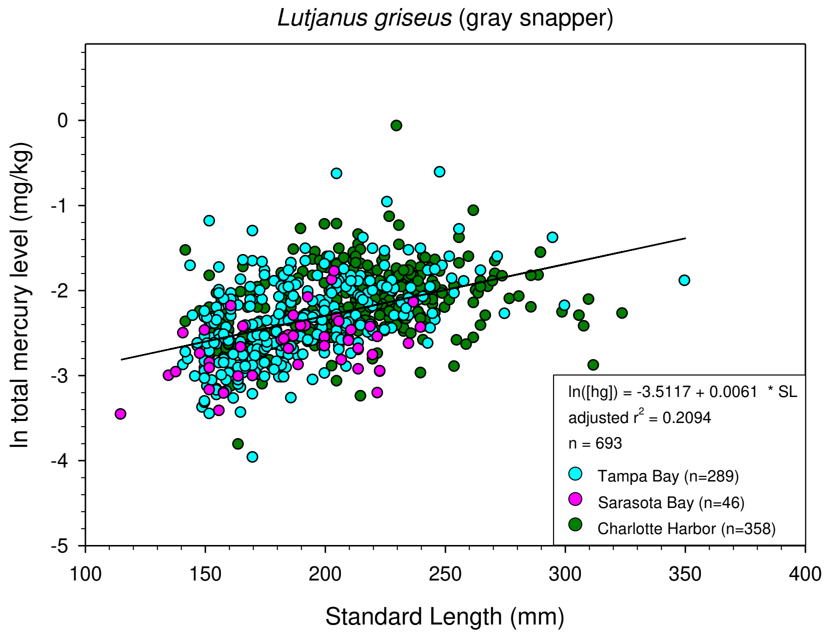

Figure 29. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for gray snapper collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

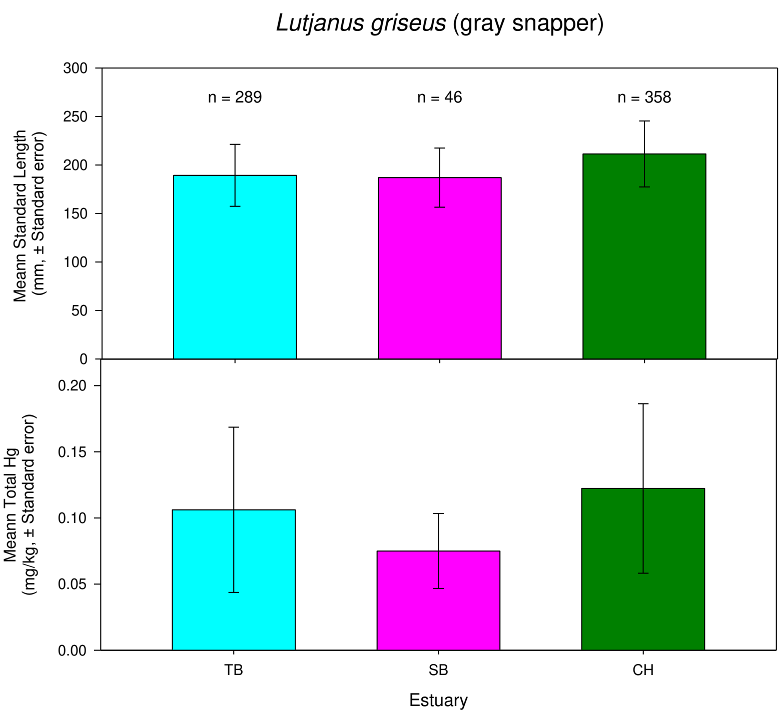

Figure 30. Comparison of sizes and total mercury concentration for gray snapper collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Pinfish, *Lagodon rhomboides*

All pinfish collected for mercury analysis (n=59) from Sarasota Bay have been processed (*Table 19*). Pinfish collected for mercury analysis from Sarasota Bay ranged in size from 63 to 151 mm SL (mean of 110.3 mm). The mean total mercury level for pinfish in Sarasota Bay was 0.058 mg/kg (range 0.023 to 0.160 mg/kg).

Pinfish collected from Charlotte Harbor (n=6) and Sarasota Bay (n=59) estuaries had a significant ($P<0.01$) positive linear relationship between total mercury concentration and size, indicating that mercury concentrations increase as pinfish grew (*Figure 31*).

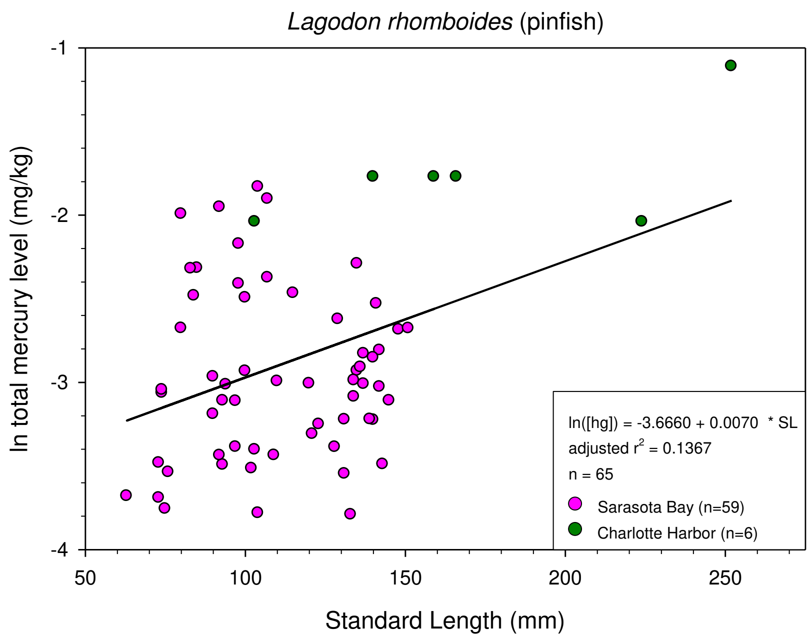

Figure 31. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for pinfish collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

Sheepshead, *Archosargus probatocephalus*

Within Sarasota Bay, 101 sheepshead (131 to 358 mm SL) have been collected for mercury analysis (*Table 19*). Eighty-one of those fish have been analyzed for total mercury concentrations with mercury levels ranging from 0.032 to 0.211 mg/kg (mean of 0.102 mg/kg).

Linear regression indicates that total mercury concentration had a significant ($P<0.0001$) positive relationship with standard length for sheepshead collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries (*Figure 32*). Average sizes of sheepshead were smallest in Sarasota Bay (239.5 mm SL, n=81) and larger in the Charlotte Harbor (245.1 mm SL, n=99) and Tampa Bay estuaries (260.4 mm SL, n=127; *Figure 33*). Average total mercury concentration was also lowest in Sarasota Bay (0.102 mg/kg) and higher in the Tampa Bay and Charlotte Harbor estuaries (0.132 and 0.134 mg/kg, respectively).

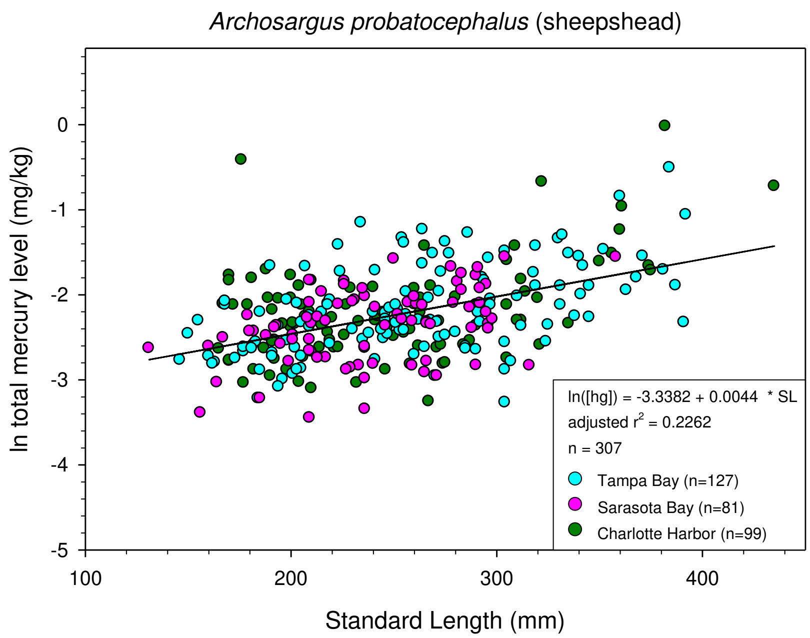

Figure 32. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for sheepshead collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

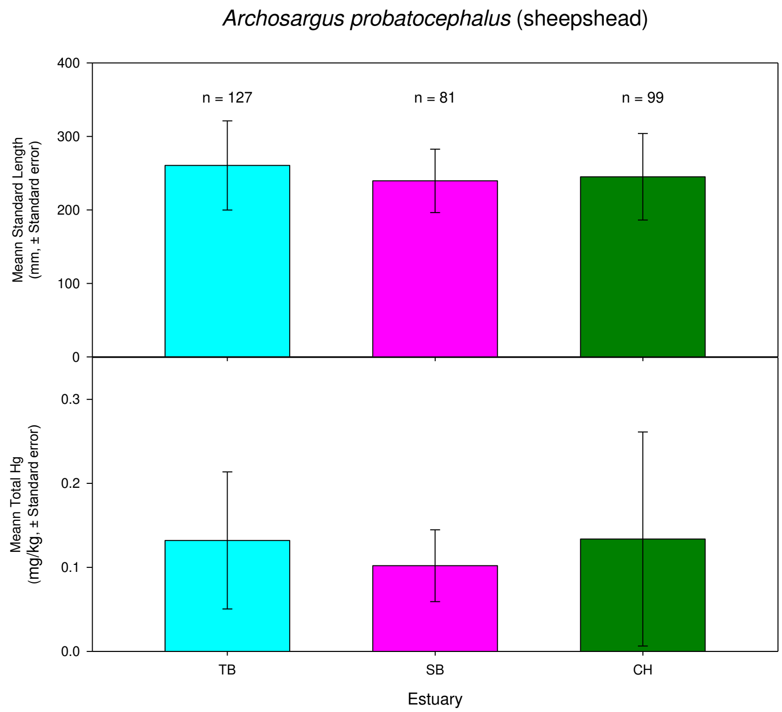

Figure 33. Comparison of sizes and total mercury concentration for sheepshead collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Spotted Seatrout, *Cynoscion nebulosus*

Twenty of the 28 spotted seatrout that were collected for total mercury concentrations from Sarasota Bay have been analyzed (*Table 19*). The collected spotted seatrout ranged in size from 118 to 434 mm SL (mean of 277.1 mm SL). The total mercury concentration for spotted seatrout collected from Sarasota Bay ranged from 0.031 to 0.520 mg/kg (mean of 0.215 mg/kg). Total mercury concentrations for spotted seatrout from the estuarine waters of Tampa Bay, Sarasota Bay and Charlotte Harbor had a significant (P<0.0001) and positive linear relationship with size (*Figure 34*). The average size of spotted seatrout collected for mercury analysis was smallest from Sarasota Bay (296.5 mm SL, n=20) and largest from the Charlotte Harbor estuary (332.4 mm SL, n=123; *Figure 35*). Similarly, the mean total mercury concentration was higher in the Charlotte Harbor estuary (0.380 mg/kg) than either the Tampa Bay (0.331 mg/kg) or the Sarasota Bay (0.215 mg/kg) estuaries.

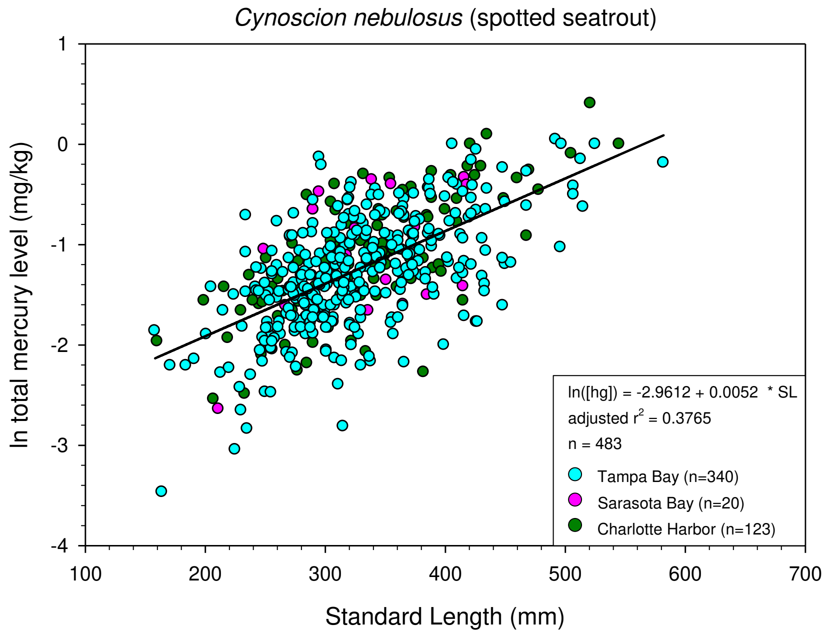

Figure 34. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for spotted seatrout collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

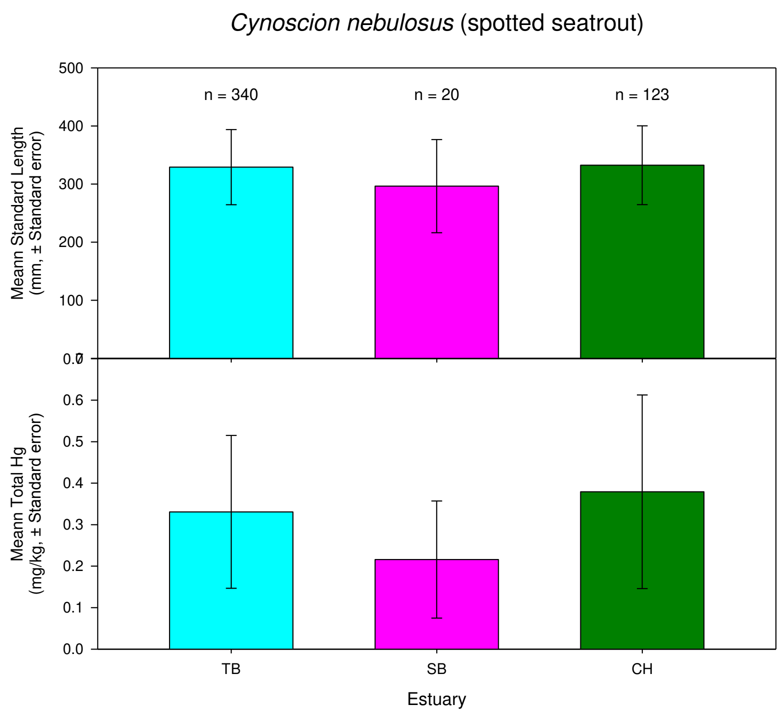

Figure 35. Comparison of average sizes and total mercury concentration for spotted seatrout collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Black Drum, *Pogonias cromis*

Sixteen black drum have been collected from the Sarasota Bay estuary for mercury analysis and ten of them have been processed (*Table 19*). Black drum collected for mercury analysis from Sarasota Bay ranged in size from 171 to 348 mm SL (mean of 255.4 mm). The mean total mercury level for black drum in Sarasota Bay was 0.079 mg/kg (range 0.018 to 0.291 mg/kg).

Black drum collected from Charlotte Harbor (n=20), Sarasota Bay (n=10) , and Tampa Bay (n=21) estuaries had a significant (P<0.001) positive linear relationship between total mercury concentration and size, indicating that mercury concentrations increase as black drum increased in size (*Figure 36*).

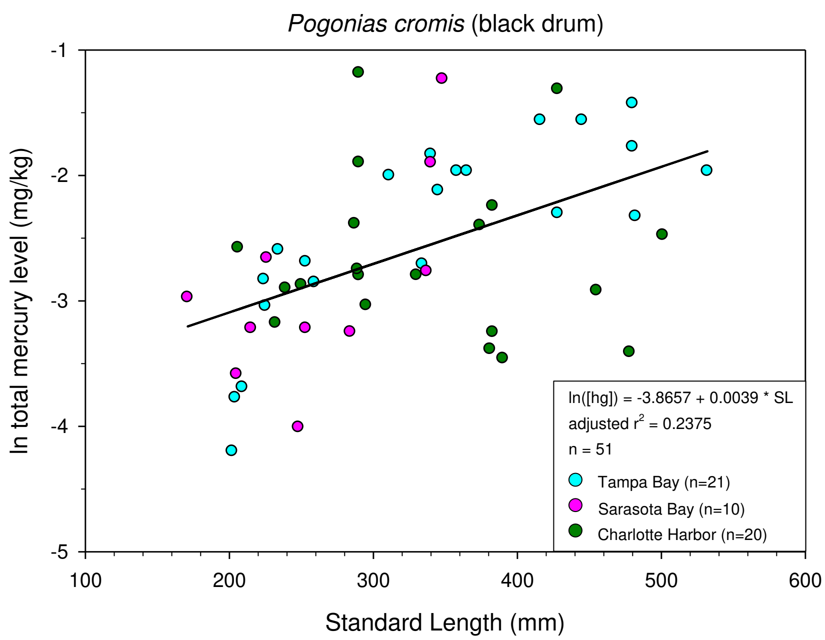

Figure 36. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for black drum collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

Red Drum, *Sciaenops ocellatus*

Forty of the 54 red drum collected for total mercury concentrations from Sarasota Bay have been analyzed (*Table 19*). The collected red drum ranged in size from 224 to 592 mm SL (mean of 403.6 mm SL). The mean total mercury concentration for red drum collected from Sarasota Bay was 0.096 mg/kg (range: 0.019 to 0.188 mg/kg). Red drum from the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries had a significant (P<0.0001) and positive linear relationship between size and total mercury concentration (*Figure 37*). The average size red drum analyzed for mercury concentrations were smaller in Sarasota Bay (415.0 mm SL, n=40) and Tampa Bay (420.0 mm SL) estuaries than in the Charlotte Harbor estuary (452.8 mm SL; *Figure 38*). The mean total mercury concentration was highest in the Charlotte Harbor estuary (0.159 mg/kg) and lowest in Sarasota Bay (0.096 mg/kg; *Figure 38*).

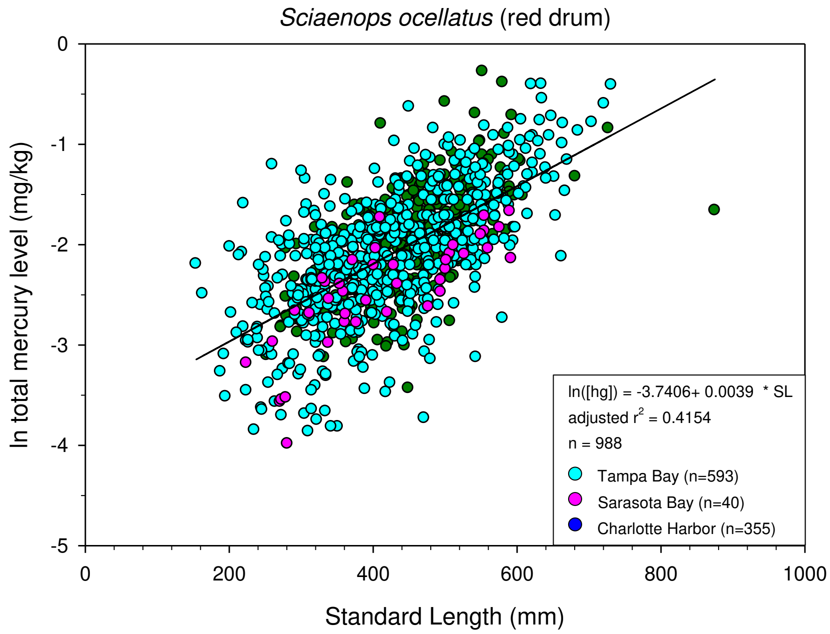

Figure 37. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for red drum collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

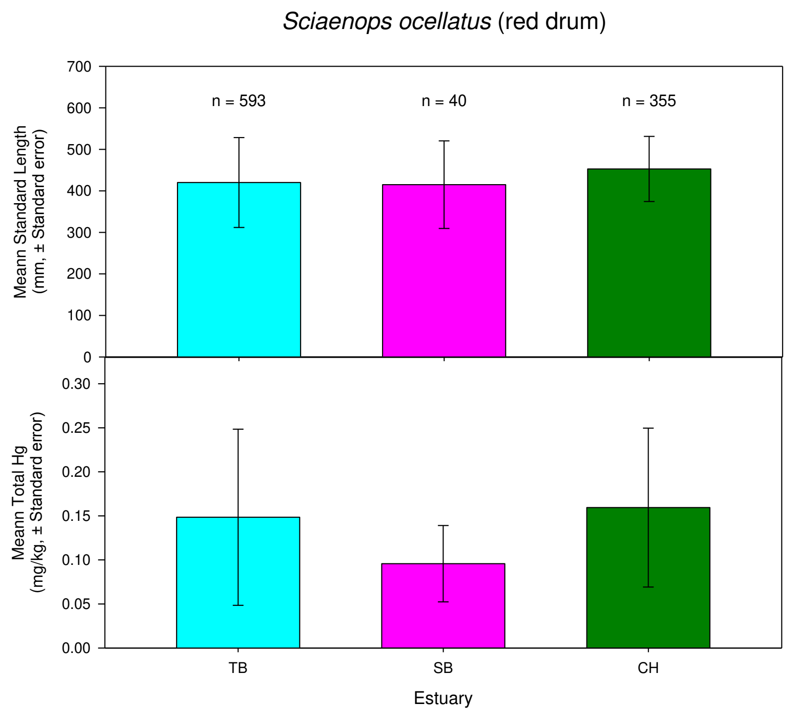

Figure 38. Comparison of average sizes and total mercury concentration for red drum collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

Striped Mullet, *Mugil cephalus*

All ten striped mullet collected from the Sarasota Bay estuary for mercury analysis have all been processed (*Table 19*). Striped mullet collected for mercury analysis from Sarasota Bay ranged in size from 135 to 379 mm SL (mean of 262.5 mm). Striped mullet had the lowest mercury concentrations of any species analyzed so far in Sarasota Bay; the mean total mercury level for striped mullet was 0.006 mg/kg (range 0.005 to 0.008 mg/kg).

Striped mullet collected from Charlotte Harbor (n=28), Sarasota Bay (n=10) , and Tampa Bay (n=46) estuaries did not have a significant (*P*=0.3931) linear relationship between total mercury concentration and size, indicating that mercury concentrations did not accumulate with increasing size for striped mullet (*Figure 39*).

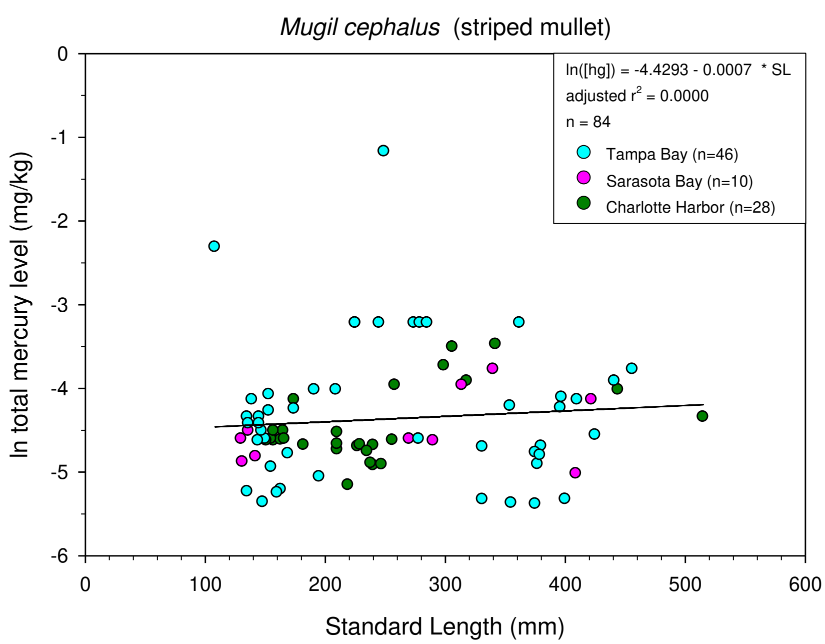

Figure 39. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for striped mullet collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

Gulf Flounder, *Paralichthys albigutta*

Thirteen of the 21 gulf flounder collected for total mercury concentrations from Sarasota Bay have been analyzed (*Table 19*). The collected gulf flounder ranged in size from 194 to 368 mm SL (mean of 249.9 mm SL). The mean total mercury concentration for gulf flounder collected from Sarasota Bay was 0.116 mg/kg (range: 0.038 to 0.270 mg/kg). Gulf flounder from the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries had a significant (P<0.0001) and positive linear relationship between size and total mercury concentration (*Figure 40*). The average size gulf flounder analyzed for mercury concentrations were smaller in the Sarasota Bay (234.3 mm SL, n=13) than in the Tampa Bay (276.3 mm SL, n=163) and Charlotte Harbor estuaries (273.1 mm SL, n=304; *Figure 41*). The mean total mercury concentration was also lower in the Sarasota Bay estuary (0.116 mg/kg) than in either the Tampa Bay or Charlotte Harbor estuaries (0.162 and 0.160 mg/kg, respectively; *Figure 41*).

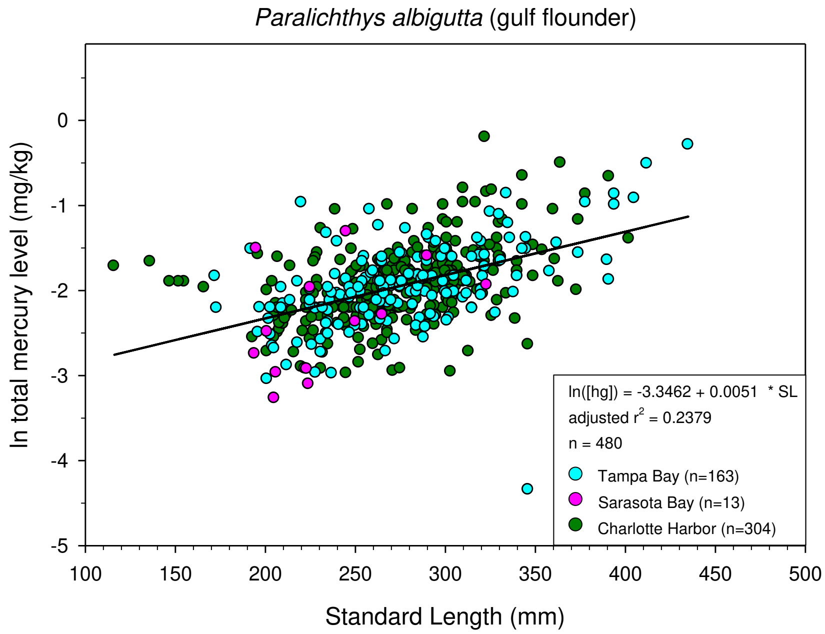

Figure 40. Relationship between natural log transformed (ln) total mercury level (mg/kg) and standard length (mm) for gulf flounder collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

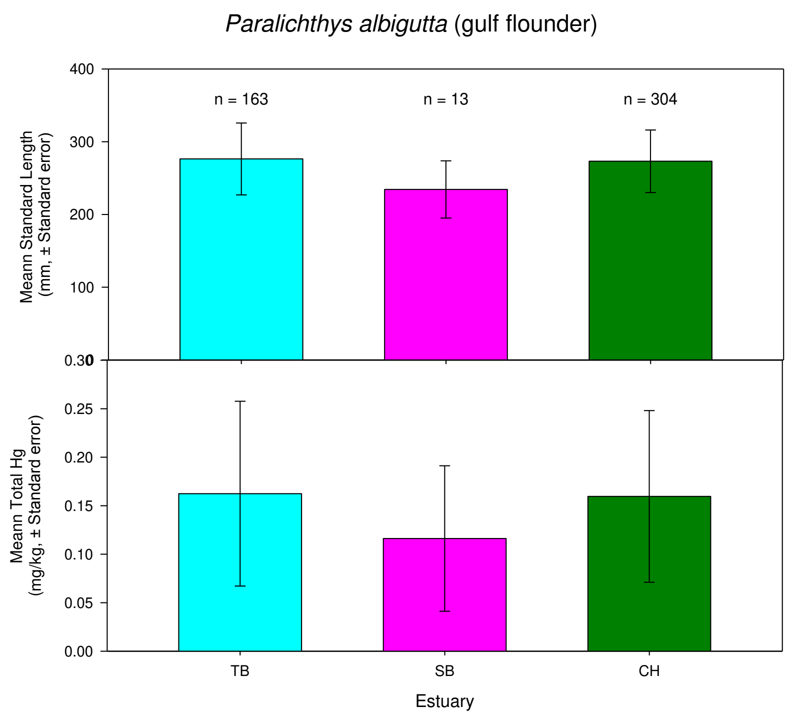

Figure 41. Comparison of average sizes and total mercury concentration for gulf flounder collected in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries. Error bars represent one standard error.

CONCLUSIONS

Physiochemical conditions

The meteorological conditions during the first three years of this study followed the 30-year trend (1979 – 2008) but both temperature and rainfall deviated from the normal average condition during several months. Monthly average temperatures from January to March 2010 and December 2010 to January 2011 were well below normal, while temperatures during the summer of 2010 and spring of 2011 tended to be higher than normal. In the third year of the study, June 2011 to April 2012, all months had higher temperatures than the historical average except October. Precipitation in the normally dry months of January to May was unseasonably high during both 2010 and 2011. While in year three, June 2011 to April 2012, percipation was lower than the historical average during most months. Undoubtedly these conditions influenced the physiochemical makeup of Sarasota Bay and potentially the composition of the nekton community as well.

Composition of overall nekton community

The nekton community in Sarasota Bay from June 2011 to April 2012 was typical of Florida estuaries. Almost 87% of the total nekton catch during the third year of this study were collected in 21.3-m seine hauls. The bay anchovy (*Anchoa mitchilli*), a small schooling fish, comprised almost 56% of the catch in this gear and over 49% of the total catch across all gears. Pinfish (*Lagodon rhomboides*) were also particularly abundant, representing one of the top three most abundant taxa collected in each of the gear types and the top taxa in 183-m haul seines and 6.1-m otter trawls. Pinfish comprised almost 15% of the total catch. Other estuarine dependent species such as spot (*Leiostomus xanthurus*), eucinostomus mojarra (*Eucinostomus* spp.), silver jenny (*Eucinostomus gula*), silver perch (*Bairdiella chrysoura*), and pigfish (*Orthopristis chrysoptera*) were relatively abundant in Sarasota Bay as well.

<u>Nekton Community Structure</u>

Nekton abundance was higher in Little Sarasota Bay for the 21.3-m shoreline and offshore seines and the 6.1-m otter trawls, while abundance for the 183-m haul seine was hghest in Sarasota Bay proper. Two Sarasota Bay embayments (Roberts and Little Sarasota bays) had very similar nekton assemblages in habitats sampled by three of the four gears (21.3-m shoreline seines, 183-m haul seines, and 6.1-m otter trawls). Nekton assemblages in Palma Sola and Sarasota bays were also similar to each other, but different from the group of Roberts and Little Sarasota bays for these same three gear types. Nekton assemblages in the fifth Sarasota Bay estuary embayment (Blackburn Bay) tended to group alone (21.3-m shoreline seine and 6.1-m otter trawl) or group with Little Sarasota Bay (21.3-m offshore seine and 183-m haul seine). Differences in nekton communities within habitats sampled by each gear type were defined by differences in abundance of similar pseudo-species rather than by differences in taxa that were present. Pseudo-species that discriminated embayment groupings for 21.3-m seines and 6.1-m otter trawls tended to be more abundant in Roberts and Little Sarasota bays grouping than in other embayments. Roberts and Little Sarasota bays differ from other embayments of Sarasota Bay in that they have relatively small surface areas, receive freshwater inflow from Phillippi Creek, and they lack direct connection to the Gulf of Mexico. These factors likely influence the observed differences in the nekton community structure between Roberts and Little Sarasota bays group and other embayments.

The *inter*bay analyses comparing nekton assemblages in bay segments of Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries resulted in three basic groupings regardless of gear type: 1) small Sarasota embayments, 2) larger bay segments with relatively direct connection to the Gulf of Mexico and little freshwater inflow from tributaries, and 3) larger bay segments without direct passes to the Gulf of Mexico and relatively high freshwater inflow from tributaries. As with *intra*bay analyses, these bay segment groupings tended to be defined by differences in abundance of similar taxa and not by entirely different suites of taxa.

The *intra*bay and *inter*bay analyses of community assemblages provided similar results. Nekton communities of Roberts and Little Sarasota bays grouped together for three of the four gears in both analyses. Nekton assemblages from larger bay segments with direct access to the Gulf of Mexico also tended to group together in both *intra*bay and *inter*bay analyses. In *inter*bay analysis, consistent groupings of small Sarasota embayments, large bay segments with direct access to the Gulf, and large bay segments with freshwater infow likely indicates that embayment size, proximity to the Gulf of Mexico, and freshwater inflow are important in determining nekton composition in these three Southwest Florida estuaries. The smaller embayments of Sarasota Bay estuary are closer to the Gulf than are larger bay segments that have significant freshwater influence (Upper Charlotte Harbor, Hillsborough Bay and Lower Tampa Bay South). Possibly, proximity to the Gulf of Mexico and/or embayment size is more important in determining nekton composition than is freshwater inflow in these Sarasota Bay estuary embayments.

Mercury Content Analysis

Sample sizes were not large enough to run linear regressions on any of the taxa collected for total mercury concentration analysis from Sarasota Bay without combining with data from adjacent estuaries (Tampa Bay and Charlotte Harbor). Preliminary results of total mercury concentration analysis provides no reason to suspect that fish from Sarasota Bay have different concentrations of mercury than those found in adjacent estuaries and suggest that accumulation rates for Sarasota Bay are similar to those found in Tampa Bay and Charlotte Harbor.

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APPENDICES

Appendix A. Animals designated as Selected Taxa because of their commercial or recreational importance.

Scientific Name	Common Name
Albula vulpes	*bonefish*
Archosargus probatocephalus	*sheepshead*
Callinectes sapidus	*blue crab*
Centropomus undecimalis	*common snook*
Cynoscion arenarius	*sand seatrout*
Cynoscion nebulosus	spotted seatrout
Cynoscion nothus	silver seatrout
Cynoscion regalis	weakfish
Cynoscion complex	seatrout
Elops saurus	ladyfish
Epinephelus adscensionis	rock hind
Epinephelus afer	mutton hamlet
Epinephelus cruentatus	graysby
Epinephelus drummondhayi	speckled hind
Epinephelus flavolimbatus	yellowedge grouper
Epinephelus fulvus	coney
Epinephelus guttatus	red hind
Epinephelus inermis	marbled grouper
Epinephelus itajara	goliath grouper
Epinephelus morio	red grouper
Epinephelus mystacinus	misty grouper
Epinephelus nigritus	Warsaw grouper
Epinephelus niveatus	snowy grouper
Epinephelus striatus	Nassau grouper
Farfantepenaeus aztecus	brown shrimp
Farfantepenaeus duorarum	pink shrimp
Farfantepenaeus brasiliensis	pinkspotted shrimp
Farfantepenaeus spp.	penaeid shrimps
Leiostomus xanthurus	spot
Litopenaeus setiferus	white shrimp
Lutjanus analis	mutton snapper
Lutjanus apodus	schoolmaster
Lutjanus buccanella	blackfin snapper
Lutjanus campechanus	red snapper
Lutjanus cyanopterus	cubera snapper
Lutjanus griseus	gray snapper
Lutjanus jocu	dog snapper
Lutjanus mahogoni	mahogany snapper
Lutjanus synagris	lane snapper
Lutjanus vivanus	silk snapper
Megalops atlanticus	tarpon
Menippe spp.	stone crab
Menticirrhus americanus	southern kingfish
Menticirrhus littoralis	Gulf kingfish
Menticirrhus saxatillis	northern kingfish
Micropogonias undulatus	Atlantic croaker
Mugil cephalus	striped mullet
Mugil curema	white mullet
Mugil gaimardianus	redeye mullet
Mugil gyrans	whirligig mullet
Mugil liza	liza
Mycteroperca bonaci	black grouper
Mycteroperca microlepis	gag
Mycteroperca phenax	scamp
Mycteroperca tigris	tiger grouper
Mycteroperca venenosa	yellowfin grouper
Panulirus argus	spiny lobster
Paralichthys albigutta	Gulf flounder
Paralichthys dentatus	summer flounder
Paralichthys lethostigma	southern flounder
Paralichthys oblongus	fourspot flounder
Paralichthys squamilentus	broad flounder
Penaeidae spp.	shrimps
Pogonias cromis	black drum
Pomatomus saltatrix	bluefish
Rachycentron canadum	cobia
Sciaenops ocellatus	red drum
Scomberomorus cavalla	king mackerel
Scomberomorus maculatus	Spanish mackerel
Scomberomorus regalis	cero
Trachinotus carolinus	pompano
Trachinotus falcatus	permit
Trachinotus goodei	palometa

Appendix B. Summary of species collected, by sampling event (bi-monthly), during Sarasota Bay nekton sampling, June 2011 to April 2012. Effort, or total number of hauls, is labeled 'E'. Taxa are arranged alphabetically. Species of commercial or recreational importance (Selected Taxa) are denoted with an asterisk (*) after the species name.

		Month and Year						*Totals*
		Jun 2011	*Aug 2011*	*Oct 2011*	*Dec 2011*	*Feb 2012*	*Apr 2012*	
Scientific Name	*Common Name*	*E=42*	*E=42*	*E=37*	*E=40*	*E=42*	*E=42*	*E=245*
Acanthostracion quadricornis	scrawled cowfish	12	5	17	7	2	5	48
Achirus lineatus	lined sole	14	6	5	2	1	4	32
Aluterus schoepfii	orange filefish	3	.	2	.	.	.	5
Anchoa cubana	cuban anchovy	1	.	110	.	.	.	111
Anchoa hepsetus	striped anchovy	17	.	4	2	.	26	49
Anchoa mitchilli	bay anchovy	6,622	4,294	28,508	21,568	42	680	61,714
Ancylopsetta quadrocellata	ocellated flounder	.	.	6	1	.	.	7
Archosargus probatocephalus *	sheepshead	46	48	26	20	30	52	222
Ariopsis felis	hardhead catfish	25	28	95	36	24	13	221
Bagre marinus	gafftopsail catfish	.	6	.	1	.	.	7
Bairdiella chrysoura	silver perch	2,048	727	127	4	10	111	3,027
Bathygobius soporator	frillfin goby	.	.	4	.	.	.	4
Brevoortia spp.	menhaden	17	31	13	14	.	18	93
Calamus arctifrons	grass porgy	1	.	.	.	1	.	2
Calamus spp.	porgies	.	.	.	2	.	.	2
Callinectes sapidus *	blue crab	58	14	117	8	19	30	246
Caranx crysos	blue runner	.	.	1	.	.	67	68
Caranx hippos	crevalle jack	.	3	13	14	.	4	34
Centropomus undecimalis *	common snook	31	91	23	40	43	56	284
Centropristis striata	black sea bass	.	4	9	1	.	.	14
Chaetodipterus faber	atlantic spadefish	1	11	4	2	1	14	33
Chasmodes saburrae	florida blenny	2	2	1	5	2	.	12
Chilomycterus schoepfii	striped burrfish	24	13	11	9	11	4	72
Citharichthys macrops	spotted whiff	.	1	.	.	2	.	3
Ctenogobius boleosoma	darter goby	.	.	.	.	.	2	2
Cynoscion arenarius *	sand seatrout	1	.	377	.	.	1	379
Cynoscion nebulosus *	spotted seatrout	53	70	40	21	9	13	206
Cyprinodon variegatus	sheepshead minnow	34	21	.	33	1	1	90
Dasyatis sabina	atlantic stingray	1	5	8	4	1	2	21

Scientific Name	Common Name	Month and Year						Totals
		Jun 2011	Aug 2011	Oct 2011	Dec 2011	Feb 2012	Apr 2012	
		E=42	E=42	E=37	E=40	E=42	E=42	E=245
Dasyatis say	bluntnose stingray	2	2	2	1	3	2	12
Dasyatis spp.	stingrays	.	.	.	.	1	.	1
Diapterus auratus	irish pompano	.	.	.	.	.	1	1
Diplectrum formosum	sand perch	.	.	1	1	.	1	3
Diplodus holbrookii	spottail pinfish	12	186	50	.	7	.	255
Echeneis neucratoides	whitefin sharksucker	1	.	.	.	.	.	1
Elops saurus *	ladyfish	38	8	17	99	.	13	175
Etropus crossotus	fringed flounder	4	5	5	4	.	2	20
Eucinostomus argenteus	spotfin mojarra	.	.	.	.	2	.	2
Eucinostomus gula	silver jenny	180	490	528	358	161	178	1,895
Eucinostomus harengulus	tidewater mojarra	80	257	133	80	83	270	903
Eucinostomus spp.	eucinostomus mojarra	3,125	2,261	5,632	2,862	1,089	298	15,267
Eugerres plumieri	striped mojarra	1	44	3	.	.	4	52
Farfantepenaeus duorarum *	pink shrimp	400	228	1,063	83	154	60	1,988
Floridichthys carpio	goldspotted killifish	331	148	34	165	2	77	757
Fundulus grandis	gulf killifish	.	1	7	10	2	.	20
Fundulus similis	longnose killifish	6	7	5	.	.	2	20
Gobiosoma bosc	naked goby	.	1	.	.	.	.	1
Gobiosoma longipala	twoscale goby	.	.	.	2	4	.	6
Gobiosoma robustum	code goby	46	4	44	25	135	59	313
Gobiosoma spp.	gobies	24	8	12	5	9	.	58
Gymnura micrura	smooth butterfly ray	.	4	3	.	.	.	7
Haemulon plumierii	white grunt	3	5	19	.	1	.	28
Harengula jaguana	scaled sardine	132	181	43	56	1	14	427
Hippocampus erectus	lined seahorse	2	.	2	1	2	3	10
Hippocampus zosterae	dwarf seahorse	4	3	1	2	2	2	14
Hypleurochilus caudovittatus	zebratail blenny	6	.	.	.	.	1	7
Hyporhamphus meeki	american halfbeak	.	.	.	.	4	2	6
Hypsoblennius hentz	feather blenny	.	.	.	.	1	1	2
Lachnolaimus maximus	hogfish	.	.	1	.	.	.	1
Lagodon rhomboides	pinfish	3,262	2,979	1,244	1,094	4,417	5,379	18,375
Leiostomus xanthurus *	spot	71	60	49	2	89	24	295
Limulus polyphemus	horseshoe crab	.	.	2	.	.	1	3
Lucania parva	rainwater killifish	4,333	539	871	1,808	21	535	8,107
Lutjanus griseus *	gray snapper	23	28	57	3	.	2	113
Lutjanus synagris *	lane snapper	.	.	62	12	2	.	76
Membras martinica	rough silverside	3	.	5	.	.	.	8
Menidia spp.	menidia silversides	656	1,085	29	1	9	806	2,586
Menippe spp. *	stone crabs	10	12	30	18	15	19	104

Scientific Name	Common Name	*Month and Year* Jun 2011 E=42	Aug 2011 E=42	Oct 2011 E=37	Dec 2011 E=40	Feb 2012 E=42	Apr 2012 E=42	Totals E=245
Menticirrhus americanus *	southern kingfish	1	.	6	4	.	.	11
Microgobius gulosus	clown goby	87	361	254	19	73	84	878
Micropogonias undulatus	atlantic croaker	5	9	1	.	.	.	15
Monacanthus ciliatus	fringed filefish	1	1	6	1	.	.	9
Mugil cephalus *	striped mullet	6	4	18	22	41	16	107
Mugil curema *	white mullet	7	1	2	36	29	8	83
Mugil gyrans *	fantail mullet	.	98	15	14	30	.	157
Mugil spp. *	mullets	.	.	10	.	.	.	10
Nicholsina usta	emerald parrotfish	31	14	9	2	15	2	73
Ogcocephalus cubifrons	batfish	.	2	1	1	.	5	9
Oligoplites saurus	leatherjacket	35	39	5	2	.	12	93
Opisthonema oglinum	atlantic thread herring	9	6	1	3	.	322	341
Opsanus beta	gulf toadfish	9	4	7	2	5	8	35
Orthopristis chrysoptera	pigfish	655	216	153	854	585	572	3,035
Paralichthys albigutta *	gulf flounder	34	18	17	14	16	8	107
Poecilia latipinna	sailfin molly	.	.	.	22	.	.	22
Pogonias cromis	black drum	16	2	3	1	.	7	29
Portunus spp.	swimming crabs	15	6	2	2	9	11	45
Prionotus scitulus	leopard searobin	2	8	20	11	13	4	58
Prionotus tribulus	bighead searobin	1	.	4	5	4	.	14
Rhinoptera bonasus	cownose ray	11	4	5	5	.	2	27
Rhizoprionodon terraenovae	atlantic sharpnose shark	1	.	.	.	.	.	1
Sciaenops ocellatus *	red drum	.	1	58	69	13	13	154
Scomberomorus maculatus *	spanish mackerel	.	.	.	.	.	2	2
Scorpaena brasiliensis	barbfish	.	1	5	.	.	.	6
Selene vomer	lookdown	1	.	26	.	.	1	28
Serraniculus pumilio	pygmy sea bass	.	.	.	.	1	.	1
Serranus subligarius	belted sandfish	.	.	.	2	.	2	4
Sphoeroides nephelus	southern puffer	17	4	6	26	6	20	79
Sphoeroides spengleri	bandtail puffer	.	.	1	1	.	.	2
Sphyraena barracuda	great barracuda	.	1	.	3	.	.	4
Sphyraena borealis	northern sennet	.	.	.	.	7	.	7
Sphyrna tiburo	bonnethead	.	.	.	.	.	1	1
Stephanolepis hispidus	planehead filefish	59	45	6	41	9	4	164
Strongylura marina	atlantic needlefish	24	.	.	1	9	2	36
Strongylura notata	redfin needlefish	35	26	28	18	21	54	182
Strongylura spp.	needlefish	2	.	.	.	.	1	3
Strongylura timucu	timucu	1	.	.	.	.	.	1
Symphurus plagiusa	blackcheek tonguefish	.	1	33	1	4	2	41

Scientific Name	Common Name	Month and Year Jun 2011 E=42	Aug 2011 E=42	Oct 2011 E=37	Dec 2011 E=40	Feb 2012 E=42	Apr 2012 E=42	Totals E=245
Syngnathus floridae	dusky pipefish	6	2	2	.	5	2	17
Syngnathus louisianae	chain pipefish	19	8	5	3	1	.	36
Syngnathus scovelli	gulf pipefish	65	59	14	37	64	91	330
Synodus foetens	inshore lizardfish	18	7	26	17	11	13	92
Trachinotus carolinus *	florida pompano	1	.	.	2	.	.	3
Trachinotus falcatus *	permit	.	5	.	.	.	.	5
Trinectes maculatus	hogchoker	.	.	3	.	.	3	6
Tylosurus crocodilus	houndfish	1	.	.	.	.	.	1
Urophycis floridana	southern hake	.	.	.	.	1	.	1
Totals		22,941	14,879	40,227	29,727	7,387	10,131	125,292

Appendix C. Summary of species collected, by gear and stratum, during Sarasota Bay nekton sampling, June 2011 to April 2012. Effort, or the total number of hauls, is labeled 'E'. Taxa are arranged alphabetically. Species of commercial or recreational importance (Selected Taxa) are denoted with an asterisk (*) after the species name.

		Gear and Strata						
		21.3-m bay seine			*183-m haul seine*		*6.1-m otter trawl*	
		Veg	*Unveg*	*Shore*	*Over*	*Nonover*		*Totals*
Species	*Common Name*	*E=65*	*E=37*	*E=59*	*E=29*	*E=7*	*E=48*	*E=245*
Acanthostracion quadricornis	scrawled cowfish	1	.	3	16	3	25	48
Achirus lineatus	lined sole	2	.	4	1	.	25	32
Aluterus schoepfii	orange filefish	.	.	.	.	1	4	5
Anchoa cubana	cuban anchovy	.	.	58	.	.	53	111
Anchoa hepsetus	striped anchovy	19	3	14	.	.	13	49
Anchoa mitchilli	bay anchovy	2,722	9,956	48,629	.	.	407	61,714
Ancylopsetta quadrocellata	ocellated flounder	.	.	.	.	.	7	7
Archosargus probatocephalus *	sheepshead	31	1	10	113	48	19	222
Ariopsis felis	hardhead catfish	4	1	1	146	50	19	221
Bagre marinus	gafftopsail catfish	.	.	.	1	6	.	7
Bairdiella chrysoura	silver perch	1,032	9	747	191	320	728	3,027
Bathygobius soporator	frillfin goby	.	.	4	.	.	.	4
Brevoortia spp.	menhaden	.	.	1	60	32	.	93
Calamus arctifrons	grass porgy	1	.	.	.	.	1	2
Calamus spp.	porgies	.	.	2	.	.	.	2
Callinectes sapidus *	blue crab	10	3	20	11	2	200	246
Caranx crysos	blue runner	.	.	.	1	67	.	68
Caranx hippos	crevalle jack	1	.	1	16	16	.	34
Centropomus undecimalis *	common snook	1	.	2	166	115	.	284
Centropristis striata	black sea bass	.	.	.	13	.	1	14
Chaetodipterus faber	atlantic spadefish	2	1	.	27	1	2	33
Chasmodes saburrae	florida blenny	5	.	6	.	.	1	12
Chilomycterus schoepfii	striped burrfish	10	.	3	18	12	29	72
Citharichthys macrops	spotted whiff	.	.	.	.	.	3	3
Ctenogobius boleosoma	darter goby	.	.	2	.	.	.	2
Cynoscion arenarius *	sand seatrout	.	2	16	1	.	360	379
Cynoscion nebulosus *	spotted seatrout	104	1	43	23	20	15	206

Species	Common Name	Gear and Strata						Totals
		21.3-m bay seine			183-m haul seine		6.1-m otter trawl	
		Veg	Unveg	Shore	Over	Nonover		
		E=65	E=37	E=59	E=29	E=7	E=48	E=245
Cyprinodon variegatus	sheepshead minnow	4	.	86	.	.	.	90
Dasyatis sabina	atlantic stingray	.	.	.	7	4	10	21
Dasyatis say	bluntnose stingray	.	.	1	2	.	9	12
Dasyatis spp.	stingrays	.	.	.	1	.	.	1
Diapterus auratus	irish pompano	.	.	.	1	.	.	1
Diplectrum formosum	sand perch	.	.	.	1	.	2	3
Diplodus holbrookii	spottail pinfish	7	.	.	237	10	1	255
Echeneis neucratoides	whitefin sharksucker	.	.	.	.	.	1	1
Elops saurus *	ladyfish	.	1	.	64	110	.	175
Etropus crossotus	fringed flounder	.	.	.	.	5	15	20
Eucinostomus argenteus	spotfin mojarra	.	2	.	.	.	.	2
Eucinostomus gula	silver jenny	444	235	610	336	70	200	1,895
Eucinostomus harengulus	tidewater mojarra	33	300	480	50	30	10	903
Eucinostomus spp.	eucinostomus mojarra	6,387	1,647	6,723	.	.	510	15,267
Eugerres plumieri	striped mojarra	.	.	38	8	6	.	52
Farfantepenaeus duorarum *	pink shrimp	481	92	1,344	2	1	68	1,988
Floridichthys carpio	goldspotted killifish	79	2	675	.	.	1	757
Fundulus grandis	gulf killifish	.	.	17	3	.	.	20
Fundulus similis	longnose killifish	.	.	17	.	3	.	20
Gobiosoma bosc	naked goby	1	.	.	.	.	.	1
Gobiosoma longipala	twoscale goby	.	.	.	.	.	6	6
Gobiosoma robustum	code goby	116	13	140	.	.	44	313
Gobiosoma spp.	gobies	24	3	26	.	.	5	58
Gymnura micrura	smooth butterfly ray	.	.	1	.	4	2	7
Haemulon plumierii	white grunt	1	.	12	12	2	1	28
Harengula jaguana	scaled sardine	209	.	129	64	23	2	427
Hippocampus erectus	lined seahorse	2	.	1	2	.	5	10
Hippocampus zosterae	dwarf seahorse	9	.	5	.	.	.	14
Hypleurochilus caudovittatus	zebratail blenny	.	.	.	.	.	7	7
Hyporhamphus meeki	american halfbeak	.	.	.	6	.	.	6
Hypsoblennius hentz	feather blenny	.	.	.	.	.	2	2
Lachnolaimus maximus	hogfish	.	.	.	1	.	.	1
Lagodon rhomboides	pinfish	6,433	302	4,043	5,141	1,566	890	18,375
Leiostomus xanthurus *	spot	8	35	73	106	37	36	295
Limulus polyphemus	horseshoe crab	.	1	.	.	.	2	3
Lucania parva	rainwater killifish	6,011	7	2,089	.	.	.	8,107

Species	Common Name	Gear and Strata						Totals
		21.3-m bay seine			183-m haul seine		6.1-m otter trawl	
		Veg	Unveg	Shore	Over	Nonover		
		E=65	E=37	E=59	E=29	E=7	E=48	E=245
Lutjanus griseus *	gray snapper	26	1	36	30	13	7	113
Lutjanus synagris *	lane snapper	19	.	21	20	.	16	76
Membras martinica	rough silverside	.	5	3	.	.	.	8
Menidia spp.	menidia silversides	261	40	2,285	.	.	.	2,586
Menippe spp. *	stone crabs	.	.	.	.	.	104	104
Menticirrhus americanus *	southern kingfish	.	.	.	.	4	7	11
Microgobius gulosus	clown goby	257	32	588	.	.	1	878
Micropogonias undulatus	atlantic croaker	.	.	.	8	7	.	15
Monacanthus ciliatus	fringed filefish	1	.	.	8	.	.	9
Mugil cephalus *	striped mullet	3	5	16	58	25	.	107
Mugil curema *	white mullet	.	.	.	49	34	.	83
Mugil gyrans *	fantail mullet	.	.	104	43	10	.	157
Mugil spp. *	mullets	.	.	.	10	.	.	10
Nicholsina usta	emerald parrotfish	4	.	11	24	29	5	73
Ogcocephalus cubifrons	batfish	.	.	.	.	.	9	9
Oligoplites saurus	leatherjacket	10	23	37	8	15	.	93
Opisthonema oglinum	atlantic thread herring	6	.	9	21	303	2	341
Opsanus beta	gulf toadfish	2	1	.	5	1	26	35
Orthopristis chrysoptera	pigfish	952	23	215	391	880	574	3,035
Paralichthys albigutta *	gulf flounder	7	6	5	15	17	57	107
Poecilia latipinna	sailfin molly	.	.	22	.	.	.	22
Pogonias cromis *	black drum	.	.	.	14	15	.	29
Portunus spp.	swimming crabs	.	.	.	.	.	45	45
Prionotus scitulus	leopard searobin	.	1	.	4	2	51	58
Prionotus tribulus	bighead searobin	1	1	5	.	1	6	14
Rhinoptera bonasus	cownose ray	.	1	.	18	8	.	27
Rhizoprionodon terraenovae	atlantic sharpnose shark	.	.	.	1	.	.	1
Sciaenops ocellatus *	red drum	5	2	119	26	2	.	154
Scomberomorus maculatus *	spanish mackerel	.	.	.	.	2	.	2
Scorpaena brasiliensis	barbfish	.	.	3	3	.	.	6
Selene vomer	lookdown	.	.	.	28	.	.	28
Serraniculus pumilio	pygmy sea bass	.	1	.	.	.	.	1
Serranus subligarius	belted sandfish	.	.	.	.	.	4	4
Sphoeroides nephelus	southern puffer	32	2	25	4	1	15	79
Sphoeroides spengleri	bandtail puffer	.	.	.	1	.	1	2
Sphyraena barracuda	great barracuda	.	1	1	1	1	.	4

Species	Common Name	Gear and Strata						Totals
		21.3-m bay seine			183-m haul seine		6.1-m otter trawl	
		Veg	Unveg	Shore	Over	Nonover		
		E=65	E=37	E=59	E=29	E=7	E=48	E=245
Sphyraena borealis	northern sennet	1	.	6	.	.	.	7
Sphyrna tiburo	bonnethead	.	.	.	1	.	.	1
Stephanolepis hispidus	planehead filefish	24	1	5	66	7	61	164
Strongylura marina	atlantic needlefish	.	22	3	11	.	.	36
Strongylura notata	redfin needlefish	5	3	61	95	18	.	182
Strongylura spp.	needlefish	.	.	3	.	.	.	3
Strongylura timucu	timucu	.	.	1	.	.	.	1
Symphurus plagiusa	blackcheek tonguefish	1	3	3	.	.	34	41
Syngnathus floridae	dusky pipefish	5	2	5	.	.	5	17
Syngnathus louisianae	chain pipefish	12	.	6	.	.	18	36
Syngnathus scovelli	gulf pipefish	183	19	103	.	.	25	330
Synodus foetens	inshore lizardfish	9	11	15	11	3	43	92
Trachinotus carolinus *	florida pompano	.	.	.	1	2	.	3
Trachinotus falcatus *	permit	.	3	2	.	.	.	5
Trinectes maculatus	hogchoker	.	.	.	.	.	6	6
Tylosurus crocodilus	houndfish	.	.	.	.	1	.	1
Urophycis floridana	southern hake	1	.	.	.	.	.	1
Totals		26,021	12,826	69,794	7,823	3,965	4,863	125,292

Appendix D. Summary of species collected, by embayment, during Sarasota Bay stratified-random sampling, June 2011 to April 2012. Effort, or the total number of hauls, is labeled 'E'. Taxa are arranged alphabetically.

		Bay (Zone)					
		Palma Sola Bay (A)	Sarasota Bay (B)	Roberts Bay (C)	Little Sarasota Bay (D)	Blackburn Bay (E)	Totals
Species	Common Name	E=42	E=82	E=40	E=42	E=39	E=245
Acanthostracion quadricornis	scrawled cowfish	5	39	1	1	2	48
Achirus lineatus	lined sole	9	12	6	5	.	32
Aluterus schoepfii	orange filefish	2	2	.	.	1	5
Anchoa cubana	cuban anchovy	.	.	.	53	58	111
Anchoa hepsetus	striped anchovy	.	2	19	28	.	49
Anchoa mitchilli	bay anchovy	31,121	22,192	3,581	4,815	5	61,714
Ancylopsetta quadrocellata	ocellated flounder	.	5	.	.	2	7
Archosargus probatocephalus *	sheepshead	29	39	12	60	82	222
Ariopsis felis	hardhead catfish	10	22	46	63	80	221
Bagre marinus	gafftopsail catfish	1	5	.	1	.	7
Bairdiella chrysoura	silver perch	151	606	621	1,525	124	3,027
Bathygobius soporator	frillfin goby	4	.	.	.	.	4
Brevoortia spp.	menhaden	52	12	12	17	.	93
Calamus arctifrons	grass porgy	.	2	.	.	.	2
Calamus spp.	porgies	.	.	2	.	.	2
Callinectes sapidus *	blue crab	34	40	54	112	6	246
Caranx crysos	blue runner	67	1	.	.	.	68
Caranx hippos	crevalle jack	3	3	14	14	.	34
Centropomus undecimalis *	common snook	4	77	30	137	36	284
Centropristis striata	black sea bass	.	14	.	.	.	14
Chaetodipterus faber	atlantic spadefish	9	17	2	3	2	33
Chasmodes saburrae	florida blenny	3	6	1	2	.	12
Chilomycterus schoepfii	striped burrfish	6	47	3	7	9	72
Citharichthys macrops	spotted whiff	.	2	1	.	.	3
Ctenogobius boleosoma	darter goby	.	.	2	.	.	2
Cynoscion arenarius *	sand seatrout	17	.	7	355	.	379
Cynoscion nebulosus *	spotted seatrout	55	29	50	65	7	206
Cyprinodon variegatus	sheepshead minnow	56	34	.	.	.	90
Dasyatis sabina	atlantic stingray	3	1	10	5	2	21
Dasyatis say	bluntnose stingray	1	6	5	.	.	12
Dasyatis spp.	stingrays	.	.	.	1	.	1
Diapterus auratus	irish pompano	.	.	.	.	1	1

Species	Common Name	Bay (Zone)					Totals
		Palma Sola Bay (A)	Sarasota Bay (B)	Roberts Bay (C)	Little Sarasota Bay (D)	Blackburn Bay (E)	
		E=42	E=82	E=40	E=42	E=39	E=245
Diplectrum formosum	sand perch	.	3	.	.	.	3
Diplodus holbrookii	spottail pinfish	.	253	.	.	2	255
Echeneis neucratoides	whitefin sharksucker	.	1	.	.	.	1
Elops saurus *	ladyfish	5	16	37	112	5	175
Etropus crossotus	fringed flounder	4	13	1	1	1	20
Eucinostomus argenteus	spotfin mojarra	.	.	.	.	2	2
Eucinostomus gula	silver jenny	219	487	387	342	460	1,895
Eucinostomus harengulus	tidewater mojarra	147	120	235	292	109	903
Eucinostomus spp.	eucinostomus mojarra	2,195	3,770	1,244	3,902	4,156	15,267
Eugerres plumieri	striped mojarra	2	2	6	38	4	52
Farfantepenaeus duorarum *	pink shrimp	867	150	201	422	348	1,988
Floridichthys carpio	goldspotted killifish	190	456	.	31	80	757
Fundulus grandis	gulf killifish	11	9	.	.	.	20
Fundulus similis	longnose killifish	.	18	2	.	.	20
Gobiosoma bosc	naked goby	.	.	.	1	.	1
Gobiosoma longipala	twoscale goby	.	6	.	.	.	6
Gobiosoma robustum	code goby	79	64	13	82	75	313
Gobiosoma spp.	gobies	3	7	13	25	10	58
Gymnura micrura	smooth butterfly ray	.	4	2	1	.	7
Haemulon plumierii	white grunt	1	26	.	.	1	28
Harengula jaguana	scaled sardine	49	87	141	109	41	427
Hippocampus erectus	lined seahorse	1	5	2	.	2	10
Hippocampus zosterae	dwarf seahorse	4	5	2	3	.	14
Hypleurochilus caudovittatus	zebratail blenny	.	7	.	.	.	7
Hyporhamphus meeki	american halfbeak	.	6	.	.	.	6
Hypsoblennius hentz	feather blenny	.	1	1	.	.	2
Lachnolaimus maximus	hogfish	.	1	.	.	.	1
Lagodon rhomboides	pinfish	2,552	7,747	942	4,187	2,947	18,375
Leiostomus xanthurus	spot	48	38	43	113	53	295
Limulus polyphemus	horseshoe crab	1	2	.	.	.	3
Lucania parva	rainwater killifish	905	6,215	189	680	118	8,107
Lutjanus griseus *	gray snapper	4	54	7	21	27	113
Lutjanus synagris *	lane snapper	1	51	.	.	24	76
Membras martinica	rough silverside	3	.	5	.	.	8
Menidia spp.	menidia silversides	911	585	772	37	281	2,586
Menippe spp.	stone crabs	14	64	11	.	15	104

Species	Common Name	Bay (Zone): Palma Sola Bay (A) E=42	Sarasota Bay (B) E=82	Roberts Bay (C) E=40	Little Sarasota Bay (D) E=42	Blackburn Bay (E) E=39	Totals E=245
Menticirrhus americanus *	southern kingfish	.	.	5	6	.	11
Microgobius gulosus	clown goby	112	35	169	470	92	878
Micropogonias undulatus	atlantic croaker	2	7	6	.	.	15
Monacanthus ciliatus	fringed filefish	.	9	.	.	.	9
Mugil cephalus *	striped mullet	21	50	5	27	4	107
Mugil curema *	white mullet	6	26	4	35	12	83
Mugil gyrans *	fantail mullet	9	127	9	10	2	157
Mugil spp. *	mullets	10	.	.	.	.	10
Nicholsina usta	emerald parrotfish	10	59	1	.	3	73
Ogcocephalus cubifrons	batfish	.	6	.	.	3	9
Oligoplites saurus	leatherjacket	22	24	25	18	4	93
Opisthonema oglinum	atlantic thread herring	306	18	7	10	.	341
Opsanus beta	gulf toadfish	5	14	7	8	1	35
Orthopristis chrysoptera	pigfish	160	764	261	1,304	546	3,035
Paralichthys albigutta *	gulf flounder	12	52	14	20	9	107
Poecilia latipinna	sailfin molly	22	.	.	.	.	22
Pogonias cromis	black drum	4	14	4	1	6	29
Portunus spp.	swimming crabs	6	24	15	.	.	45
Prionotus scitulus	leopard searobin	9	33	2	4	10	58
Prionotus tribulus	bighead searobin	5	3	3	2	1	14
Rhinoptera bonasus	cownose ray	5	.	13	5	4	27
Rhizoprionodon terraenovae	atlantic sharpnose shark	.	.	1	.	.	1
Sciaenops ocellatus *	red drum	53	2	9	72	18	154
Scomberomorus maculatus *	spanish mackerel	2	.	.	.	.	2
Scorpaena brasiliensis	barbfish	.	4	.	.	2	6
Selene vomer	lookdown	.	2	.	24	2	28
Serraniculus pumilio	pygmy sea bass	.	1	.	.	.	1
Serranus subligarius	belted sandfish	.	4	.	.	.	4
Sphoeroides nephelus	southern puffer	18	22	14	13	12	79
Sphoeroides spengleri	bandtail puffer	.	2	.	.	.	2
Sphyraena barracuda	great barracuda	.	2	.	.	2	4
Sphyraena borealis	northern sennet	6	.	.	.	1	7
Sphyrna tiburo	bonnethead	.	1	.	.	.	1
Stephanolepis hispidus	planehead filefish	15	107	3	26	13	164
Strongylura marina	atlantic needlefish	.	32	1	3	.	36
Strongylura notata	redfin needlefish	25	56	31	44	26	182

Species	Common Name	Bay (Zone) Palma Sola Bay (A)	Sarasota Bay (B)	Roberts Bay (C)	Little Sarasota Bay (D)	Blackburn Bay (E)	Totals
		E=42	E=82	E=40	E=42	E=39	E=245
Strongylura spp.	needlefish	1	.	.	2	.	3
Strongylura timucu	timucu	1	.	.	.	.	1
Symphurus plagiusa	blackcheek tonguefish	3	3	4	31	.	41
Syngnathus floridae	dusky pipefish	2	8	1	3	3	17
Syngnathus louisianae	chain pipefish	2	18	6	3	7	36
Syngnathus scovelli	gulf pipefish	72	114	34	81	29	330
Synodus foetens	inshore lizardfish	8	32	18	18	16	92
Trachinotus carolinus *	florida pompano	.	.	1	2	.	3
Trachinotus falcatus *	permit	2	3	.	.	.	5
Trinectes maculatus	hogchoker	.	.	6	.	.	6
Tylosurus crocodilus	houndfish	.	1	.	.	.	1
Urophycis floridana	southern hake	.	1	.	.	.	1
Totals		40,794	45,168	9,414	19,910	10,006	125,292

Appendix E. Catch summary for taxa collected during three years, June 2009 to April 2012, of nekton sampling in Sarasota Bay with 21.3-m seines. S_u is the density-weighted average salinity (salinity at each sampling site weighted by the number of animals collected). Taxa are arranged phylogenetically. Species of commercial or recreational importance (Selected Taxa) are denoted with an asterisk (*) after the species name.

Scientific name	*Common Name*	*Number*	*Collection*	S_u	*CPUE (Animals •100m^{-2})*	
		Collected	*Frequency*	*(psu)*	*Average*	*Maximum*
Argopecten spp.	Scallops	5	0.8	35.29	0.01	1.43
Limulus polyphemus	Horseshoe crab	3	0.6	34.78	<0.01	0.71
Farfantepenaeus duorarum *	Pink shrimp	4,455	54.9	32.77	6.55	459.29
Sicyonia laevigata	Hardback	3	0.6	33.92	<0.01	0.71
Callinectes sapidus *	Blue crab	140	14.4	32.30	0.21	7.86
Callinectes ornatus	Shelligs	1	0.2	33.00	<0.01	0.71
Portunus spp.	Portunus crabs	6	1.0	33.56	0.01	1.43
Menippe spp. *	Stone crab	1	0.2	31.95	<0.01	0.71
Dasyatis say	Bluntnose stingray	1	0.2	35.40	<0.01	0.71
Gymnura micrura	Smooth butterfly ray	1	0.2	27.20	<0.01	0.71
Rhinoptera bonasus	Cownose ray	1	0.2	35.20	<0.01	0.71
Elops saurus *	Ladyfish	4	0.8	32.19	0.01	0.71
Brevoortia spp.	Menhadens	54	1.4	27.37	0.08	11.43
Opisthonema oglinum	Atlantic thread herring	952	3.5	31.77	1.40	443.57
Harengula jaguana	Scaled sardine	9,666	13.0	33.30	14.21	1,757.86
Sardinella aurita	Spanish sardine	6	0.4	35.09	0.01	3.57
Anchoa hepsetus	Striped anchovy	236	1.6	33.24	0.35	142.86
Anchoa mitchilli	Bay anchovy	132,610	27.8	32.68	194.90	15,405.71
Anchoa cubana	Cuban anchovy	3,361	2.1	31.46	4.94	1,135.71
Synodus foetens	Inshore lizardfish	179	22.2	32.97	0.26	5.71
Ariopsis felis	Hardhead catfish	38	2.7	33.45	0.06	10.00
Opsanus beta	Gulf toadfish	17	2.3	32.94	0.02	2.86
Urophycis floridana	Southern hake	7	1.2	33.36	0.01	1.43
Hyporhamphus spp.	Halfbeaks	19	0.8	34.87	0.03	8.57
Hyporhamphus meeki	False silver halfbeak	41	2.7	33.63	0.06	7.14
Strongylura spp.	Needlefishes	10	1.6	32.22	0.01	1.43
Strongylura marina	Atlantic needlefish	52	2.9	35.98	0.08	15.71
Strongylura notata	Redfin needlefish	248	19.3	33.18	0.36	18.57
Strongylura timucu	Timucu	2	0.4	34.43	<0.01	0.71
Cyprinodon variegatus	Sheepshead minnow	343	4.3	34.38	0.50	125.71

Scientific name	Common Name	Number Collected	Collection Frequency	S_u (psu)	CPUE (Animals •100m^{-2}) Average	Maximum
Fundulus confluentus	Marsh killifish	1	0.2	31.30	<0.01	0.71
Fundulus grandis	Gulf killifish	77	3.1	31.27	0.11	13.57
Fundulus similis	Longnose killifish	107	2.7	34.05	0.16	22.14
Lucania parva	Rainwater killifish	13,804	31.9	34.24	20.29	1,689.29
Adinia xenica	Diamond killifish	9	0.4	32.54	0.01	3.57
Floridichthys carpio	Goldspotted killifish	1,666	16.5	34.07	2.45	219.29
Poecilia latipinna	Sailfin molly	113	1.6	33.00	0.17	40.71
Membras martinica	Rough silverside	69	1.6	34.18	0.10	24.29
Menidia spp.	Menidia silversides	7,172	23.9	34.72	10.54	806.43
Syngnathus floridae	Dusky pipefish	45	5.8	33.92	0.07	3.57
Syngnathus louisianae	Chain pipefish	45	7.0	34.15	0.07	4.29
Syngnathus scovelli	Gulf pipefish	689	44.0	33.75	1.01	18.57
Hippocampus erectus	Lined seahorse	4	0.8	34.70	0.01	0.71
Hippocampus zosterae	Dwarf seahorse	47	7.8	33.41	0.07	5.00
Scorpaena brasiliensis	Barbfish	3	0.2	34.90	<0.01	2.14
Prionotus scitulus	Leopard searobin	11	2.1	32.77	0.02	1.43
Prionotus tribulus	Bighead searobin	20	3.5	32.03	0.03	2.14
Centropomus undecimalis *	Common snook	13	1.6	30.57	0.02	2.14
Centropristis striata	Black sea bass	8	1.0	33.56	0.01	2.14
Mycteroperca microlepis *	Gag	4	0.8	34.51	0.01	0.71
Serraniculus pumilio	Pygmy sea bass	2	0.4	34.55	<0.01	0.71
Serranus subligarius	Belted sandfish	1	0.2	33.10	<0.01	0.71
Caranx hippos	Crevalle jack	5	1.0	32.87	0.01	0.71
Caranx latus	Horse-eye jack	1	0.2	31.50	<0.01	0.71
Chloroscombrus chrysurus	Atlantic bumper	1	0.2	33.80	<0.01	0.71
Oligoplites saurus	Leatherjacket	206	18.5	33.86	0.30	7.86
Trachinotus falcatus *	Permit	9	0.8	33.69	0.01	2.14
Lutjanus griseus *	Gray snapper	250	17.5	33.07	0.37	24.29
Lutjanus synagris *	Lane snapper	133	6.0	33.41	0.20	17.14
Eucinostomus spp.	Eucinostomus	41,177	68.1	33.13	60.52	3,285.71
Eucinostomus argenteus	Spotfin mojarra	2	0.2	34.50	<0.01	1.43
Eucinostomus gula	Silver jenny	4,186	52.1	32.78	6.15	377.14
Eucinostomus harengulus	Tidewater mojarra	1,696	25.5	33.45	2.49	97.14
Eugerres plumieri	Striped mojarra	40	1.4	29.20	0.06	14.29
Haemulon plumierii	White grunt	68	2.1	33.07	0.10	17.14
Orthopristis chrysoptera	Pigfish	1,955	25.5	34.15	2.87	152.86
Lagodon rhomboides	Pinfish	65,253	78.6	32.83	95.90	1,159.29
Archosargus probatocephalus *	Sheepshead	136	11.1	34.61	0.20	13.57
Diplodus holbrookii	Spottail pinfish	33	2.7	35.15	0.05	5.71
Calamus spp.		2	0.2	32.90	<0.01	1.43
Calamus arctifrons	Grass porgy	1	0.2	34.50	<0.01	0.71
Calamus penna	Sheepshead porgy	4	0.2	30.80	0.01	2.86

Scientific name	Common Name	Number Collected	Collection Frequency	S_u (psu)	CPUE (Animals •100m^{-2}) Average	Maximum
Cynoscion nebulosus *	Spotted seatrout	407	20.4	33.16	0.60	20.00
Cynoscion arenarius *	Sand seatrout	18	0.6	33.53	0.03	11.43
Bairdiella chrysoura	Silver perch	4,647	25.5	34.22	6.83	319.29
Leiostomus xanthurus *	Spot	22,559	27.0	31.61	33.16	965.00
Sciaenops ocellatus *	Red drum	274	6.6	33.26	0.40	40.71
Chaetodipterus faber	Atlantic spadefish	6	1.0	34.52	0.01	1.43
Mugil cephalus *	Striped mullet	3,495	9.9	30.79	5.14	650.00
Mugil curema *	White mullet	9	0.2	33.50	0.01	6.43
Mugil gyrans *	Fantail mullet	120	1.9	35.24	0.18	67.14
Sphyraenidae spp.		1	0.2	32.30	<0.01	0.71
Sphyraena borealis	Northern sennet	9	0.6	34.60	0.01	4.29
Sphyraena barracuda	Great barracuda	7	1.2	34.17	0.01	1.43
Nicholsina usta	Emerald parrotfish	34	2.7	34.29	0.05	7.14
Astroscopus y-graecum	Southern stargazer	1	0.2	33.50	<0.01	0.71
Hypsoblennius hentz	Feather blenny	2	0.2	34.70	<0.01	1.43
Chasmodes saburrae	Florida blenny	33	4.1	33.92	0.05	7.86
Ctenogobius boleosoma	Darter goby	12	1.0	31.65	0.02	5.00
Gobiosoma spp.	Gobiosoma gobies	306	20.2	31.49	0.45	20.00
Gobiosoma bosc	Naked goby	1	0.2	32.05	<0.01	0.71
Gobiosoma robustum	Code goby	752	28.2	32.45	1.11	30.71
Gobiosoma longipala	Twoscale goby	1	0.2	28.20	<0.01	0.71
Microgobius gulosus	Clown goby	1,895	37.2	30.91	2.79	135.00
Bathygobius soporator	Frillfin goby	5	0.6	33.91	0.01	1.43
Paralichthys albigutta *	Gulf flounder	68	8.6	33.08	0.10	8.57
Symphurus plagiusa	Blackcheek tonguefish	20	3.1	31.79	0.03	2.86
Achirus lineatus	Lined sole	36	5.1	30.85	0.05	3.57
Monacanthus ciliatus	Fringed filefish	7	0.8	33.71	0.01	2.86
Stephanolepis hispidus	Planehead filefish	146	7.2	33.88	0.21	45.00
Ostraciidae spp.		1	0.2	34.70	<0.01	0.71
Acanthostracion quadricornis	Scrawled cowfish	6	0.8	34.37	0.01	2.14
Sphoeroides nephelus	Southern puffer	122	17.1	33.60	0.18	5.00
Chilomycterus schoepfii	Striped burrfish	32	4.9	34.17	0.05	2.86

Appendix F. Catch summary for taxa collected during three years, June 2009 to April 2012, of nekton sampling in Sarasota Bay with 183-m haul seines. S_u is the density-weighted average salinity (salinity at each sampling site weighted by the number of animals collected). Taxa are arranged phylogenetically. Species of commercial or recreational importance (Selected Taxa) are denoted with an asterisk (*) after the species name.

Scientific name	*Common Name*	*Number Collected*	*Collection Frequency*	*S_u (psu)*	*CPUE (Animals •100m^{-2}) Average*	*Maximum*
Argopecten spp.	Scallops	2	1.9	36.71	<0.01	0.02
Limulus polyphemus	Horseshoe crab	2	1.9	29.19	<0.01	0.02
Farfantepenaeus duorarum *	Pink shrimp	5	3.7	31.75	<0.01	0.05
Callinectes sapidus *	Blue crab	74	27.8	33.58	0.02	0.24
Callinectes similis	Lesser blue crab	1	0.9	35.00	<0.01	0.02
Callinectes ornatus	Shelligs	2	0.9	35.10	<0.01	0.05
Portunus spp.	Portunus crabs	3	2.8	31.14	<0.01	0.02
Menippe spp. *	Stone crab	1	0.9	29.73	<0.01	0.02
Rhizoprionodon terraenovae	Atlantic sharpnose shark	1	0.9	36.03	<0.01	0.02
Sphyrna tiburo	Bonnethead	5	2.8	35.26	<0.01	0.05
Dasyatis spp.	Whiptail stingrays	1	0.9	33.75	<0.01	0.02
Dasyatis americana	Southern stingray	2	1.9	35.81	<0.01	0.02
Dasyatis sabina	Atlantic stingray	19	9.3	32.54	<0.01	0.10
Dasyatis say	Bluntnose stingray	6	3.7	35.00	<0.01	0.07
Gymnura micrura	Smooth butterfly ray	5	1.9	34.15	<0.01	0.10
Rhinoptera bonasus	Cownose ray	42	13.9	33.64	0.01	0.24
Elops saurus *	Ladyfish	357	43.5	33.02	0.08	2.40
Brevoortia spp.	Menhadens	2,261	19.4	32.99	0.51	44.37
Opisthonema oglinum	Atlantic thread herring	626	9.3	34.17	0.14	7.35
Harengula jaguana	Scaled sardine	2,089	23.1	33.31	0.47	25.34
Synodus foetens	Inshore lizardfish	52	21.3	33.60	0.01	0.34
Bagre marinus	Gafftopsail catfish	12	5.6	32.66	<0.01	0.12
Ariopsis felis	Hardhead catfish	473	35.2	33.17	0.11	1.75
Opsanus beta	Gulf toadfish	23	13.9	32.94	0.01	0.10
Ogcocephalus cubifrons	Polka-dot batfish	7	2.8	33.15	<0.01	0.12
Hyporhamphus meeki	False silver halfbeak	10	4.6	34.63	<0.01	0.10
Strongylura marina	Atlantic needlefish	19	6.5	34.23	<0.01	0.15
Strongylura notata	Redfin needlefish	428	44.4	34.14	0.10	4.27
Tylosurus crocodilus	Houndfish	1	0.9	36.45	<0.01	0.02

Scientific name	Common Name	Number Collected	Collection Frequency	S_u (psu)	CPUE (Animals •100m^{-2}) Average	Maximum
Cyprinodon variegatus	Sheepshead minnow	1	0.9	31.95	<0.01	0.02
Fundulus grandis	Gulf killifish	4	2.8	32.66	<0.01	0.05
Fundulus similis	Longnose killifish	10	2.8	35.60	<0.01	0.15
Floridichthys carpio	Goldspotted killifish	1	0.9	32.80	<0.01	0.02
Hippocampus erectus	Lined seahorse	4	3.7	35.42	<0.01	0.02
Scorpaena brasiliensis	Barbfish	9	2.8	33.84	<0.01	0.15
Prionotus scitulus	Leopard searobin	11	4.6	34.59	<0.01	0.12
Prionotus tribulus	Bighead searobin	5	4.6	31.15	<0.01	0.02
Centropomus undecimalis *	Common snook	482	50.0	33.46	0.11	1.00
Centropristis striata	Black sea bass	22	4.6	34.74	<0.01	0.22
Mycteroperca microlepis *	Gag	67	10.2	34.64	0.02	0.44
Diplectrum formosum	Sand perch	1	0.9	34.53	<0.01	0.02
Caranx hippos	Crevalle jack	50	13.9	33.22	0.01	0.34
Caranx crysos	Blue runner	68	1.9	34.99	0.02	1.63
Oligoplites saurus	Leatherjacket	39	15.7	33.83	0.01	0.24
Selene vomer	Lookdown	49	10.2	31.46	0.01	0.58
Trachinotus carolinus *	Florida pompano	5	2.8	34.47	<0.01	0.05
Trachinotus falcatus *	Permit	8	3.7	32.70	<0.01	0.10
Hemicaranx amblyrhynchus	Bluntnose jack	1	0.9	29.30	<0.01	0.02
Lutjanus griseus *	Gray snapper	180	30.6	33.72	0.04	0.70
Lutjanus synagris *	Lane snapper	43	4.6	33.25	0.01	0.44
Eucinostomus gula	Silver jenny	722	63.9	33.60	0.16	1.80
Eucinostomus harengulus	Tidewater mojarra	128	21.3	35.19	0.03	0.58
Eugerres plumieri	Striped mojarra	38	15.7	32.16	0.01	0.12
Diapterus auratus	Irish pompano	1	0.9	36.20	<0.01	0.02
Haemulon plumierii	White grunt	25	6.5	35.46	0.01	0.17
Orthopristis chrysoptera	Pigfish	2,145	51.9	33.64	0.48	20.24
Lagodon rhomboides	Pinfish	19,470	96.3	33.64	4.38	33.96
Archosargus probatocephalus *	Sheepshead	524	65.7	32.70	0.12	0.97
Diplodus holbrookii	Spottail pinfish	444	11.1	35.35	0.10	4.51
Cynoscion nebulosus *	Spotted seatrout	125	32.4	32.40	0.03	0.51
Cynoscion arenarius *	Sand seatrout	1	0.9	36.03	<0.01	0.02
Bairdiella chrysoura	Silver perch	1,465	35.2	35.03	0.33	10.70
Leiostomus xanthurus *	Spot	589	39.8	33.32	0.13	2.82
Menticirrhus americanus *	Southern kingfish	9	2.8	31.91	<0.01	0.10
Menticirrhus littoralis *	Gulf kingfish	1	0.9	35.00	<0.01	0.02
Micropogonias undulatus	Atlantic croaker	19	5.6	34.49	<0.01	0.17
Pogonias cromis *	Black drum	33	11.1	34.85	0.01	0.29
Sciaenops ocellatus *	Red drum	90	26.9	32.23	0.02	0.46
Chaetodipterus faber	Atlantic spadefish	49	18.5	34.22	0.01	0.27
Sarotherodon melanotheron	Blackchin tilapia	2	1.9	35.23	<0.01	0.02
Oreochromis niloticus		1	0.9	28.17	<0.01	0.02

Scientific name	Common Name	Number Collected	Collection Frequency	S_u (psu)	CPUE (Animals •100m^{-2}) Average	Maximum
Mugil spp. *	Mullets	10	0.9	31.70	<0.01	0.24
Mugil cephalus *	Striped mullet	200	45.4	32.60	0.04	0.58
Mugil curema *	White mullet	265	40.7	33.48	0.06	0.70
Mugil gyrans *	Fantail mullet	96	22.2	33.19	0.02	0.70
Sphyraena barracuda	Great barracuda	27	9.3	33.64	0.01	0.27
Lachnolaimus maximus	Hogfish	1	0.9	35.53	<0.01	0.02
Nicholsina usta	Emerald parrotfish	216	13.0	35.20	0.05	2.01
Scomberomorus maculatus *	Spanish mackerel	15	8.3	33.44	<0.01	0.10
Etropus crossotus	Fringed flounder	6	2.8	33.83	<0.01	0.10
Paralichthys albigutta *	Gulf flounder	85	38.0	33.43	0.02	0.19
Ancylopsetta quadrocellata	Ocellated flounder	3	2.8	32.38	<0.01	0.02
Achirus lineatus	Lined sole	2	1.9	35.60	<0.01	0.02
Aluterus schoepfii	Orange filefish	2	1.9	35.71	<0.01	0.02
Monacanthus ciliatus	Fringed filefish	16	4.6	34.97	<0.01	0.17
Stephanolepis hispidus	Planehead filefish	127	15.7	35.28	0.03	1.07
Acanthostracion quadricornis	Scrawled cowfish	30	10.2	34.73	0.01	0.27
Sphoeroides nephelus	Southern puffer	39	15.7	34.03	0.01	0.19
Sphoeroides spengleri	Bandtail puffer	1	0.9	35.53	<0.01	0.02
Chilomycterus schoepfii	Striped burrfish	63	22.2	34.19	0.01	0.29

Appendix G. Catch summary for taxa collected during three years, June 2009 to April 2012, of stratified-random sampling in Sarasota Bay with 6.1-m otter trawls. S_u is the density-weighted average salinity (salinity at each sampling site weighted by the number of animals collected). Taxa are arranged phylogenetically. Species of commercial or recreational importance (Selected Taxa) are denoted with an asterisk (*) after the species name.

Scientific name	*Common Name*	*Number Collected*	*Collection Frequency*	*S_u (psu)*	*CPUE (Animals •100m^{-2}) Average*	*CPUE (Animals •100m^{-2}) Maximum*
Argopecten spp.	Scallops	2	1.4	35.23	<0.01	0.07
Limulus polyphemus	Horseshoe crab	12	5.6	32.79	0.01	0.27
Farfantepenaeus duorarum *	Pink shrimp	214	35.4	32.36	0.10	1.75
Sicyonia laevigata	Hardback	2	1.4	33.00	<0.01	0.07
Callinectes sapidus *	Blue crab	699	43.8	31.57	0.34	9.31
Callinectes ornatus	Shelligs	22	3.5	33.52	0.01	1.01
Portunus spp.	Portunus crabs	396	46.5	33.95	0.19	6.48
Menippe spp. *	Stone crab	502	51.4	34.11	0.25	5.46
Dasyatis americana	Southern stingray	1	0.7	34.68	<0.01	0.07
Dasyatis sabina	Atlantic stingray	16	7.6	33.10	0.01	0.36
Dasyatis say	Bluntnose stingray	11	4.9	33.59	0.01	0.21
Gymnura micrura	Smooth butterfly ray	4	2.1	29.31	<0.01	0.14
Opisthonema oglinum	Atlantic thread herring	5	3.5	34.01	<0.01	0.07
Harengula jaguana	Scaled sardine	6	2.8	31.80	<0.01	0.13
Anchoa hepsetus	Striped anchovy	16	3.5	32.39	0.01	0.54
Anchoa mitchilli	Bay anchovy	2,012	8.3	31.69	0.95	80.21
Anchoa cubana	Cuban anchovy	61	2.8	28.35	0.03	3.51
Synodus foetens	Inshore lizardfish	118	38.9	33.71	0.06	0.67
Ariopsis felis	Hardhead catfish	74	18.8	33.06	0.04	0.71
Opsanus beta	Gulf toadfish	84	25.0	33.42	0.04	0.58
Gobiesox strumosus	Skilletfish	1	0.7	36.63	<0.01	0.08
Ogcocephalus cubifrons	Polka-dot batfish	29	12.5	34.65	0.01	0.40
Urophycis floridana	Southern hake	31	8.3	32.86	0.02	0.54
Lucania parva	Rainwater killifish	2	1.4	35.26	<0.01	0.07
Floridichthys carpio	Goldspotted killifish	1	0.7	36.60	<0.01	0.08
Syngnathus floridae	Dusky pipefish	6	2.8	36.09	<0.01	0.16
Syngnathus louisianae	Chain pipefish	38	20.1	34.14	0.02	0.14
Syngnathus scovelli	Gulf pipefish	67	11.8	33.34	0.03	1.35
Hippocampus erectus	Lined seahorse	24	12.5	33.98	0.01	0.14
Hippocampus zosterae	Dwarf seahorse	5	2.1	33.09	<0.01	0.20

Scientific name	Common Name	Number Collected	Collection Frequency	S_u (psu)	CPUE (Animals •100m^{-2}) Average	Maximum
Scorpaena brasiliensis	Barbfish	7	3.5	33.54	<0.01	0.21
Prionotus scitulus	Leopard searobin	150	43.1	34.01	0.07	0.77
Prionotus tribulus	Bighead searobin	42	16.7	32.45	0.02	0.34
Centropristis striata	Black sea bass	3	2.1	34.55	<0.01	0.07
Epinephelus morio *	Red grouper	1	0.7	36.00	<0.01	0.07
Mycteroperca microlepis *	Gag	2	1.4	34.32	<0.01	0.07
Diplectrum formosum	Sand perch	5	3.5	34.60	<0.01	0.07
Serraniculus pumilio	Pygmy sea bass	3	2.1	33.98	<0.01	0.13
Serranus subligarius	Belted sandfish	8	4.2	35.04	<0.01	0.15
Echeneis neucratoides	Whitefin sharksucker	1	0.7	36.60	<0.01	0.07
Chloroscombrus chrysurus	Atlantic bumper	1	0.7	34.85	<0.01	0.07
Lutjanus griseus *	Gray snapper	43	8.3	32.98	0.02	0.71
Lutjanus synagris *	Lane snapper	39	13.9	34.66	0.02	0.57
Eucinostomus spp.	Eucinostomus	1,170	29.9	35.00	0.55	16.51
Eucinostomus argenteus	Spotfin mojarra	1	0.7	35.18	<0.01	0.13
Eucinostomus gula	Silver jenny	783	45.8	33.06	0.38	8.30
Eucinostomus harengulus	Tidewater mojarra	71	11.8	32.93	0.03	1.20
Haemulon plumierii	White grunt	10	4.2	35.54	<0.01	0.28
Orthopristis chrysoptera	Pigfish	2,074	54.2	34.00	1.00	62.53
Lagodon rhomboides	Pinfish	6,808	76.4	32.20	3.31	66.65
Archosargus probatocephalus *	Sheepshead	166	13.2	34.30	0.08	4.54
Diplodus holbrookii	Spottail pinfish	26	3.5	35.39	0.01	1.35
Calamus arctifrons	Grass porgy	3	1.4	35.48	<0.01	0.13
Cynoscion nebulosus *	Spotted seatrout	20	6.3	35.10	0.01	0.81
Cynoscion arenarius *	Sand seatrout	364	4.2	27.91	0.17	23.88
Bairdiella chrysoura	Silver perch	771	11.8	35.94	0.36	44.32
Leiostomus xanthurus *	Spot	8,950	16.7	29.95	4.32	314.14
Menticirrhus americanus *	Southern kingfish	11	4.9	32.35	0.01	0.28
Sciaenops ocellatus *	Red drum	1	0.7	34.76	<0.01	0.07
Chaetodipterus faber	Atlantic spadefish	9	3.5	33.24	<0.01	0.27
Nicholsina usta	Emerald parrotfish	34	5.6	34.94	0.02	1.42
Hypsoblennius hentz	Feather blenny	2	1.4	35.13	<0.01	0.11
Chasmodes saburrae	Florida blenny	4	2.8	33.94	<0.01	0.07
Hypleurochilus caudovittatus	Zebratail blenny	19	8.3	34.75	0.01	0.40
Ctenogobius boleosoma	Darter goby	2	0.7	29.83	<0.01	0.13
Gobiosoma spp.	Gobiosoma gobies	141	16.0	34.73	0.07	3.24
Gobiosoma robustum	Code goby	151	20.1	34.06	0.08	2.90
Gobiosoma longipala	Twoscale goby	21	10.4	33.43	0.01	0.27
Microgobius gulosus	Clown goby	40	4.9	31.71	0.02	1.15
Microgobius thalassinus	Green goby	12	0.7	29.00	0.01	0.81
Citharichthys macrops	Spotted whiff	11	4.9	34.61	0.01	0.28
Etropus crossotus	Fringed flounder	34	17.4	34.11	0.02	0.21

Scientific name	Common Name	Number Collected	Collection Frequency	S_u (psu)	CPUE (Animals •$100m^{-2}$) Average	Maximum
Paralichthys albigutta *	Gulf flounder	137	39.6	33.45	0.07	1.14
Ancylopsetta quadrocellata	Ocellated flounder	25	12.5	33.48	0.01	0.13
Symphurus plagiusa	Blackcheek tonguefish	59	11.1	29.62	0.03	1.82
Trinectes maculatus	Hogchoker	7	2.1	34.17	<0.01	0.22
Achirus lineatus	Lined sole	61	23.6	32.97	0.03	0.75
Aluterus schoepfii	Orange filefish	6	2.8	34.42	<0.01	0.13
Monacanthus ciliatus	Fringed filefish	5	3.5	34.08	<0.01	0.07
Stephanolepis hispidus	Planehead filefish	133	24.3	35.22	0.06	2.50
Acanthostracion quadricornis	Scrawled cowfish	83	32.6	34.39	0.04	0.34
Sphoeroides nephelus	Southern puffer	25	9.0	34.95	0.01	0.54
Sphoeroides spengleri	Bandtail puffer	2	1.4	34.69	<0.01	0.07
Chilomycterus schoepfii	Striped burrfish	117	37.5	34.27	0.06	0.50

Appendix H. Species overview plots for dominant taxa (≥175 animals collected and ≥15 occurrence in a gear type) collected in 21.3-m seines in Sarasota Bay, June 2009 to April 2012. Taxa are arranged phylogenetically.

Farfantepenaeus duorarum (pink shrimp)
21.3-m seine

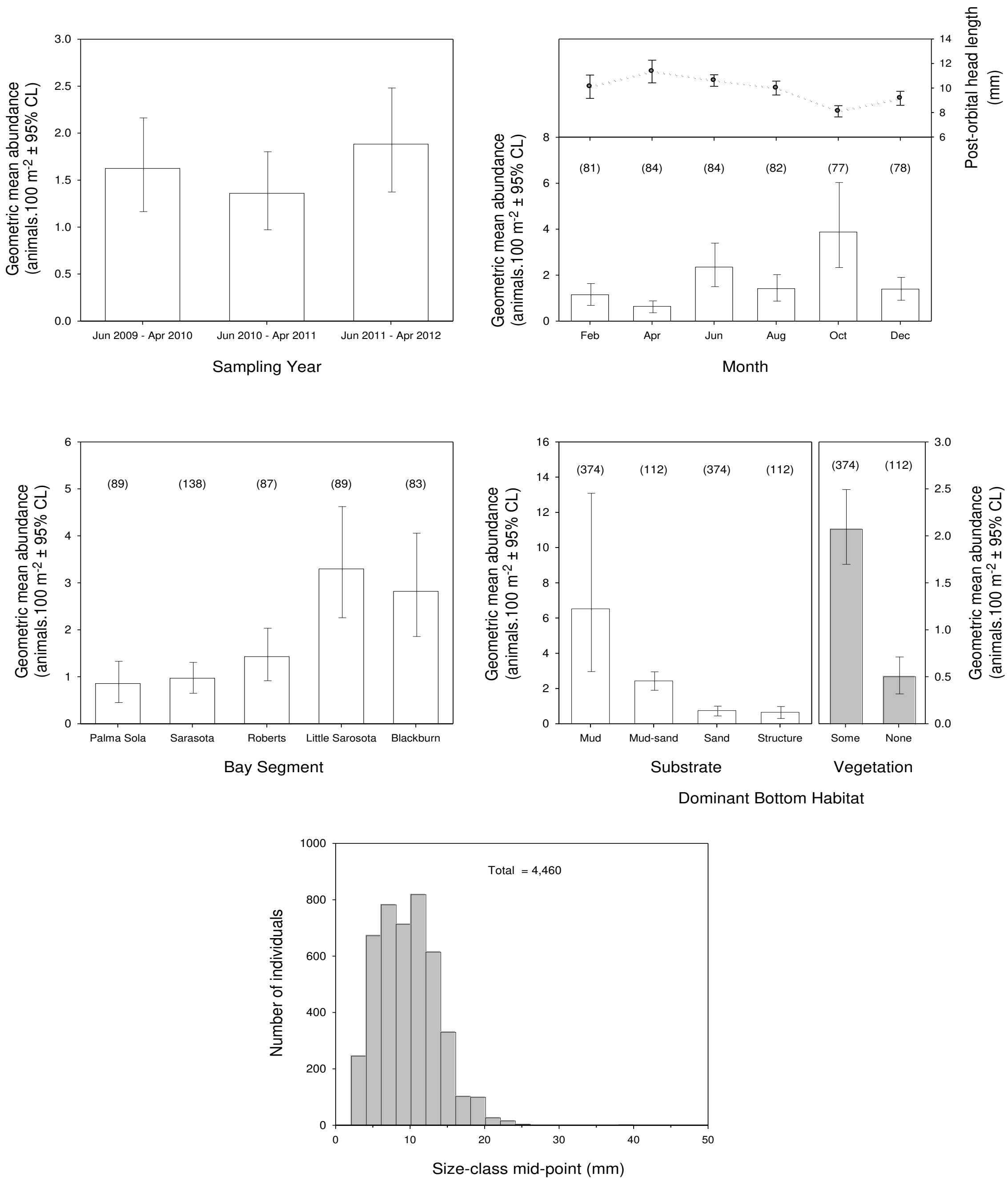


Fig. H1. Relative abundance and length-frequency distribution of pink shrimp collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Anchoa mitchilli (bay anchovy)
21.3-m seine

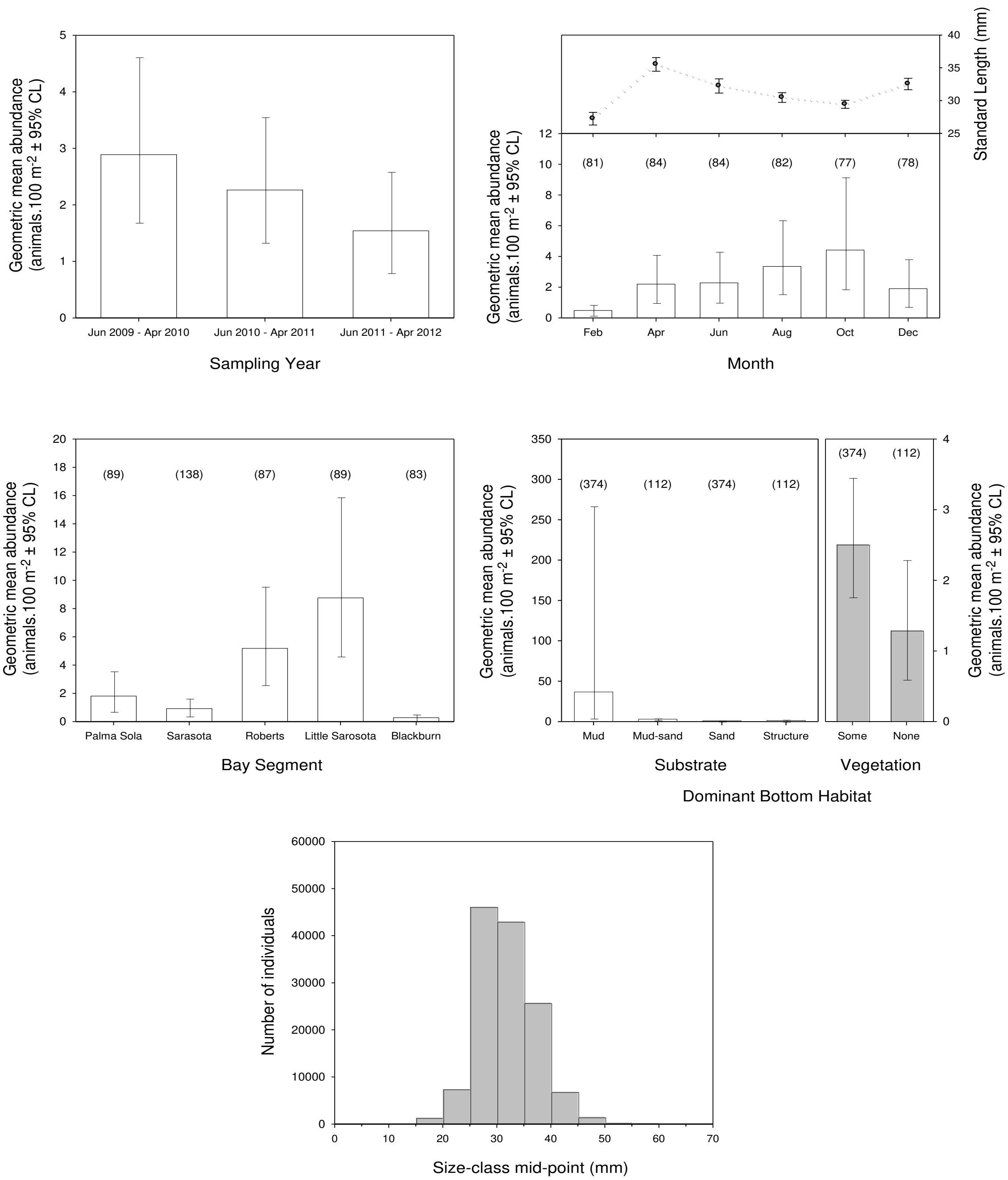


Fig. H2. Relative abundance and length-frequency distribution of bay anchovy collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Synodus foetens (inshore lizardfish)

21.3-m seine

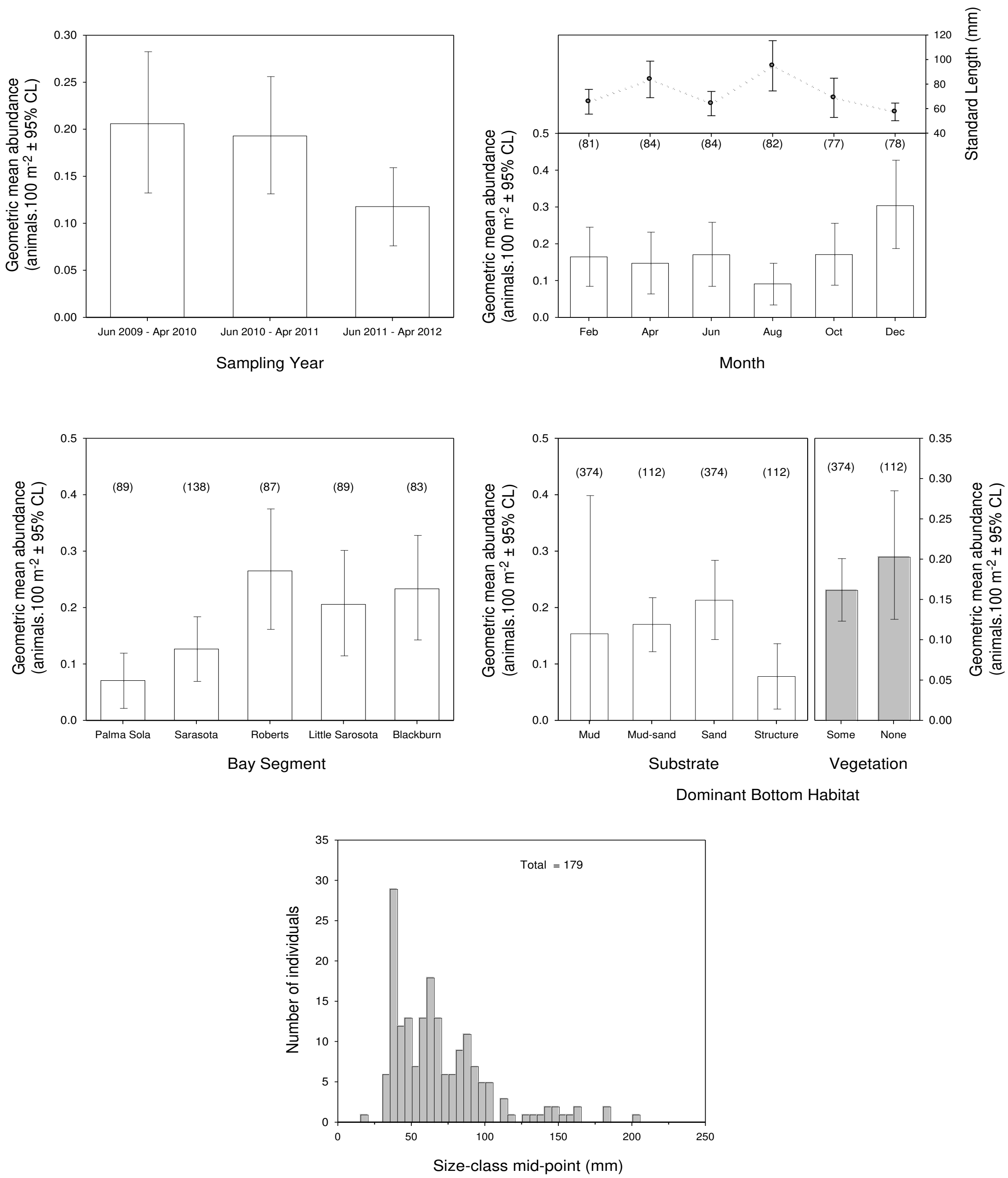


Fig. H3. Relative abundance and length-frequency distribution of inshore lizardfish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Strongylura notata (redfin needlefish)
21.3-m seine

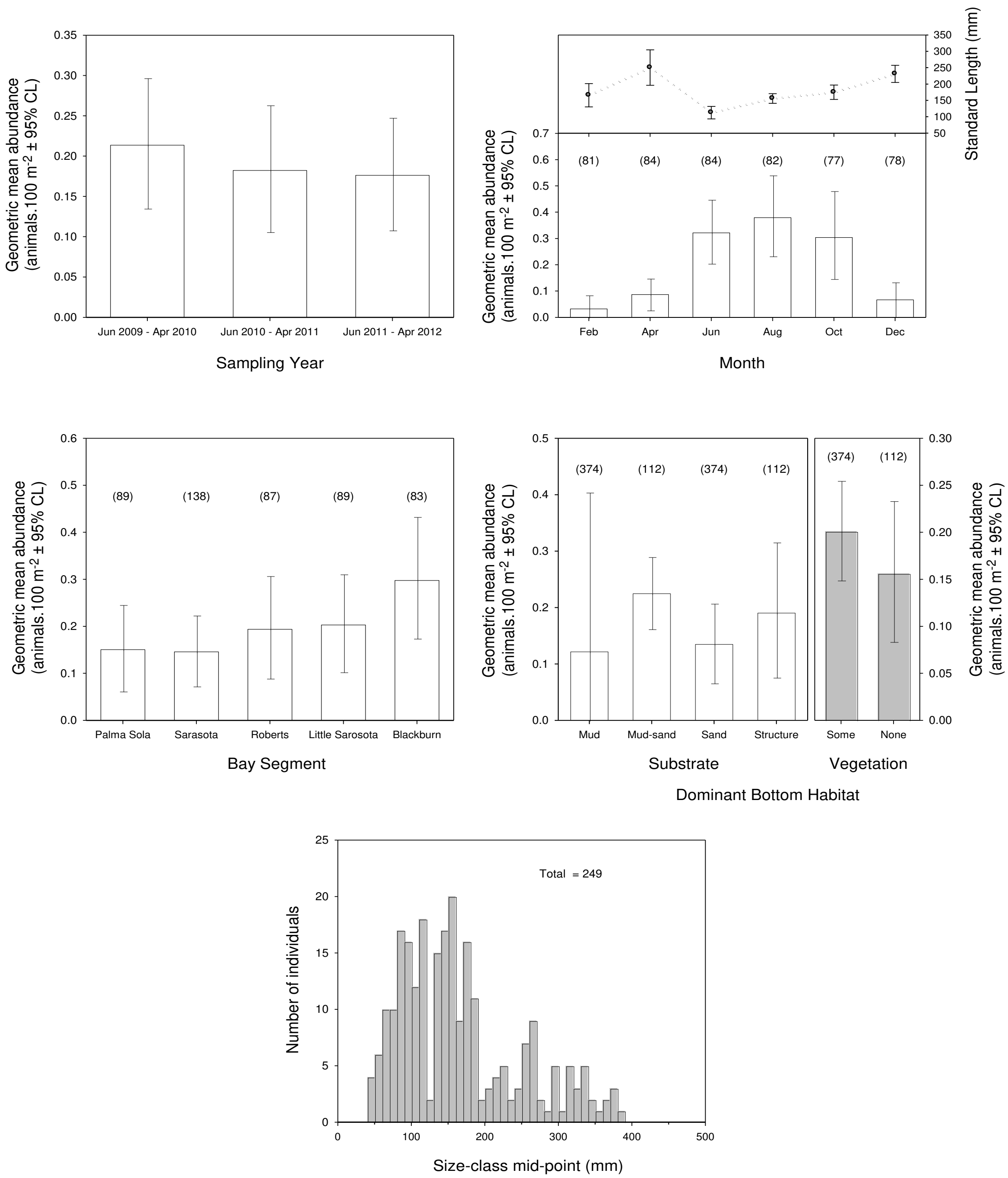


Fig. H4. Relative abundance and length-frequency distribution of redfin needlefish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lucania parva (rainwater killifish)
21.3-m seine

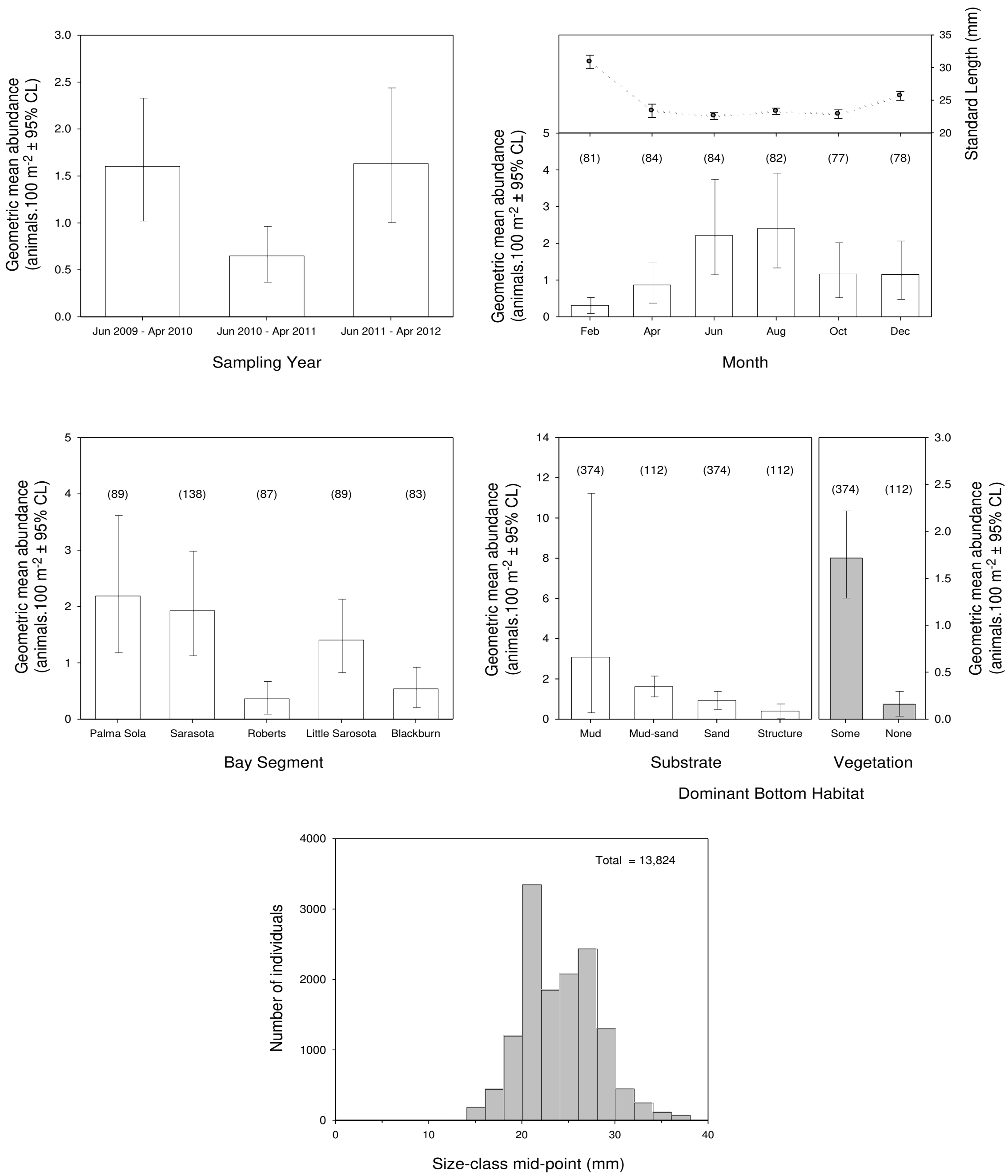
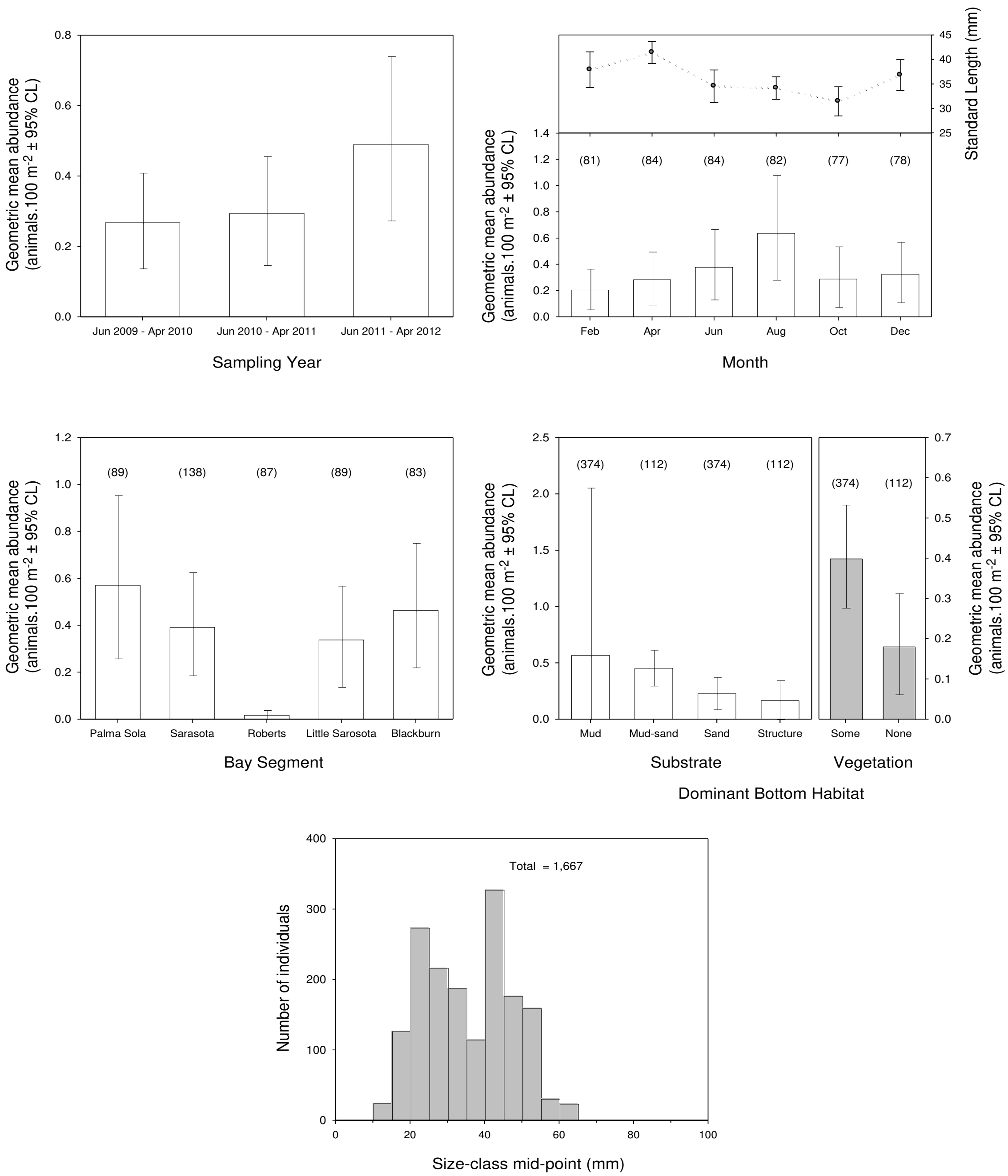


Fig. H5. Relative abundance and length-frequency distribution of rainwater killifish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Floridichthys carpio (goldspotted killifish)
21.3-m seine



FigH6. Relative abundance and length-frequency distribution of goldspotted killifish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Syngnathus scovelli (gulf pipefish)

21.3-m seine

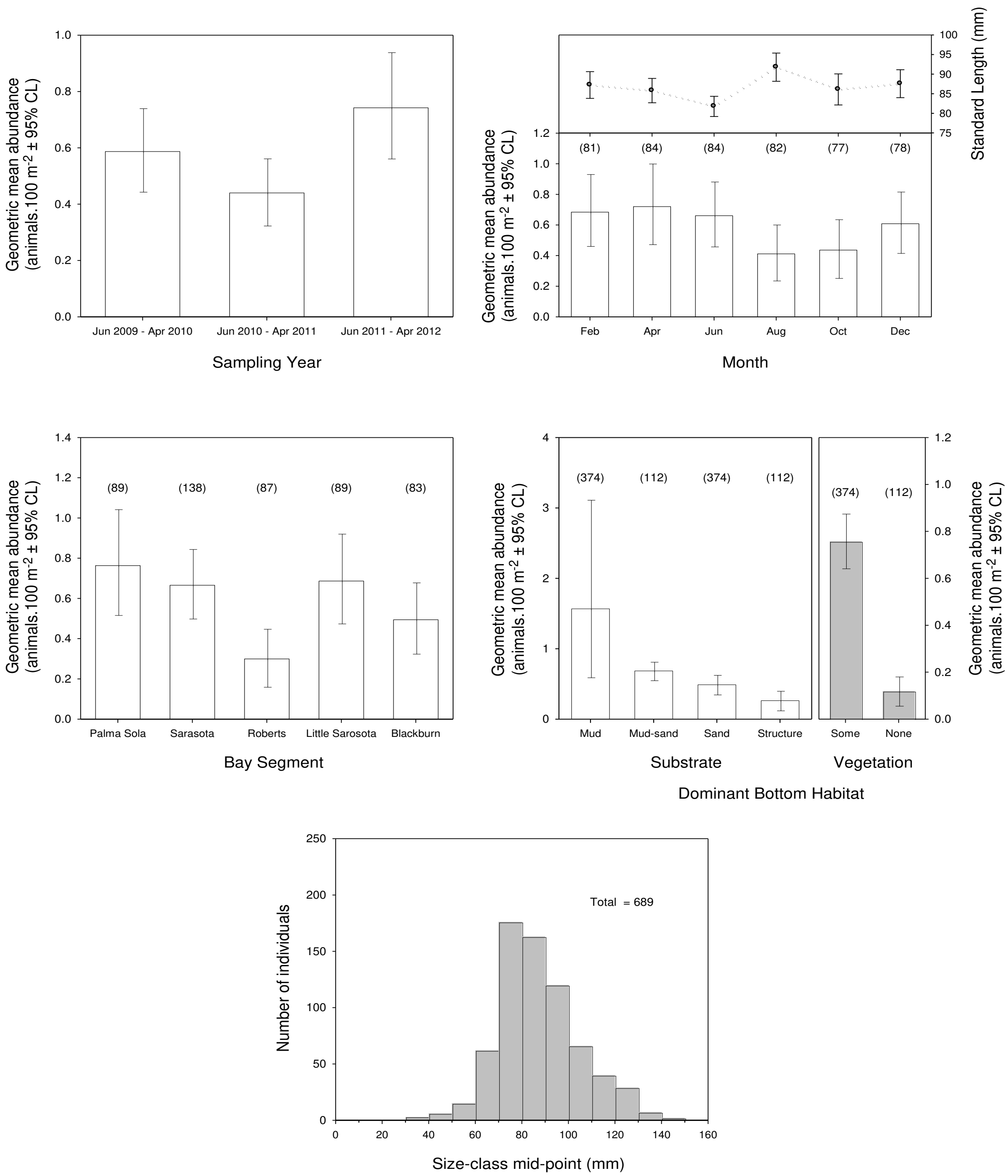


Fig. H7. Relative abundance and length-frequency distribution of gulf pipefish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

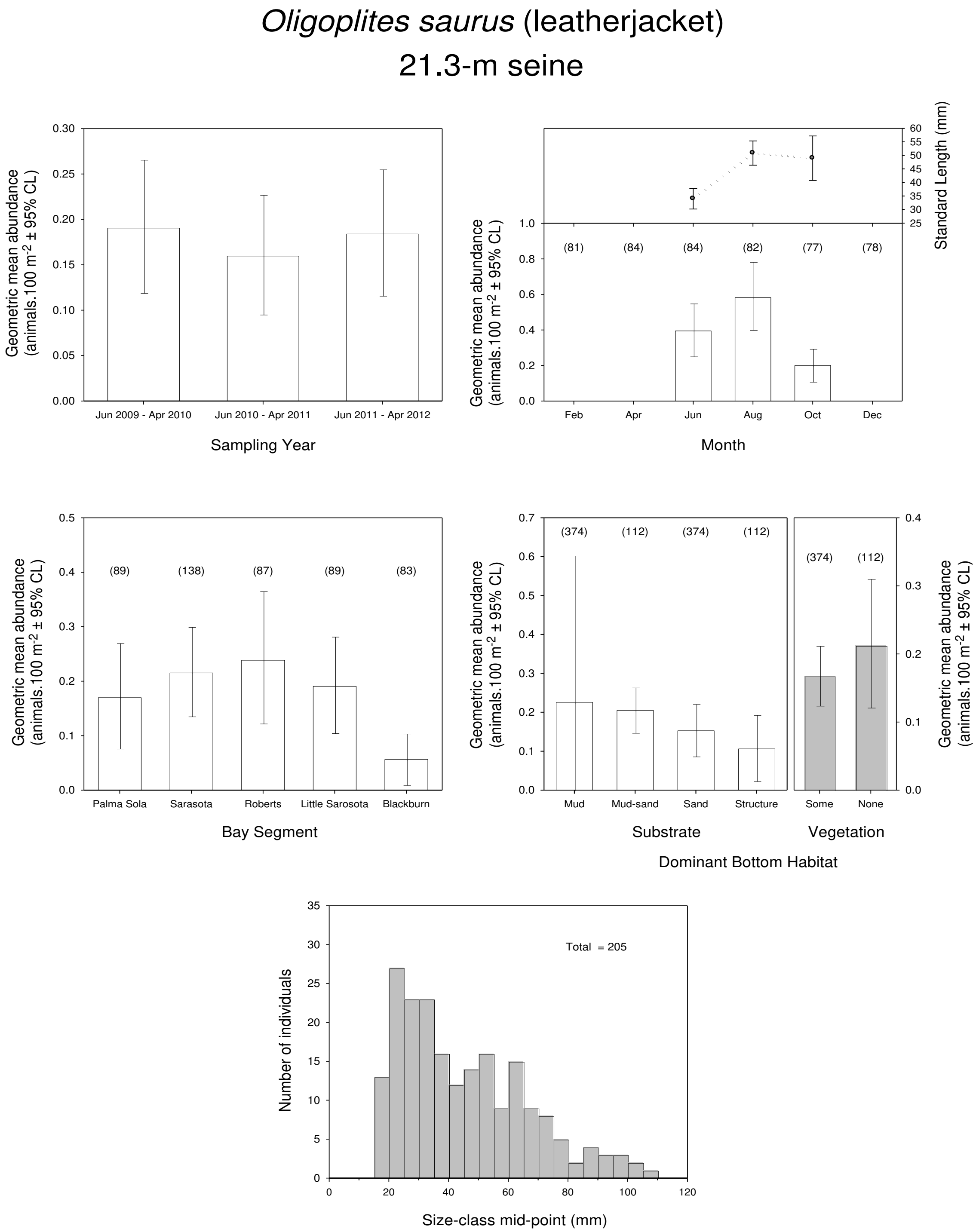


Fig. H8. Relative abundance and length-frequency distribution of leatherjacket collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lutjanus griseus (gray snapper)
21.3-m seine

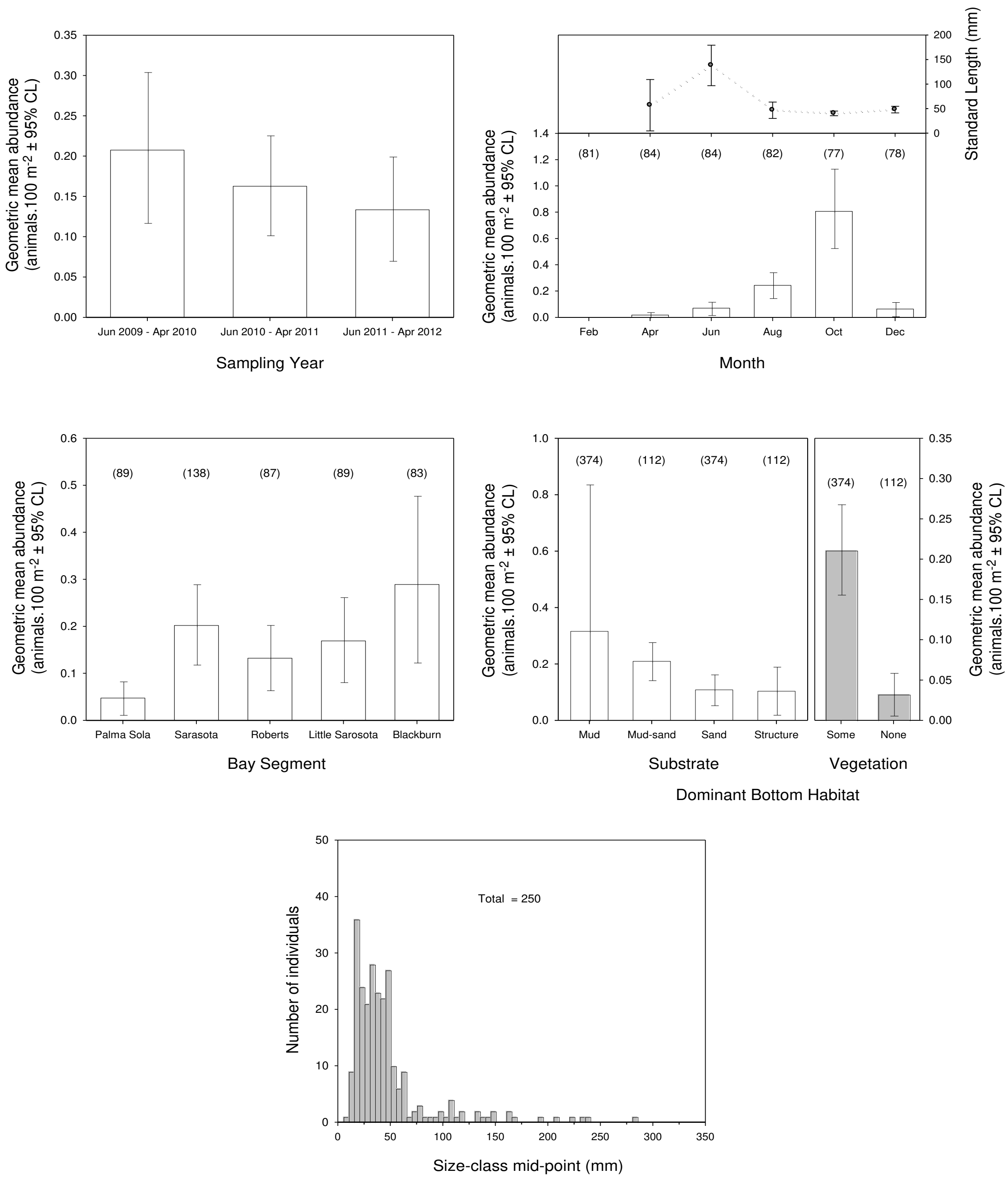


Fig. H9. Relative abundance and length-frequency distribution of gray snapper collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

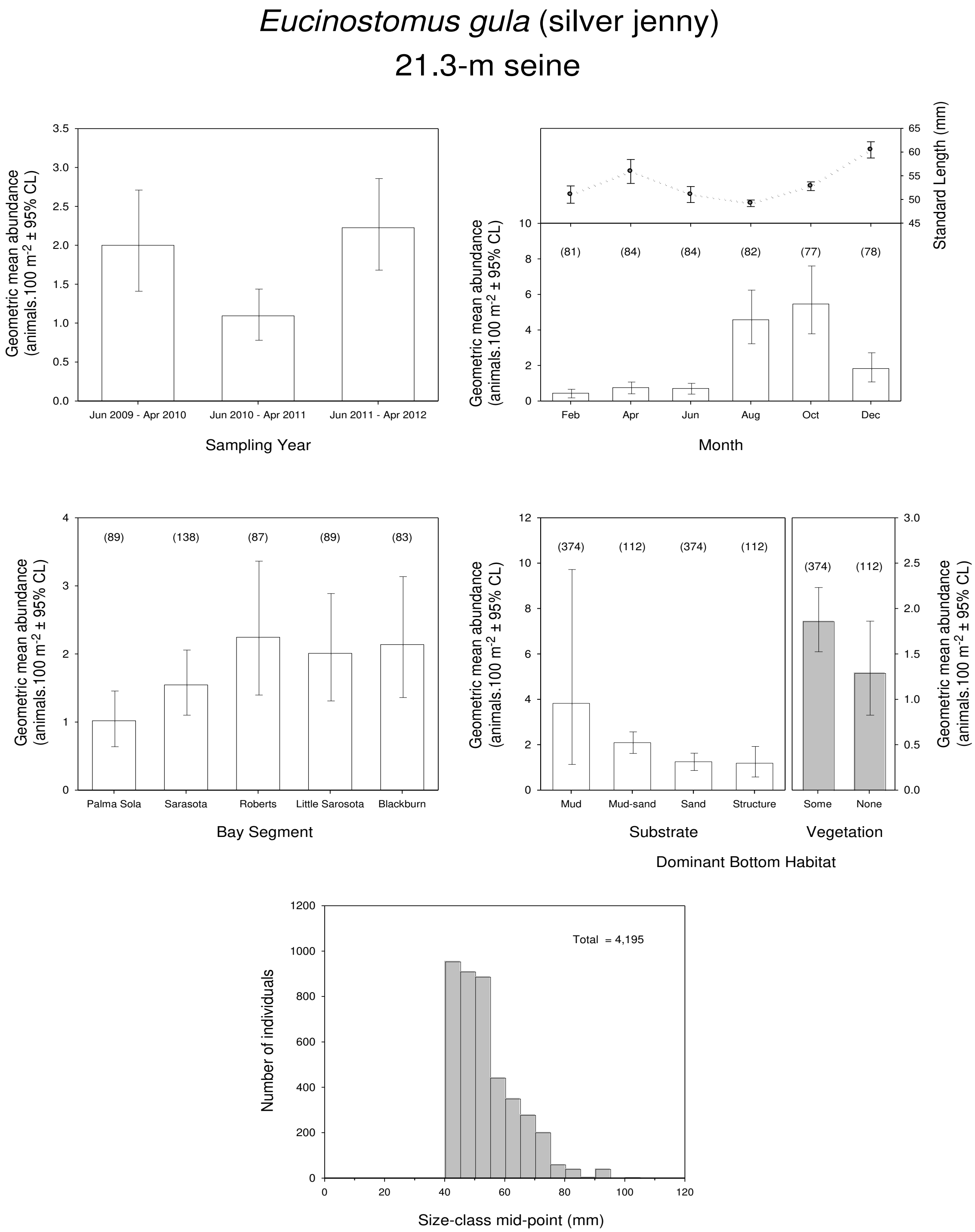


Fig. H10. Relative abundance and length-frequency distribution of silver jenny collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Eucinostomus harengulus (tidewater mojarra)
21.3-m seine

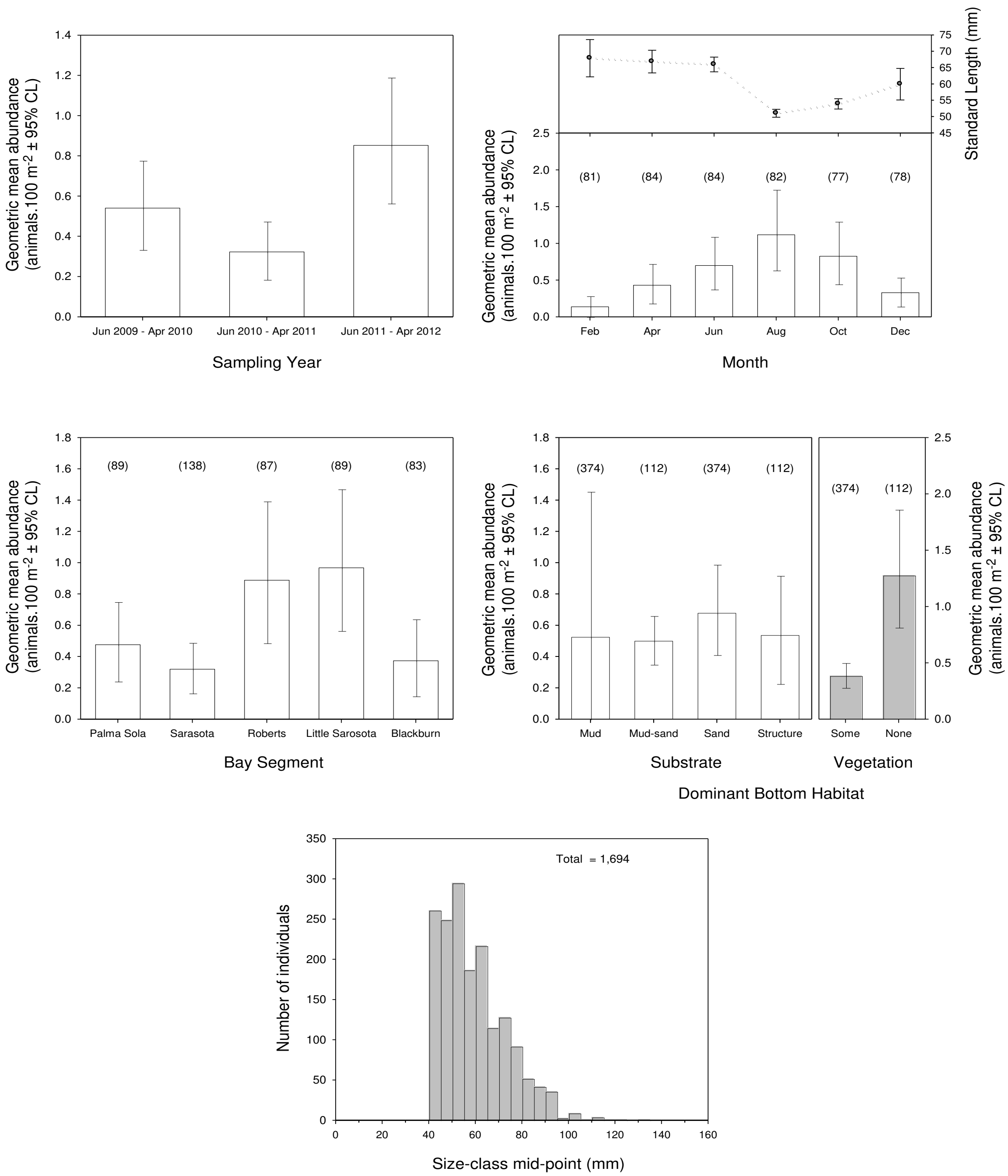


Fig. H11. Relative abundance and length-frequency distribution of tidewater mojarra collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Orthopristis chrysoptera (pigfish)
21.3-m seine

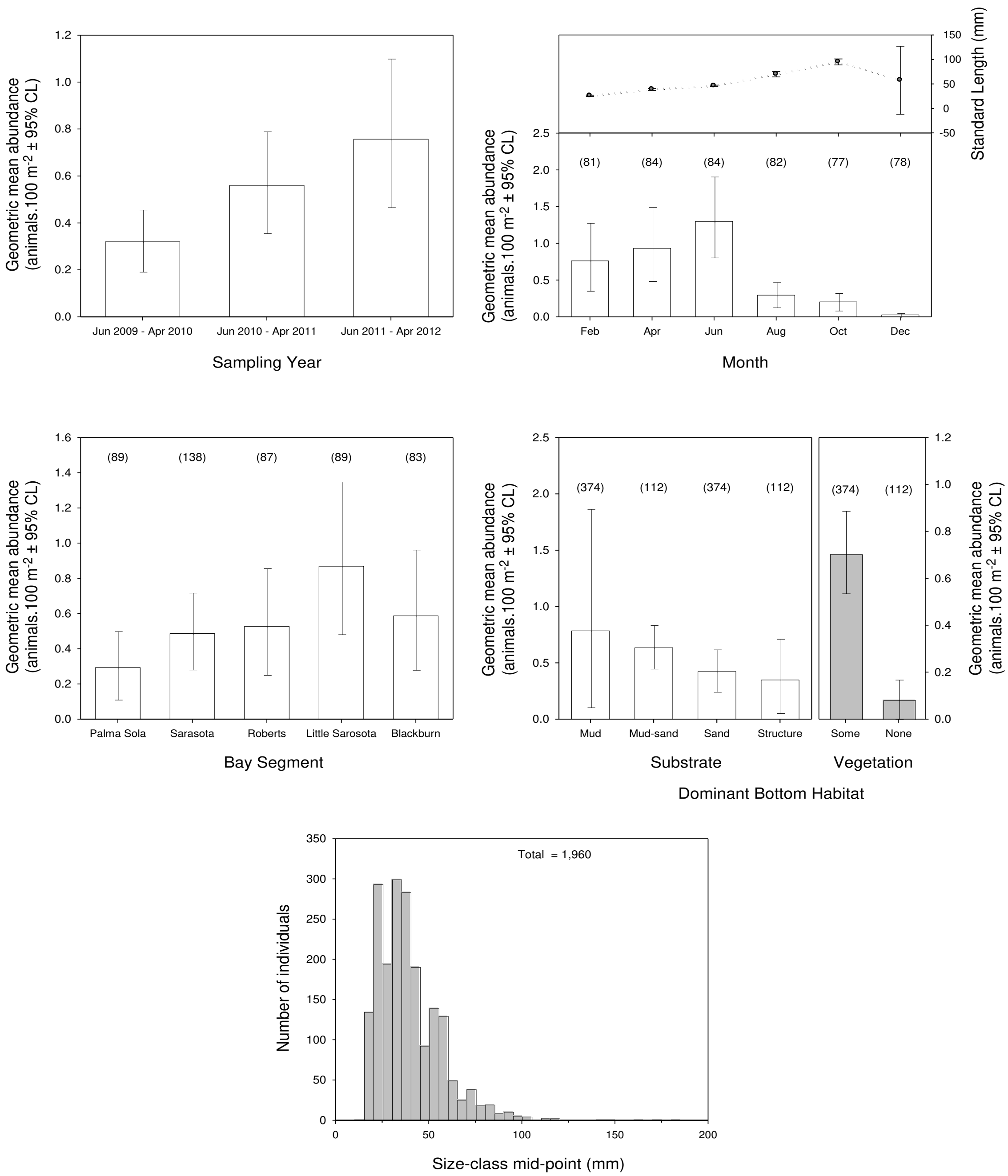


Fig. H12. Relative abundance and length-frequency distribution of pigfish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lagodon rhomboides (pinfish)
21.3-m seine

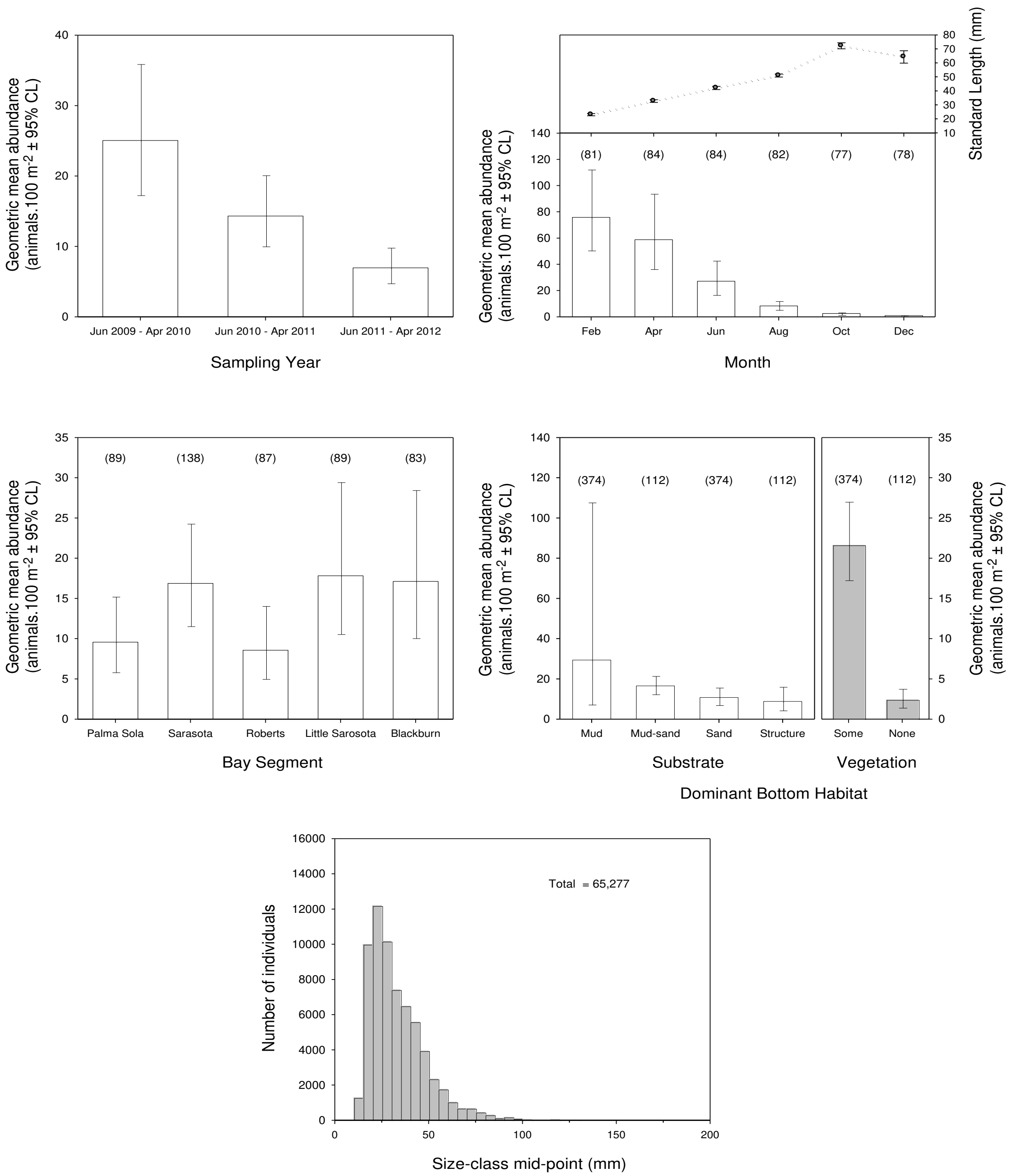


Fig. H13. Relative abundance and length-frequency distribution of pinfish collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Cynoscion nebulosus (spotted seatrout)
21.3-m seine

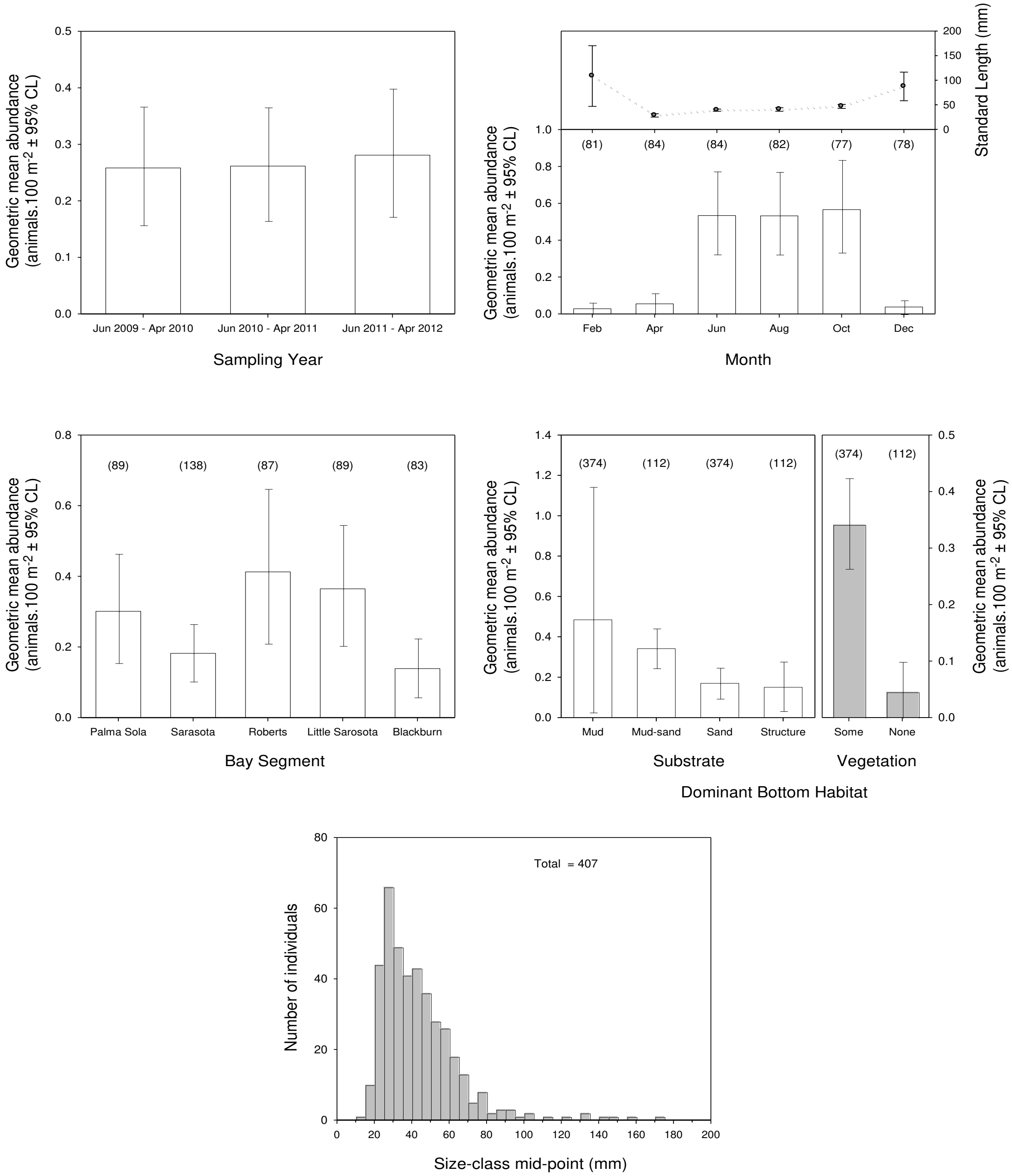


Fig. H14. Relative abundance and length-frequency distribution of spotted seatrout collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Bairdiella chrysoura (silver perch)
21.3-m seine

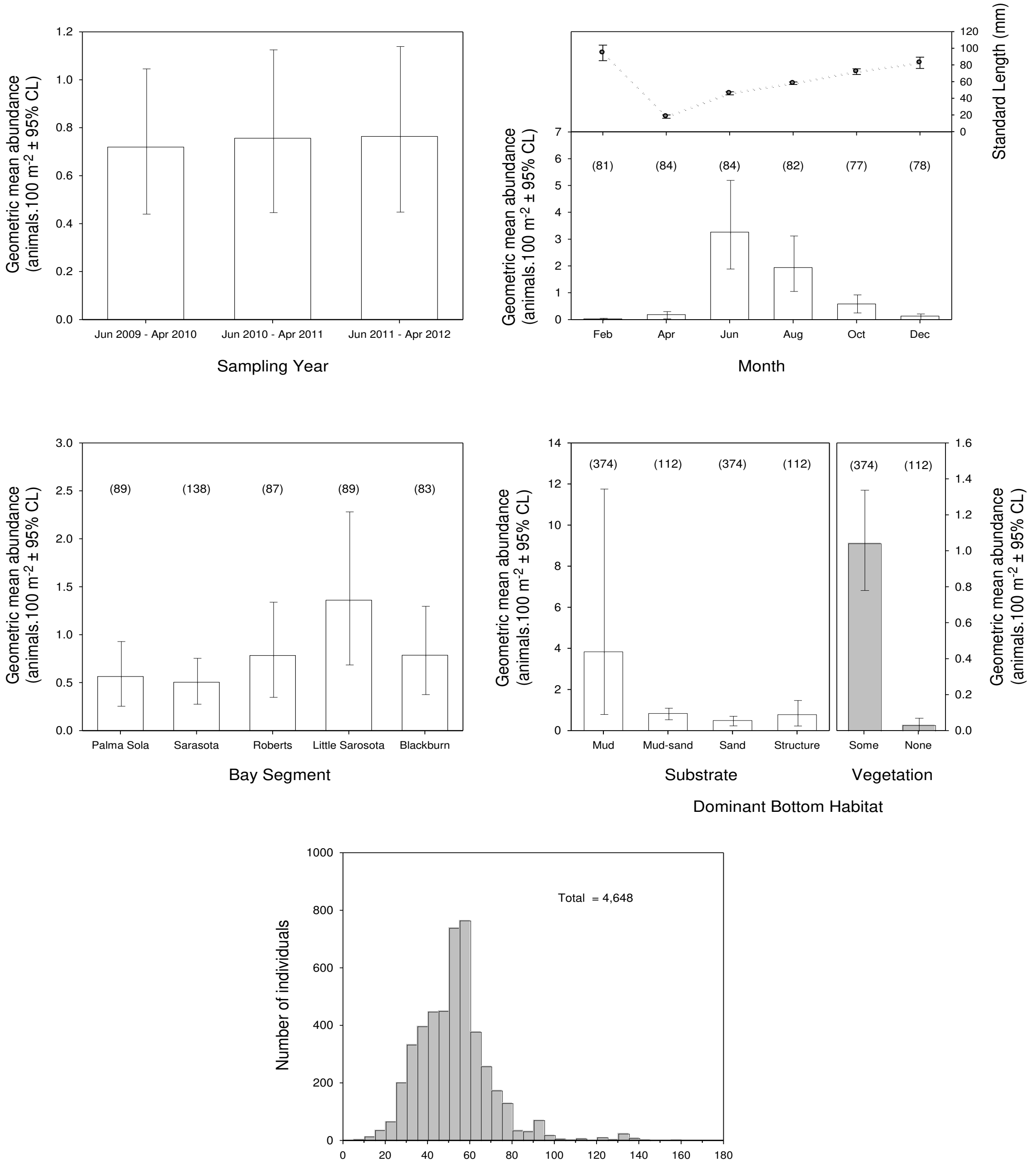


Fig. H15. Relative abundance and length-frequency distribution of silver perch collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Leiostomus xanthurus (spot)
21.3-m seine

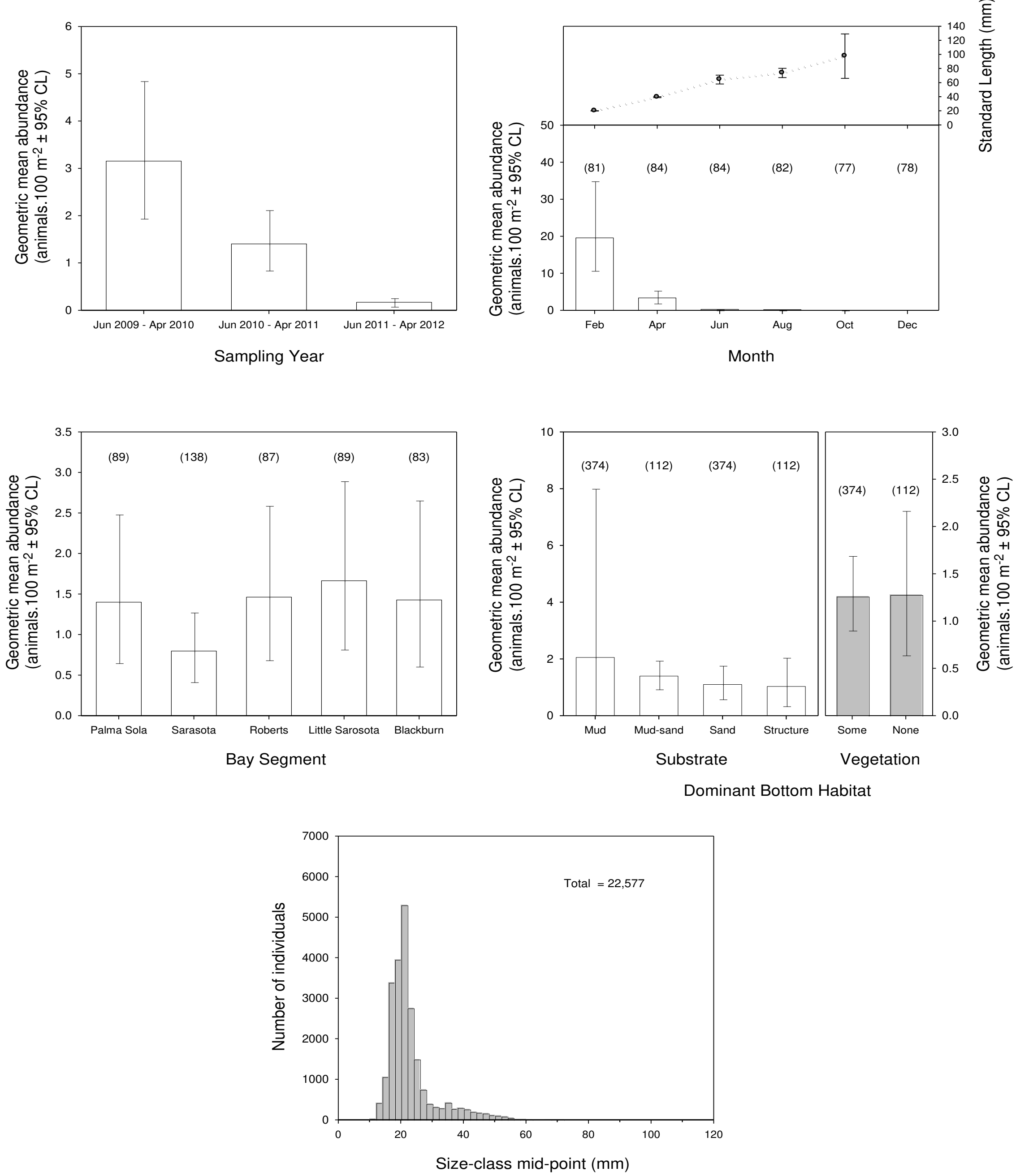


Fig. H16. Relative abundance and length-frequency distribution of spot collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Gobiosoma robustum (code goby)
21.3-m seine

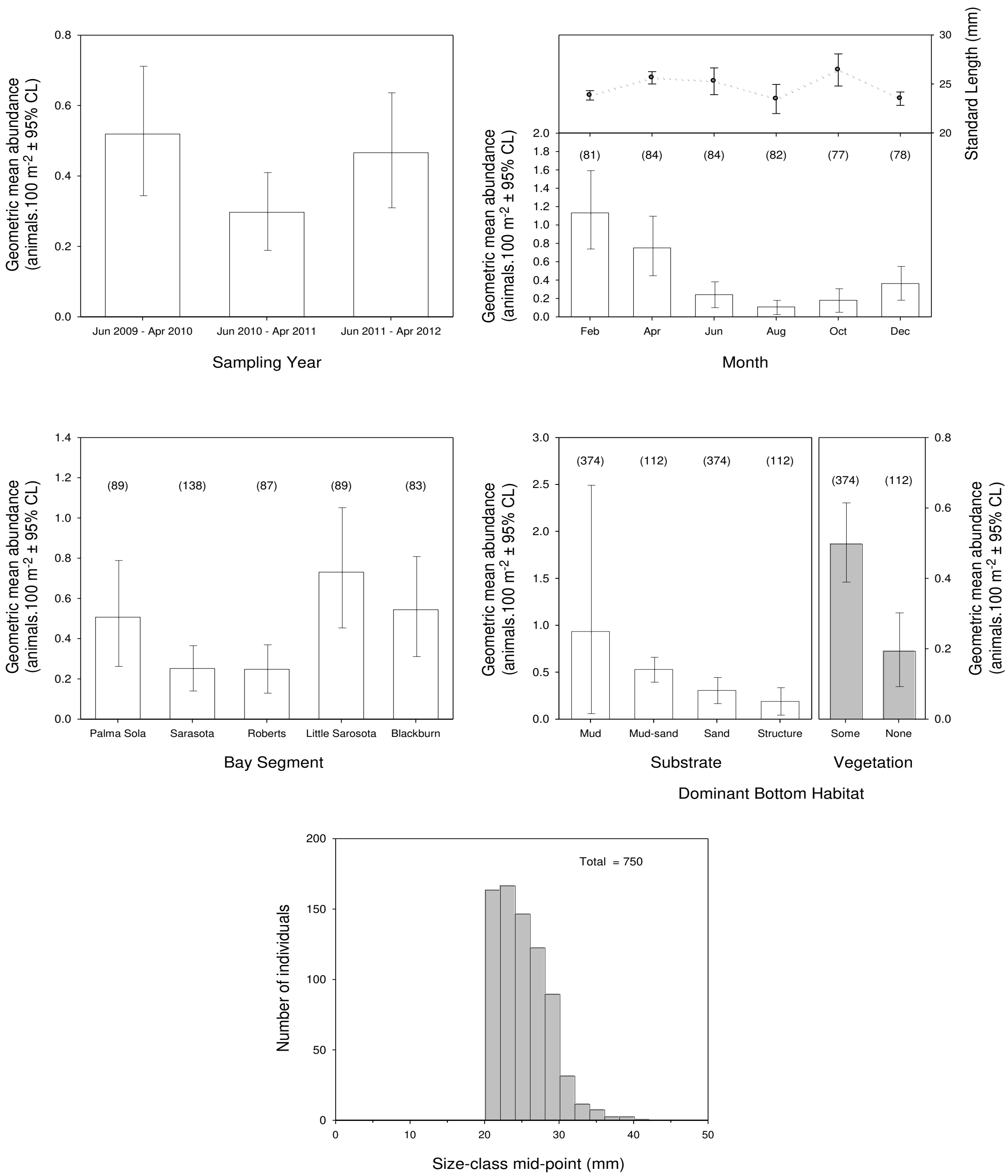


Fig. H17. Relative abundance and length-frequency distribution of code goby collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Microgobius gulosus (clown goby)
21.3-m seine

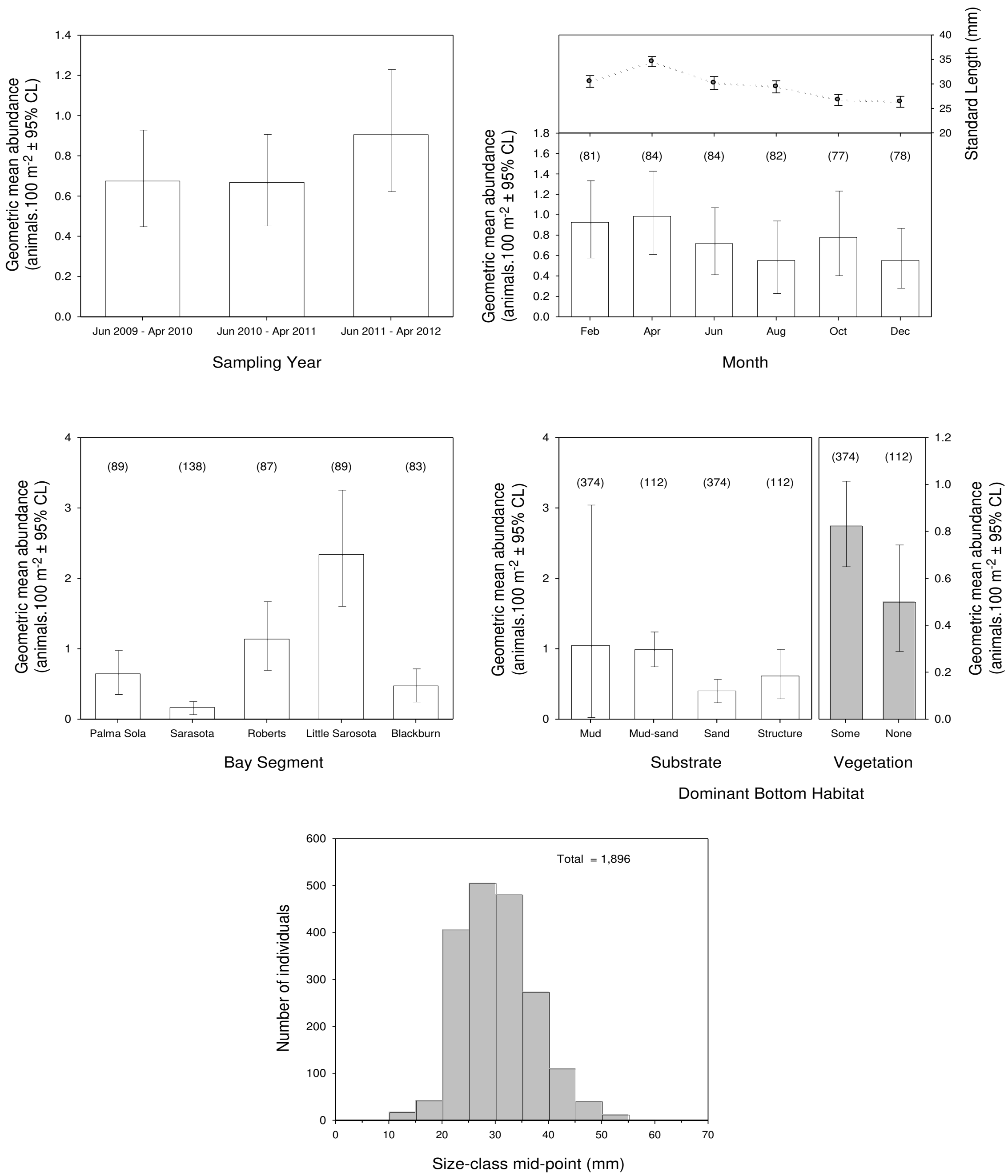


Fig. H18. Relative abundance and length-frequency distribution of clown goby collected with 21.3-m seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Appendix I. Species overview plots for dominant taxa (≥175 animals collected and ≥15 occurrence) collected in 183-m haul seines in Sarasota Bay, June 2009 to April 2012. Taxa are arranged phylogenetically.

Elops saurus (ladyfish)
183-m haul seine

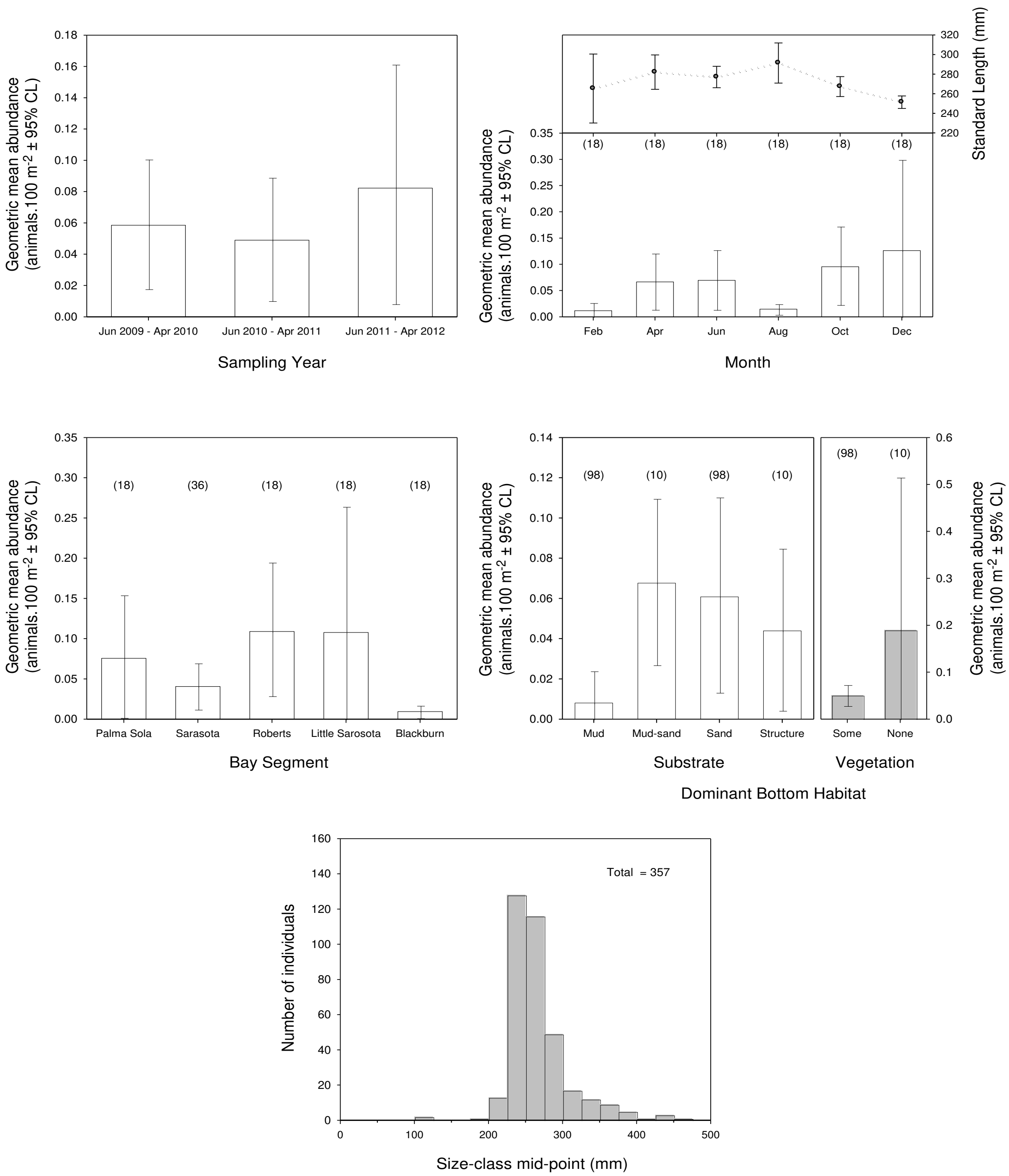


Fig. I1. Relative abundance and length-frequency distribution of ladyfish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Harengula jaguana (scaled sardine)
183-m haul seine

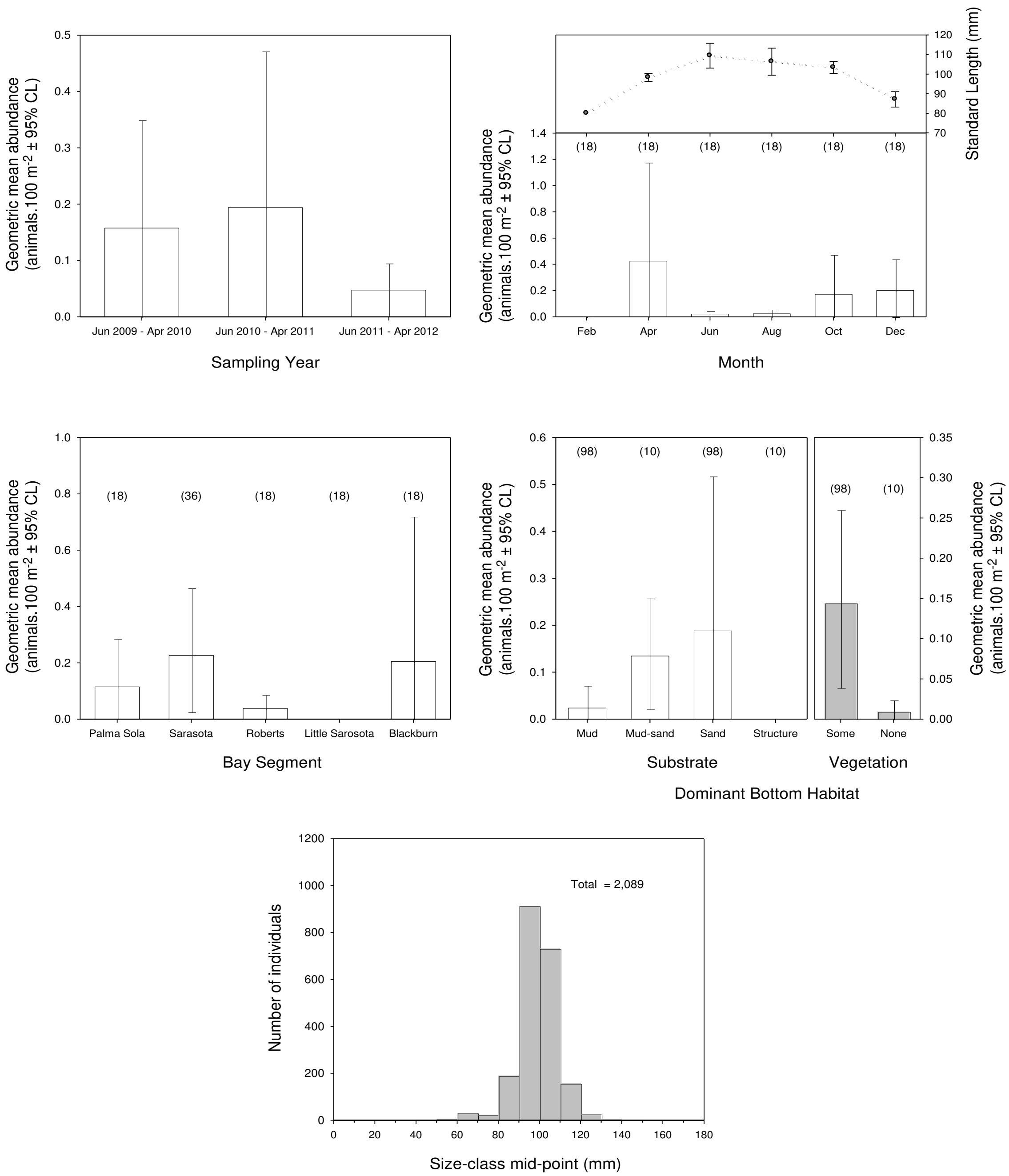


Fig. I2. Relative abundance and length-frequency distribution of scaled sardine collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Ariopsis felis (hardhead catfish)
183-m haul seine

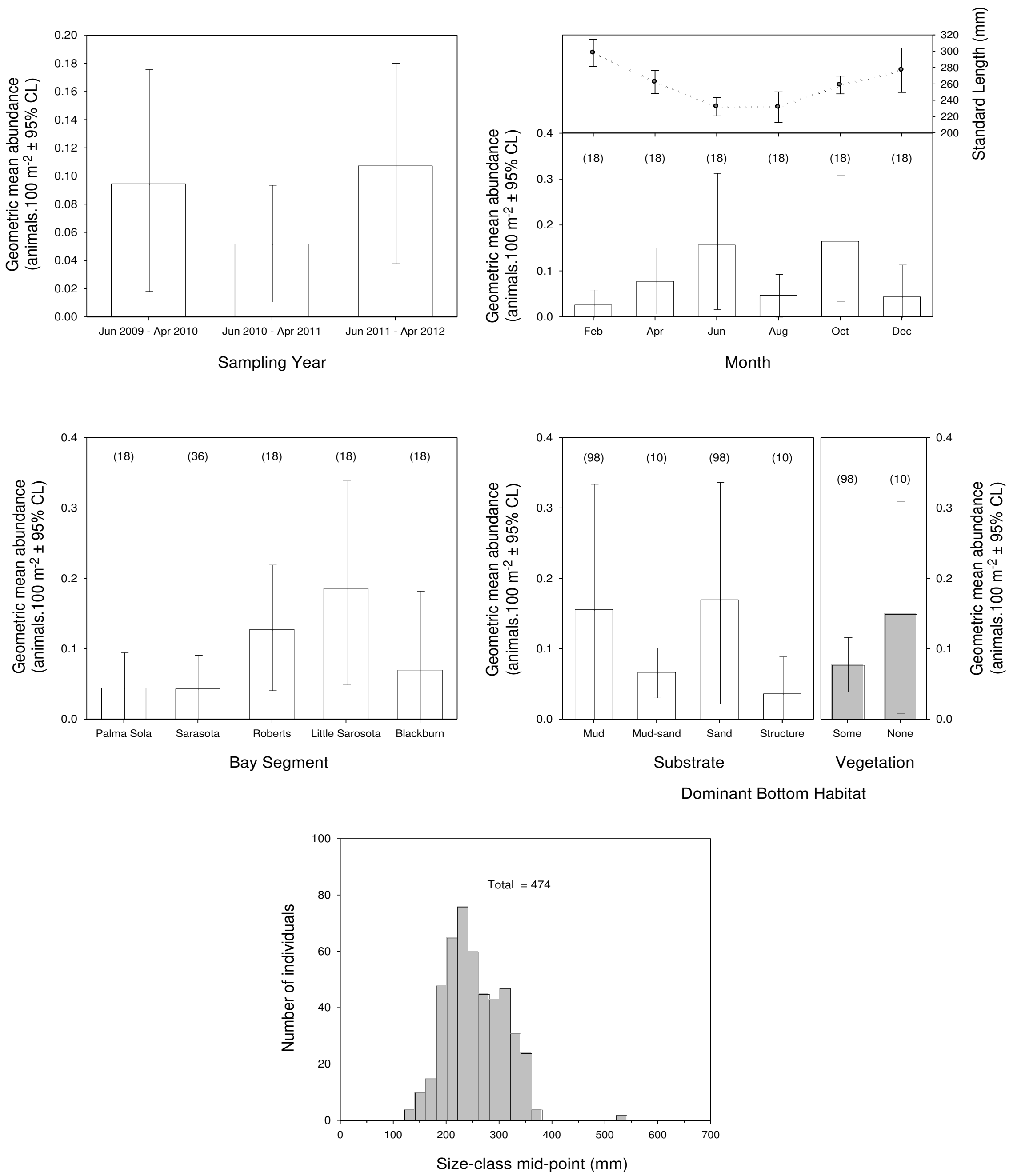


Fig. I3. Relative abundance and length-frequency distribution of hardhead catfish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Strongylura notata (redfin needlefish)
183-m haul seine

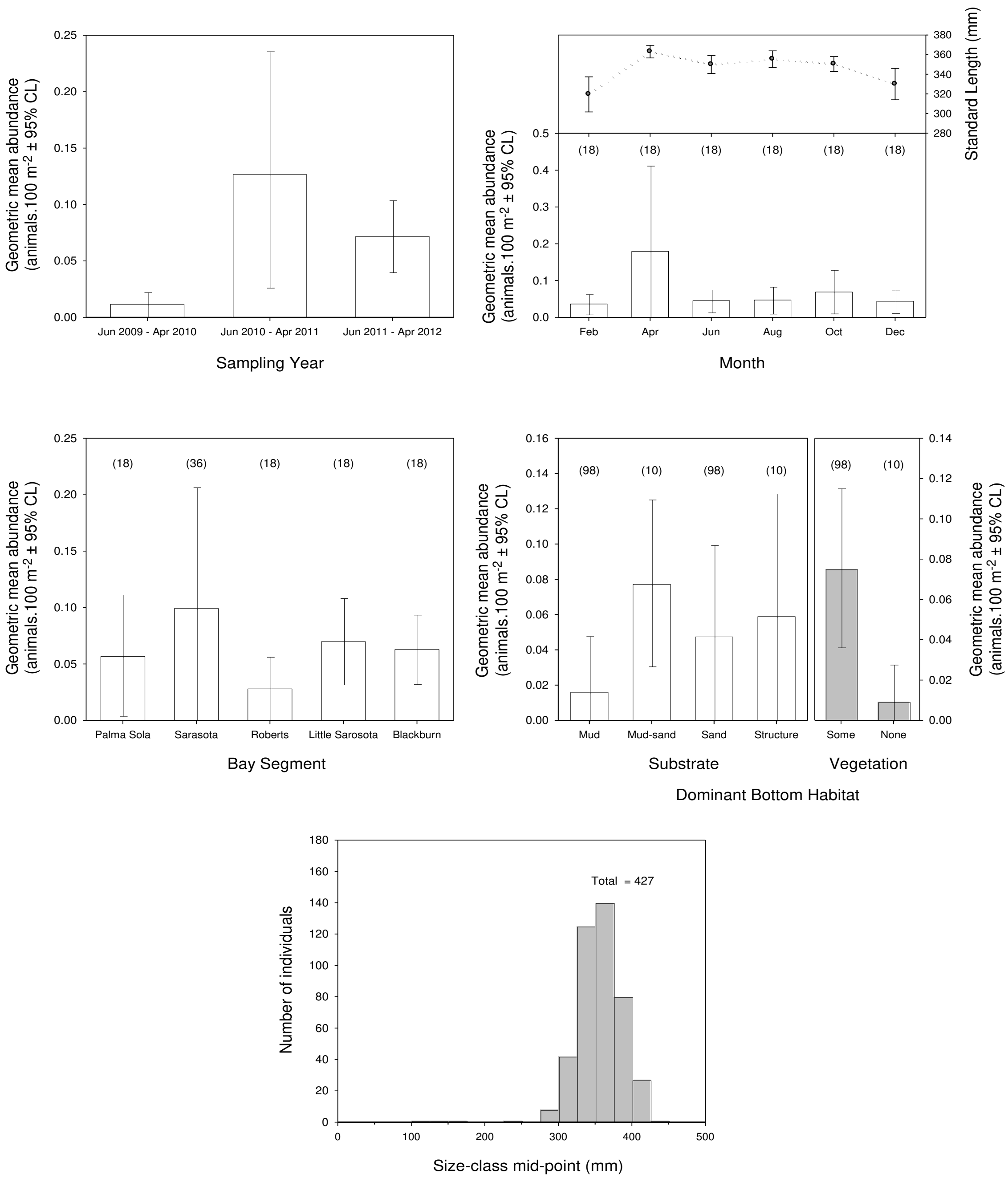


Fig. I4. Relative abundance and length-frequency distribution of redfin needlefish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Centropomus undecimalis (common snook)
183-m haul seine

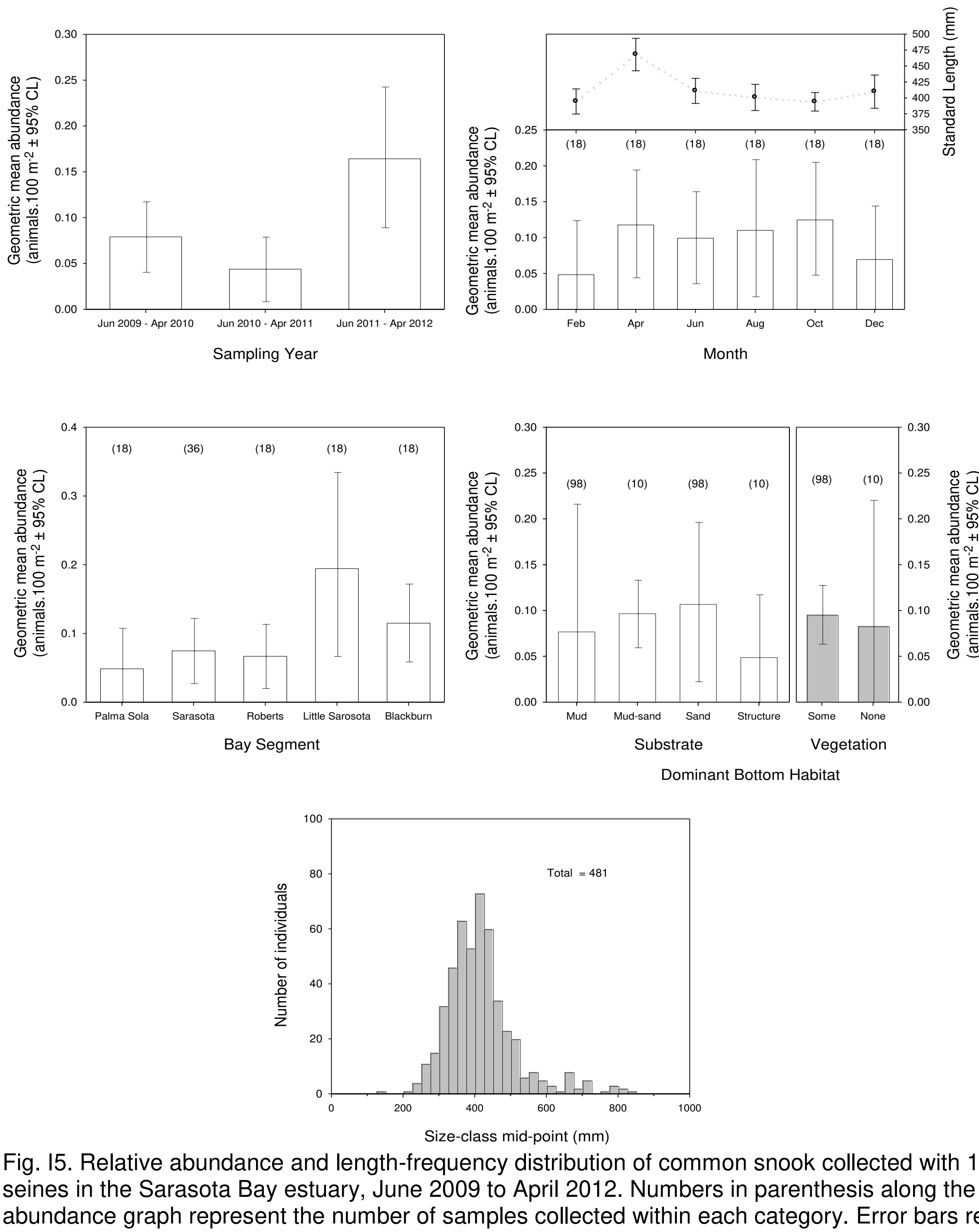


Fig. I5. Relative abundance and length-frequency distribution of common snook collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lutjanus griseus (gray snapper)
183-m haul seine

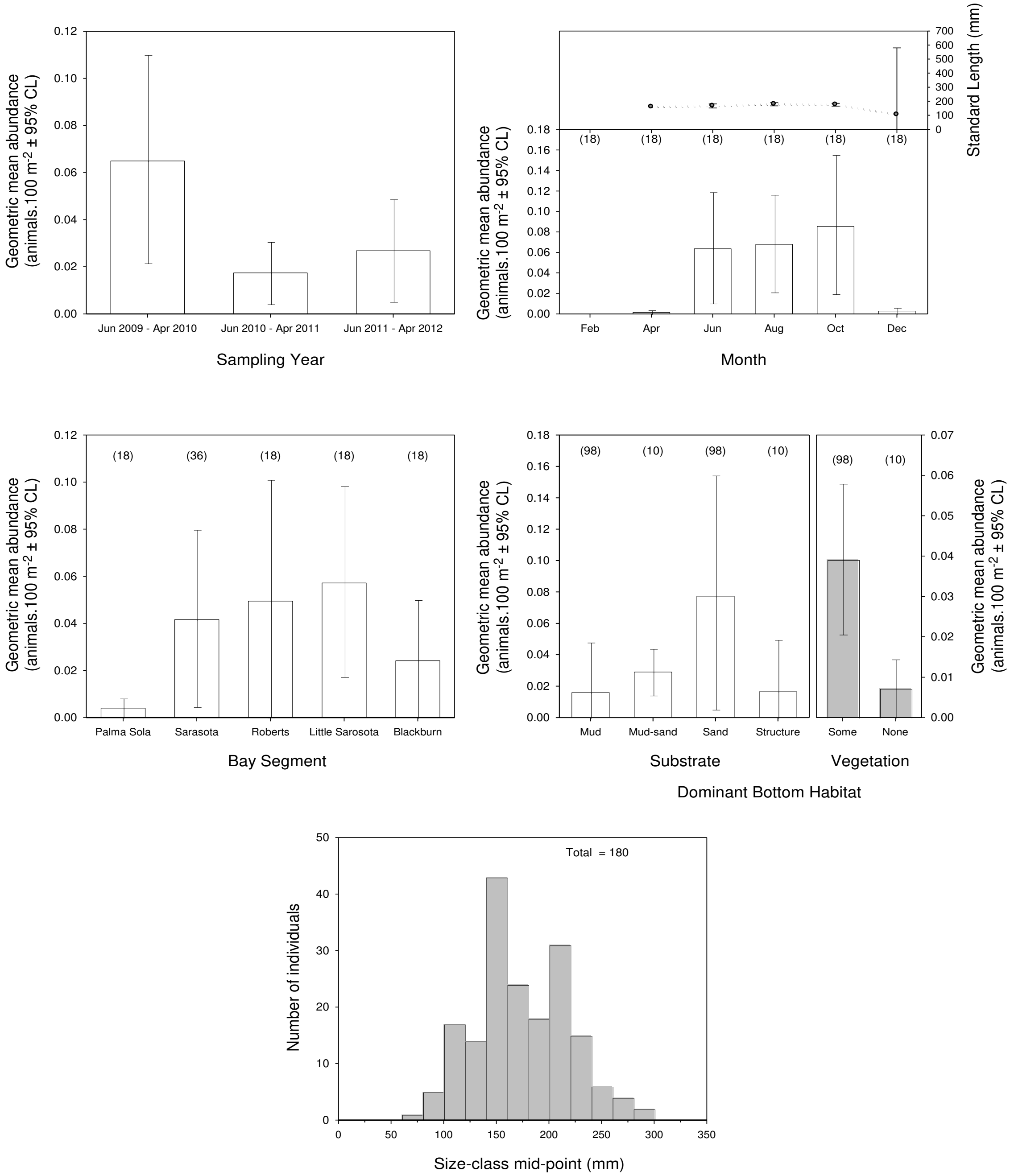


Fig. I6. Relative abundance and length-frequency distribution of gray snapper collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Eucinostomus gula (silver jenny)
183-m haul seine

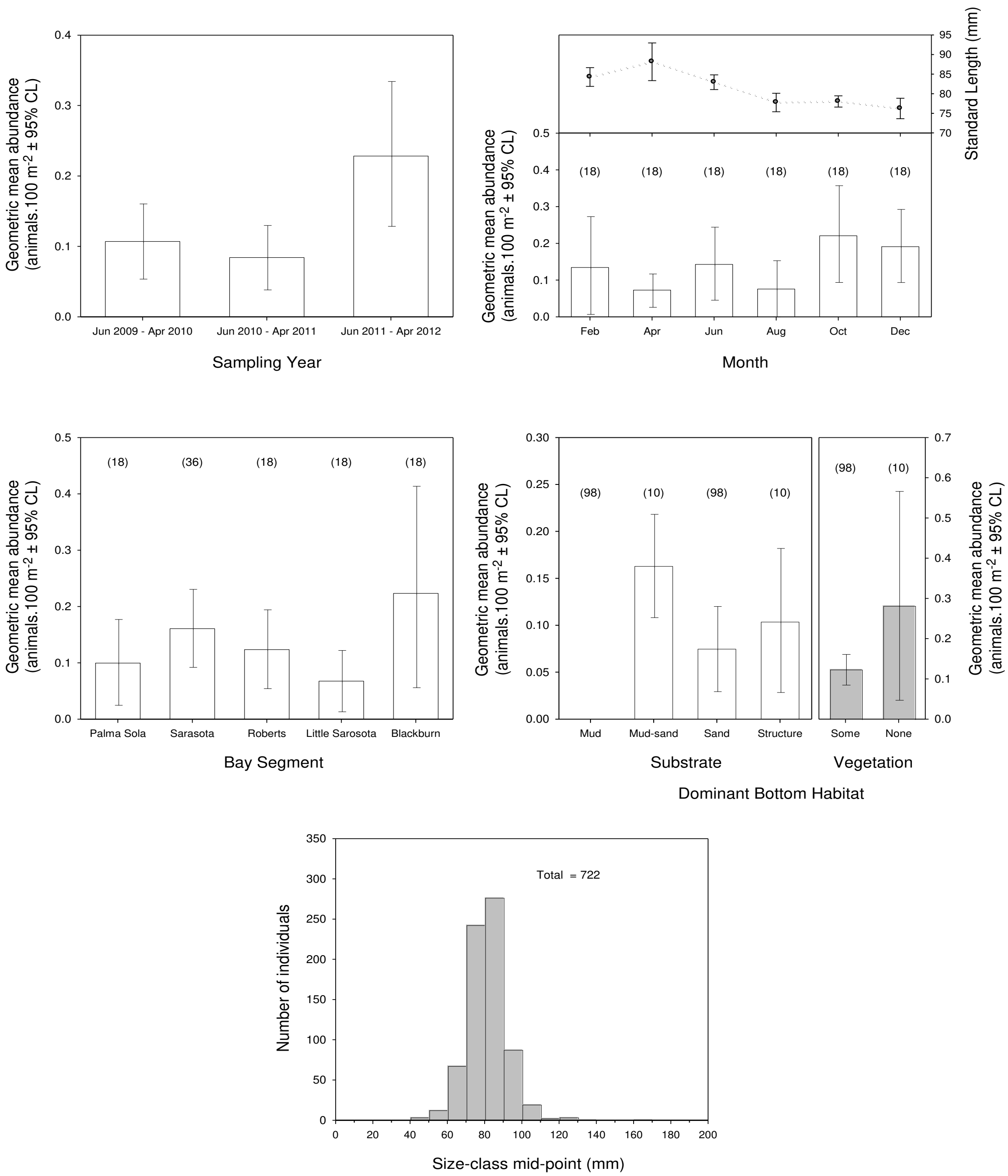


Fig. I7. Relative abundance and length-frequency distribution of silver jenny collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Orthopristis chrysoptera (pigfish)
183-m haul seine

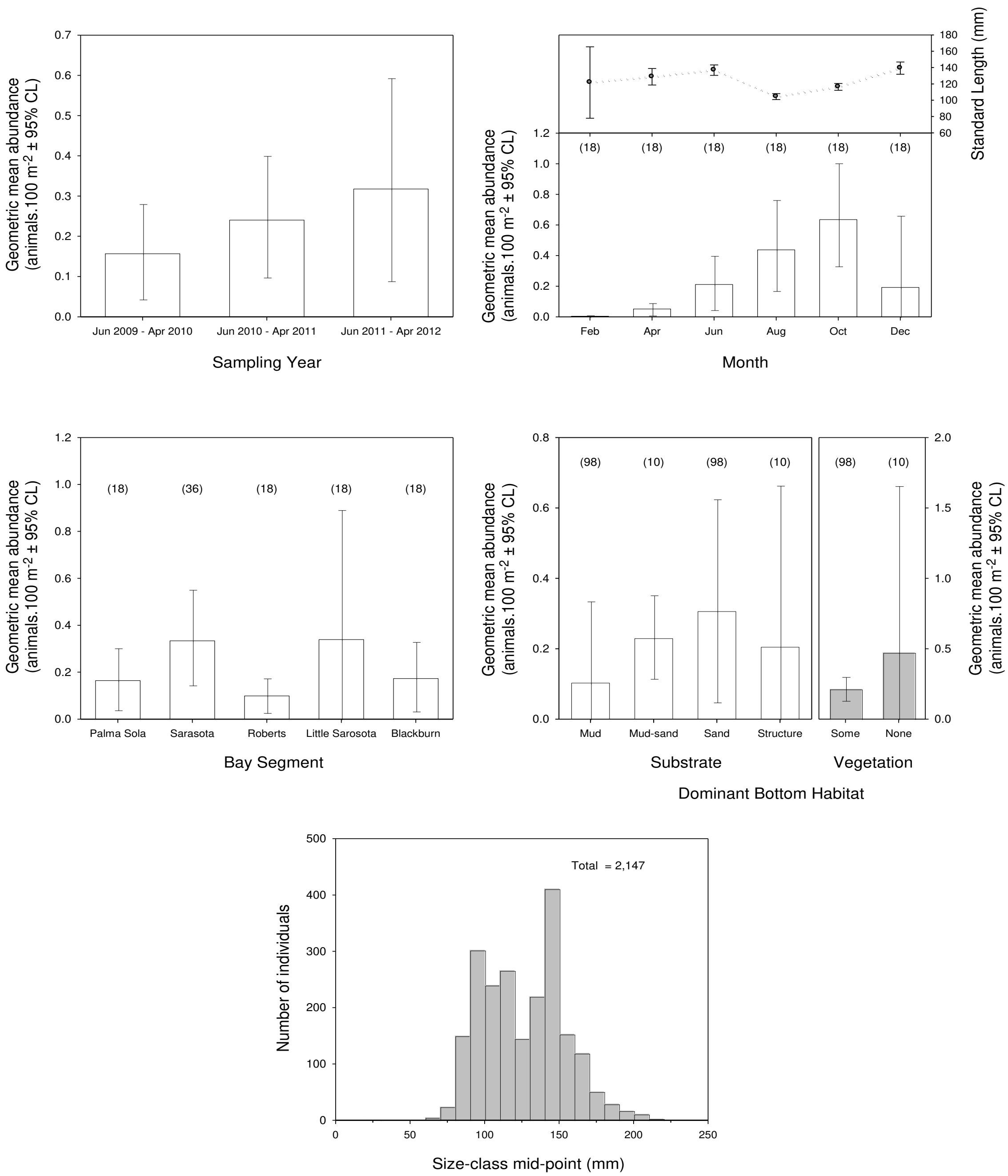


Fig. I8. Relative abundance and length-frequency distribution of pigfish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lagodon rhomboides (pinfish)
183-m haul seine

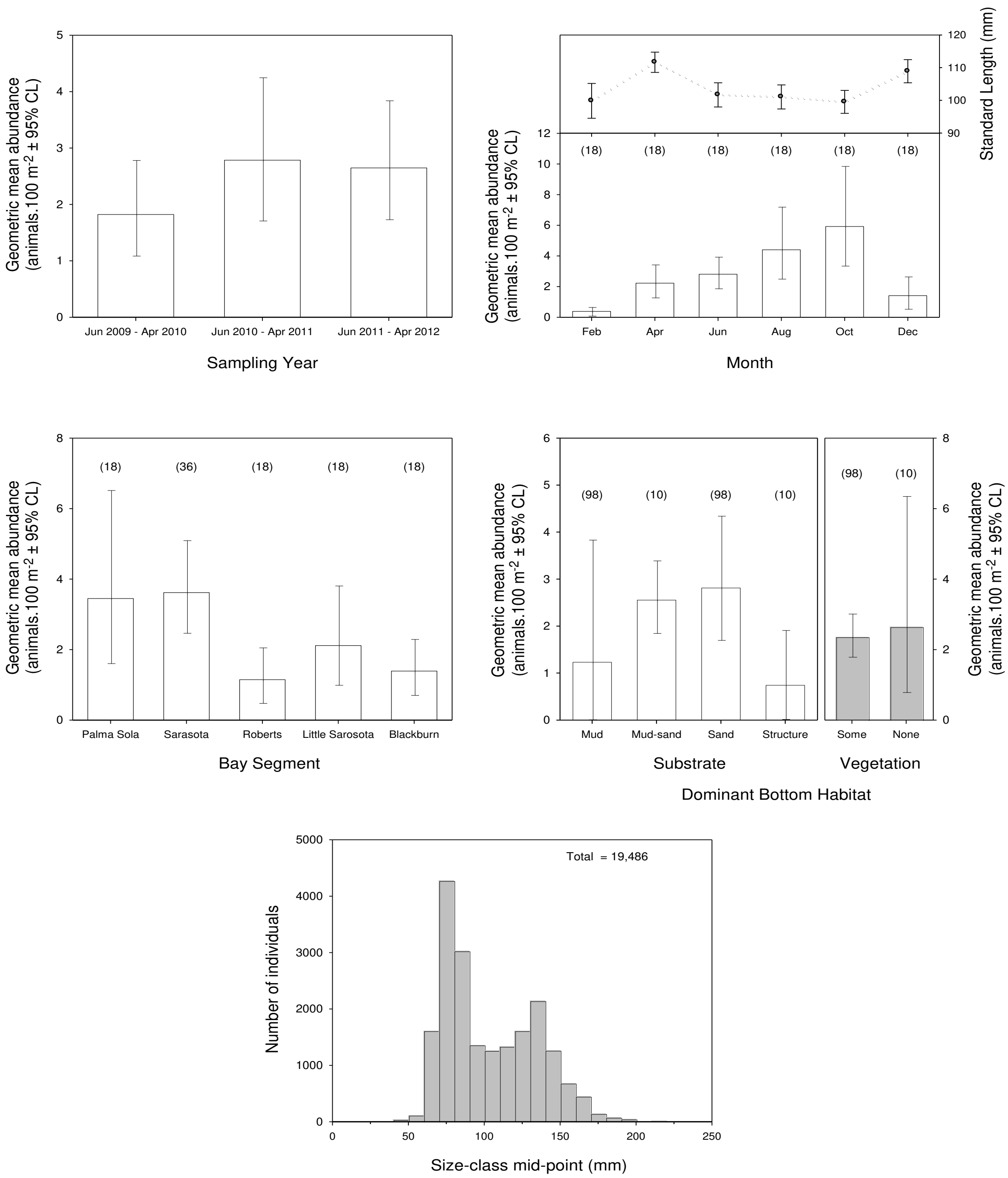


Fig. I9. Relative abundance and length-frequency distribution of pinfish collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Archosargus probatocephalus (sheepshead)
183-m haul seine

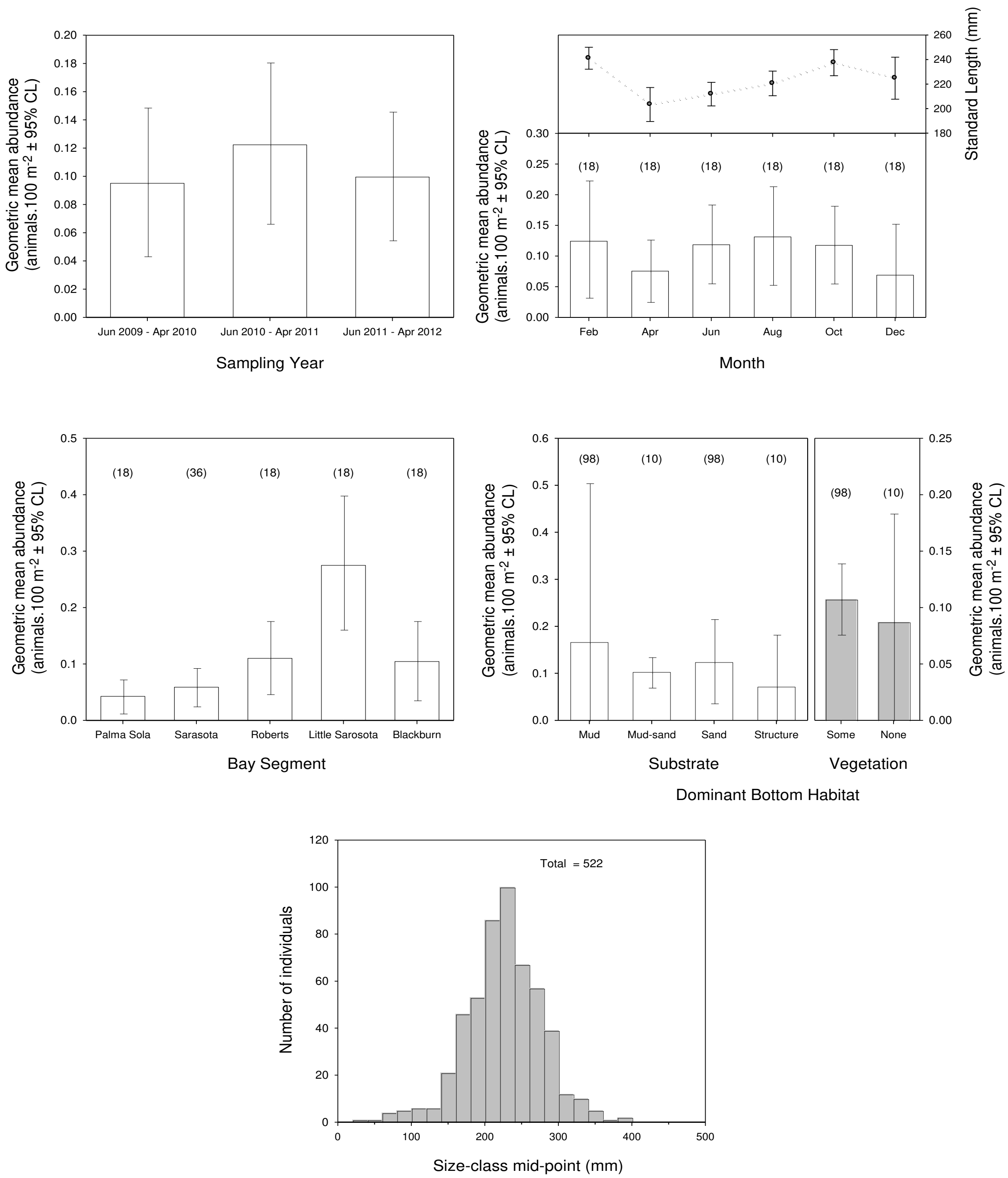


Fig. I10. Relative abundance and length-frequency distribution of sheepshead collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Bairdiella chrysoura (silver perch)
183-m haul seine

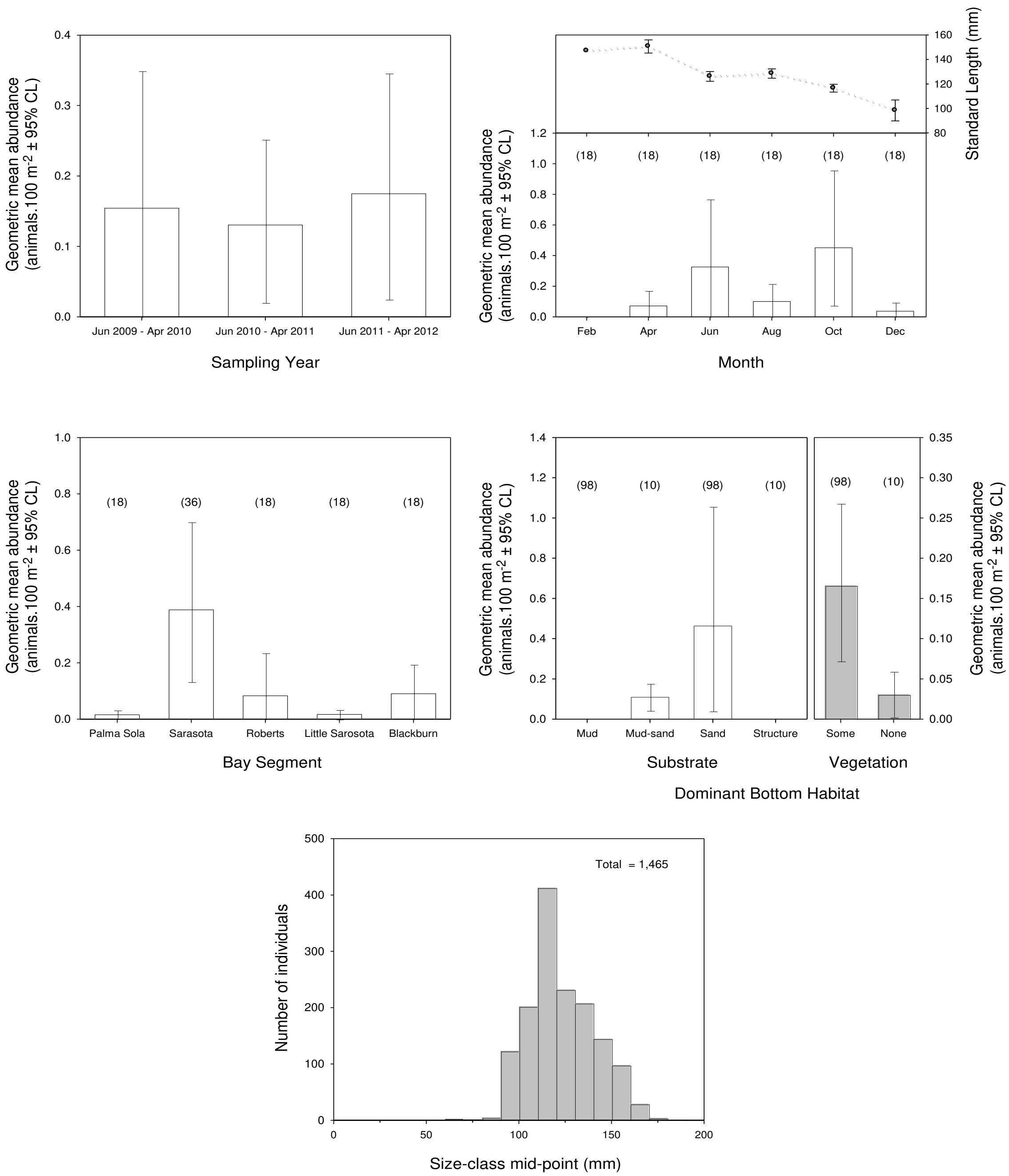


Fig. I11. Relative abundance and length-frequency distribution of silver perch collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Leiostomus xanthurus (spot)
183-m haul seine

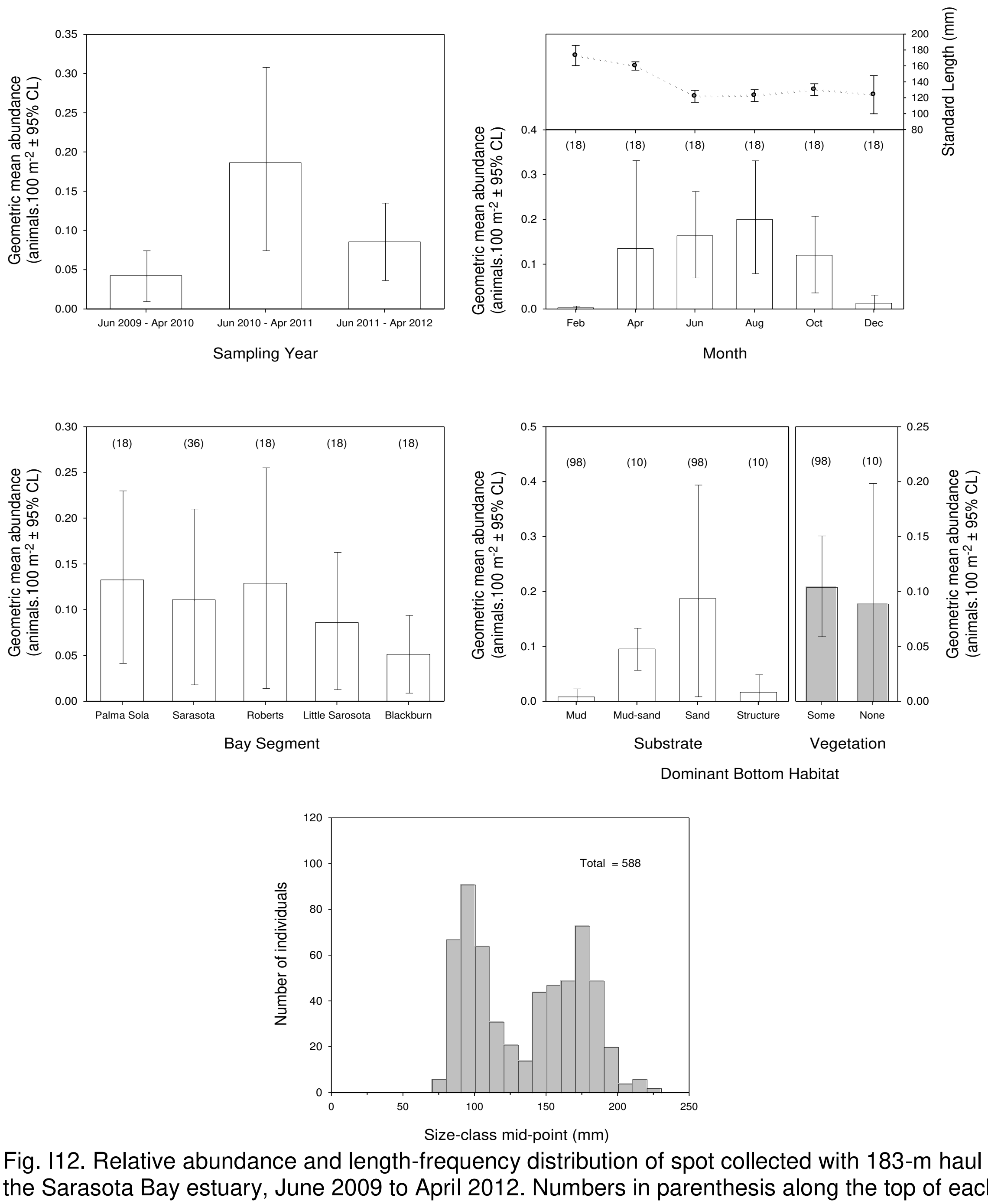


Fig. I12. Relative abundance and length-frequency distribution of spot collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Mugil cephalus (striped mullet)
183-m haul seine

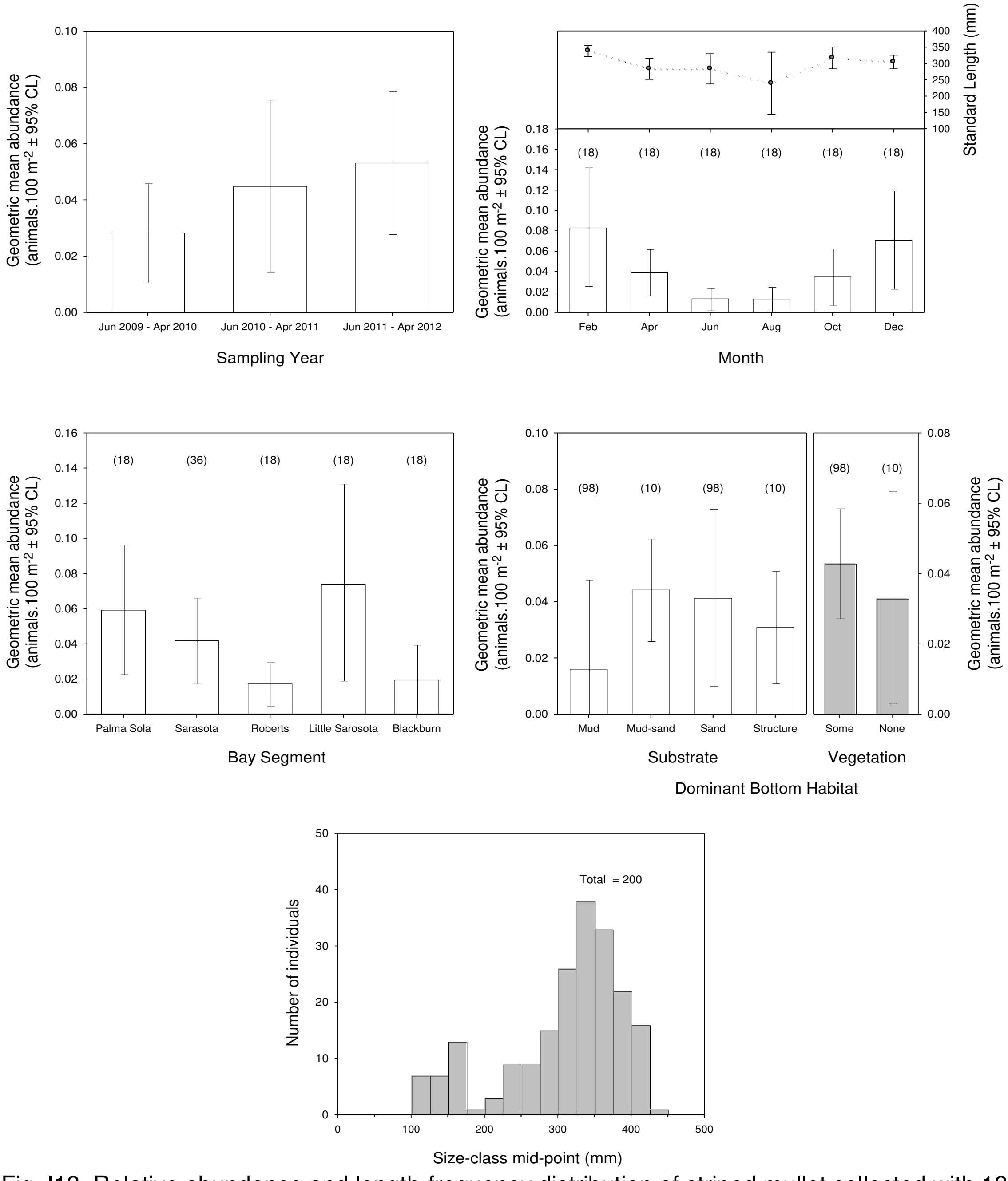


Fig. I13. Relative abundance and length-frequency distribution of striped mullet collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Mugil curema (white mullet)
183-m haul seine

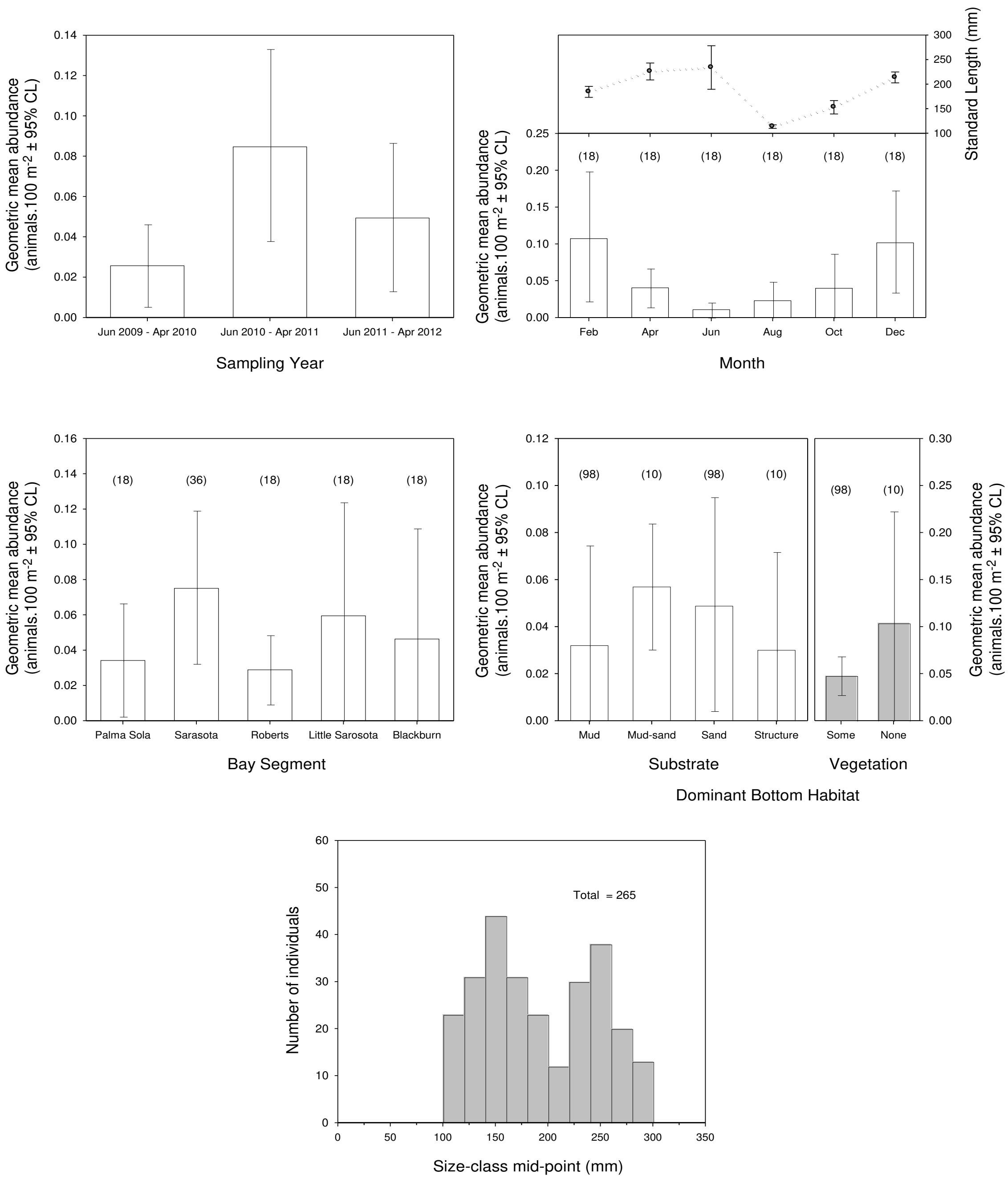


Fig. I14. Relative abundance and length-frequency distribution of white mullet collected with 183-m haul seines in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Appendix J. Species overview plots for dominant taxa (≥175 animals collected and ≥15 occurrence) collected in 6.1-m otter trawls in Sarasota Bay, June 2009 to April 2012. Taxa are arranged phylogenetically.

Farfantepenaeus duorarum (pink shrimp)

6.1-m otter trawl

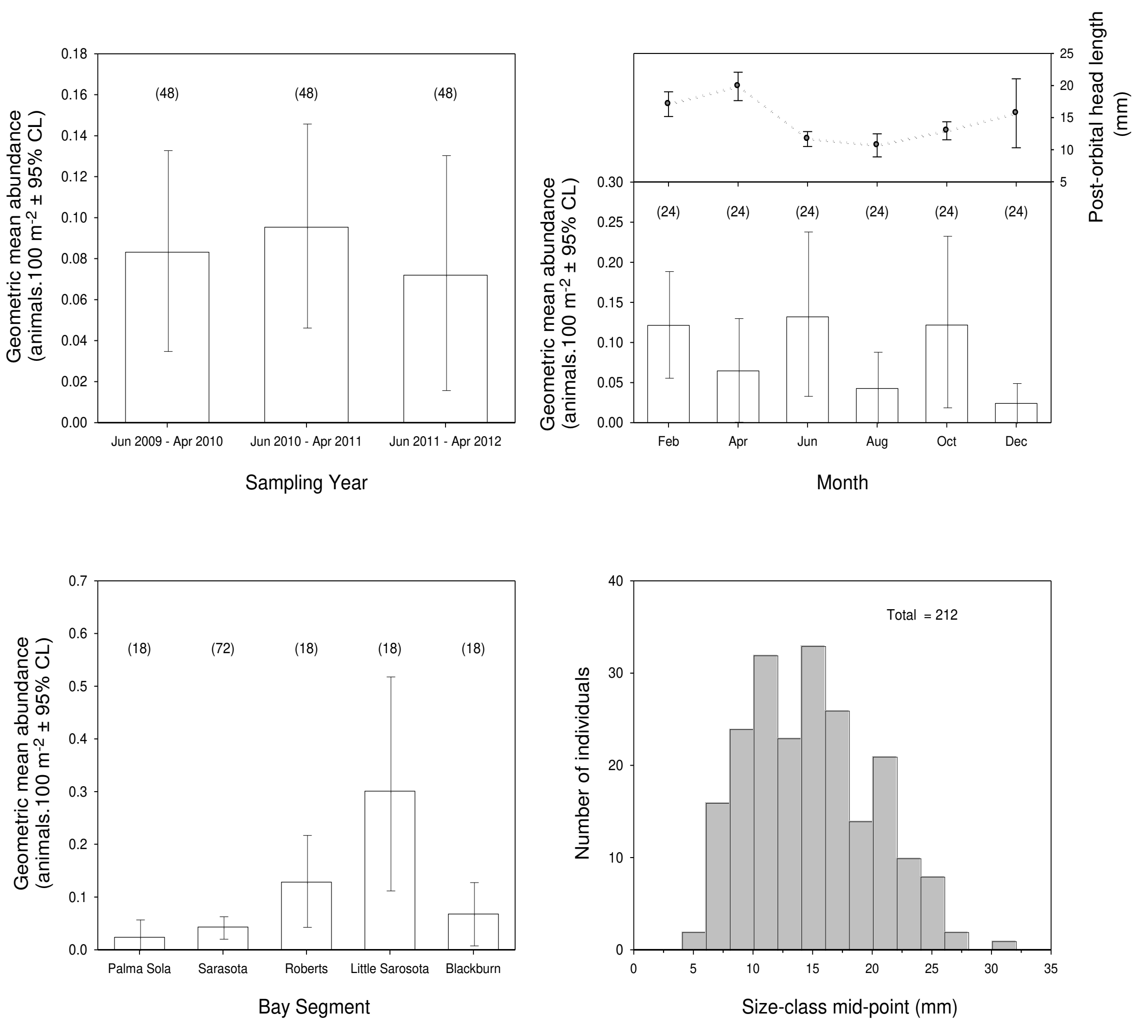


Fig. J1. Relative abundance and length-frequency distribution of pink shrimp collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Callinectes sapidus (blue crab)
6.1-m otter trawl

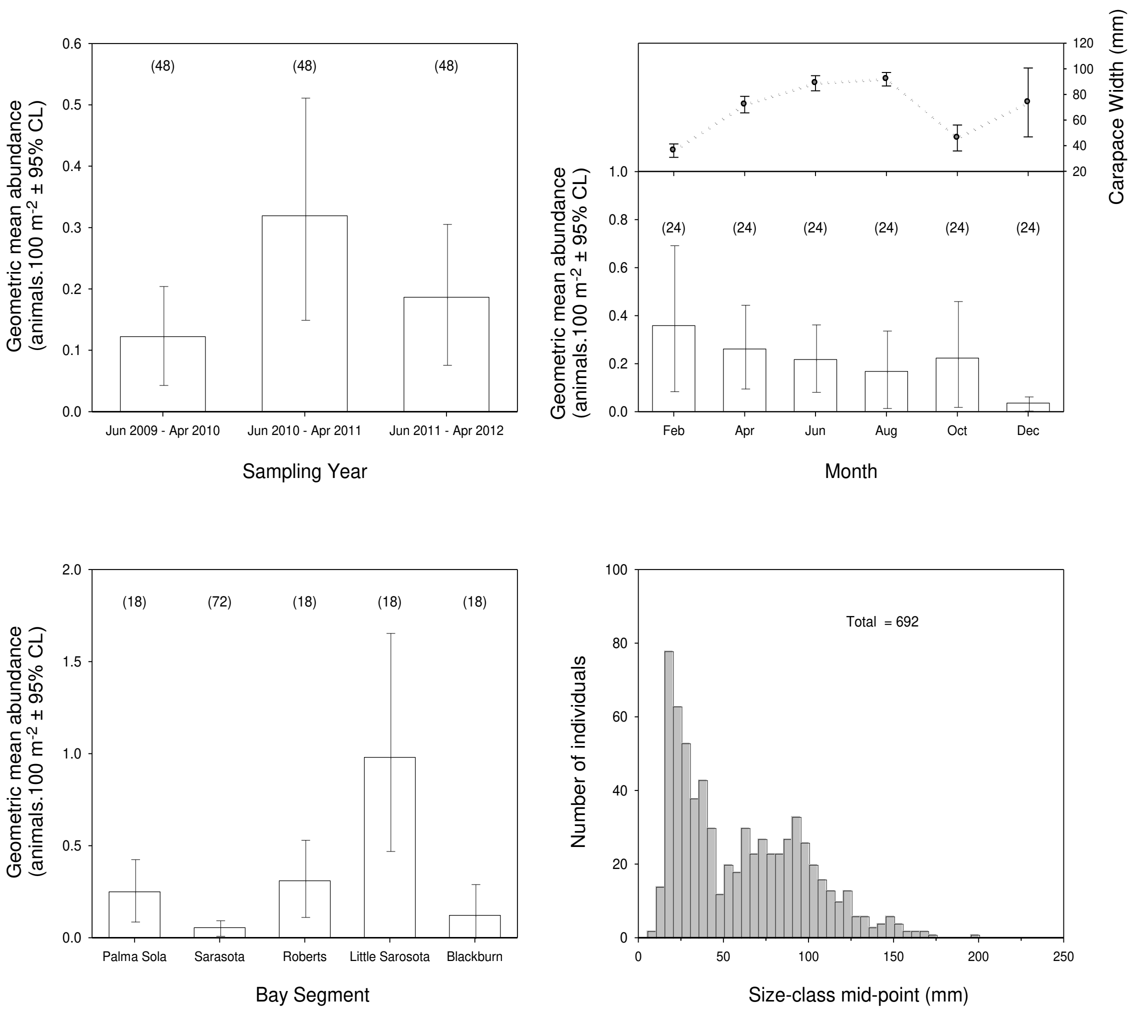


Fig. J2. Relative abundance and length-frequency distribution of blue crab collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Portunus spp. (portunus crabs)

6.1-m otter trawl

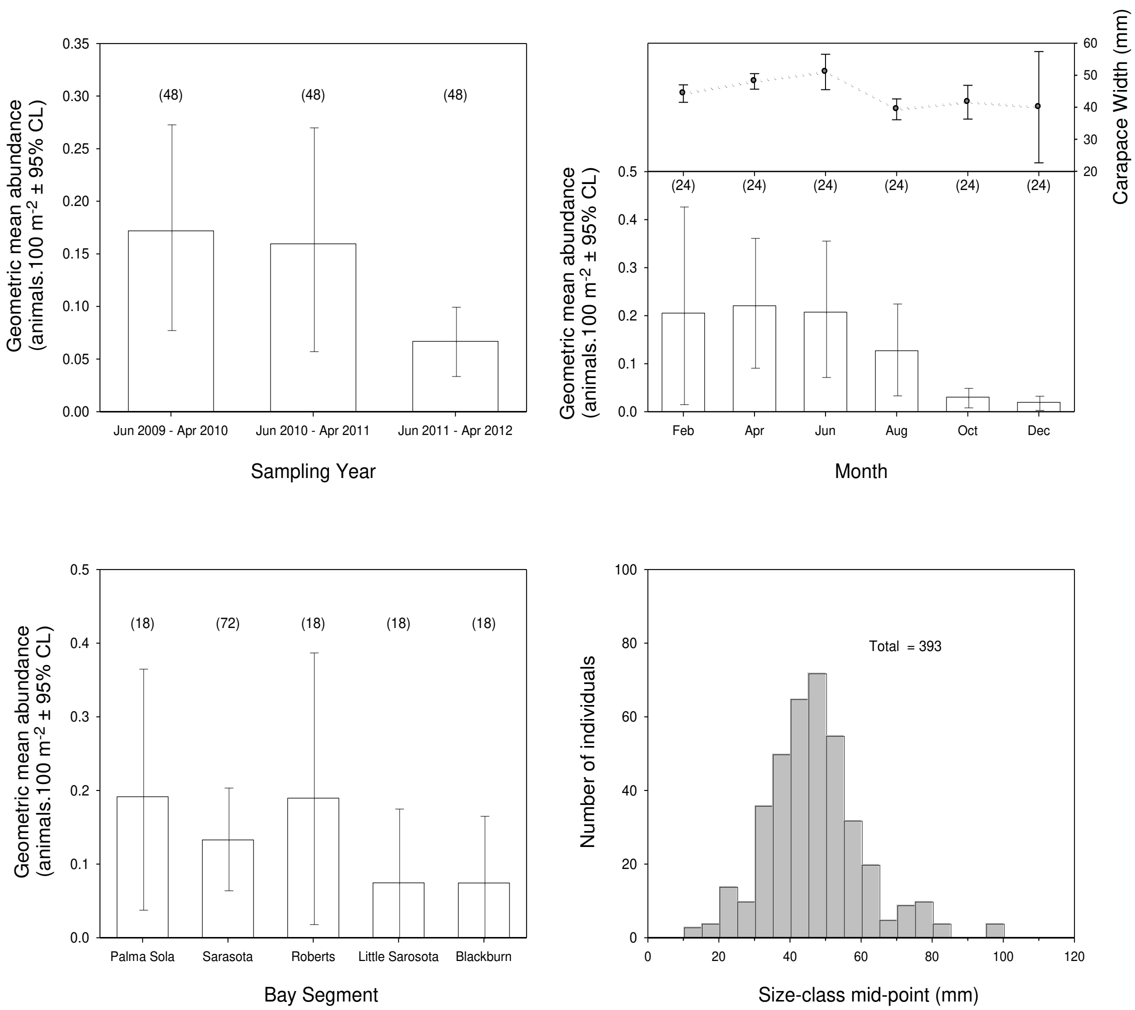


Fig. J3. Relative abundance and length-frequency distribution of portunus crabs collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Menippe spp. (stone crab)
6.1-m otter trawl

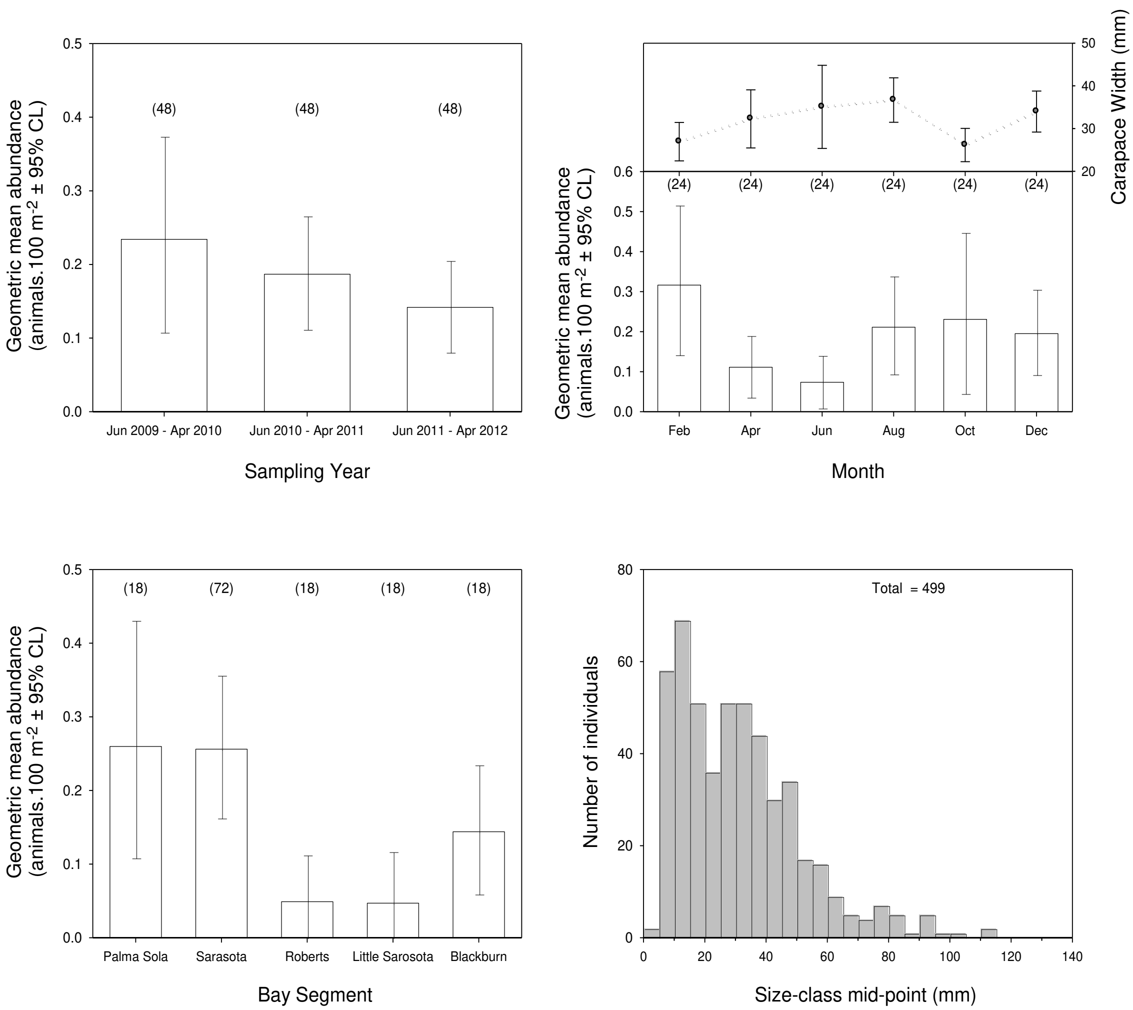


Fig. J4. Relative abundance and length-frequency distribution of stone crab collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Eucinostomus gula (silver jenny)

6.1-m otter trawl

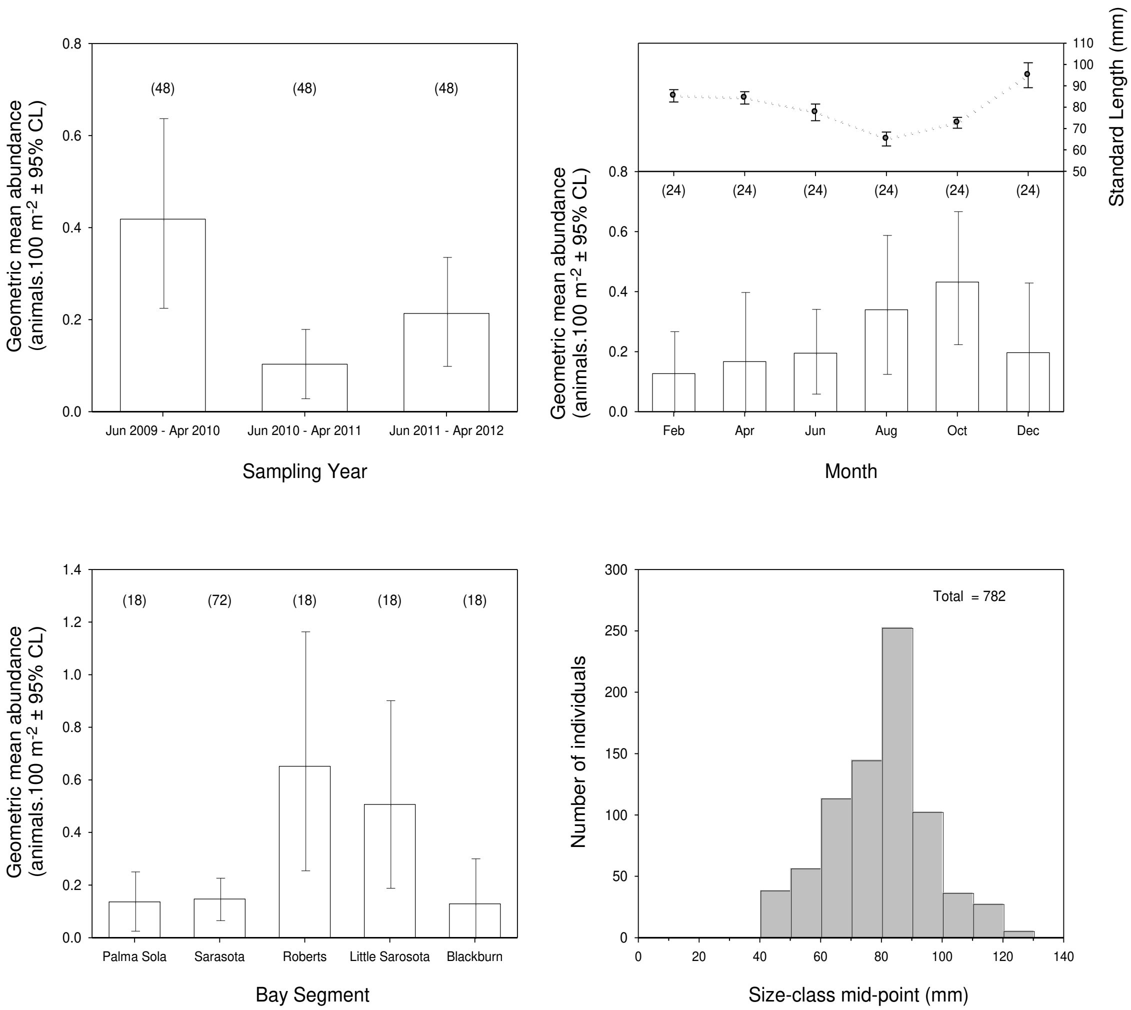


Fig. J5. Relative abundance and length-frequency distribution of silver jenny collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Orthopristis chrysoptera (pigfish)

6.1-m otter trawl

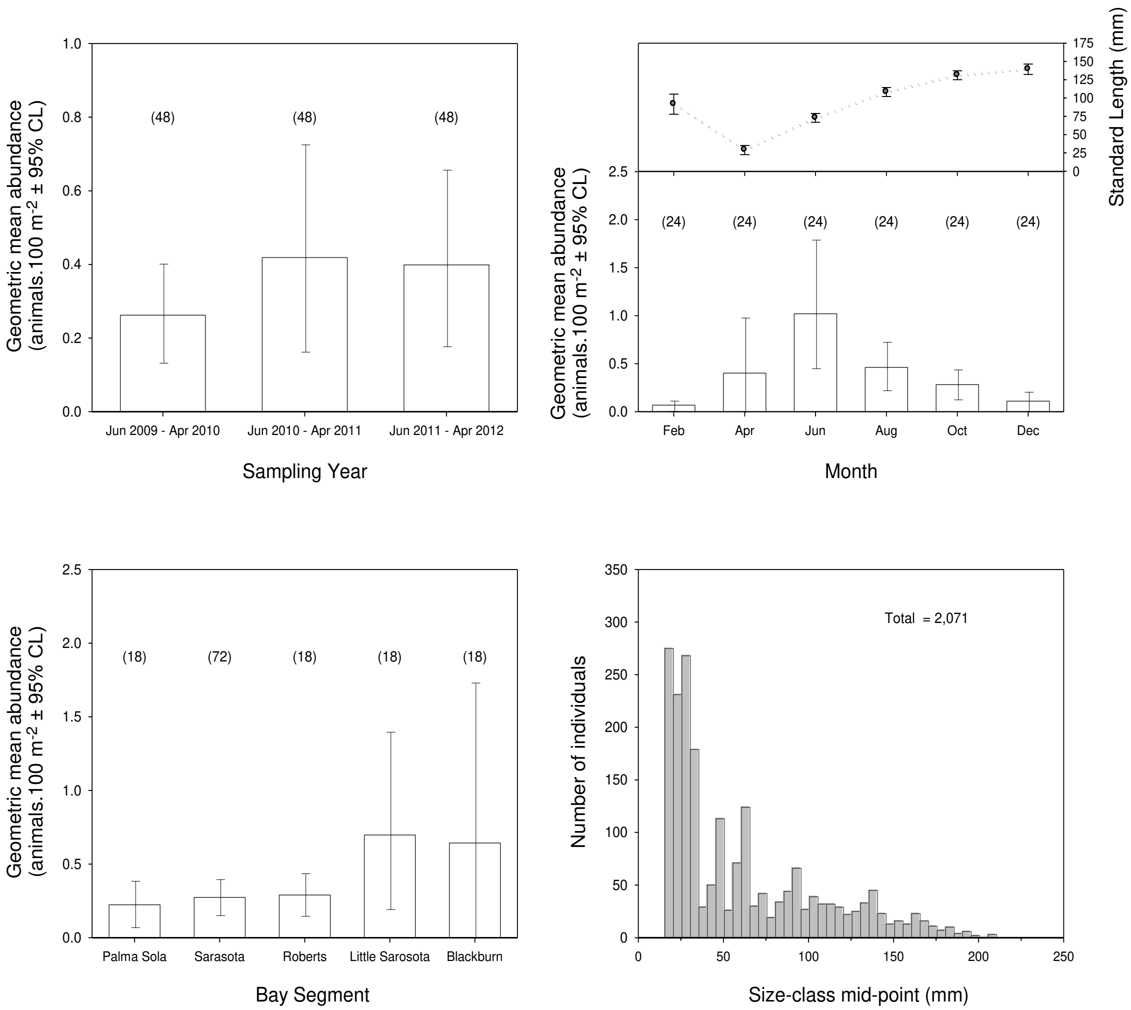


Fig. J6. Relative abundance and length-frequency distribution of pigfish collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Lagodon rhomboides (pinfish)
6.1-m otter trawl

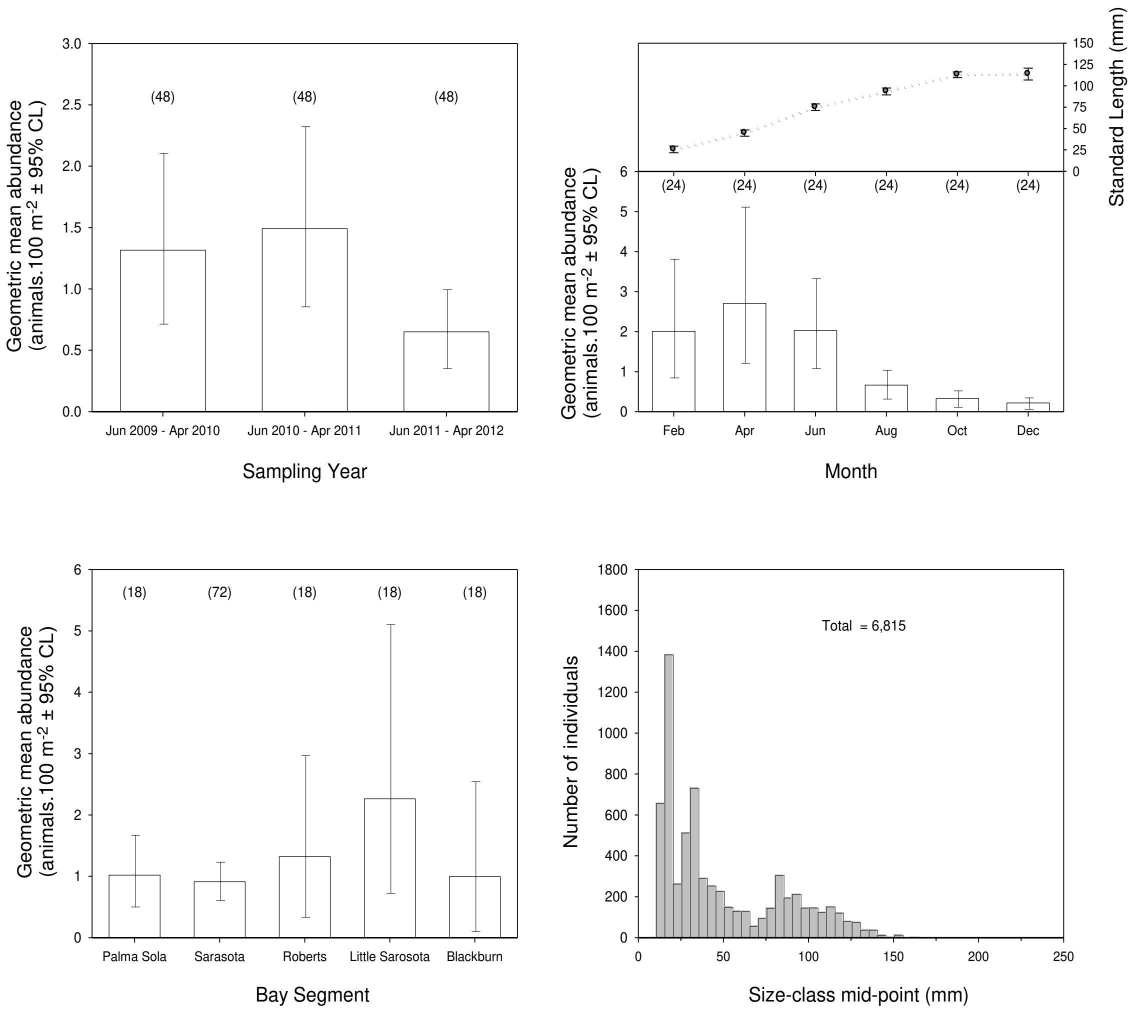


Fig. J7. Relative abundance and length-frequency distribution of pinfish collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Leiostomus xanthurus (spot)

6.1-m otter trawl

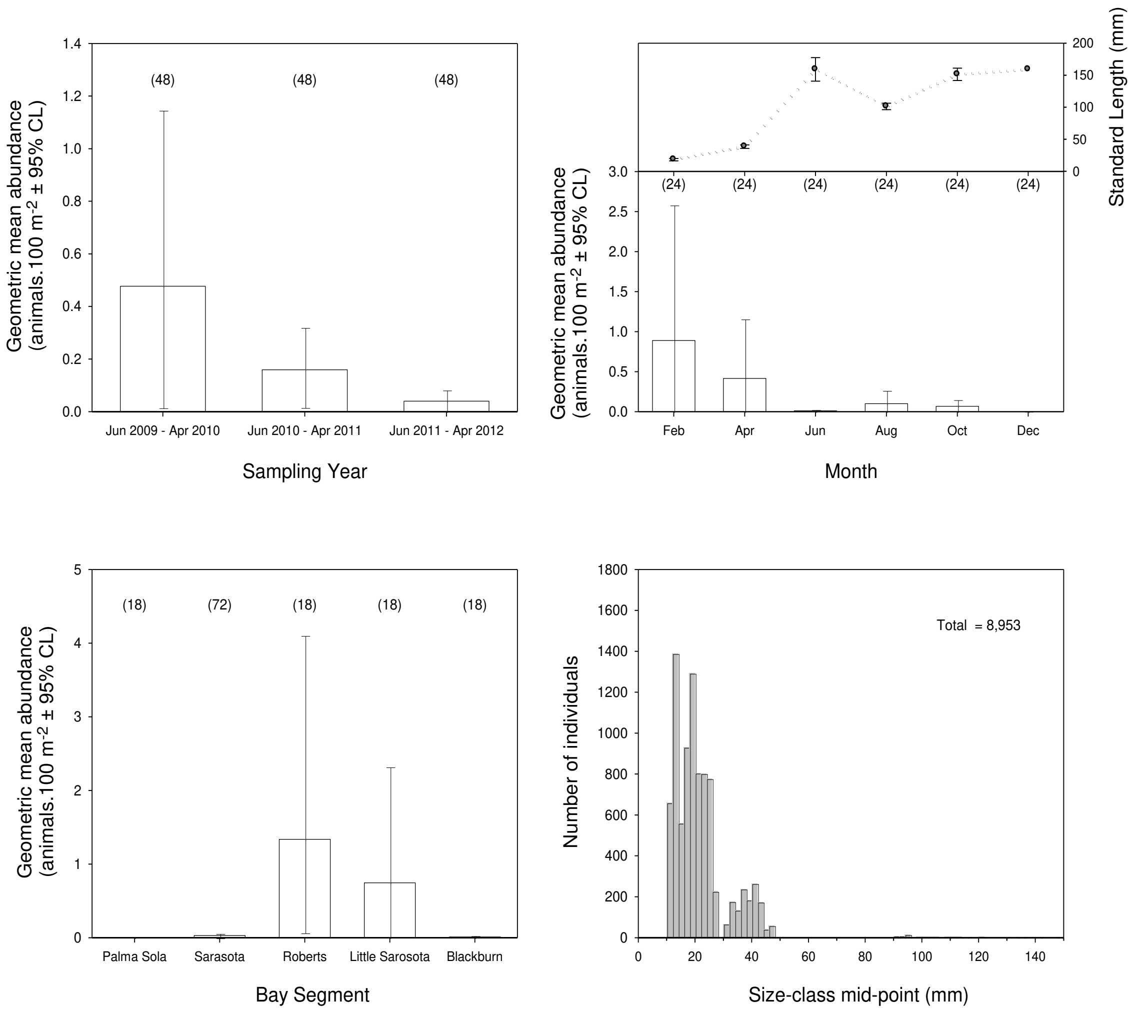


Fig. J8. Relative abundance and length-frequency distribution of spot collected with 6.1-m otter trawls in the Sarasota Bay estuary, June 2009 to April 2012. Numbers in parenthesis along the top of each abundance graph represent the number of samples collected within each category. Error bars represent 95% confidence intervals.

Appendix K. Analysis of Variance post-hoc Tukey test comparing bay segments with significant difference (*P*<0.05) in the Tampa Bay, Sarasota Bay and Charlotte Harbor estuaries.

Appendix Table K1. Tukey post-hoc test results for 21.3-m shoreline seine. An astrix indicates that bay segments in matrix were significantly different.

	Upper CH	Middel CH	Gasparilla Sound	Pine Island Sound	Palma Sola Bay	Sarasota Bay	Robert Bay	Little Sarasota Bay	Blackburn Bay	Upper TB	Middle TB	Hillsborough Bay	Lower TB - North	Lower TB - South
Upper CH	*	*	*	*	*	*	*	*	*				*	*
Middel CH												*		
Gasparilla Sound	*											*		
Pine Island Sound	*											*		
Palma Sola Bay	*										*	*		
Sarasota Bay	*										*	*		
Roberts Bay	*		*									*		
Little Sarasota Bay	*									*	*	*		
Blackburn Bay	*										*	*		
Upper TB								*						
Middle TB					*	*		*	*					
Hillsborough Bay		*	*	*	*	*	*	*	*				*	*
Lower TB – North	*											*		
Lower TB - South	*											*		

Appendix Table K2. Tukey post-hoc test results for 21.3-m offshore seine. An astrix indicates that bay segments in matrix were significantly different (*P*<0.05).

	Upper CH	Middel CH	Gasparilla Sound	Pine Island Sound	Palma Sola Bay	Sarasota Bay	Robert Bay	Little Sarasota Bay	Blackburn Bay	Upper TB	Middle TB	Hillsborough Bay	Lower TB - North	Lower TB - South
Upper CH		*				*		*						
Middel CH	*									*				
Gasparilla Sound								*		*				
Pine Island Sound								*				*		
Palma Sola Bay								*						
Sarasota Bay	*											*		*
Roberts Bay												*		
Little Sarasota Bay	*		*		*					*		*		*
Blackburn Bay												*		
Upper TB								*						
Middle TB							*	*						
Hillsborough Bay		*	*				*	*	*				*	
Lower TB – North												*		
Lower TB - South							*	*						

Appendix Table K3. Tukey post-hoc test results for 183-m haul seine. An astrix indicates that bay segments in matrix were significantly different (*P*<0.05).

	Upper CH	Middel CH	Gasparilla Sound	Pine Island Sound	Palma Sola Bay	Sarasota Bay	Robert Bay	Little Sarasota Bay	Blackburn Bay	Upper TB	Middle TB	Hillsborough Bay	Lower TB - North	Lower TB - South
Upper CH		*	*	*	*	*		*		*	*	*	*	*
Middel CH	*													
Gasparilla Sound	*					*								
Pine Island Sound	*													
Palma Sola Bay	*													
Sarasota Bay	*		*							*		*		
Roberts Bay														
Little Sarasota Bay	*													
Blackburn Bay	*													
Upper TB	*					*							*	
Middle TB	*													
Hillsborough Bay	*					*								
Lower TB – North	*									*				
Lower TB - South	*													

Appendix Table K4. Tukey post-hoc test results for 6.1-m otter trawl. An astrix indicates that bay segments in matrix were significantly different (P<0.05).

	Upper CH	Middel CH	Gasparilla Sound	Pine Island Sound	Palma Sola Bay	Sarasota Bay	Robert Bay	Little Sarasota Bay	Blackburn Bay	Upper TB	Middle TB	Hillsborough Bay	Lower TB - North	Lower TB - South
Upper CH				*				*					*	
Middel CH			*								*			*
Gasparilla Sound	*	*		*			*	*					*	
Pine Island Sound			*								*	*		*
Palma Sola Bay								*						
Sarasota Bay								*						
Roberts Bay			*				*				*			*
Little Sarasota Bay	*		*		*	*				*	*	*		*
Blackburn Bay														
Upper TB								*						
Middle TB		*		*			*	*					*	
Hillsborough Bay				*				*					*	
Lower TB – North	*		*								*	*		
Lower TB - South		*		*				*					*	*