FLORIDA BAY SCALLOP 2011 ANNUAL REPORT

Florida Wildlife Conservation Commission

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Molluscan Fisheries Research Group

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1.0 PROGRAM OVERVIEW

This report summarizes bay scallop (*Argopecten irradians*) research conducted by scientists in the Molluscan Fisheries program at the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute during the calendar year 2011. For each site monitored in 2011, from St. Andrew Bay (Bay County) in the northwest to Pine Island Sound (Lee County) in the southwest, the results of annual population surveys, recruitment monitoring activities, and restoration efforts, if applicable, are reported. Next, a summary of other species observed in 2011 is included. Finally, a brief summary of 2011 is presented followed by an overview of planned activities for 2012.

2.0 METHODS

2.1 Site Selection

The Florida bay scallop population is comprised of many small, discreet, local populations along the Gulf Coast that are in large part limited to the near-shore, shallow-water seagrass beds. Abundance, recruitment and restoration stations are located within the 1-2 meter depth stratum and, whenever possible, within or adjacent to seagrass beds; primarily *Thalassia testudinum* but also *Syringodium filiforme* and *Halodule wrightii.*

2.2 Abundance Surveys

The 2011 scallop sampling protocol consisted of diver transect surveys at replicate stations, initially randomly chosen within seagrass beds. The methodology was consistent with previous surveys (e.g., Stephenson and O'Hern 2011). At each station, a 300-m transect line was deployed and two divers, one on each side of the line, searched the area within one meter from the line. All scallops within that 2 X 300 meter area were counted, and the shell heights (distance from the hinge to the leading ventral margin) of the first 30 scallops encountered were measured. Ten study sites were surveyed from May through July of 2011: St. Andrew Bay, St. Joseph Bay, St. Marks, Steinhatchee, Homosassa, Hernando, Anclote, Tampa Bay, Sarasota Bay and Pine Island Sound (Appendix 1). Twenty stations were sampled at each site with the exception of Sarasota Bay (n = 10). In 2011 ten additional randomly selected stations were added to the summer surveys in both Steinhatchee and Homosassa in suitable locations (seagrass meadows in the 1-2 meter depth contours) increasing the total number of stations surveyed at those sites to 30. Those stations were added to determine if the 20 fixed stations encompassed the most accurate snapshot of the bay scallop population in that particular site and time. Due to special request, six of the ten sites surveyed in the summer were sampled again in the fall of 2011. Those fall surveys were conducted after the bay scallop recreational season ended.

In 2011 the length of the bay scallop recreational season was extended beyond the typical open period of July 1 to September 10. This extended season was intended to assist the local economies that were possibly still recovering from the impacts of the Deepwater Horizon Oil Spill that occurred in the Gulf of Mexico in 2010. The 2011 bay scallop season opened on June 25th 2011, one week early, and closed on September 25th, 2011, two weeks later than usual. All areas open to recreational harvest were surveyed by Fish and Wildlife Research Institute (FWRI) scientists prior to the June 25th opening day.

FWRI scientists classified the health of the local populations by determining the average number of scallops observed per 600 m² area. Populations with an average abundance of less than five scallops per 600 m² were classified as "collapsed"; populations with an average between 5 and 25 scallops per 600 m² were classified as "transitional"; and populations with an average greater than 25 scallops per 600 m² area were classified as

"healthy." FWRI scientists also considered the distribution of scallops among stations within a site. Sites with scallops at ≥ half of the stations were considered to have healthy distributions. Those abundance and distribution classifications were used to determine which local areas needed assistance in the form of restoration efforts. Statistical comparisons between years were performed based on the abundances for each site using a SAS Glimmix procedure (SAS Institute, 1985). Letter designations of those comparisons are shown in the respective graphs, where years labeled with the same letters were not significantly different from each other.

In 2011, FWRI scientists also assisted in local community scallop searches hosted by Tampa Bay Watch, Sarasota Bay Watch, UF Sea Grant in Charlotte Harbor, and UF Sea Grant in Pine Island Sound. Those surveys followed procedures similar to FWRI abundance surveys with the exception of transect length. In those volunteer-based surveys, a 50-m weighted transect line was deployed in shallow-water grassy habitats at each station, and volunteers snorkeled the length, counting all scallops within a one meter path on each side of the transect line for a total area of 100 m^2 surveyed.

2.3 Recruitment Monitoring

After scallops spawn, the larvae undergo a 2-week planktonic life stage before settling out of the water column onto seagrass blades. Those newly settled juvenile scallop recruits, called spat, grow and become the next year-class. Scientists determined recruitment rates of bay scallop spat using collectors designed to mimic seagrass blades. Those collectors were comprised of a 48.5 x 30 cm section of Vexar© mesh panel encased within a 17.6-L citrus bag with a small round float attached at one end. The collector was attached to a 5-m length of polypropylene rope anchored to a cement block and supported at the surface with a round buoy (Arnold et al., 1998; Brand et al., 1980 as modified from a design described in Motada, 1977). A single collector was deployed at each station and allowed to soak for eight weeks prior to retrieval. An additional collector was deployed at the same station, four weeks later, and similarly allowed to soak for eight weeks. This overlapping deployment/recovery schedule ensured that any recruitment event that occurred immediately prior to retrieval of one collector would be detected on the overlapping collector. Upon recovery, collectors were returned to the laboratory for visual examination and enumeration of all recruits. For each collector, a maximum of 50 bay scallop recruit shell heights (distance from the hinge to the leading ventral margin) were measured.

Collectors were deployed at 11 sites statewide: St. Andrew Bay, St. Joseph Bay, Homosassa, Hernando, Anclote, Tampa Bay, Sarasota Bay North (within Manatee County), Sarasota Bay South (intracoastal waters from lower Sarasota Bay through Lemon Bay within Sarasota County), Charlotte Harbor (intracoastal waters from lower Lemon Bay through Charlotte Harbor within Charlotte County), Pine Island Sound North and Pine Island Sound South (Appendix 2).

Scientists within the FWRI's Molluscan Fisheries group deployed and retrieved the collectors from St. Andrew Bay, St. Joseph Bay, Homosassa, Hernando, Anclote, Tampa Bay and Sarasota Bay North. Collectors in the remaining sites, Sarasota Bay South (Sarasota County staff), Charlotte Harbor (University of Florida- Institute of Food and Agricultural Sciences), Pine Island Sound North (Mote Marine Lab) and Pine Island Sound South (Sanibel-Captiva Conservation Foundation), were deployed and retrieved by external agency staff and were shipped and/or transported to FWRI for processing.

In order to standardize the data, the number of scallop spat found on a collector was divided by the number of days that the collector was deployed, and then multiplied by 56. This standardized number represents the

number of scallops per collector for each 8-week deployment period. For reporting purposes, those standardized data were averaged and graphically reported by retrieval date. Statistical comparisons of recruitment in 2010 and 2011 were completed for each site using a SAS Glimmix procedure (SAS Institute, 1985).

In conjunction with recruitment monitoring, hourly temperature and salinity values were recorded at three locations along the central portion of Florida's west coast within the Citrus-Pinellas County area in 2011. At each of those locations a Sea-Bird data logger was deployed in a PVC tube attached to a cement slab. The logger housings were situated just south of both the Crystal River and Homosassa River in Citrus County and north of the Anclote River in Pasco County. Those water monitoring stations were originally selected due to their proximity to scallop restoration sites in 1997.

2.4 Restoration Activities

In 2011, FWRI scientists focused restoration efforts in Pine Island Sound, the Charlotte Harbor area, Sarasota County intracoastal waters, Tampa Bay and St. Andrew Bay. The primary methodology for restoration efforts in 2011 involved collection of naturally occurring recruits during monthly recruitment monitoring efforts in Tampa Bay and St. Andrew Bay. At those sites, supplemental collectors were deployed at stations with historically high natural recruitment rates. The supplemental collectors, consisting of a citrus bag stuffed with a 61 cm x 91 cm piece of Vexar© (3.8 times larger than the routine monitoring collectors), were deployed at a time when peak recruitment was anticipated, and allowed to soak for 8 weeks. Upon retrieval all supplemental collectors were processed immediately and live scallop spat were collected and placed in coolers with ambient seawater. Most of the spat were then transported to the FWRI facility and cultured in cages in Bayboro Harbor.

Some recruits harvested from collectors in St. Andrew Bay were given directly to collaborators from Gulf Coast State College, St. Andrew Bay Resource Management Association, Inc., and local NOAA staff for subsequent use in community cage-rearing efforts. The growth and survival of those caged bay scallops was studied as a portion of the course curriculum for college students as well as an outreach tool for local volunteers. Ultimately, as the scallops approached maturity, they were released to suitable habitat within St. Andrew Bay. Similar efforts were initiated in Pensacola Bay but funding for the Aquatic preserve staff ended around May 2011, so those restoration activities were suspended. Those St. Andrew Bay recruits that were cultured in Bayboro Harbor waters were released into seagrass beds in St. Andrew Bay after reaching an average size of 15 mm. Recruits harvested from collectors in Tampa Bay were used in community cage efforts in Tampa Bay, Charlotte County and Lee County, with assistance from Tampa Bay Watch, University of Florida-IFAS and Sanibel-Captiva Conservation Foundation. Additional Tampa Bay recruits were cultured in Bayboro Harbor waters for eventual released into seagrass beds in Tampa Bay and Sarasota Bay.

In 2011, FWRI scientists continued their PCEF-funded partnership with Bay Shellfish Company to develop a restoration strategy for Tampa Bay that would result in an abundant, widely distributed, and resilient local bay scallop population. For this grant, FWRI scientists were responsible for collecting broodstock scallops, releasing the larval and seed scallops, culturing seed scallops to juvenile sizes for eventual release, performing annual abundance surveys, and year-round monthly monitoring of bay scallop recruitment collectors in Tampa Bay. That research is funded through October 2012.

Finally, in 2011, the Sarasota Yacht Club hosted a fundraising event and obtained enough funds to purchase a batch of larval scallops from Bay Shellfish Company. FWRI scientists assisted with this effort by collecting and

delivering broodstock to the hatchery. Sarasota Bay Watch staff assisted with the release of competent, ready-to-set scallop larvae into seagrass beds within Sarasota Bay in December 2011.

3.0 RESULTS

3.1 St. Andrew Bay

For the purposes of this report the St. Andrew Bay area includes portions of St. Andrew Bay, Grand Lagoon, East Bay, and North Bay waters of Bay County.

3.1.1 St. Andrew Bay Abundance Surveys

In June of 2011, FWRI scientists surveyed 20 stations in St. Andrew Bay (Appendix 3). St. Andrew Bay mean scallop abundance increased significantly in 2011 ($P < 0.01$) to 99.8 scallops per 600 m^2 (Figure 1). Based on this mean abundance, scientists classified this summer population as "healthy". This is the highest recorded mean abundance in the history of bay scallop sampling in St. Andrew Bay by FWRI staff. Scallops were present at 19 of the 20 stations surveyed in the summer of 2011 (Figure 2). The average shell height in 2011 (44.1 $\pm$ 5.2 mm) was slightly larger than that of 2010 (41.3 $\pm$ 13.5 mm) and the overall range of measured shell heights was similar (Appendix 4). This population is closed to recreational harvest and shows some signs of rebounding, but abundances are still highly variable from year to year. Our goal is to continue with restoration efforts in St. Andrew Bay and use the abundance and recruitment monitoring data to assess the success of those efforts.

In September 2011, FWRI scientists surveyed 20 stations in St. Andrew Bay. St. Andrew Bay mean abundances did not vary significantly ($P = 0.63$) from spring to fall. The total number of scallops observed in St. Andrew Bay in the fall of 2011 decreased by 20% to an average of 79.4 scallops per 600 m^2. Based on this mean abundance, this population remained classified as "healthy" at the end of the recreational season. Fall abundance surveys have only been conducted in two years, so a graphical representation of the data was not created. Scallops were present at 17 of the 20 stations, with scallop abundances increasing at seven stations. The average shell height in the fall increased to 54.5 ± 5.8 mm (Appendix 5), suggesting that individuals grew an average of 10 mm from summer to fall at this location (Figure 3).

3.1.2 St. Andrew Bay Recruitment Monitoring

Recruitment monitoring occurred at 10 stations in St. Andrew Bay in 2011 (Appendix 3). All 120 collectors deployed in 2011 were recovered and processed. Of the 120 collectors processed, spat were present on 77.5% which is the highest percentage among all sites monitored in Florida in 2011. The total spat observed at this site in 2011 was 3,873, the average was 32.3 per collector, and the maximum number found on a single collector was 464. All of those data points are slightly lower than the values observed in 2010, but are not significantly different ($P = 0.13$). Recruitment peaked on collectors retrieved in November, and scallops were observed in 11 of the 12 retrieval dates (Figure 4). No spat were found on collectors retrieved in March. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.1.3 St. Andrew Bay Restoration Activities

On January 19-20, 2011, 18 of the 20 supplemental collectors (2 were lost) were collected and processed *in situ*. A total of 3,297 scallops were harvested from those collectors. Approximately 1,000 of those spat were delivered to Gulf Coast State College (GCSC) staff for use in a monthly growth study. The remaining spat were transported to FWRI and cultured in Bayboro Harbor until they reached a mean size of 15 mm SH. The cultured scallops were transported back to St. Andrew Bay on February 16 (n = 144), and March 15 (n = 2,450), 2011 and released into seagrass beds near North Bay. On October 26, 2011, 20 supplemental collectors were deployed in St. Andrew Bay. On December 20, 2011, all of those collectors were recovered and processed *in situ*. A total of 966 scallops were collected from those collectors and the majority (n = 871) were delivered directly to Linda Fitzhugh of GCSC. The remaining scallops (n = 96) were released into seagrass beds along the northwest coast of North Bay. Figure 5 illustrates the mean number of wild spat harvested from supplemental collectors deployed each year since this method began in 2008.

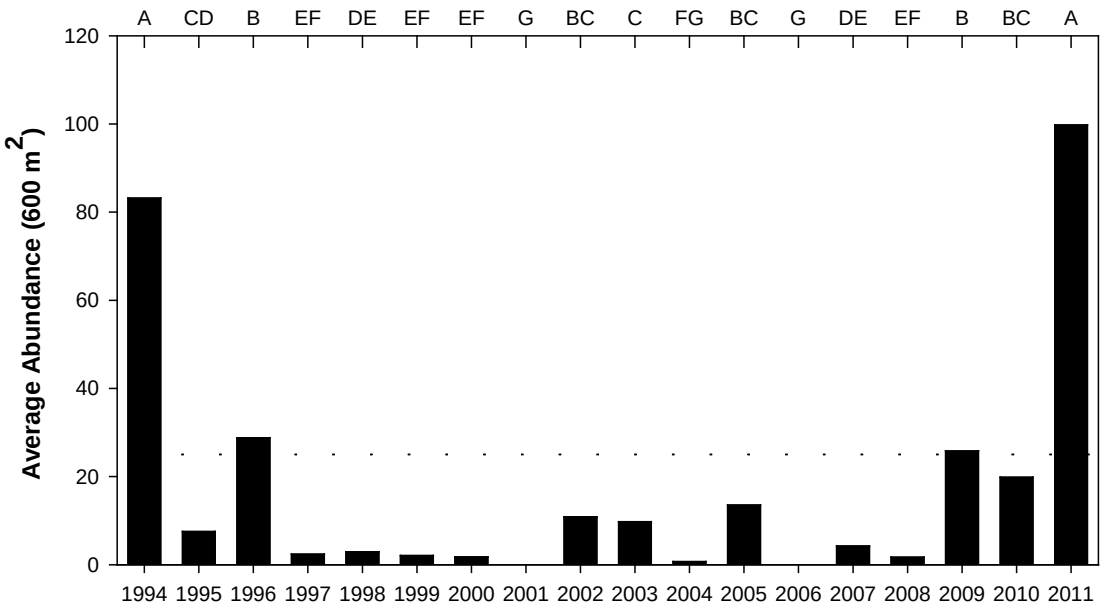

Figure 1. Average bay scallop abundances observed on underwater surveys conducted each summer in St. Andrew Bay. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05.

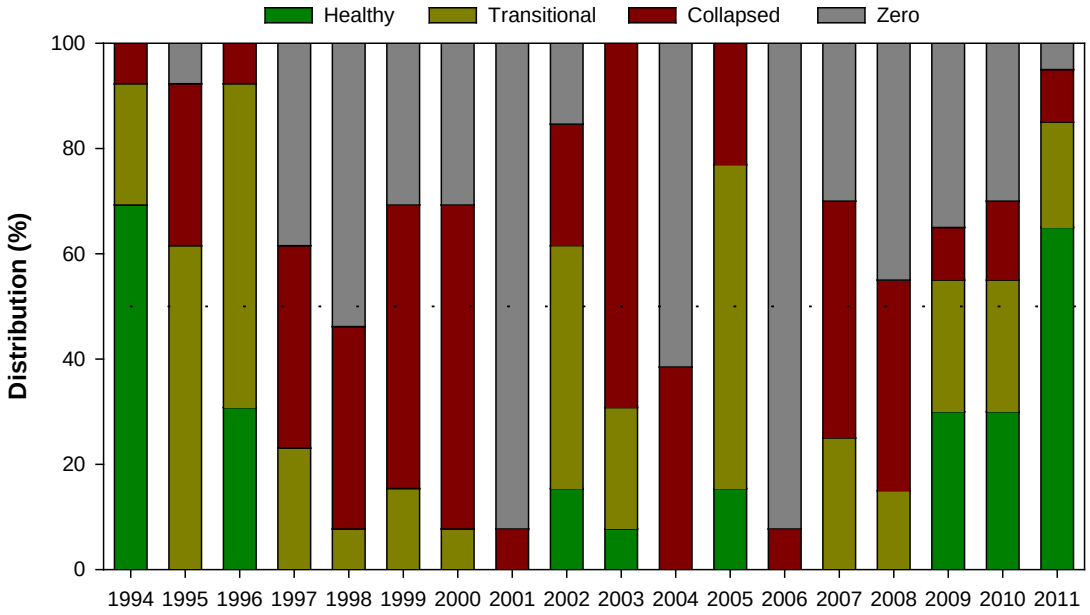

Figure 2. Percent distributions of bay scallops observed on underwater surveys conducted each summer in St. Andrew Bay. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution.

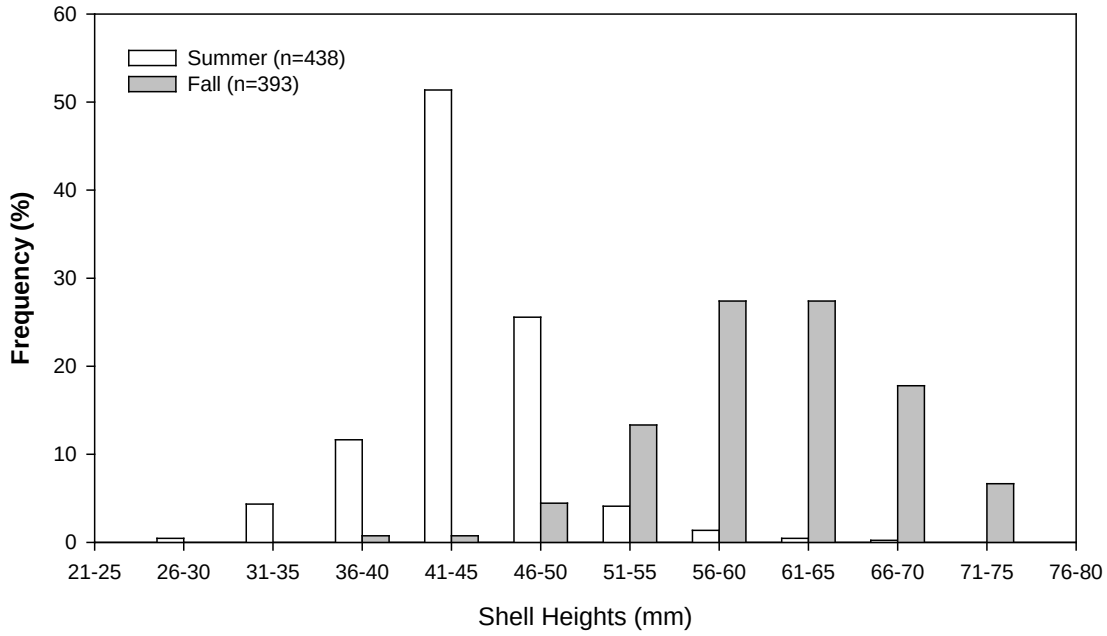

Figure 3. Percent frequency of bay scallop summer and fall survey shell heights observed on underwater surveys conducted in St. Andrew Bay in 2011. The numbers in the legend represent the total number of shell heights measured.

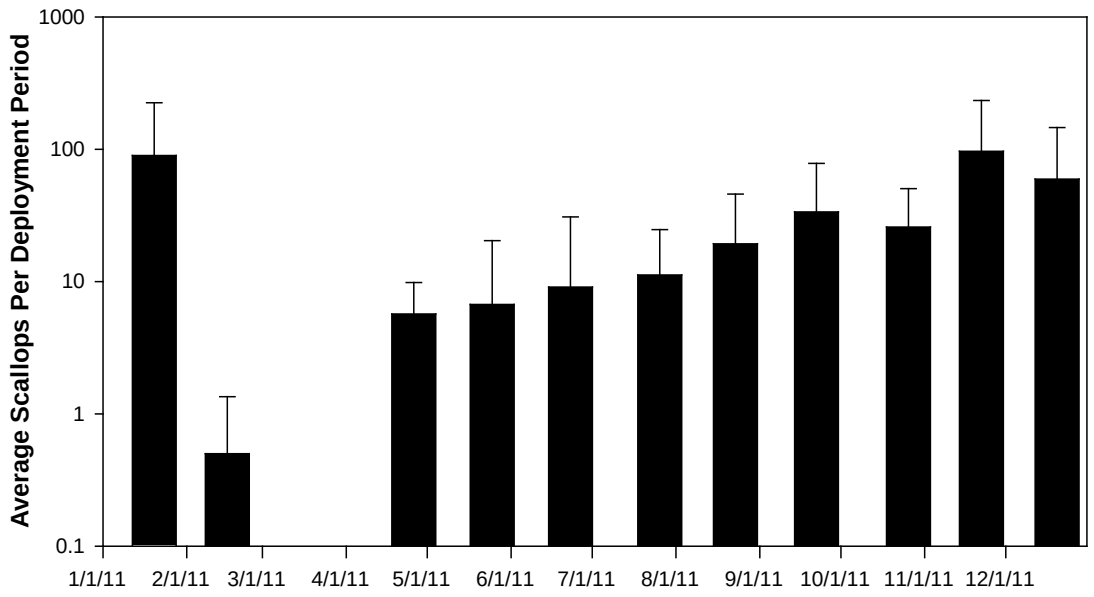

Figure 4. Bay scallop recruitment observed on collectors deployed and retrieved in St. Andrew Bay in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

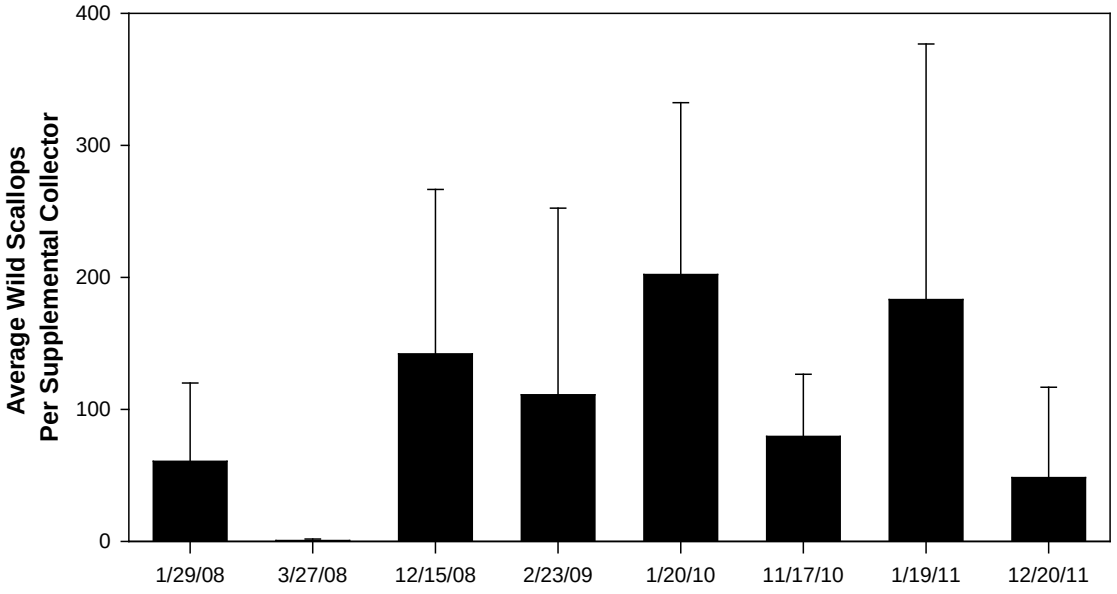

Figure 5. Bay scallop recruitment observed on supplemental collectors deployed in St. Andrew Bay since 2008. The bars represent the average number of scallops observed per collector during the standard 8-week deployment period plotted by retrieval date. This data is not directly comparable to routine monitoring collectors due to the slightly modified composition of the supplemental collectors, which contain 3.8 times more Vexar© and therefore more surface area for scallop settlement.

3.2 St. Joseph Bay

3.2.1 St. Joseph Bay Abundance Surveys

In June of 2011, FWRI scientists surveyed 20 stations in St. Joseph Bay (Appendix 7). St. Joseph Bay mean scallop abundance increased significantly in 2011 ($P < 0.01$) to 154.8 scallops per 600 m^2 (Figure 6). Based on this mean abundance, scientists classified this summer population as "healthy". Scallops were present at 15 of the 20 stations surveyed in the summer of 2011 (Figure 7). The majority of scallops were found in the southern portion of the bay which is an area with thick and continuous seagrass beds. The average shell height in 2011 (43.5 $\pm$ 5.4) was almost identical to the average shell height in 2010 (43.1 $\pm$ 14.5 mm) and the overall range of measured shell heights decreased in 2011 (Appendix 4). This population is generally stable, with a healthy population status observed in 13 out of 18 years sampled, and has had scallops present at ≥75% of the stations surveyed in 14 out of 18 years sampled. St. Joseph Bay remains a highly targeted area for recreational harvesters, and is heavily fished each year.

In October 2011, FWRI scientists surveyed 20 stations in St. Joseph Bay. Mean abundances decreased significantly ($P = 0.03$) from spring to fall. The total number of scallops observed decreased by 83% to a mean of 26.6 scallops per 600 m^2 (Figure 8). Based on this mean abundance, this population remained classified as "healthy" at the end of the recreational season. Scallops were present at 11 of the 20 stations surveyed in the fall of 2011 (Figure 9). This was a 20% decline in spatial distribution. There was a noticeable lack of scallops at stations in the southern end of the bay. At four of those southern stations no scallops were present and at two others there was an 87% average decrease in density. In surveys conducted in fall 2011 at this site, seven stations increased in abundance. The majority of those stations were on the east side of the bay where no scallops were observed in the summer. A substantial increase in scallop counts was observed at one station in the southern end of the bay, but the scallops were very patchy along that transect. The average fall shell height (61.3 ± 6.9 mm) was much higher than the spring mean (Appendix 5), suggesting that individuals grew an average of 18 mm from summer to fall at this location (Figure 10).

3.2.2 St. Joseph Bay Recruitment Monitoring

Recruitment monitoring occurred at 12 stations in St. Joseph Bay in 2011 (Appendix 7). Of the 144 collectors deployed in 2011, 95.1% were recovered and processed. Of the 137 collectors processed, spat were present on 41.6%. The total spat observed at this site in 2011 was 1,814, the average was 13.2 per collector, and the maximum number found on a single collector was 278. The number of recruits observed in 2011 was not significantly different from the 2010 total ($P = 0.31$). Recruitment peaked on collectors retrieved in January, and recruitment was observed on all 12 of the retrieval dates (Figure 11). Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

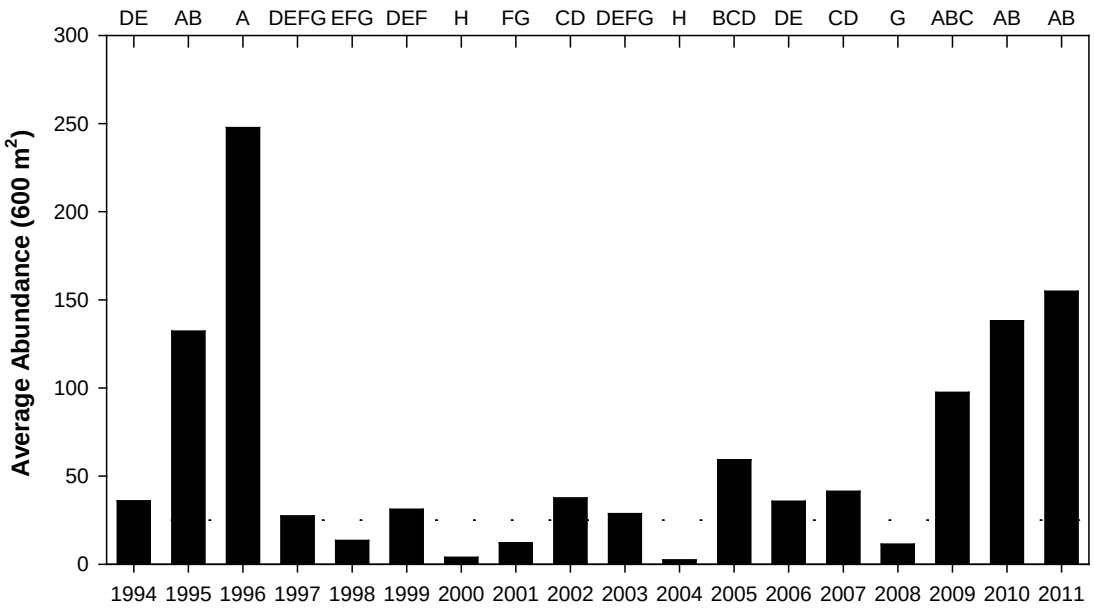

Figure 6. Average bay scallop abundances observed on underwater surveys conducted each summer in St. Joseph Bay. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05.

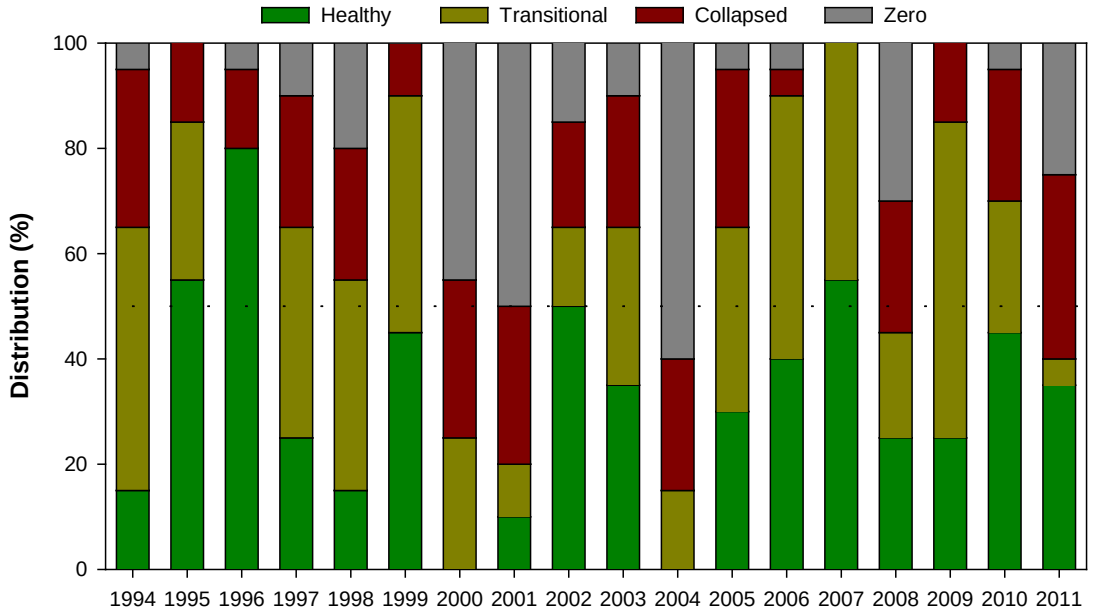

Figure 7. Percent distributions of bay scallops observed on underwater surveys conducted each summer in St. Joseph Bay. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution.

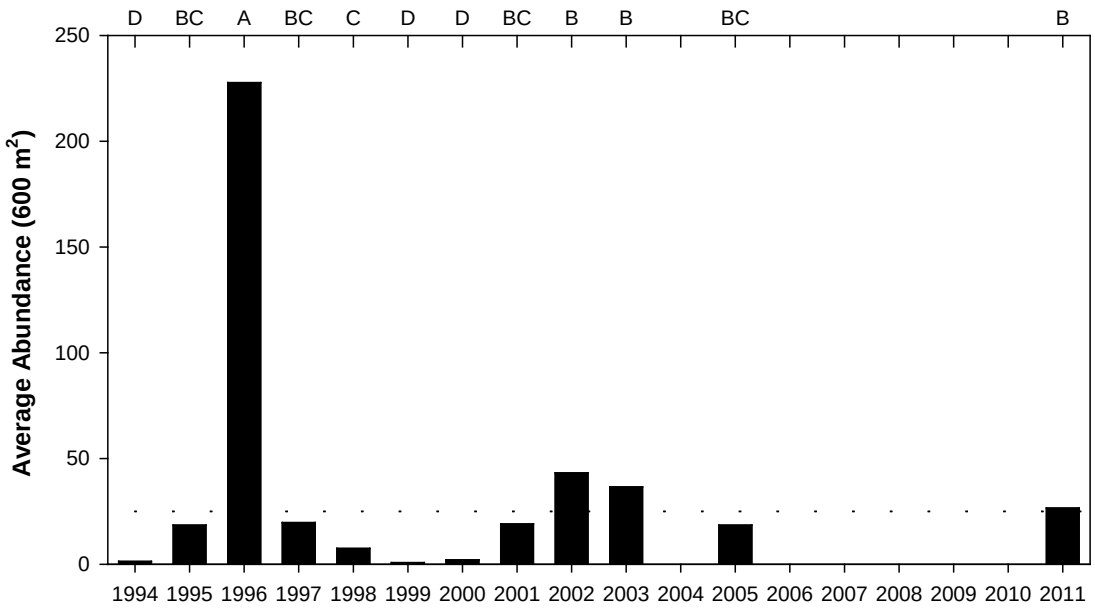

Figure 8. Average bay scallop abundances observed on underwater surveys conducted each fall in St. Joseph Bay. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Fall surveys were not conducted in 2004 and 2006-2010.

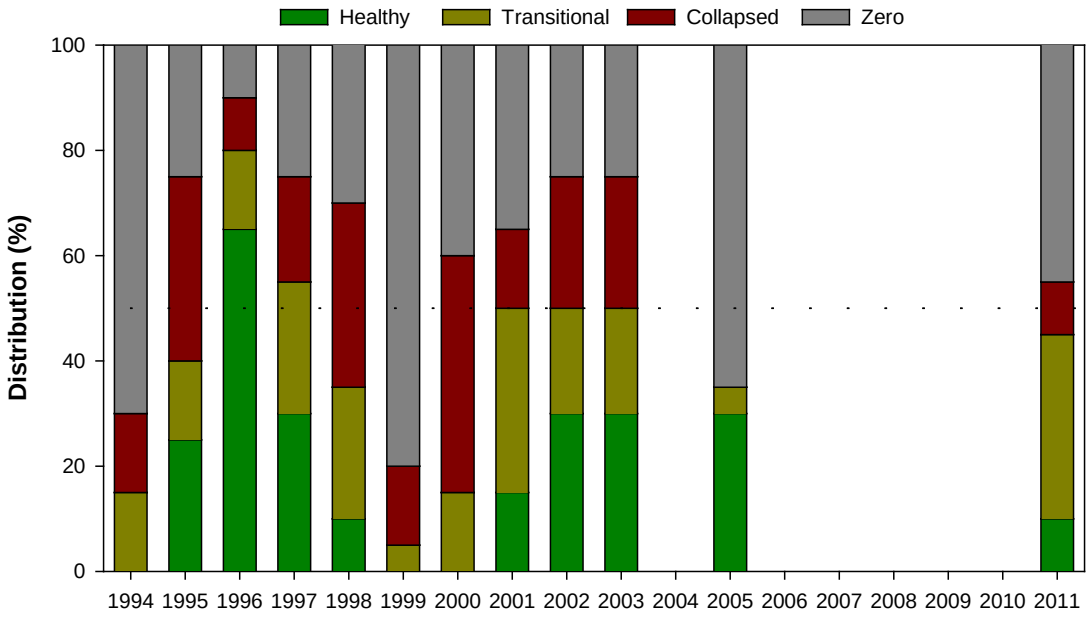

Figure 9. Percent distributions of bay scallops observed on underwater surveys conducted each fall in St. Joseph Bay. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Fall surveys were not conducted in 2004 and 2006-2010.

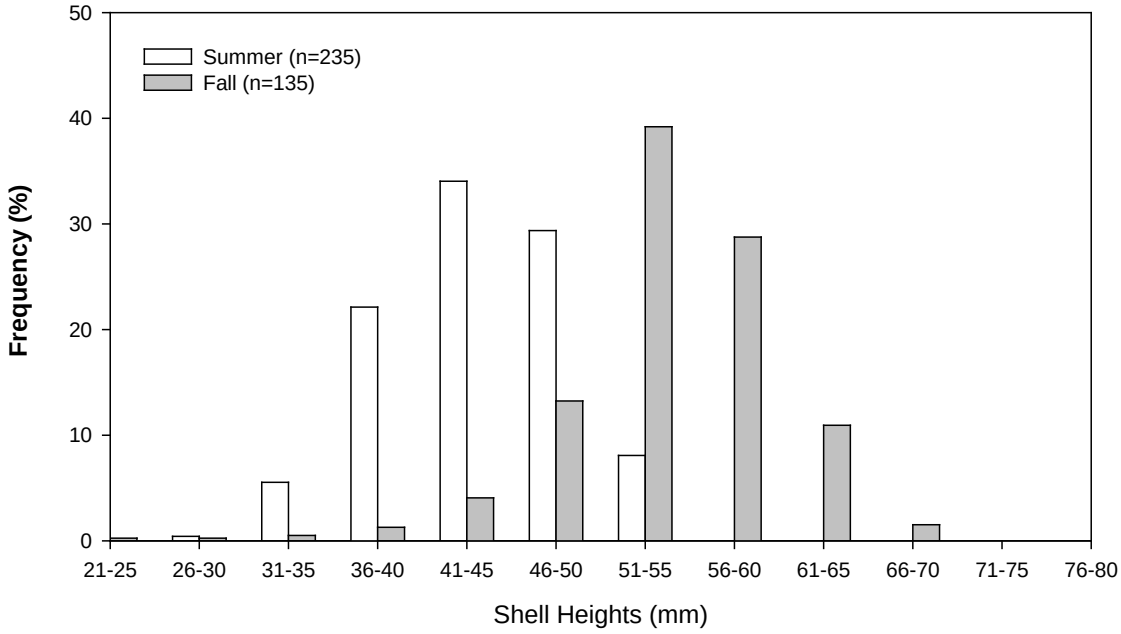

Figure 10. Percent frequency of bay scallop summer and fall survey shell heights observed on underwater surveys conducted in St. Joseph Bay in 2011. The numbers in the legend represent the total number of shell heights measured.

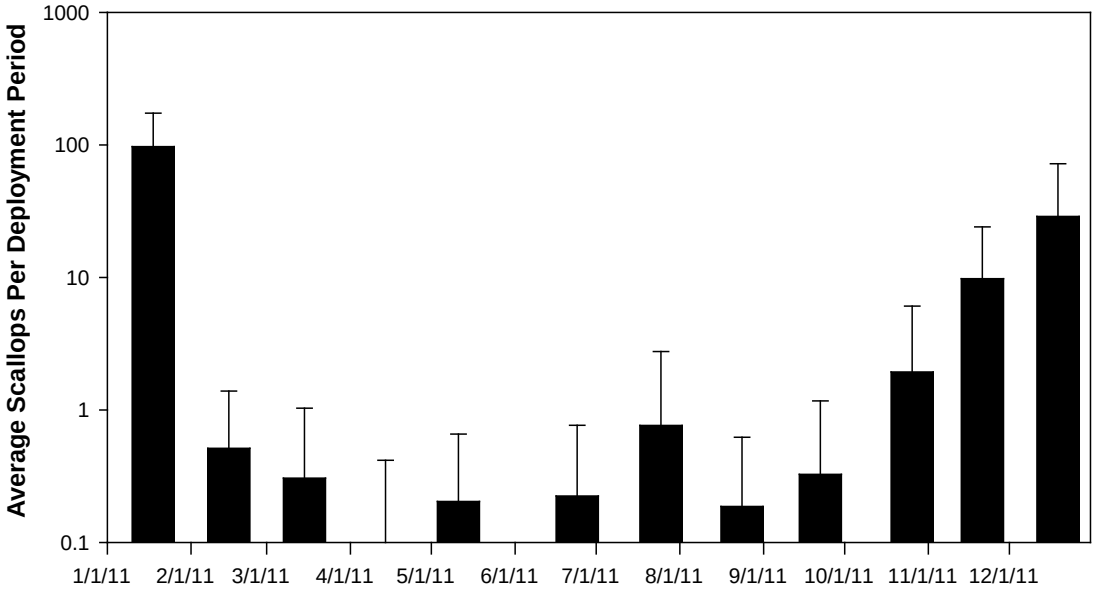

Figure 11. Bay scallop recruitment observed on collectors deployed and retrieved in St. Joseph Bay in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

3.3 Apalachee Bay Area

For the purpose of this report, the Apalachee Bay area ranges from Lanark in the west past the St. Marks River to near the mouth of the Aucilla River in the east and includes the coastal waters of Franklin, Wakulla and Jefferson counties.

3.3.1 Apalachee Bay Area Abundance Surveys

In May and June of 2011, FWRI scientists surveyed 20 stations in the Apalachee Bay area (Appendix 8). The Apalachee Bay area mean scallop abundance increased significantly in 2011 ($P < 0.01$) to 19.4 scallops per 600 m^2 (Figure 12). Based on this mean abundance, scientists classified this summer population as "transitional". Scallops were present at 18 of the 20 stations surveyed in summer 2011 (Figure 13), which was an increase in distribution from the survey conducted in 2010. The average shell height in 2011 (49.0 ± 6.0) was slightly higher than the average shell height in 2010 (46.6 ± 9.5 mm) and the overall range of measured shell heights decreased in 2011 (Appendix 4). This marked the fourth year in a row that surveys were conducted in the Apalachee Bay area. This population is targeted by recreational harvesters, but due to the remoteness of the area, is not as heavily fished as the other open areas. For this reason post-season abundance surveys were not conducted at this location.

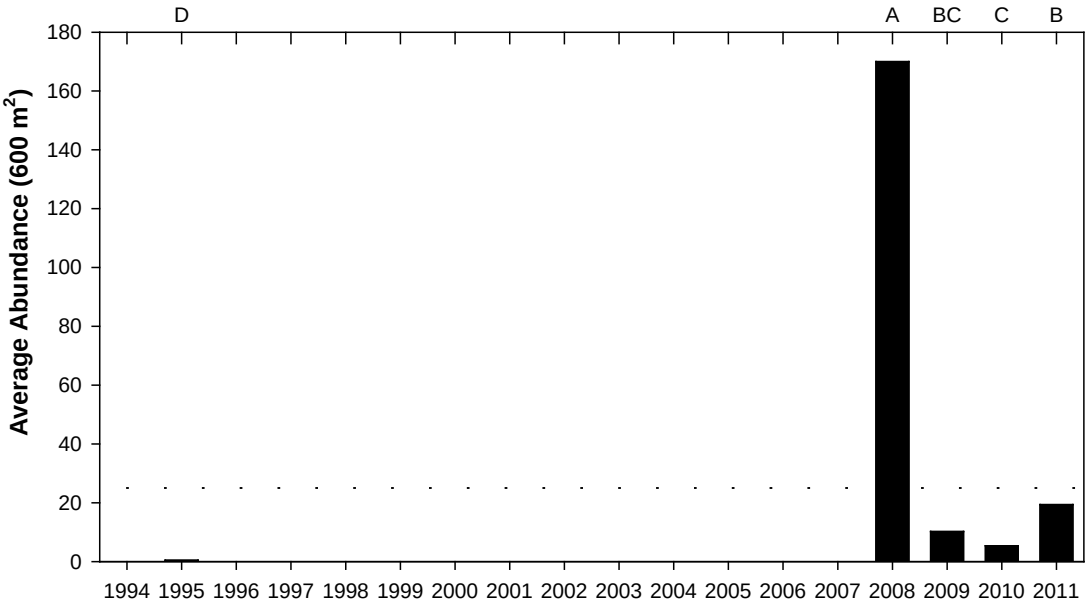

Figure 12. Average bay scallop abundances observed on underwater surveys conducted each summer in the Apalachee Bay area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Summer surveys were not conducted in 1994 and 1996-2007.

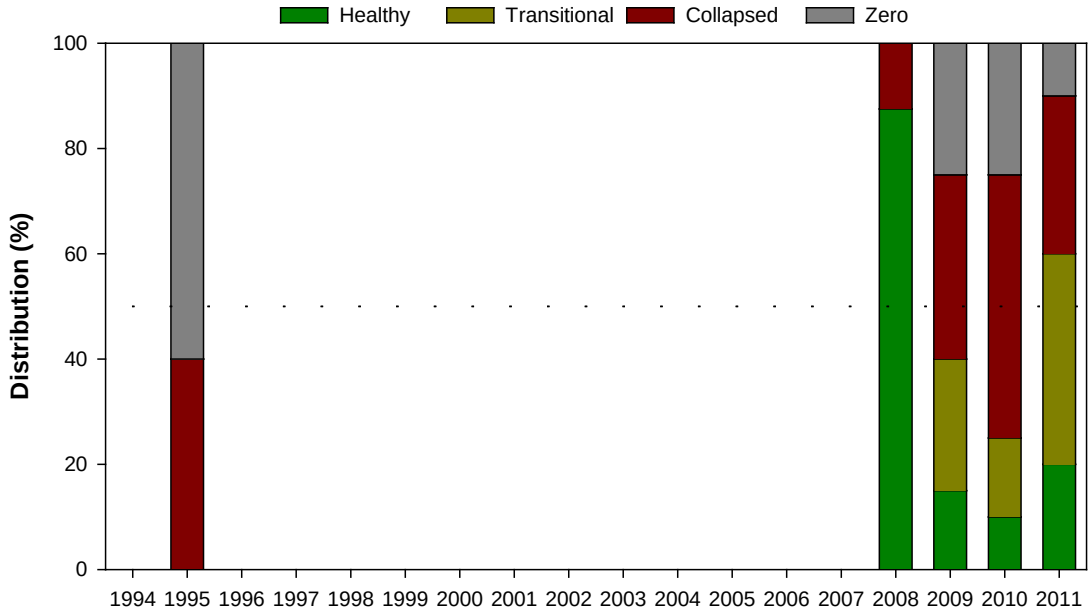

Figure 13. Percent distributions of bay scallops observed on underwater surveys conducted each summer in the Apalachee Bay area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Summer surveys were not conducted in 1994 and 1996-2007.

3.4 Steinhatchee Area

The Steinhatchee area extends from just south of Keaton Beach to just north of Pepperfish Keys and occurs in coastal waters of both Taylor and Dixie Counties. Additional survey stations sampled in 2011 extended the area north towards Dekle Beach and south towards Horseshoe Beach.

3.4.1 Steinhatchee Area Abundance Surveys

In May and June of 2011, FWRI scientists surveyed 20 fixed and 10 new, randomly-selected stations in the Steinhatchee area (Appendix 9). Steinhatchee mean scallop abundance at the 20 fixed stations increased significantly in 2011 ($P < 0.01$) to 136.1 scallops per 600 m^2 (Figure 14). Based on this mean abundance, scientists classified this summer population as "healthy". The 150% increase in abundance in summer of 2011 at this site occurred after two years of abundance decreases and illustrates the resiliency of this population. The mean scallop abundance at the 10 new stations was 20.8 scallops per 600 m^2. Scallops were present at all 20 of the fixed stations surveyed in the summer of 2011 (Figure 15), and ≥ 25 scallops were present at 13 of those stations. Scallops were present at 6 of the 10 new stations surveyed in the summer of 2011, and ≥ 25 scallops were present at only two of those stations. The average shell height in 2011 (43.6 $\pm$ 6.3 mm) was slightly higher than the average shell height in 2010 (44.7 ± 5.3 mm) and the range of measured shell heights decreased in 2011 (Appendix 4). The Steinhatchee area remains a highly targeted area for recreational harvesters, and is heavily fished each year.

In October 2011, FWRI scientists surveyed the 20 fixed stations in the Steinhatchee area. Steinhatchee mean abundances decreased significantly ($P < 0.01$) from spring to fall. The total number of scallops observed decreased by 78% to a mean of 30.1 scallops per 600 m^2 (Figure 16). Based on this mean abundance, this population remained classified as "healthy" at the end of the recreational season. Scallops were present at 18 of the 20 stations surveyed in the fall of 2011 (Figure 17), but only six of those stations had ≥25 scallops. The average fall shell height (61.7 ± 6.8 mm) was higher than the spring mean (Appendix 5), suggesting that individuals grew an average of 17 mm from summer to fall at this location (Figure 18).

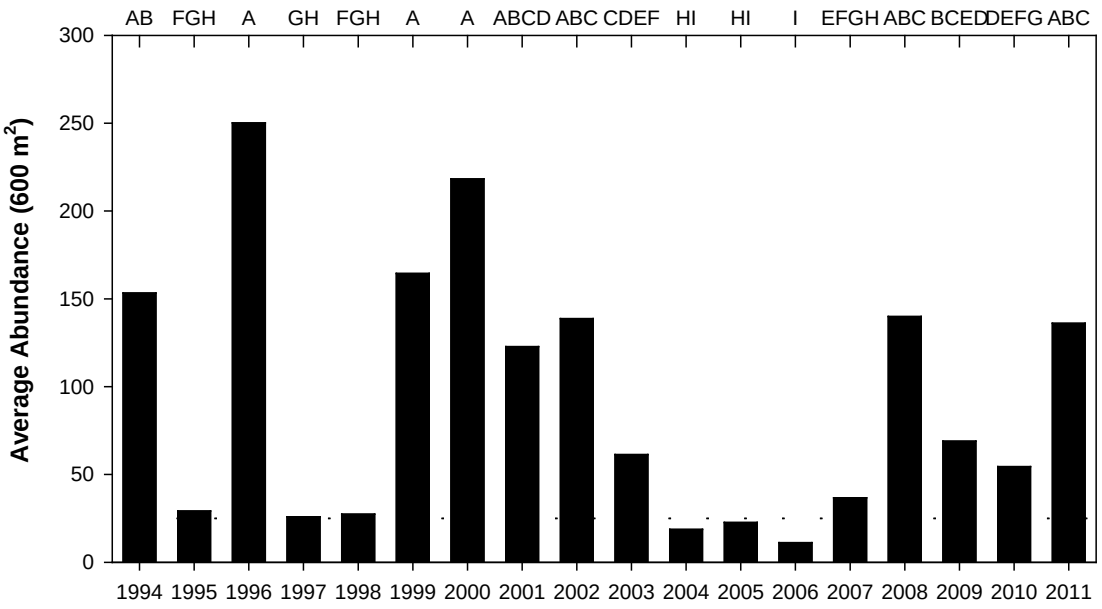

Figure 14. Average bay scallop abundances observed on underwater surveys conducted each summer in the Steinhatchee area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05.

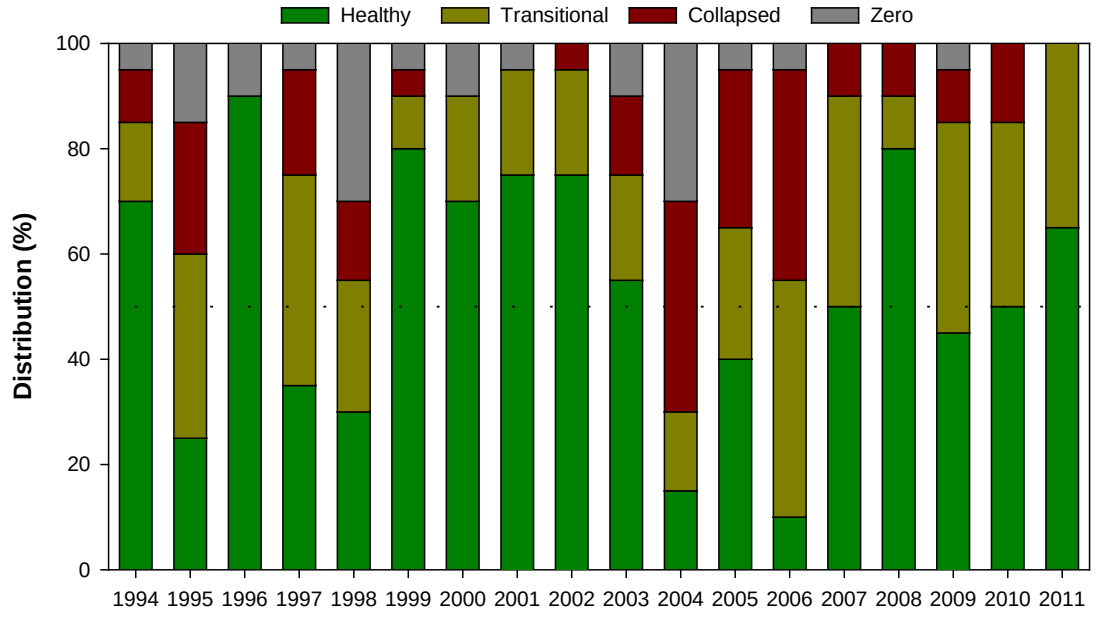

Figure 15. Percent distributions of bay scallops observed on underwater surveys conducted each summer in the Steinhatchee area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution.

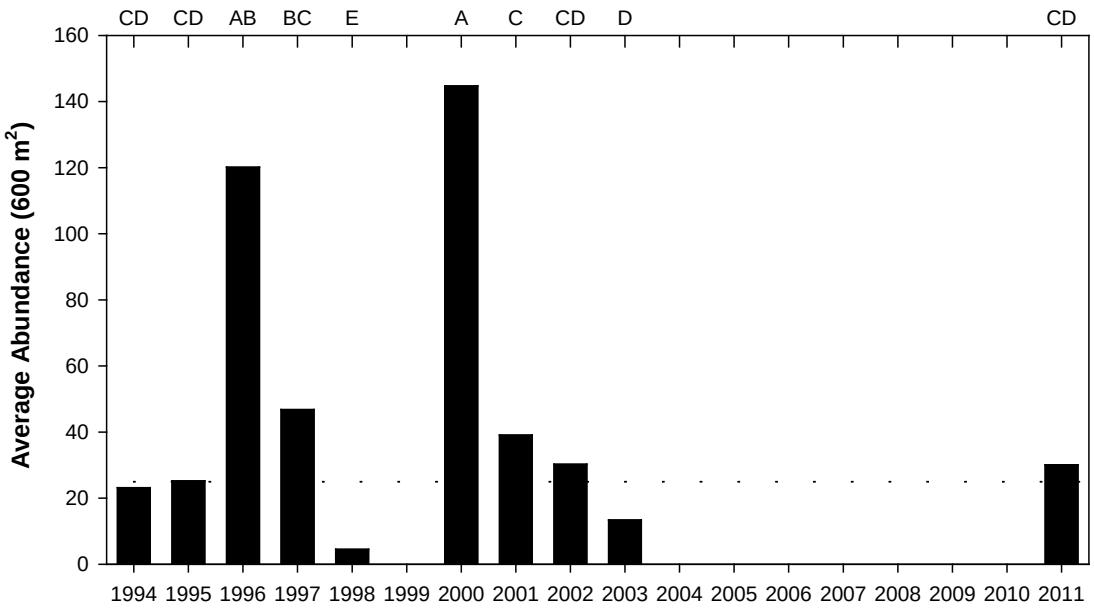

Figure 16. Average bay scallop abundances observed on underwater surveys conducted each fall in the Steinhatchee area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Fall surveys were not conducted in 1999 and 2004-2010.

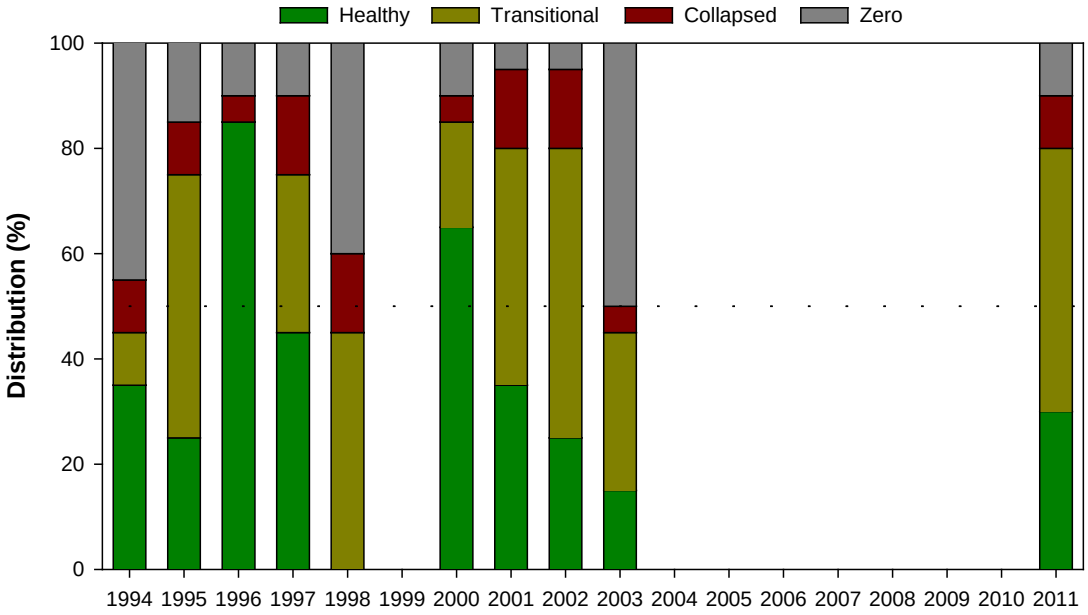

Figure 17. Percent distributions of bay scallops observed on underwater surveys conducted each fall in the Steinhatchee area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Fall surveys were not conducted in 1999 and 2004-2010.

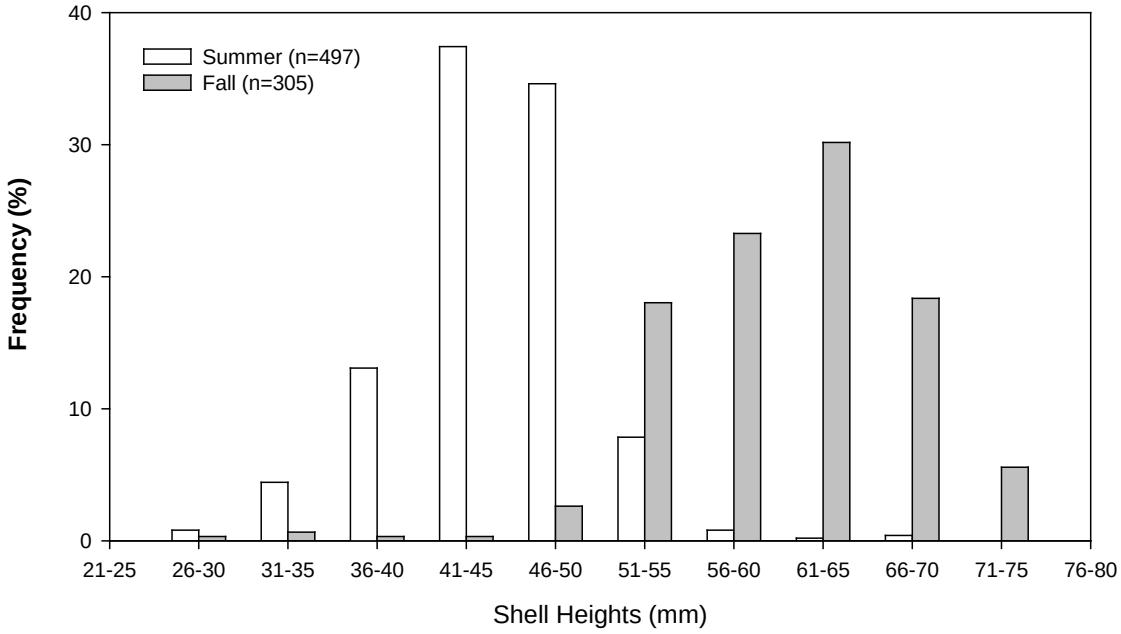

Figure 18. Percent frequency of bay scallop summer and fall survey shell heights observed on underwater surveys conducted in the Steinhatchee area in 2011. The numbers in the legend represent the total number of shell heights measured.

3.5 Homosassa Area

For the purpose of this report, the Homosassa area ranges from the Crystal River in the north to Weekie Watchee in the south. This area encompasses the near shore zone along coastal Citrus County.

3.5.1 Homosassa Area Abundance Surveys

In June of 2011, FWRI scientists surveyed 20 fixed and 10 new, randomly-selected stations in the Homosassa area (Appendix 10). Homosassa mean scallop abundance at the 20 fixed stations decreased significantly in 2011 ($P < 0.01$) to 37.9 scallops per 600 m^2 (Figure 19). Based on this mean abundance, scientists classified this summer population as "healthy". The mean scallop abundance at the 10 new stations was 21.1 scallops per 600 m^2. Scallops were present at 18 of the 20 fixed stations surveyed in the summer of 2011 (Figure 20), and ≥25 scallops were present at 11 of those stations. Scallops were present at 8 of the 10 new stations and ≥25 scallops were present at three of those stations. The average shell height in 2011 (52.0 $\pm$ 3.3 mm) was greater than the average shell height in 2010 (46.2 $\pm$ 6.2 mm) and the range of shell heights measured was smaller (Appendix 4). The Homosassa area remains a highly targeted area for recreational harvesters, and is heavily fished each year.

In October 2011, FWRI scientists surveyed the 20 fixed stations in the Homosassa area. Mean abundances decreased significantly ($P < 0.01$) from spring to fall. The total number of scallops observed decreased by 87% to a mean of 5.1 scallops per 600 m^2 (Figure 21). Based on this mean abundance, this population was classified as "transitional" at the end of the recreational season. The mean abundance in the Homosassa area was barely above the cut-off criteria for being classified as a collapsed population, and this abundance is among the lowest fall abundances observed by FWRI scientists at this site since restoration efforts began in the late 1990s. Scallops were present at 17 of the 20 stations surveyed in the fall of 2011 (Figure 22), and counts higher than 25 scallops were not observed at any of those stations. Two stations increased in abundance, albeit only by a total of four scallops, and the average abundance at the remaining 18 stations decreased by 83%. The average fall shell height (60.3 ± 4.7 mm) was higher than the spring mean (Appendix 5), suggesting that individuals grew an average of 8 mm from summer to fall at this location (Figure 23).

3.5.2 Homosassa Area Recruitment Monitoring

Recruitment monitoring occurred at 15 stations in the Homosassa area in 2011 (Appendix 10). Of the 180 collectors deployed in 2011, 93.9% were recovered and processed. Of those 169 collectors processed, spat were present on 16.6%. The total spat observed at this site in 2011 was 261, the average was 1.5 per collector, and the maximum number found on a single collector was 51. The number of recruits observed in 2011 was not significantly different from the 2010 total ($P = 0.46$). Recruitment peaked on collectors retrieved in November, and scallops were observed in 9 of the 12 retrieval dates (Figure 24). No spat were found on collectors retrieved in February, July or September. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm. The monthly temperature and salinity averages, standard deviations, and ranges for all years for the data logger deployed near the mouth of the Crystal River are summarized in Appendices 11 and 12. The monthly temperature and salinity averages, standard deviations, and ranges for all years for the data logger deployed near the mouth of the Homosassa River are summarized in Appendices 13 and 14.

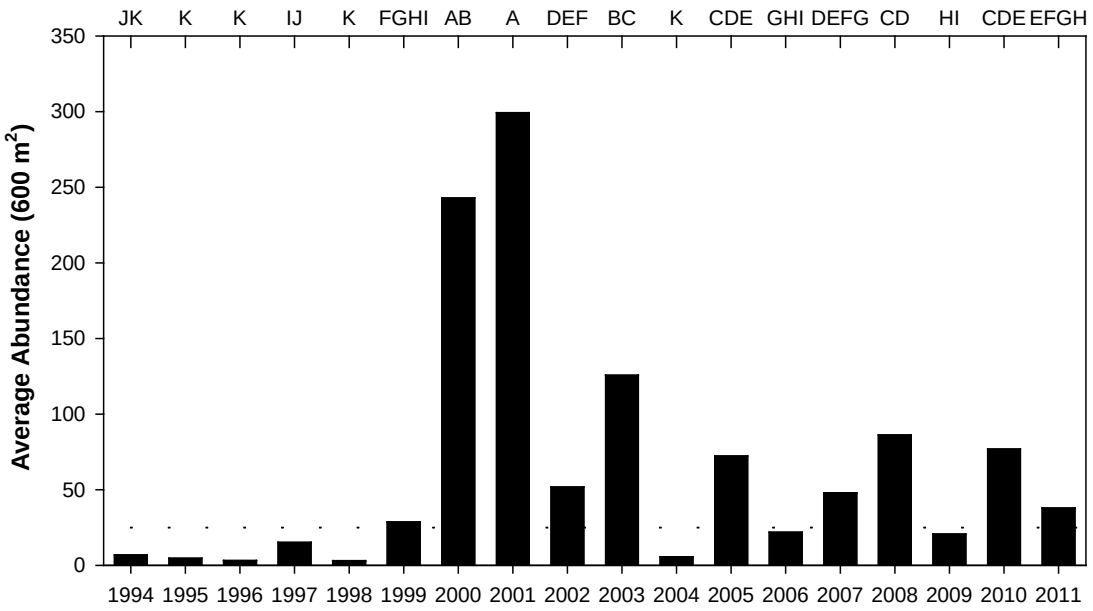

Figure 19. Average bay scallop abundances observed on underwater surveys conducted each summer in the Homosassa area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05.

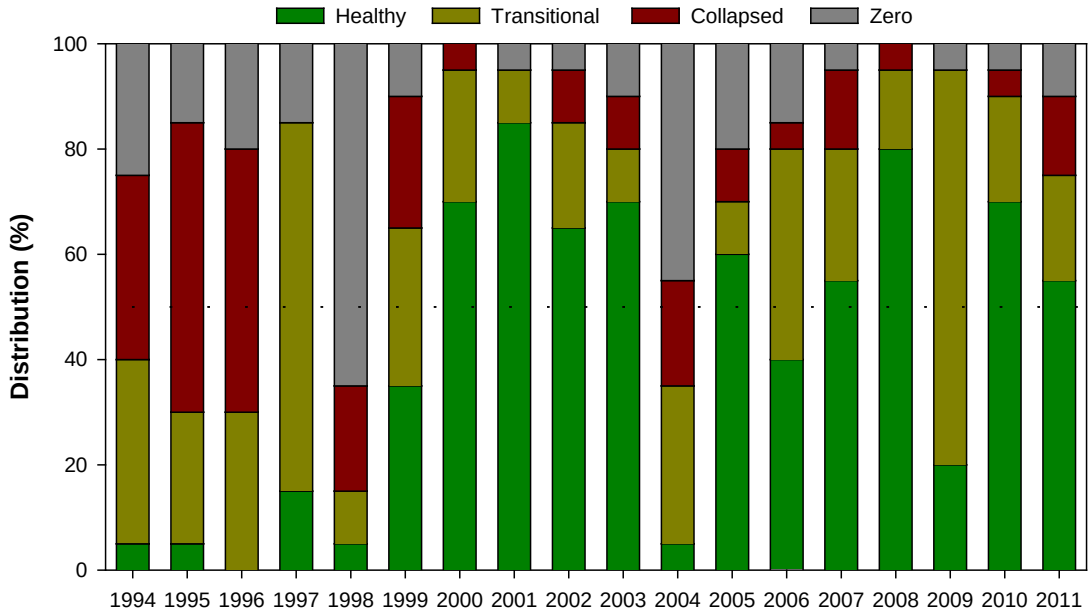

Figure 20. Percent distributions of bay scallops observed on underwater surveys conducted each summer in the Homosassa area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution.

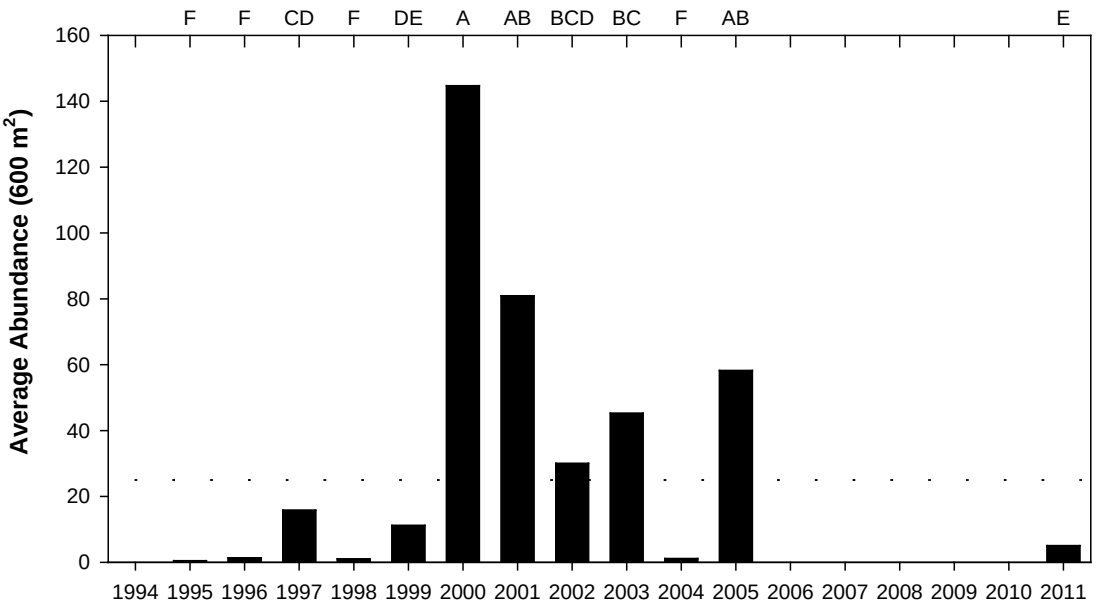

Figure 21. Average bay scallop abundances observed on underwater surveys conducted each fall in the Homosassa area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Fall surveys were not conducted in 1994 and 2006-2010.

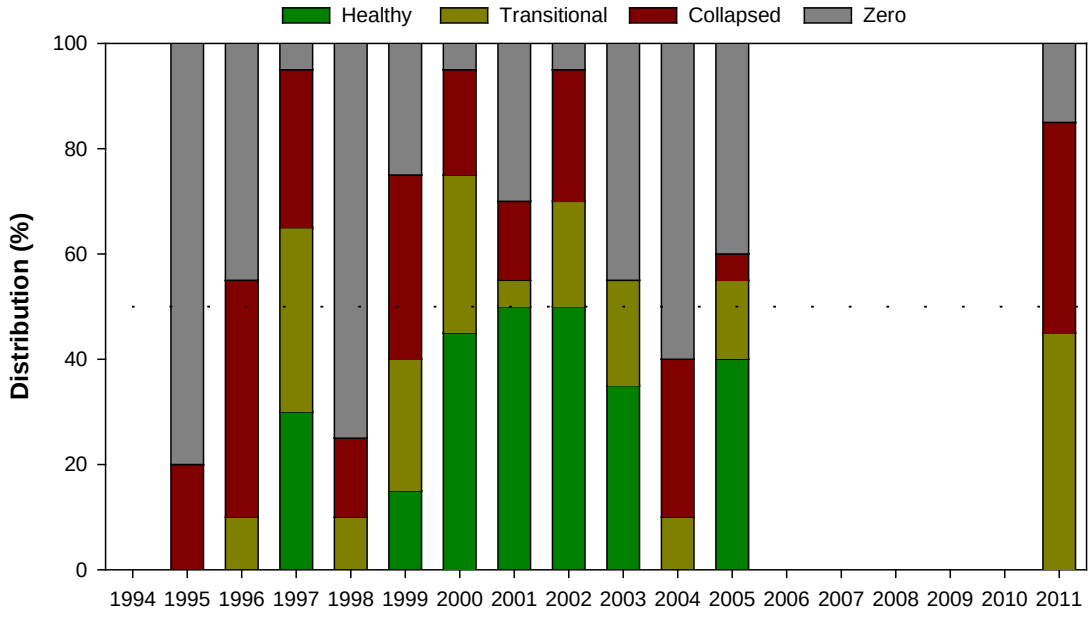

Figure 22. Percent distributions of bay scallops observed on underwater surveys conducted each fall in the Homosassa area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Fall surveys were not conducted in 1994 and 2006-2010.

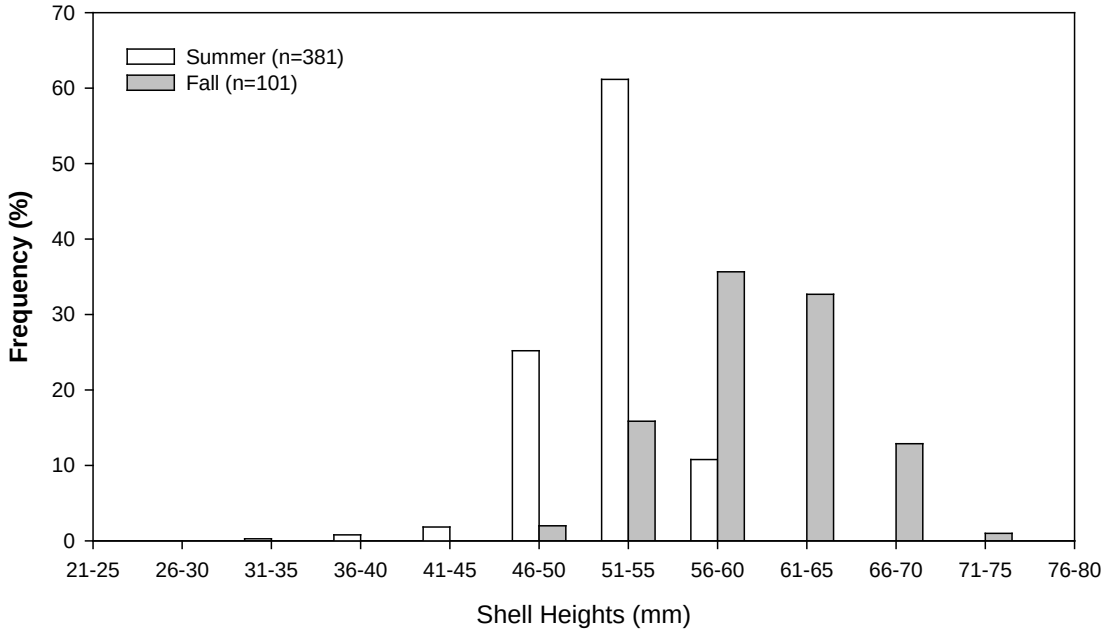

Figure 23. Percent frequency of bay scallop summer and fall survey shell heights observed on underwater surveys conducted in the Homosassa area in 2011. The numbers in the legend represent the total number of shell heights measured.

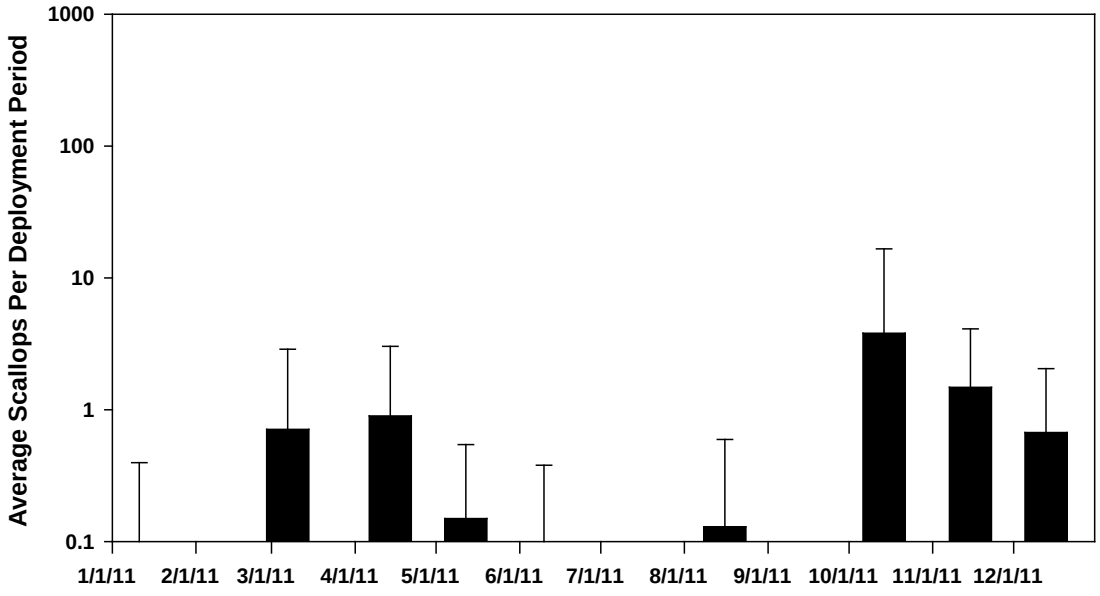

Figure 24. Bay scallop recruitment observed on collectors deployed and retrieved in the Homosassa area in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

3.6 Hernando Area

For the purpose of this report, the Hernando area ranges from the Chassahowitzka River in the north to the Pithlachascotee River in the south. This area encompasses the near shore zone along coastal Hernando County.

3.6.1 Hernando Area Abundance Surveys

In May and June of 2011, FWRI scientists surveyed 20 stations in the Hernando area (Appendix 15). Hernando mean scallop abundance increased significantly in 2011 ($P < 0.01$) to 148.4 scallops per 600 m^2 (Figure 25). Based on this mean abundance, scientists classified this summer population as "healthy". Scallops were present at 19 of the 20 stations surveyed in the summer of 2011 (Figure 26). Of those 19 stations, ≥ 25 scallops were present at 16, which is the highest percentage among all sites surveyed in the summer of 2011. The average shell height in 2011 (44.0 $\pm$ 6.2 mm) was slightly less than that of 2010 (47.3 $\pm$ 6.8 mm) and the range of shell heights measured decreased (Appendix 4). Approximately half of the Hernando area (12 of 20 stations) is open to recreational harvesters, but due to the inconsistent habitat within the area, is not as heavily fished as the other open areas. The mean abundance in the summer of 2011 at those 12 stations sampled within the open area was 144.1 scallops per 600 m^2. The mean abundance in the summer of 2011 at the 8 stations sampled in the closed area was 154.8 scallops per 600 m^2.

In October 2011, FWRI scientists surveyed 20 stations in the Hernando area. Mean abundances decreased significantly ($P < 0.01$) from spring to fall. The total number of scallops observed in the fall of 2011 decreased by 68% to a mean of 47.9 scallops per 600 m^2 (Figure 27). Based on this mean abundance, this population remained classified as "healthy" at the end of the recreational season. The average abundance at the 12 stations located within the open area decreased by 68% to 45.5 scallops per 600 m^2, and the average abundance at the 8 stations outside the open area decreased by 67% to 51.5 scallops per 600 m^2. Scallops were present at all 20 stations surveyed in the fall of 2011, and ≥25 scallops were present at 11 of those stations, 5 of which were within the open area (Figure 28). The average fall shell height (56.4 ± 3.8 mm) was higher than the spring mean (Appendix 5), suggesting that individuals grew an average of 12 mm from summer to fall at this location (Figure 29).

3.6.2 Hernando Area Recruitment Monitoring

Recruitment monitoring occurred at 15 stations in the Hernando area in 2011 (Appendix 15). Of the 180 collectors deployed in 2011, 91.7% were recovered and processed. Of those 165 collectors processed, spat were present on 37.6%. The total spat observed at this site in 2011 was 988, the average was 6.0 per collector, and the maximum number found on a single collector was 144. Recruitment rates were approximately three times higher than each of the previous two years, and the 2011 values were significantly higher than the 2010 values ($P < 0.01$). Recruitment peaked on collectors retrieved in December, and scallops were observed in 11 of the 12 retrieval dates (Figure 30). No spat were found on collectors retrieved in August. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

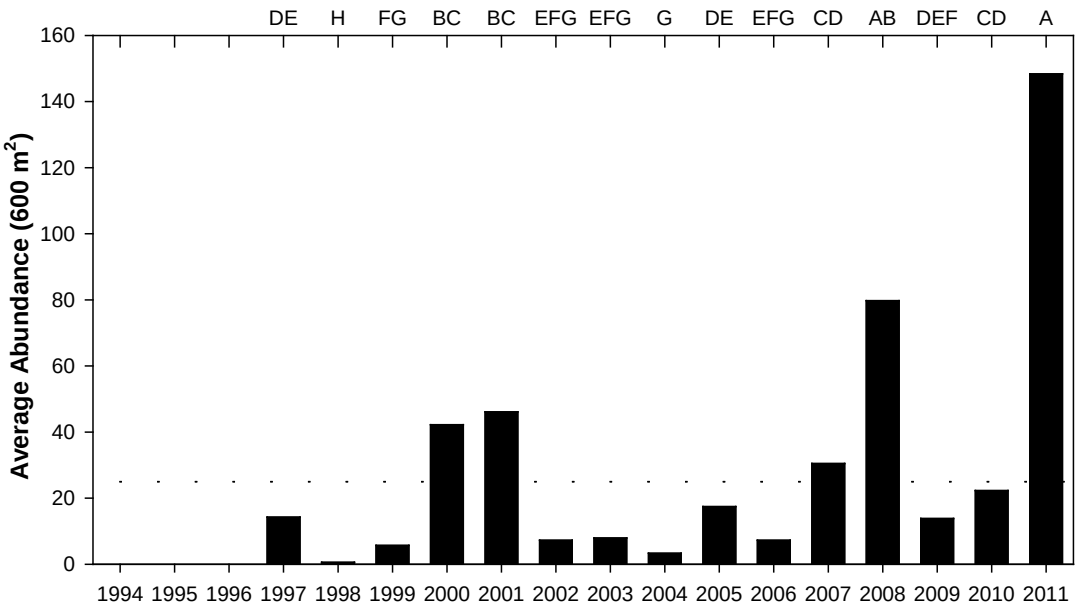

Figure 25. Average bay scallop abundances observed on underwater surveys conducted each summer in the Hernando area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Summer surveys were not conducted in 1994-1996.

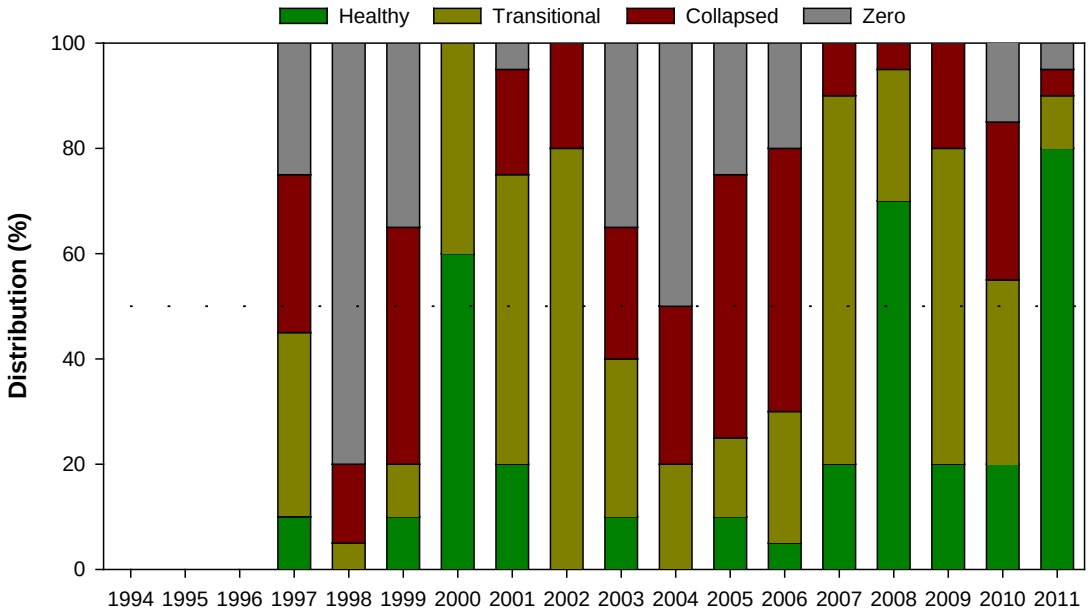

Figure 26. Percent distributions of bay scallops observed on underwater surveys conducted each summer in the Hernando area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Summer surveys were not conducted in 1994-1996.

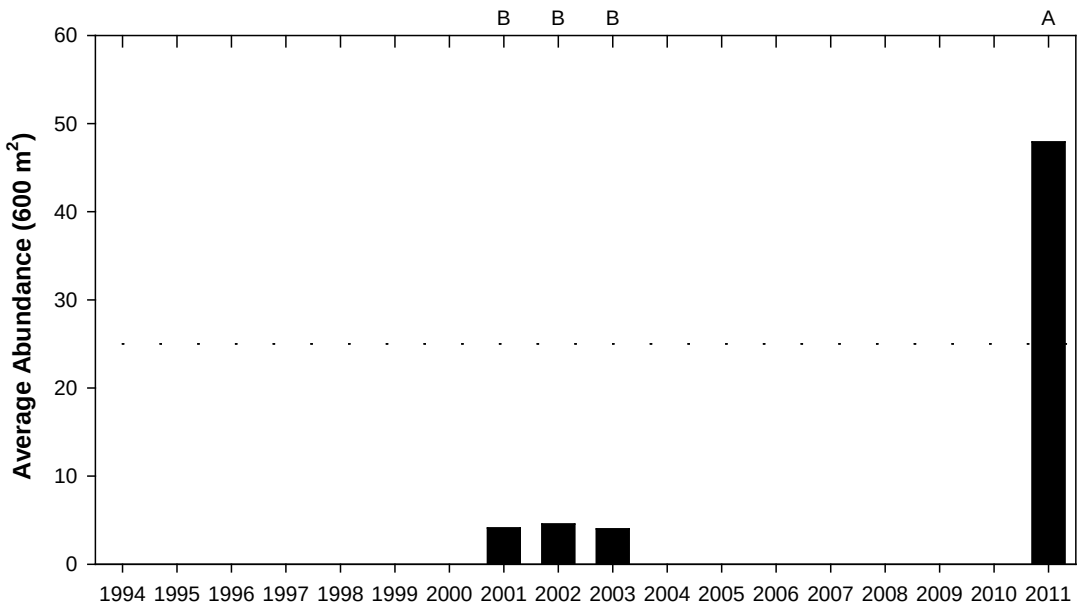

Figure 27. Average bay scallop abundances observed on underwater surveys conducted each fall in the Hernando area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Fall surveys were not conducted in 1994-2000 and 2004-2010.

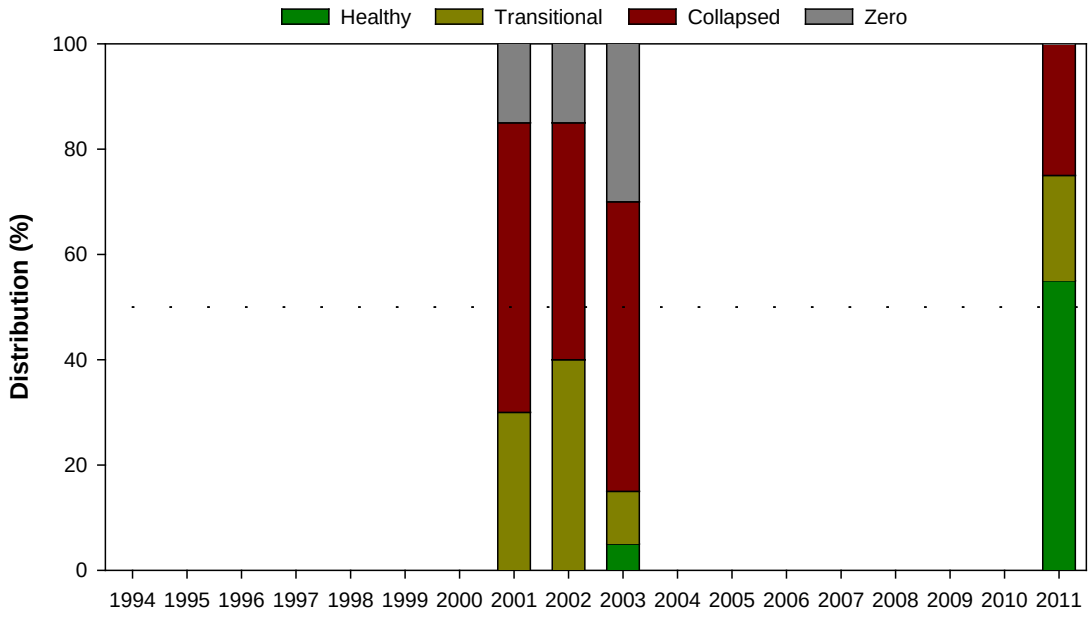

Figure 28. Percent distributions of bay scallops observed on underwater surveys conducted each fall in the Hernando area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Fall surveys were not conducted in 1994-2000 and 2004-2010.

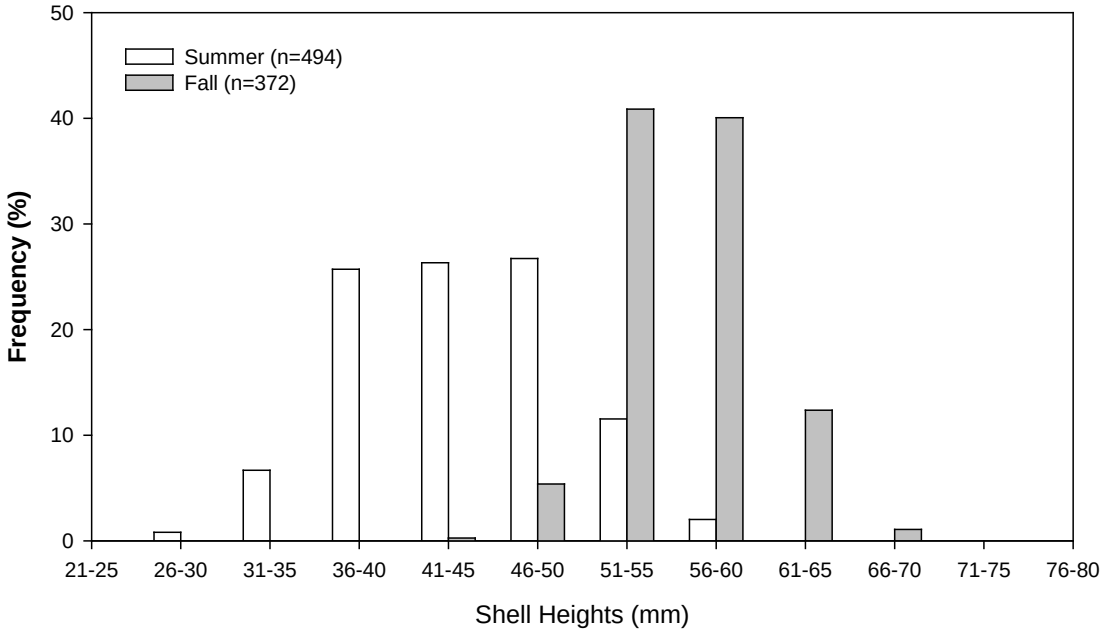

Figure 29. Percent frequency of bay scallop summer and fall survey shell heights observed on underwater surveys conducted in the Hernando area in 2011. The numbers in the legend represent the total number of shell heights measured.

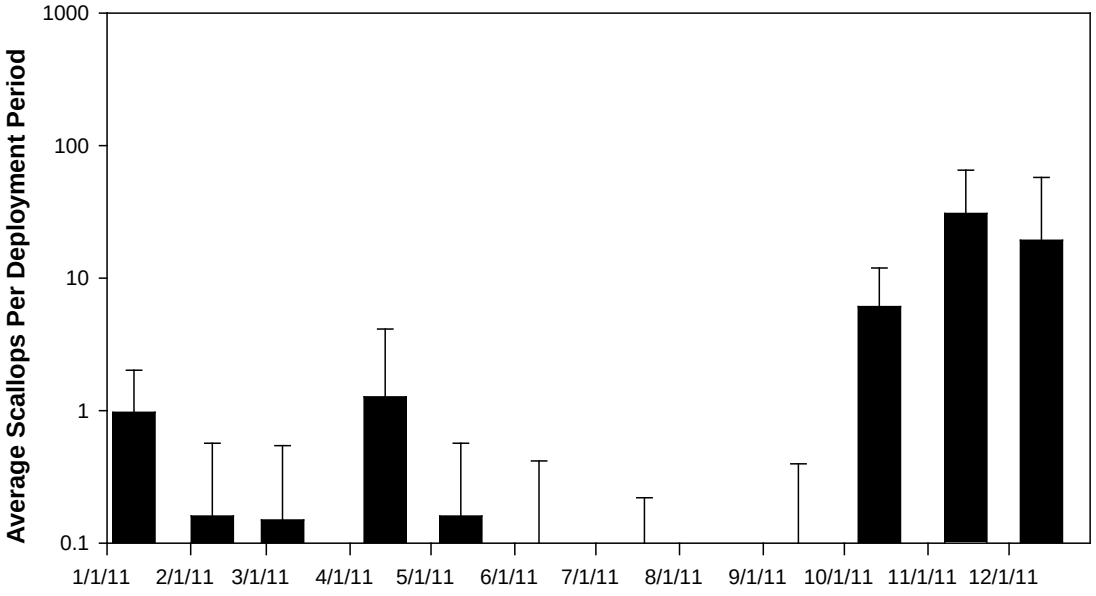

Figure 30. Bay scallop recruitment observed on collectors deployed and retrieved in the Hernando area in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

3.7 Anclote Area

For the purpose of this report, the Anclote area ranges from the Pithlachascotee River in the north to Clearwater Harbor in the south. This area encompasses the near shore zone along coastal Pasco and Pinellas counties.

3.7.1 Anclote Area Abundance Surveys

In June of 2011, FWRI scientists surveyed 20 stations in the Anclote area (Appendix 16). Anclote mean scallop abundance increased significantly in 2011 ($P < 0.01$) to 269.9 (Figure 31). Based on this mean abundance, scientists classified this summer population as "healthy". Scallops were present at 18 of the 20 stations surveyed in the summer of 2011 (Figure 32), and ≥25 scallops were present at 15 of those stations. The average shell height in 2011 (49.6 ± 4.1 mm) was slightly higher than the average shell height in 2010 (48.1 ± 5.9 mm) and the range of measured shell heights decreased in 2011 (Appendix 4). The Anclote area is closed to recreational harvest and is most likely a crucial sub-population, bolstering unstable bay scallop populations to the south. Since its substantial growth in 2007, this population has yet to undergo a harmful event such as a Red Tide, so the resiliency of this population is unknown.

In October 2011, FWRI scientists surveyed 20 stations in the Anclote area. Mean abundances decreased significantly ($P < 0.01$) from spring to fall. The total number of scallops observed decreased by 90% to a mean of 25.9 scallops per 600 m^2 (Figure 33). Based on this mean abundance, this population remained classified as "healthy" at the end of the recreational season. This decrease in abundance was unexpected considering that this area was closed to recreational fishing. While some level of natural mortality is expected for this annual species, the timing was earlier than expected. Scallops were present at 18 of the 20 stations surveyed in the fall of 2011 (Figure 34), and ≥25 scallops were present at 8 of those stations. The average fall shell height (55.7 ± 4.7 mm) was higher than the spring mean (Appendix 5), suggesting that individuals grew an average of 6 mm from summer to fall at this location (Figure 35).

3.7.2. Anclote Area Recruitment Monitoring

Recruitment monitoring occurred at 15 stations in the Anclote area in 2011 (Appendix 16). Of the 180 collectors deployed in 2011, 94.4% were recovered and processed. Of those 170 collectors processed, spat were present on 55.3%. The total spat observed at this site in 2011 was 2,061, the average was 12.1 per collector, and the maximum number found on a single collector was 194. Recruitment increased by 75% in 2011, but was not significantly different from 2010 ($P = 0.31$). Recruitment peaked on collectors retrieved in December, and scallops were observed on all 12 retrieval dates (Figure 36). Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm. The monthly temperature and salinity averages, standard deviations, and ranges for all years for the data logger deployed near the mouth of the Anclote River are summarized in Appendices 17 and 18.

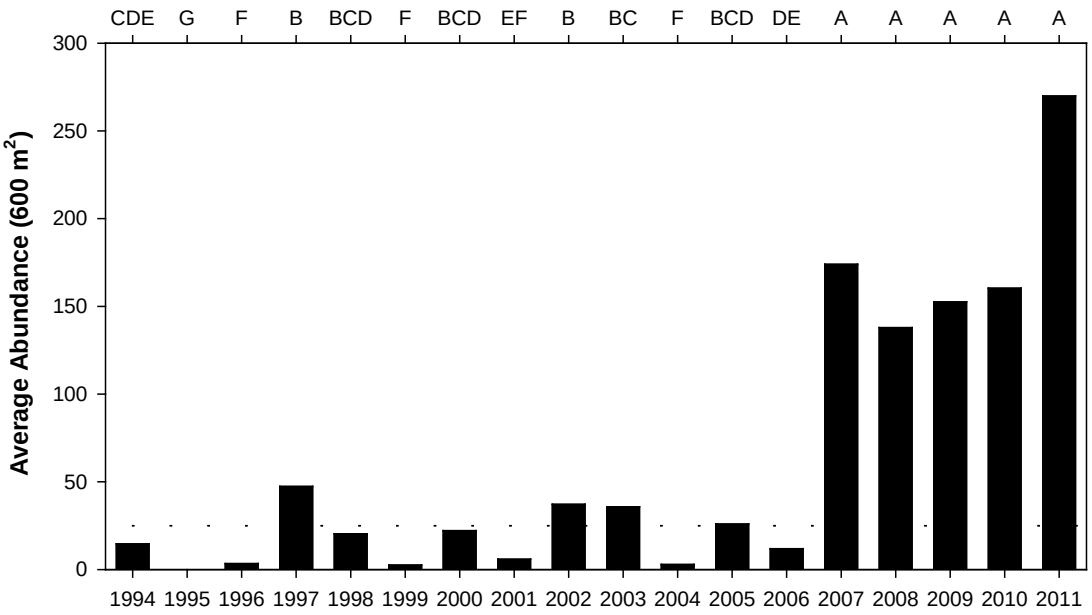

Figure 31. Average bay scallop abundances observed on underwater surveys conducted each summer in the Anclote area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05.

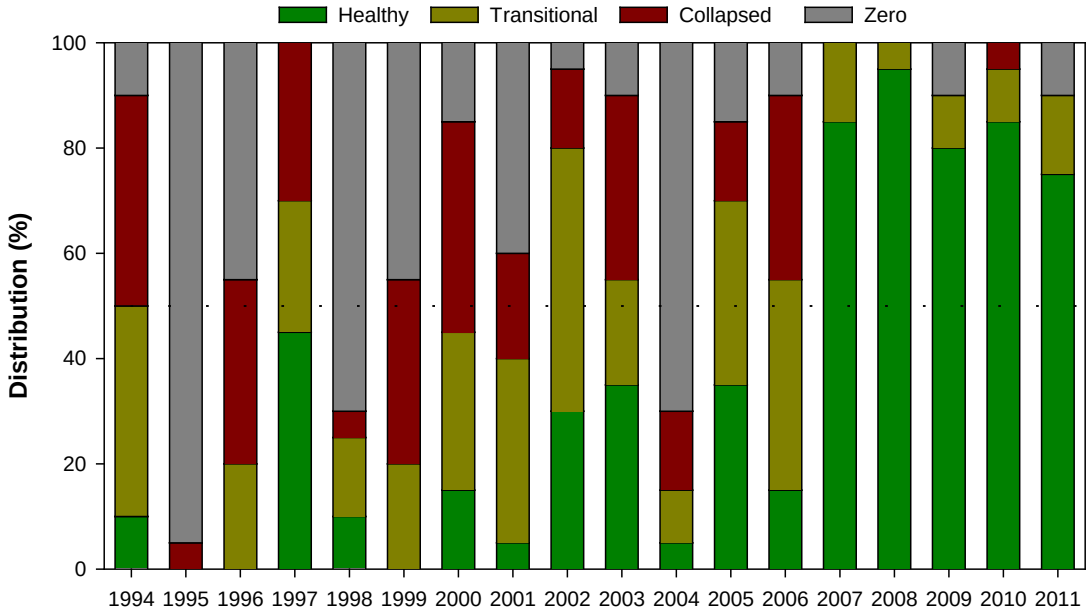

Figure 32. Percent distributions of bay scallops observed on underwater surveys conducted each summer in the Anclote area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution.

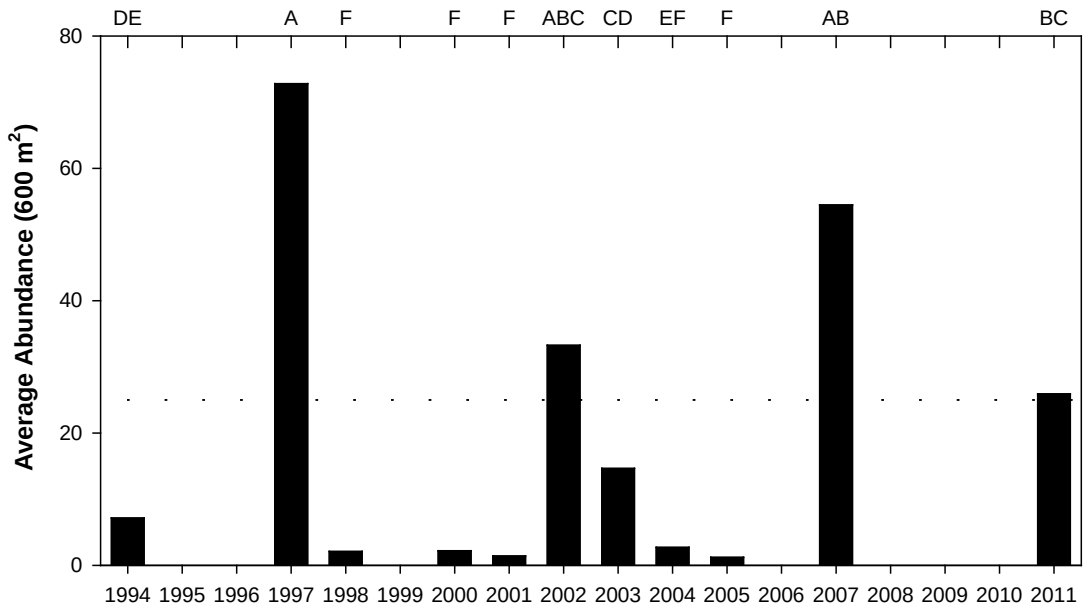

Figure 33. Average bay scallop abundances observed on underwater surveys conducted each fall in the Anclote area. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Fall surveys were not conducted in 1995-1996, 1999, 2006 and 2008-2010.

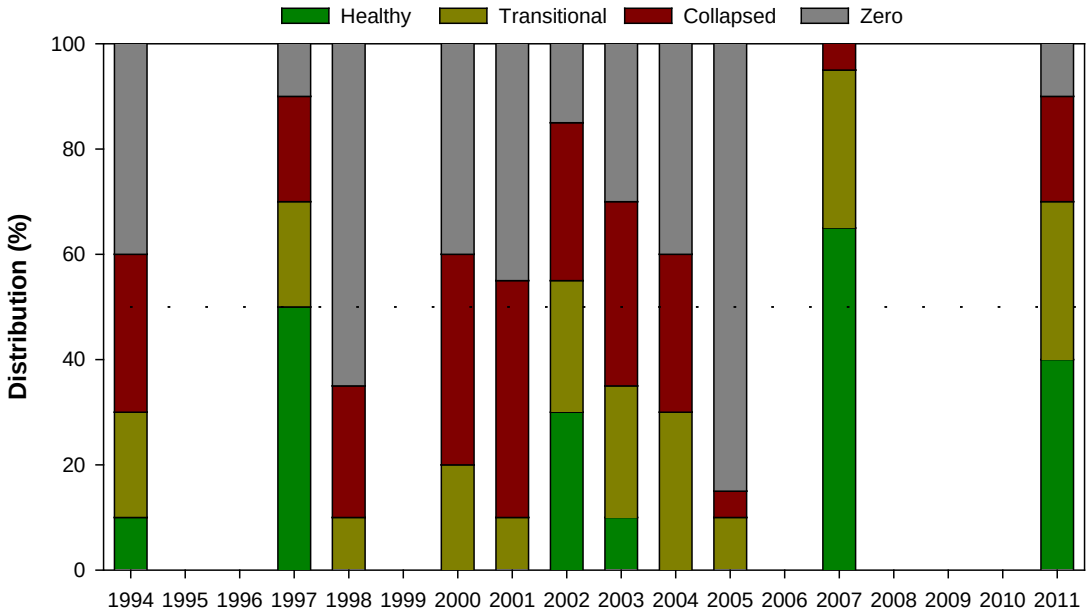

Figure 34. Percent distributions of bay scallops observed on underwater surveys conducted each fall in the Anclote area. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Fall surveys were not conducted in 1995-1996, 1999, 2006 and 2008-2010.

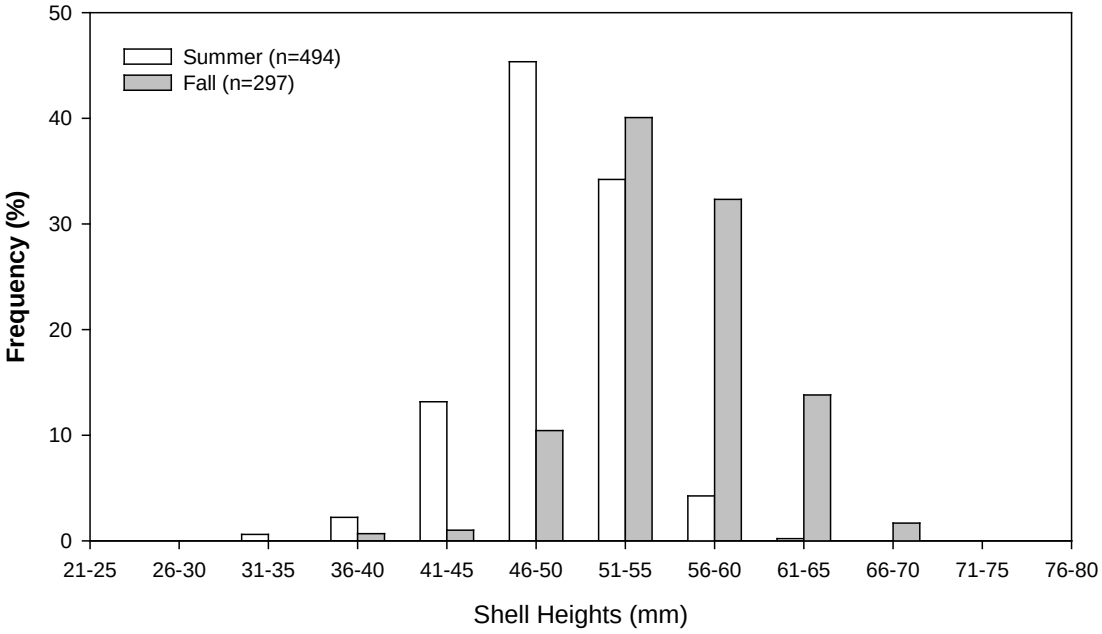

Figure 35. Percent frequency of bay scallop summer and fall survey shell heights observed on underwater surveys conducted in the Anclote area in 2011. The numbers in the legend represent the total number of shell heights measured.

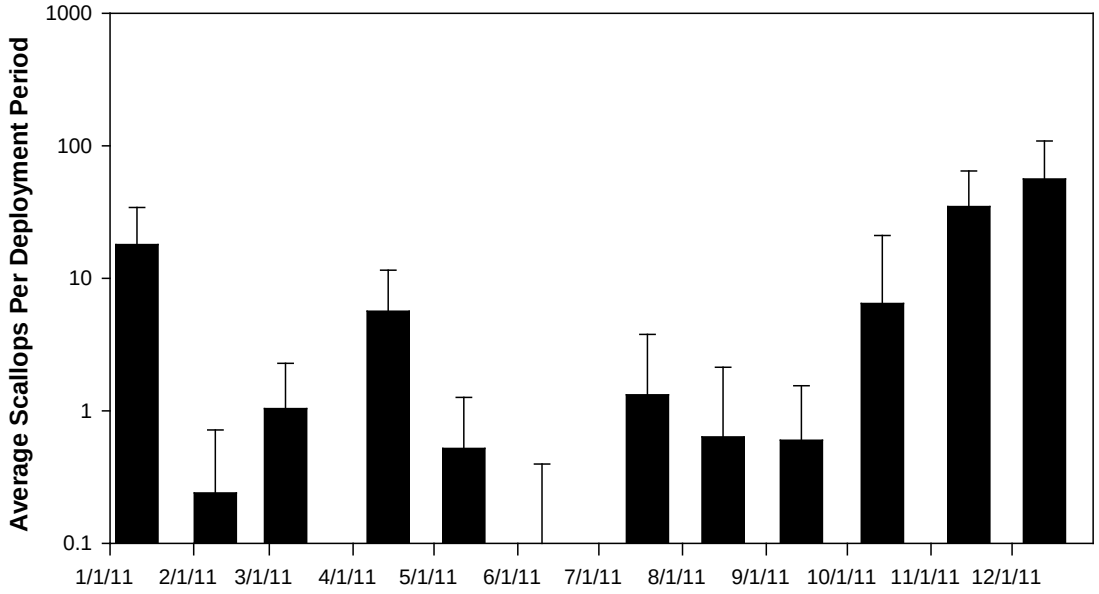

Figure 36. Bay scallop recruitment observed on collectors deployed and retrieved in the Anclote area in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

3.8 Tampa Bay Area

This area is comprised of Tampa Bay waters from Mullet Key Bayou to Weedon Island in Pinellas County, Tampa Bay waters from Apollo Beach to Cockroach Bay in Hillsborough County, and Tampa Bay waters from Cockroach Bay to Anna Maria Sound in Manatee County. For the purpose of this report, the Tampa Bay area is comprised of two abundance subsections: Tampa Bay and Boca Ciega Bay. Abundance sub-sections were designated by agencies conducting surveys: FWRI (Tampa Bay) and Tampa Bay Watch (Boca Ciega Bay).

3.8.1 Tampa Bay Area Abundance Surveys

3.8.1.1 Tampa Bay Abundance Surveys

In July of 2011, FWRI scientists surveyed 20 stations in Tampa Bay (Appendix 19). Tampa Bay mean scallop abundance decreased significantly in 2011 ($P < 0.01$) to 0.2 scallops per 600 m^2 (Figure 37). Based on this mean abundance, scientists classified this summer population as "collapsed". This year marked the second year in a row of a major decline in abundance. There were 95% fewer scallops in 2011 than in 2010 and 92% fewer scallops in 2010 than in 2009. Distributions also declined severely, with scallops present at only 3 of the 20 stations surveyed in the summer of 2011 (Figure 38). The average shell height in 2011 (56.0 $\pm$ 3.6 mm) was higher than that of 2010 (46.2 $\pm$ 7.6 mm) and the range of shell heights measured was only 7 mm (Appendix 4). This population is closed to recreational harvest, and continues to be an area of concern and a focus for enhancement.

3.8.1.2 Boca Ciega Bay Abundance Surveys

The 2011 Annual Great Bay Scallop search hosted by Tampa Bay Watch was initially scheduled for August 27th, but due to high winds was postponed until September 10, 2011. Volunteer teams surveyed the shallow water seagrass beds around Boca Ciega Bay in lower Tampa Bay. Snorkelers found 5 bay scallops within the surveyed area. Information about future volunteer events can be found on Tampa Bay Watch's website at http://tampabaywatch.org/.

3.8.2 Tampa Bay Area Recruitment Monitoring

Recruitment monitoring occurred at 6 stations on the western side of the mouth of Tampa Bay in 2011 (Appendix 19). Of the 72 collectors deployed in Tampa Bay in 2011, 98.6% were recovered and processed. Of the 71 collectors processed, spat were present on 52.1%. The total spat observed at this site in 2011 was 1,468, the average was 20.7 per collector, and the maximum number found on a single collector was 428. The total number of recruits observed in 2011 was significantly lower than the 2010 total ($P = 0.01$). Recruitment peaked on collectors retrieved in December, and scallops were observed in 7 of the 12 retrieval dates (Figure 39). No spat were found on collectors retrieved in July through November. The December peak was unexpectedly high based on the low abundance of scallops observed in the summer surveys. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.8.3 Tampa Bay Area Restoration Activities

On January 14, 2011, 6 supplemental collectors were collected and processed *in situ*. From those collectors, a total of 2,401 scallops were collected and stored in coolers with ambient seawater. The scallops were transported to FWRI and cultured in Bayboro Harbor. In early March 2011, FWRI scientists delivered 1,025 of those bay scallops to Tampa Bay Watch staff for use in community restoration cage efforts. On September 28, 2011, FWRI scientists collected 380 adult scallops from the Anclote area and delivered them to Tampa Bay Watch for additional community restoration efforts. Those scallops suffered high mortality shortly after delivery to TBW. On December 15, 2011, 6 supplemental collectors were collected and processed *in situ.* From those collectors, a total of 4,836 scallops were collected and stored in coolers with ambient seawater. The scallops were transported to FWRI and cultured in Bayboro Harbor until their eventual release into appropriate Tampa Bay habitat in 2012.

Grant funded bay scallop restoration activities in Tampa Bay were also conducted by FWRI scientists. Appendix 20 summarizes the bay scallop restoration efforts related to the Pinellas County Environmental Fund grant conducted by FWRI staff for October 2010 through September 2011.

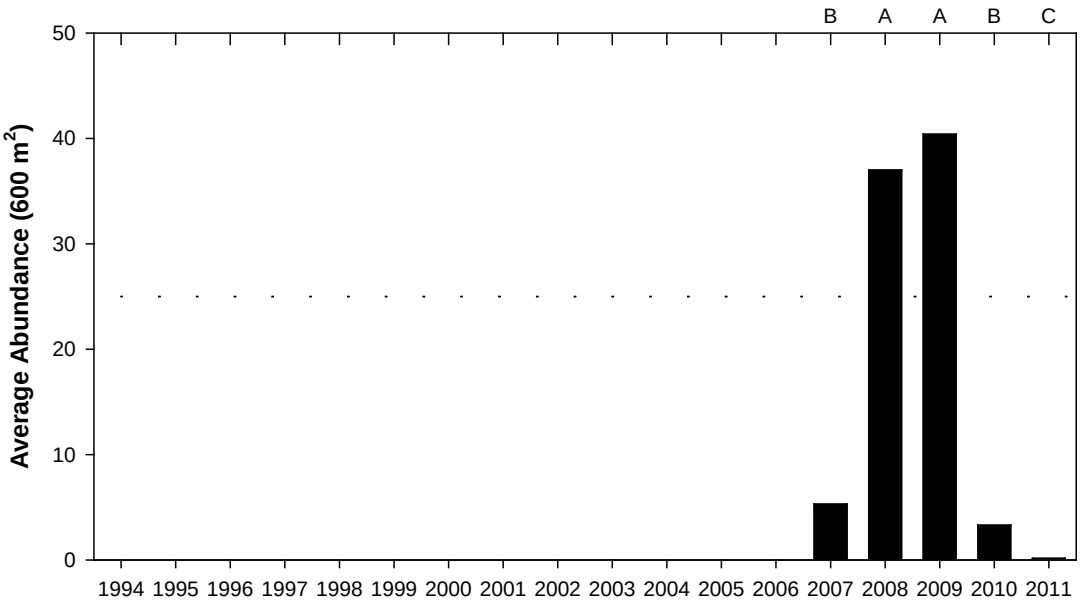

Figure 37. Average bay scallop abundances observed on underwater surveys conducted each summer by FWRI staff in Tampa Bay. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Surveys were not conducted in 1994-2006.

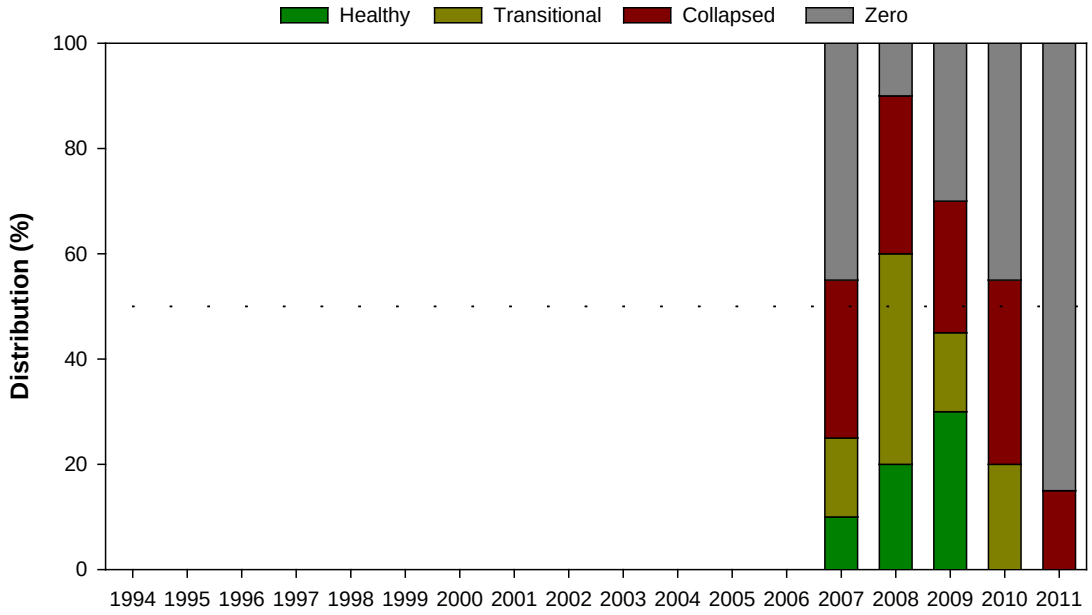

Figure 38. Percent distributions of bay scallops observed on underwater surveys conducted each summer by FWRI staff in Tampa Bay. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Surveys were not conducted in 1994-2006.

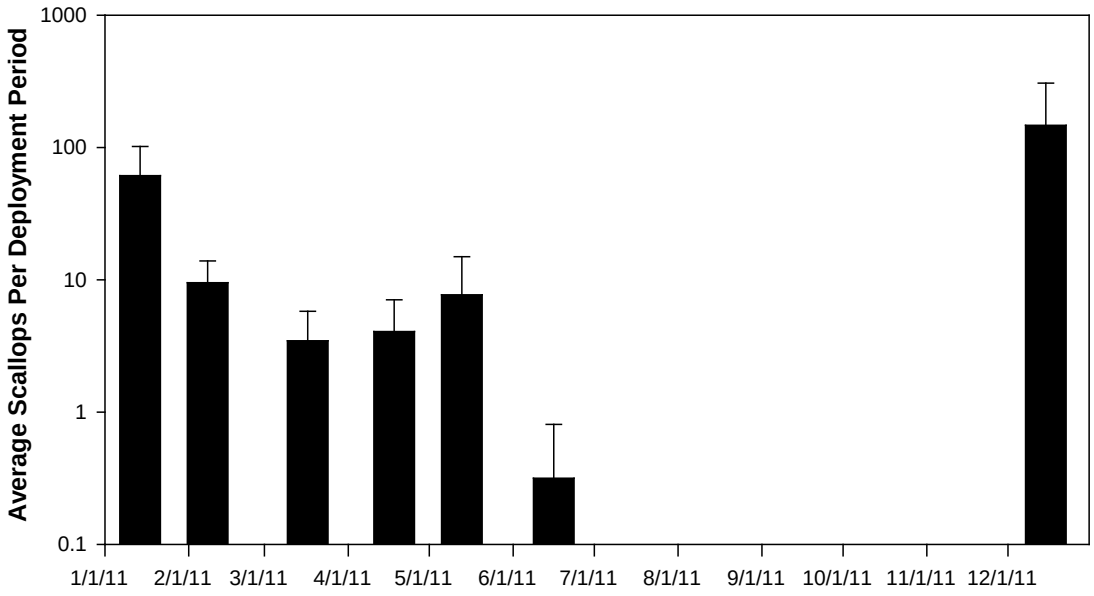

Figure 39. Bay scallop recruitment observed on collectors deployed and retrieved in Tampa Bay in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

3.9 Sarasota Bay Area

The site is comprised of waters from Anna Maria Sound in Manatee County down through Sarasota Bay and south to Lemon Bay in Sarasota County. For the purpose of this report, the Sarasota Bay area is comprised of two sub-sections: Sarasota Bay North and Sarasota Bay South. Abundance sub-sections were designated by agencies conducting surveys: FWRI (north) and Sarasota County and Sarasota Bay Watch (south). Recruitment sub-sections were designated by geographic boundaries as well as agencies deploying and retrieving collectors: FWRI staff sampled areas in Manatee County and Sarasota County staff sampled areas south of the Manatee County line through the extent of Sarasota County.

3.9.1 Sarasota Bay Area Abundance Surveys

3.9.1.1 Sarasota Bay North

In July of 2011, FWRI scientists surveyed 10 stations in northern Sarasota Bay (Appendix 21). Sarasota Bay North mean scallop abundance decreased significantly in 2011 ($P < 0.01$) to 0.3 scallops per 600 m^2 (Figure 40). Based on this mean abundance, scientists classified this summer population as "collapsed". Scallops were present at 2 of the 10 stations surveyed in the summer of 2011 (Figure 41). The average shell height in 2011 (47.3 ± 2.5) was slightly smaller than the average shell height in 2010 (48.2 ± 8.6 mm) and the range of shell heights measured was 5 mm (Appendix 4). This population is closed to recreational harvest, and continues to be an area of focus for enhancement.

3.9.1.2 Sarasota Bay South

In July-September 2011, Sarasota County staff surveyed 23 stations (15 fixed and 8 random) ranging from the southern end of Sarasota Bay to Lemon Bay in Sarasota County. Mean abundance decreased from 0.3 scallops per 200 m^2 in 2010 to 0.1 scallops per 200 m^2 in 2011. This mean abundance is comparable to the mean observed by FWRI scientists in the summer of 2011.

On August 13, 2011 Sarasota Bay Watch hosted their 4th annual Sarasota Bay Scallop Search. Volunteer teams surveyed the shallow water seagrass beds around Sarasota Bay. Snorkelers found a total of 10 bay scallops within the surveyed area. Information about future volunteer events can be found on Sarasota Bay Watch's website at http://sarasotabaywatch.org/.

3.9.2 Sarasota Bay Area Recruitment Monitoring

3.9.2.1 Sarasota Bay North Recruitment Monitoring

Recruitment monitoring occurred at 8 stations in the northern end of Sarasota Bay in 2011 (Appendix 21). Of the 96 collectors deployed in Sarasota Bay North in 2011, 87.5% were recovered and processed. Of those 84 collectors processed, spat were present on 34.5%. The total spat observed at this site in 2011 was 174, the average was 2.1 per collector, and the maximum number found on a single collector was 61. The number of recruits observed in 2011 was significantly lower than the 2010 total ($P < 0.01$). The strongest recruitment peak occurred on collectors retrieved in February, and recruitment was observed in 6 of the 12 retrieval dates (Figure 42). No spat were found on collectors retrieved in June through November. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in the Sarasota Bay table in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.9.2.2 Sarasota Bay South Recruitment Monitoring

Recruitment monitoring occurred at 15 stations in the southern end of Sarasota Bay in 2011 (Appendix 21). Those recruit collectors were deployed and retrieved by Rene Janneman of Sarasota County. Of the 170 collectors deployed in 2011, 95.9% were recovered and processed. Of those 163 collectors processed by FWRI scientists, spat were present on 13.5%. The total spat observed at this site in 2011 was 775, the average was 4.8 per collector, and the maximum number found on a single collector was 298. The number of recruits observed in 2011 was not significantly different from the 2010 total ($P = 0.60$). The strongest recruitment peak occurred on collectors retrieved in February, and recruitment was observed in 5 of the 11 retrieval dates (Figure 43). No spat were found on collectors retrieved in January, June and September through December. Field-sampling events were not conducted during August. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in the Sarasota Bay South table in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.9.3 Sarasota Bay Area Restoration Activities

On July 8, 2011, FWRI scientists released 631 scallops in Sarasota Bay. Those scallops were the last of the wild caught recruits collected from Tampa Bay waters in January. On the evening of August 6, 2011, the Sarasota Yacht Club hosted Sarasota Bay Watch's first Scallopalooza. This fundraising event generated over $12,000 in funds that were used to pay Bay Shellfish Company to produce a batch of ready-to-set larval scallops. On September 28, 2011, FWRI scientists collected broodstock from the Anclote area and transported those scallops to the Bay Shellfish Company hatchery in Palmetto. On October 28, 2011, FWRI scientists collected additional broodstock from the Anclote area and transported them to Bayboro Harbor. On November 27, 2011, FWRI scientists delivered those broodstock scallops to hatchery staff. On December 9, 2011, Sarasota Bay Watch staff released approximately 4 million ready-to-set scallop larvae into seagrass beds within Sarasota Bay.

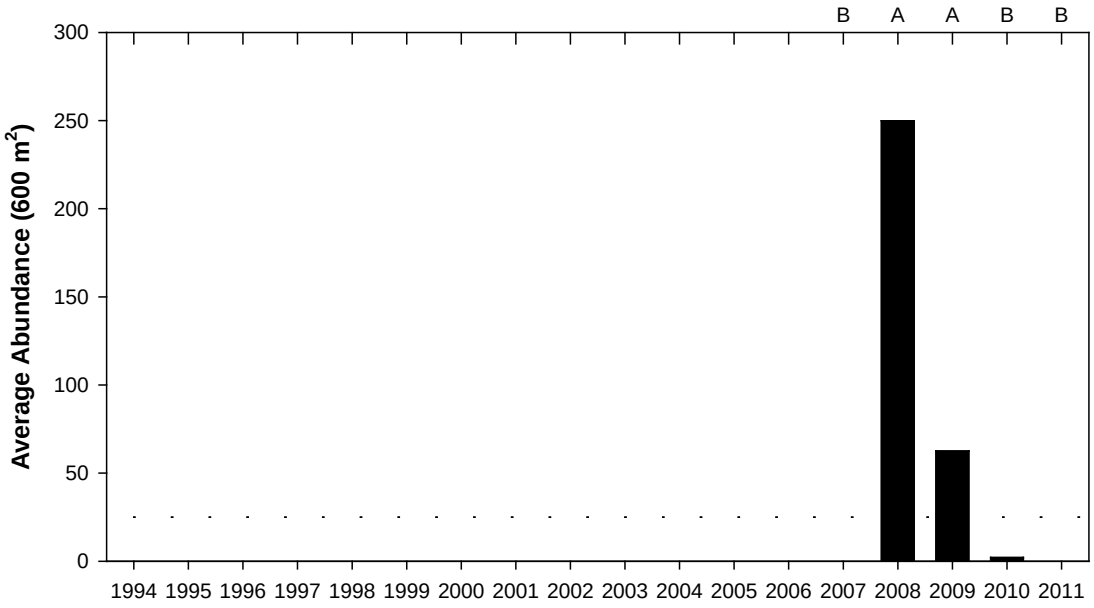

Figure 40. Average bay scallop abundances observed on underwater surveys conducted each summer by FWRI staff in Sarasota Bay North. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05. Surveys were not conducted in 1994-2006. The mean abundance in 2007 was 0.2.

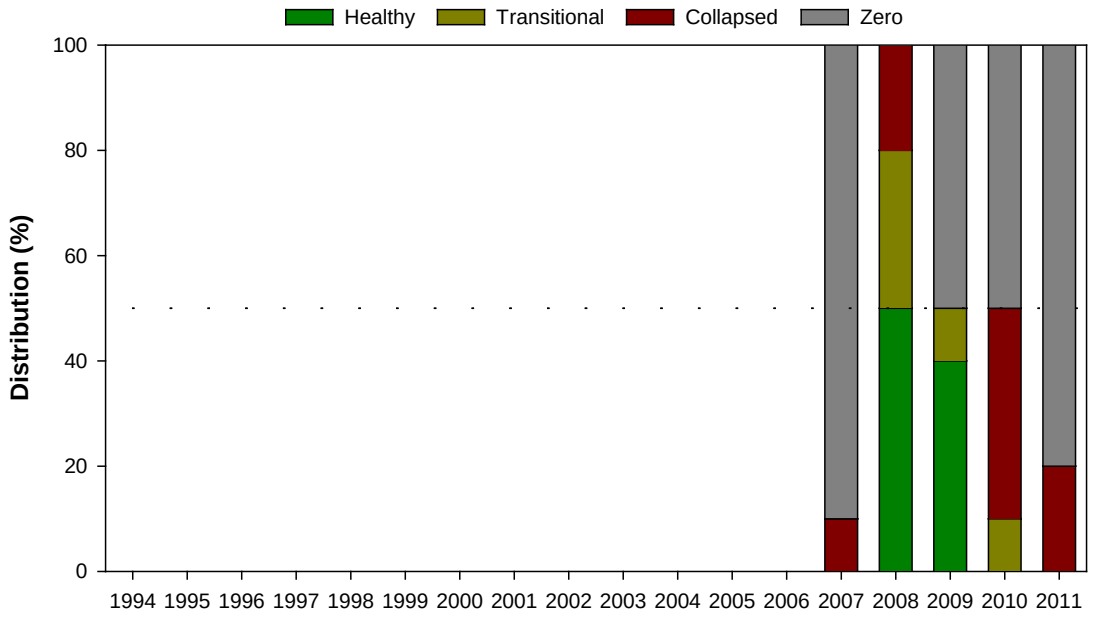

Figure 41. Percent distributions of bay scallops observed on underwater surveys conducted each summer by FWRI staff in Sarasota Bay North. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution. Surveys were not conducted in 1994-2006.

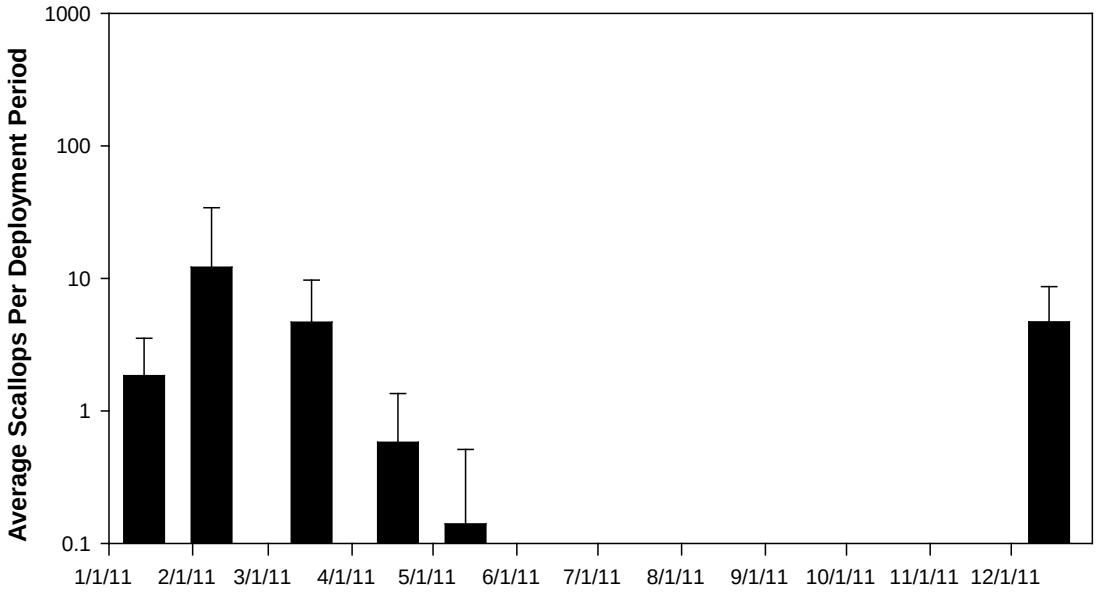

Figure 42. Bay scallop recruitment observed on collectors deployed and retrieved in Sarasota Bay North in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

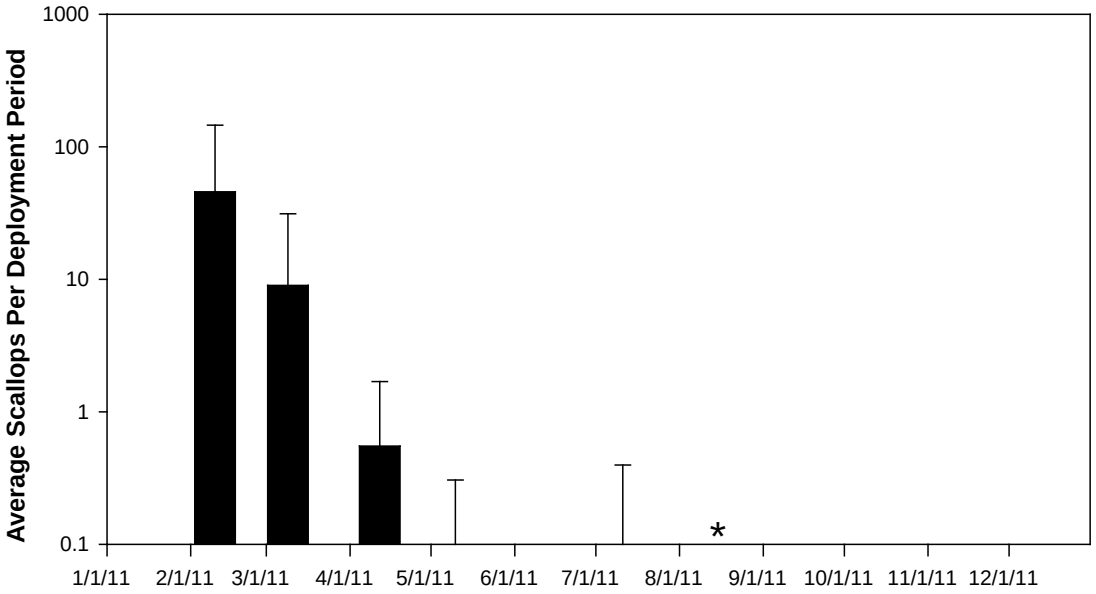

Figure 43. Bay scallop recruitment observed on collectors deployed and retrieved in Sarasota Bay South in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date. Asterisks denote months when no collectors were retrieved.

3.10 Charlotte Harbor Area

This study area encompasses the waters of Lemon Bay, Placida Harbor, Gasparilla Sound, and Charlotte Harbor in Charlotte County.

3.10.1 Charlotte Harbor Area Abundances

On August 27, 2011, UF-Sea Grant hosted their 3rd annual Great Bay & Sound Scallop Search in Charlotte County. Volunteer teams surveyed the shallow water seagrass beds in Lemon Bay, Gasparilla Sound, and Charlotte Harbor. Snorkelers found 24 bay scallops within the surveyed area, an 85% decrease from the 2010 total.

3.10.2 Charlotte Harbor Area Recruitment Monitoring

Recruitment monitoring occurred at 12 stations in the Charlotte Harbor area in 2011 (Appendix 22). Those recruit collectors were deployed and retrieved by Betty Staugler of the University of Florida – Institute of Food and Agricultural Sciences (UF-IFAS). Of the 108 collectors deployed in the Charlotte Harbor area in 2011, 93.5% were recovered and processed. Of those 101 collectors processed by FWRI scientists, spat were present on 18.8%. The total spat observed at this site in 2011 was 375, the average was 3.7 per collector, and the maximum number found on a single collector was 151. The number of recruits observed in 2011 was not significantly different from the 2010 total ($P = 0.10$). Recruitment peaked on collectors retrieved in February, and scallops were observed in the first 4 of the 10 retrieval dates (Figure 44). No spat were found on collectors retrieved in May, July, August, October and November. Field-sampling events were not conducted during the months of March, June, September and December. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in the Charlotte Harbor table in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.10.3 Charlotte Harbor Area Restoration Activities

On April 5, 2011 FWRI scientists transported 500 scallops harvested from Tampa Bay supplemental collectors and cultured in Bayboro Harbor (FWRI) to Port Charlotte where they were delivered to UF-IFAS personnel. Those scallops were divided into sets of 25 individuals and then distributed to volunteers who deployed them into cages hung off of local docks. Volunteers who “adopted” these scallops monitored them monthly by removing dead shells and recording the shell heights of any remaining live scallops.

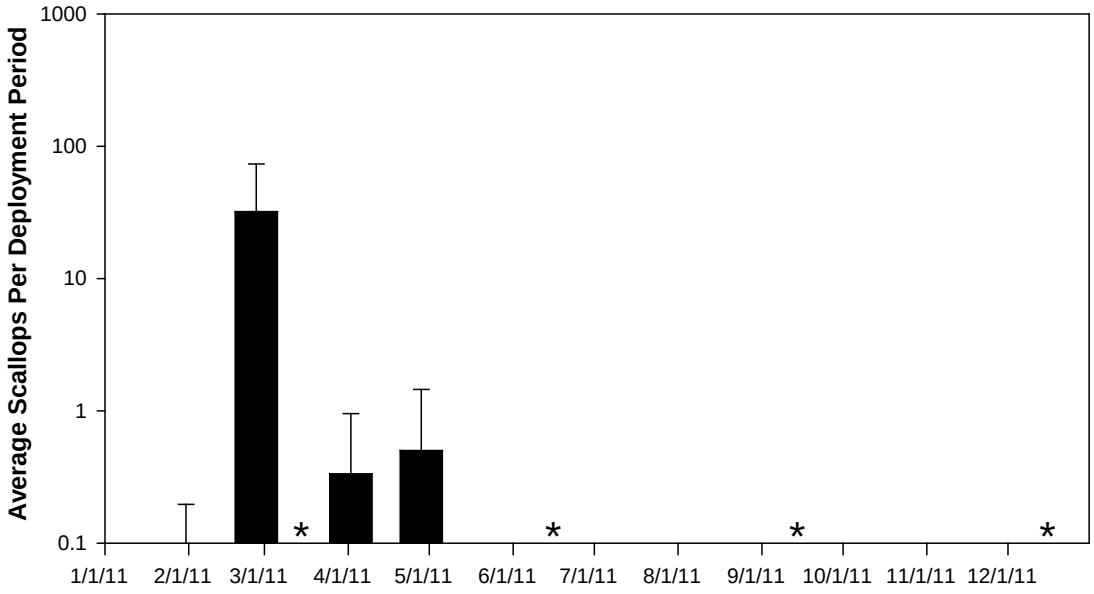

Figure 44. Bay scallop recruitment observed on collectors deployed and retrieved in the Charlotte Harbor area retrieved in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date. Asterisks denote months when no collectors were retrieved.

3.11 Pine Island Sound Area

This study area encompasses the waters of Pine Island Sound and San Carlos Bay in Lee County. For the purpose of this report, the Pine Island Sound area is comprised of two sub-sections: Pine Island Sound North and Pine Island Sound South. Abundance sub-sections were designated by agencies conducting surveys: FWRI (north) and UF-Sea Grant (south). Recruitment sub-sections were designated by geographic boundaries as well as agencies deploying and retrieving collectors: Mote Marine Lab staff sampled areas north of the powerlines and Sanibel-Captiva Conservation Foundation staff sampled areas south of the powerlines.

3.11.1 Pine Island Sound Area Abundances

3.11.1.1 Pine Island Sound North

In July of 2011, FWRI scientists surveyed 20 stations in Pine Island Sound North (Appendix 23). Pine Island Sound North mean scallop abundance increased significantly in 2011 ($P < 0.01$) to 101.1 scallops per 600 m^2 (Figure 45). Based on this mean abundance, scientists classified this summer population as "healthy". This is the 4th consecutive year that observed scallop abundance has increased at this site. Scallops were present at 16 of the 20 stations surveyed in the summer of 2011 (Figure 46), with ≥25 scallops present at 11 of those stations. The average shell height in 2011 (56.1 $\pm$ 6.4 mm) was larger than the average in 2010 (50.1 $\pm$ 7.7 mm) and the range of measured shell heights decreased (Appendix 4). This population is closed to recreational harvest.

3.11.1.2 Pine Island Sound South

On August 13, 2011, UF-Sea Grant hosted their 2nd annual Pine Island Sound Scallop Search in Lee County. Volunteer teams surveyed the shallow water seagrass beds and found 1,027 bay scallops within the surveyed area. This total was roughly a 200% increase from the 2010 total, and was the highest number of scallops observed by volunteers during the local Scallop Searches in 2011.

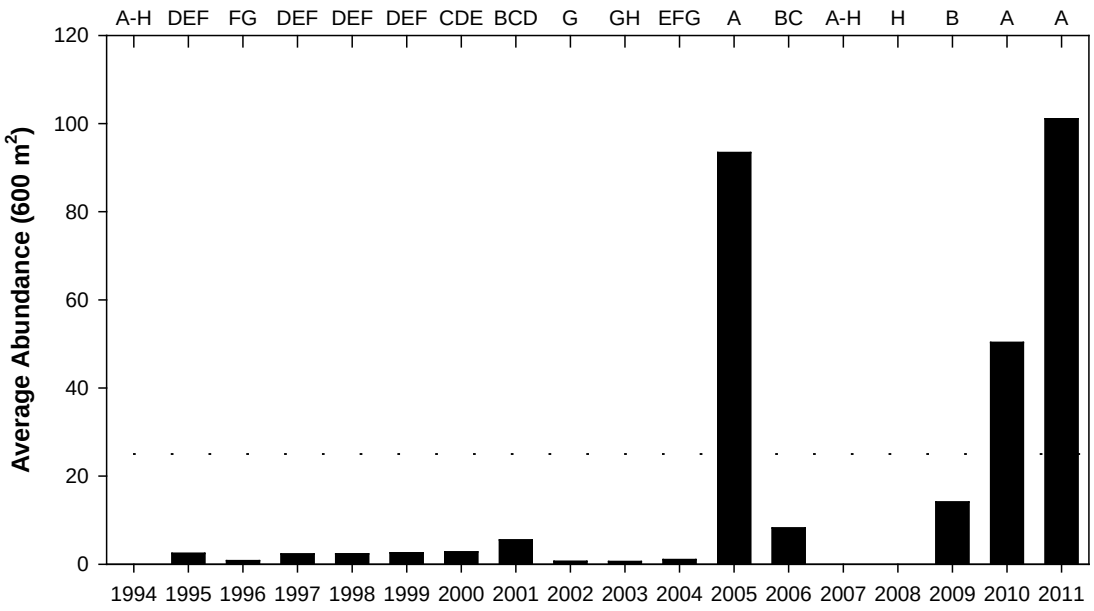

Figure 45. Average bay scallop abundances observed on underwater surveys conducted each summer in Pine Island Sound North. The dashed line represents the level at which a population is characterized as healthy (≥ 25 scallops per 600 m^2). Letters above the plot denote differences in abundances among years at a significance level of 0.05.

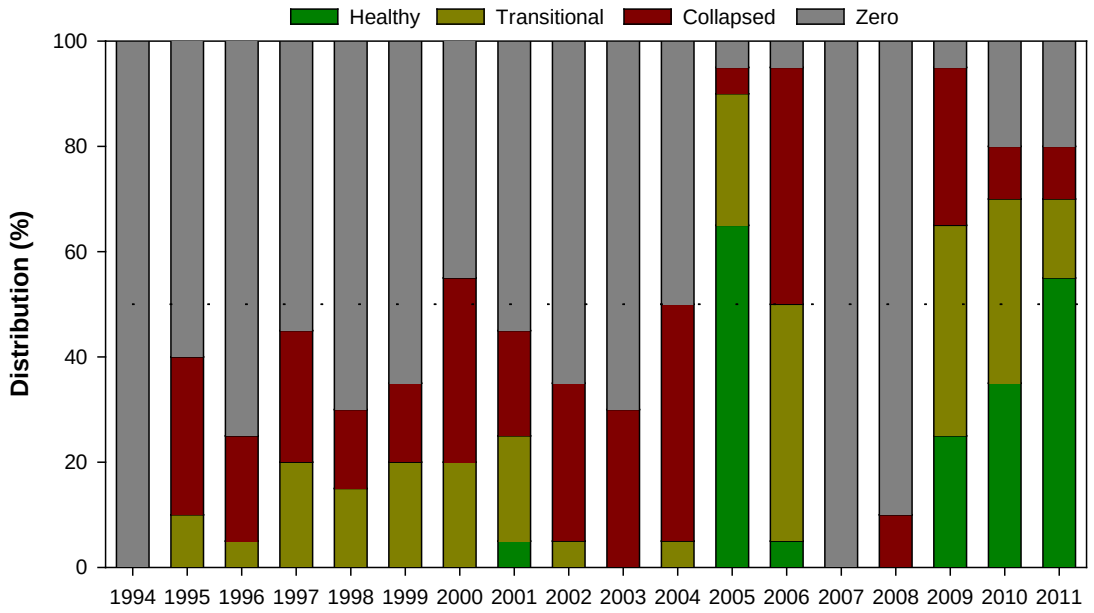

Figure 46. Percent distributions of bay scallops observed on underwater surveys conducted each summer in Pine Island Sound North. Categories for each station correspond to the classification levels previously described (collapsed: <5 scallops/600 m^2; transitional: between 5 and 25 scallops/600 m^2; healthy: ≥25 scallops/600 m^2) with an additional category representing zero scallops counted. The dashed line represents half of the stations sampled and any combination of bars with color that exceeds the line characterizes a healthy distribution.

3.11.2 Pine Island Sound Area Recruitment Monitoring

3.11.2.1 Pine Island Sound North Recruitment Monitoring

Recruitment monitoring occurred at 9 stations in the northern end of Pine Island Sound in 2011 (Appendix 23). Those recruit collectors were deployed and retrieved by Jim Culter of Mote Marine Laboratory (MML). Of the 108 collectors deployed in the northern end of Pine Island Sound in 2011, 87.0% were recovered and processed. Of those 94 collectors processed by FWRI scientists, spat were present on 36.2%. The total spat observed on Pine Island Sound north collectors in 2011 was 263, the average was 2.8 per collector, and the maximum number found on a single collector was 52. The number of recruits observed in 2011 was significantly higher than the 2010 total (P = 0.03). Recruitment peaked on collectors retrieved in July, and scallops were observed on 10 of the 12 retrieval dates (Figure 47). No spat were found in collectors retrieved in May or September. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in the Pine Island Sound North table in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.11.2.2 Pine Island Sound South Recruitment Monitoring

Recruitment monitoring occurred at 9 stations in the southern end of Pine Island Sound in 2011 (Appendix 23). Those recruit collectors were deployed and retrieved by Mark Thompson of Sanibel-Captiva Conservation Foundation (SCCF). Of the 99 collectors deployed in the southern end of Pine Island Sound in 2011, 97.0% were recovered and processed. Of those 96 collectors processed by FWRI scientists, spat were present on 33.3%, which is twice the number of collectors with spat in 2010. The total spat observed on Pine Island Sound south collectors in 2011 was 102, the average was 1.1 per collector, and the maximum number found on a single collector was 17. The number of recruits observed in 2011 was not significantly different from the 2010 total (P = 0.14). Recruitment peaked on collectors retrieved in April, and scallops were observed on 9 of the 11 retrieval dates (Figure 48). No spat were found in collectors retrieved in late August or September. Field-sampling events were not conducted during February. Recruitment shell height descriptive statistics were calculated for each retrieval when spat were present, are listed in the Pine Island Sound South table in Appendix 6, and include the maximum, minimum, average, standard deviation, total number measured, and the percent of those shell heights grouped into three size classes: 0-5 mm, 6-15 mm, and >15 mm.

3.11.3 Pine Island Sound Area Restoration Activities

On February 23, 2011, FWRI scientists transported 300 scallops harvested from Tampa Bay supplemental collectors and cultured in Bayboro Harbor to Pine Island Sound where they were delivered to Mark Thompson of SCCF. Those scallops were divided into sets of 25 individuals and then distributed to volunteers who deployed them into cages hung off of local docks. Volunteers who “adopted” these scallops monitored them monthly by removing dead shells and recording the shell heights of any remaining live scallops.

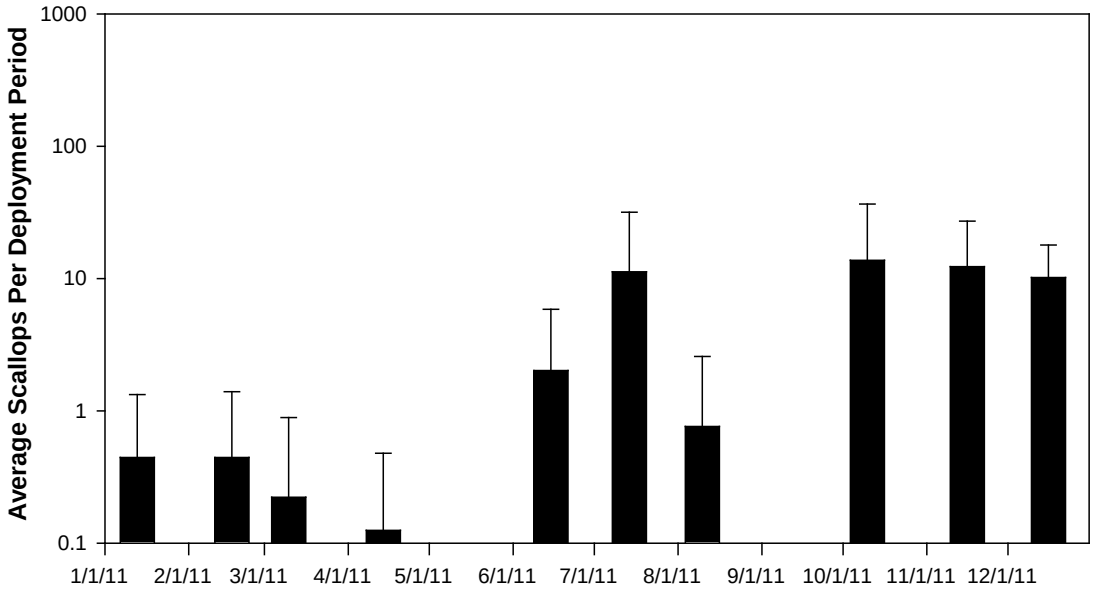

Figure 47. Bay scallop recruitment observed on collectors deployed and retrieved in Pine Island Sound North in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date.

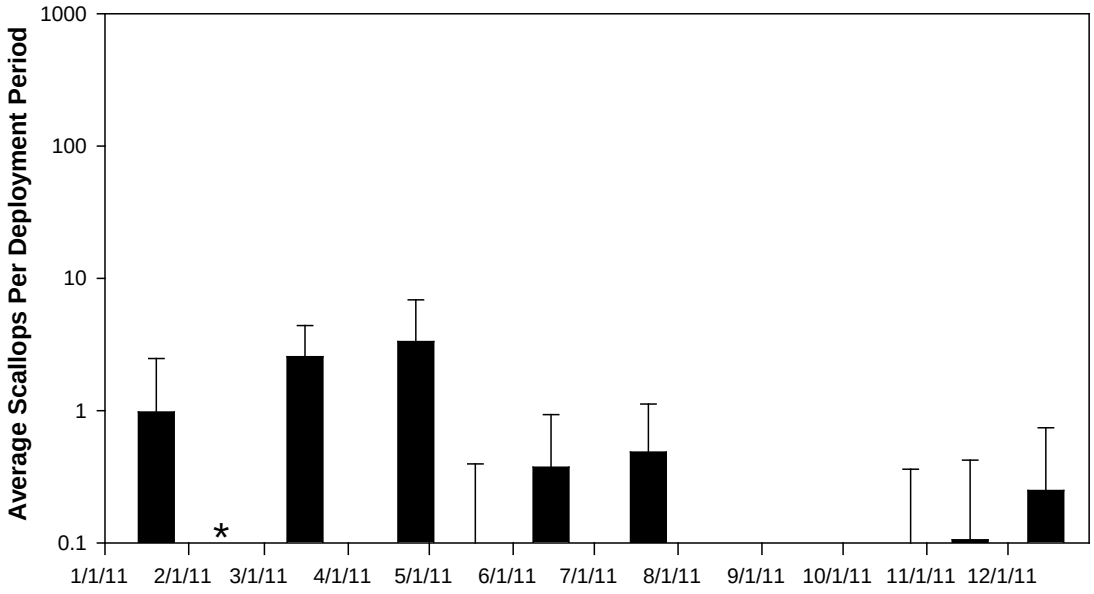

Figure 48. Bay scallop recruitment observed on collectors deployed and retrieved in Pine Island Sound South in 2011. The bars represent the average and standard deviation of the number of scallops observed per collector during a standard 8-week deployment period plotted by retrieval date. Asterisks denote months when no collectors were retrieved.

4.0 OTHER SPECIES

In conjunction with our scallop surveys, densities of several large gastropod species observed within the shallow-water grassbeds were recorded in 2011. The number of horse conchs (*Pleuroploca gigantea*), lightning whelks (*Busycon contrariu.*), and tulip snails (*Fasciolaria spp*) were recorded for each station (600 m^2 area) surveyed during summer and fall sampling events.

Additionally, the number of calico scallops (*Argopecten gibbus*), Asian green mussels (*Perna viridis*), and invasive titan acorn barnacles (*Megabalanus coccopoma*) present on bay scallop collectors in 2011 was recorded. Data are reported as presence/absence for those species. Further data was recorded for green mussel recruits observed on the small round float of each bay scallop collector retrieved in Tampa Bay and Sarasota Bay North. Green mussels present on those floats were counted and the first 30 shell lengths (mm) measured.

4.1 Gastropods

For the third consecutive year, abundances of three large marine snails were recorded during bay scallop abundance surveys (Figure 49). Most of the tulip snails observed were banded tulips (*F. hunteria)*. Some true tulips (*F. tulipa)* were observed, however, no attempts to quantify to species level were made. The total number of both horse conchs and tulip snails observed in the summer of 2011 decreased while the total number of lightning whelks observed increased, relative to 2010. Of the 71 lightning whelks recorded in the summer of 2011, 55 were observed in Pine Island Sound. Gastropod abundances were also recorded during the 2011 fall bay scallop surveys, but those data were not plotted. In 2011, the total number of both lightning whelks and tulip snails decreased from summer to fall while the total number of horse conchs increased. All of the 25 horse conchs recorded in the fall of 2011 were observed in St. Joseph Bay.

4.2 Calico Scallops (*Argopecten gibbus*)

Calico scallops were present on St. Andrew Bay collectors in July; on Sarasota Bay North collectors in May; on Sarasota Bay South collectors in May and June; and on Charlotte Harbor area collectors in April. No calico scallop spat were observed on collectors deployed in the other study sites during calendar year 2011.

4.3 Asian green mussel (*Perna viridis*)

Green mussels were present on Tampa Bay collectors in May, June, and August through November; on Sarasota Bay North collectors in June, October, and November; and on Sarasota Bay South collectors in May, June, July, September, October, and November. No green mussels were observed on collectors deployed in the other study sites during calendar year 2011.

The number of green mussels observed on donut floats attached to collectors deployed in 2011 increased in Tampa Bay (n= 21) and decreased in Sarasota Bay North (n=3) relative to 2010. The average shell length (SL) of the mussel spat collected in 2011 from Tampa Bay was 7.6 mm, and the average SL of spat collected in 2011 from Sarasota Bay North was 6.5. The minimum and maximum SLs recorded in 2011 were 4.2 and 16.2 mm in Tampa Bay and 5.2 and 9.0 mm in Sarasota Bay North.

4.4 Titan acorn barnacle (*Megabalanus coccopoma*)

Titan acorn barnacles were present on St. Andrew Bay collectors from April through July, November, and December; and on St. Joseph Bay collectors in May, June, and December. No titan barnacles were observed on collectors deployed in the other study sites during calendar year 2011.

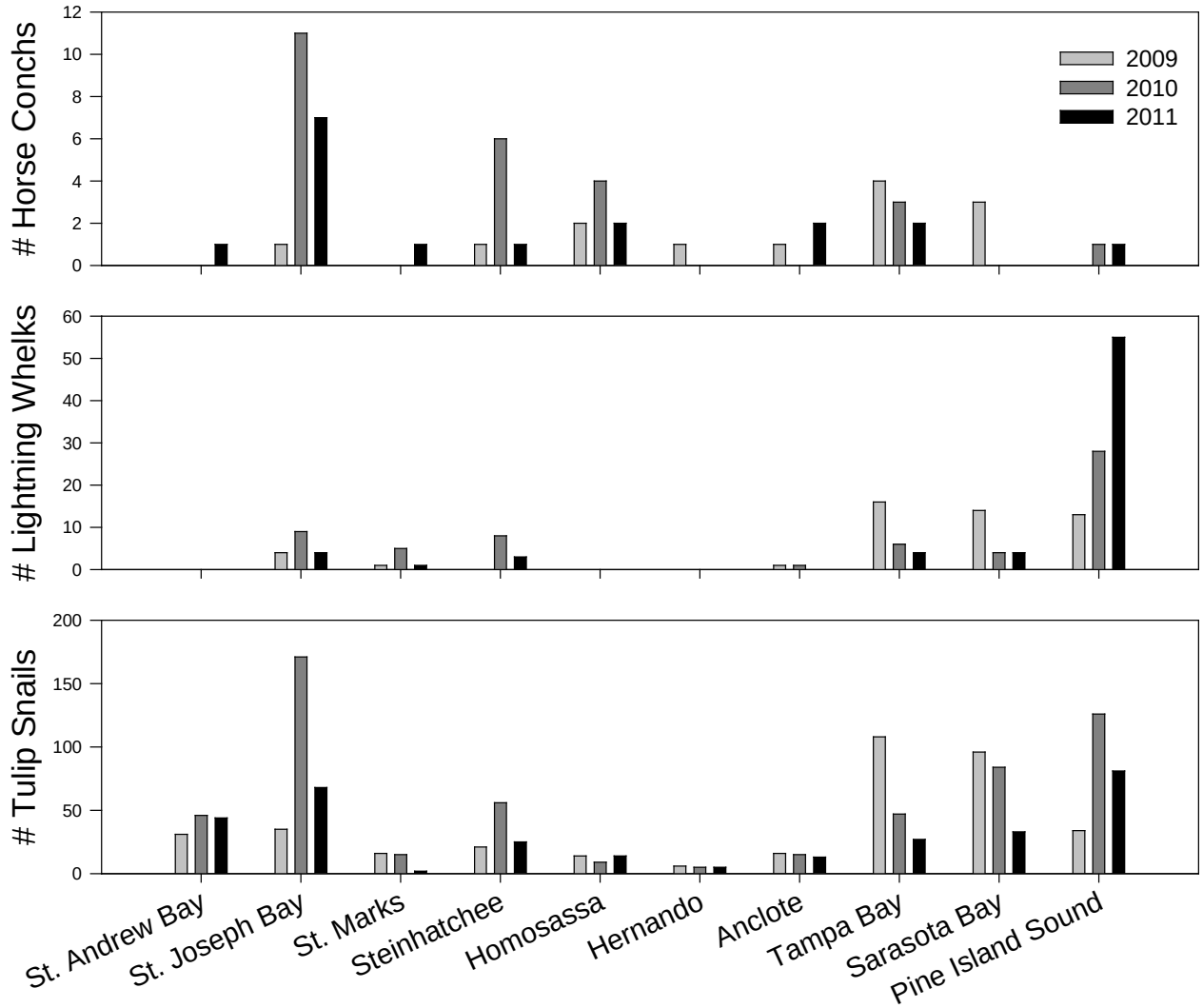

Figure 49. Total number of horse conchs (*Pleuroploca gigantea*), lightning whelks (*Busycon contrarium*), and tulip snails (*Fasciolaria spp.*) observed in seagrass beds at each site during summer abundance surveys conducted from 2009 to 2011.

5.0 SUMMARY

In 2011, in response to a request from Florida's Governor and members of the legislature, FWC opened the bay scallop recreational fishing season one week early (June 25) and extended it two weeks (to September 25) beyond the designated season closure date (September 10) to provide further assistance to communities that may have suffered a negative economic impact related to 2010's Deepwater Horizon Oil Spill. As a result of those changes to the bay scallop regulations and the second consecutive extended season, FWRI scientists in the Molluscan Fisheries program were asked to conduct post-season abundance surveys to detect changes in population density where harvest occurred.

5.1 Abundance Surveys

The results of abundance surveys conducted in the summer of 2011 suggest that the statewide bay scallop population is stable. The total number of scallops recorded in the summer of 2011 increased by 86% from the previous summer. Some sites had considerable drops in abundance from the previous year (Tampa Bay and Sarasota Bay) while others increased dramatically (St. Andrew Bay and Hernando). Statistical comparisons ($P < 0.01$) of sites surveyed in the summer of 2011 are shown in Figure 50. The local population with the highest average abundance in 2011 was the Anclote study site (270 scallops per 600 m^2), and the site with the greatest increase in average abundance was just to the north in the Hernando area. The Hernando area was statistically similar to the St. Joseph Bay and Steinhatchee sites, with mean abundances ranging from 136-155 scallops per 600 m^2. In two of the four sites where restoration efforts are ongoing (St. Andrew Bay and Pine Island Sound) the mean abundances increased from the 2010 observed values. Those two sites are at the farthest reaches of the gulf-wide study sites, and the increase in mean abundances is a positive sign. The St. Marks and Homosassa sites were statistically similar to each other with mean abundances of 19 and 38 scallops per 600 m^2. Those two sites are nestled between the St. Joseph, Steinhatchee, and Hernando sites, which have significantly higher abundances. The Tampa Bay and Sarasota Bay sites were statistically similar to each other and were significantly lower than all other sites surveyed in the summer of 2011. The bay scallop populations at those sites continue to fluctuate and are targeted for future restoration activities.

The total abundance of bay scallops observed at the six locations where post-season surveys were conducted decreased by 75% from summer to fall in 2011. The average seasonal decrease in abundance in previous years where post-harvest surveys were conducted was 54%, and the greatest decrease in abundance from pre- to post-season occurred in 1994 (84%). The total mortality recorded this year appears to be within the normal range of population decline for this annual animal, but upon further examination, some concerns become apparent. Of the four sites open to bay scallop recreational harvest that were surveyed again in the fall, only Homosassa exhibited numbers that were borderline collapsed. This severe decline was most likely due to a combination of factors, with recreational harvest chief among those. In comparison, even though the bulk of the St. Joseph Bay scallop population (82.8%) was absent, and was probably removed via harvesters, there was still a healthy amount (>25 scallops per 600 m^2) remaining in October. The similar abundances of bay scallops observed at stations in open and closed zones in the Hernando area in both the summer and fall surveys suggests that this area was not heavily fished by recreational harvesters. More likely, participating harvesters entering from Hernando County traveled north to the Homosassa area. Of the six sites surveyed in the fall, the scallop abundance in the Anclote area decreased the most. Although some poaching did occur in this area, there are likely other factors contributing to the decrease observed at this site. Figure 51 depicts the temperature (°C) and salinity values (ppt) recorded in 2011 from Sea-Bird data loggers deployed at the three

sites along the central portion of the west coast. The salinity values recorded at the Anclote site dropped below 24 ppt in mid August and remained low for a week while the Homosassa River and Crystal River salinities remained above 27 ppt during this same period. This suggests some sort of localized low salinity event occurred in the Pasco area between our pre- and post-season surveys, which may have had a severe effect on this local population.

In an attempt to gather more information on recreational bay scallop fishing efforts, FWRI scientists initiated an online web survey in 2011. The survey was short, simple, and user friendly. For each date when scalloping occurred, the harvesters were asked what county waters they collected from, how many scallopers were in their party, the total number of scallops collected, the total volume of scallops collected (in gallons of whole shell or pints of meats), and the total time they spent collecting (in hours and/or minutes). Figure 52 illustrates the distribution of responses (n = 238) by county. Citrus County had the highest number of responses which could be indicative of the larger volume of people harvesting in that area.

FWRI scientists also accessed the informal weekly reports from the FWC's Department of Law Enforcement found at http://myfwc.com/about/inside-fwc/le/weekly-reports. Bay scallop related citations issued by LE staff in 2011 included dive flag violations, over-the-limit and illegal harvest (closed areas) violations, and violations for those who failed to have a salt-water fishing license. In the 13 weekly reports spanning the length of the recreational bay scallop season, scallop-related violations were noted in 8 of those, with the most extreme citation issued for possession of 14 gallons over the allowable daily limit.

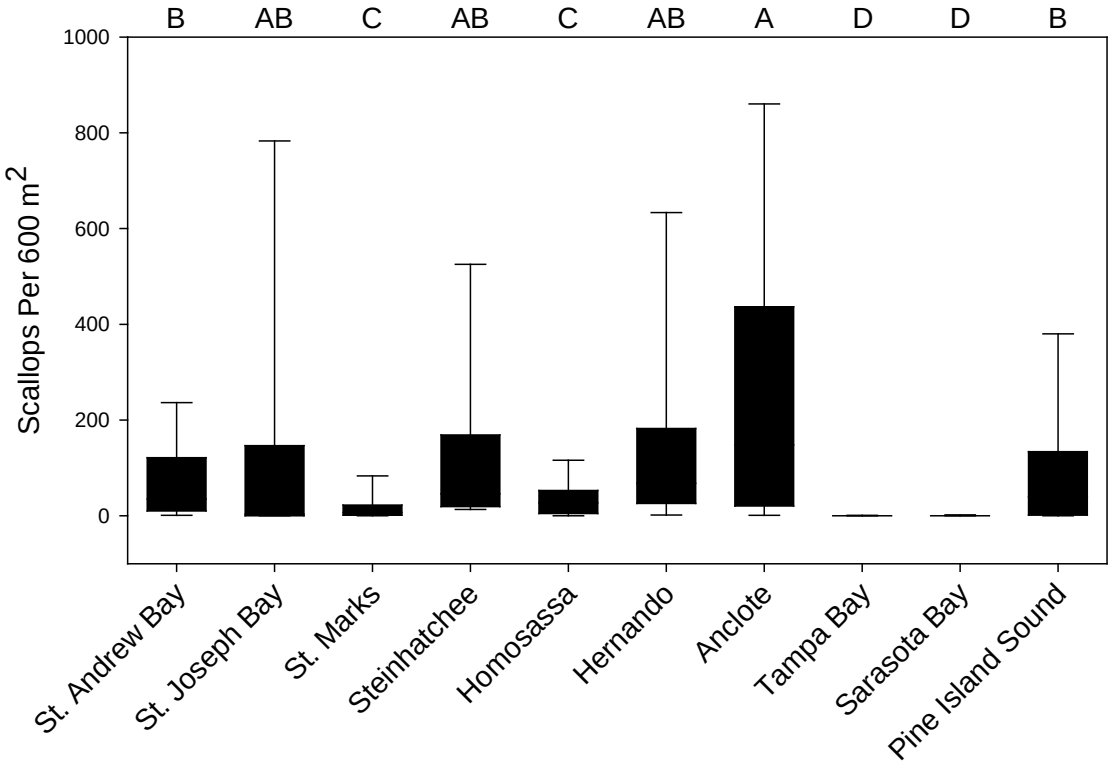

Figure 50. Statistical comparisons of bay scallop abundances among sites surveyed in the summer of 2011. The box area represents the 25^{th} – 75^{th} percentiles of the station abundances per site, and the error bars above and below the box represent the 10^{th} and 90^{th} percentiles. Letters above the error bar denote differences among sites at a significance level of 0.05.

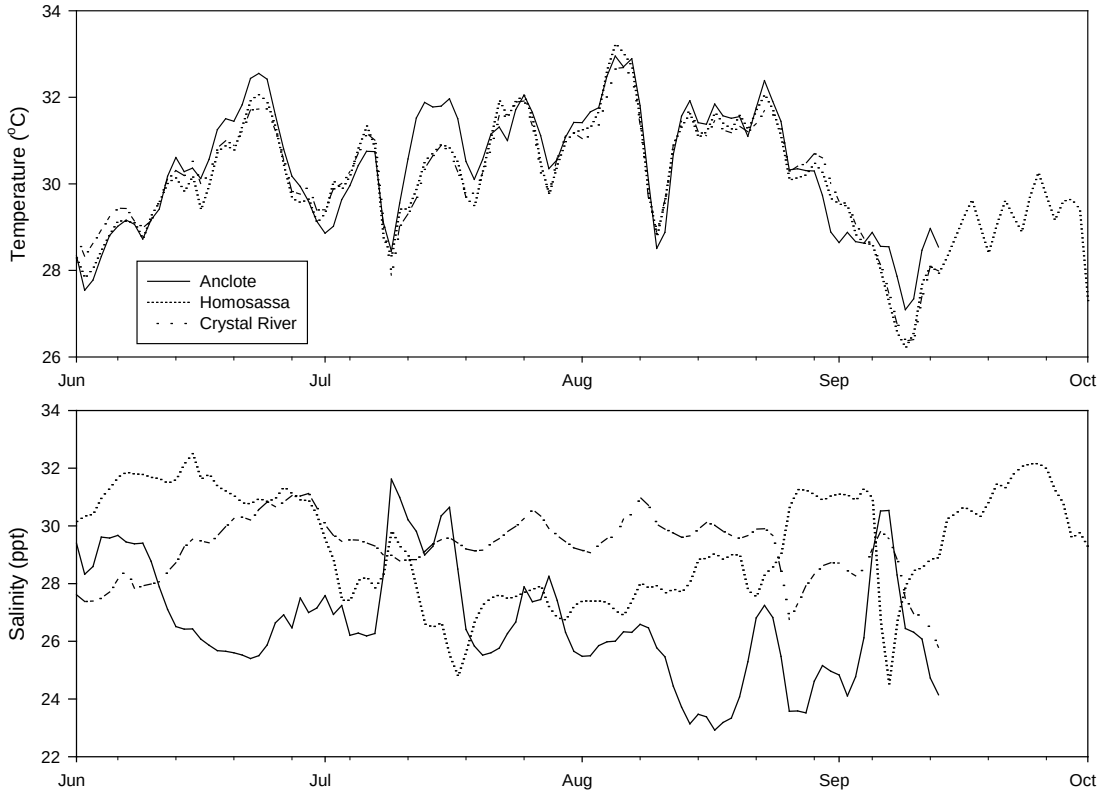

Figure 51. Temperature and salinity values recorded in June through September 2011 from Sea-Bird data loggers deployed at three sites along the west coast of Florida.

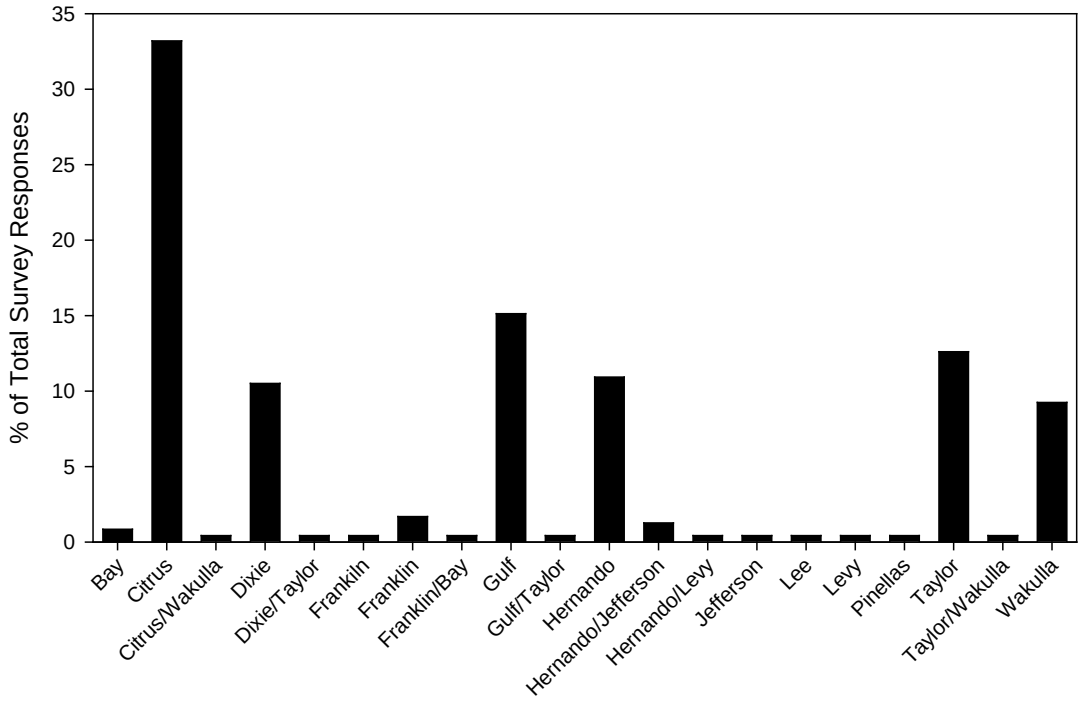

Figure 52. Percent of online survey responses reported by recreational harvesters in 2011 plotted by county.

5.2 Recruitment Monitoring

Statewide bay scallop recruitment observed in 2011 decreased at six sites: St. Andrew Bay, St. Joseph Bay, Tampa Bay, Sarasota Bay (both North and South), and Charlotte Harbor. Recruitment increased at 4 sites: Homosassa, Hernando, Anclote, and Pine Island Sound (both North and South). A total of 12,154 recruits were observed on 507 of the 1370 (37.0%) collectors processed, for an average of 8.9 spat per collector. Those numbers are slightly lower than the observed values for 2010 (16,061 spat total and 11.5 average number per processed collector). Recruitment peaked during the colder months (November through January) at six of the sites: St. Andrew Bay, St. Joseph Bay, Homosassa, Hernando, Anclote, and Tampa Bay. Atypical recruitment peaks were observed in February at the Sarasota Bay North, Sarasota Bay South and Charlotte County sites, in April at the Pine Island South site, and in July at the Pine Island North site. Recruitment to collectors in St. Andrew Bay, St. Joseph Bay, Homosassa, Hernando, Anclote and Pine Island Sound was continuous, with spat observed in more than 75% of the deployment periods, while recruitment in the southern estuaries (Tampa Bay, Sarasota Bay and Charlotte Harbor) was intermittent. Note also that continuous recruitment was present wherever healthy scallop abundances were observed in the June surveys. Statistical similarities ($P < 0.01$) of bay scallop recruitment per 8-week deployment period among sites monitored in 2011 are shown in Figure 53. The St. Andrew site had the highest recruitment while the Homosassa and Pine Island South sites had the lowest recruitment recorded.

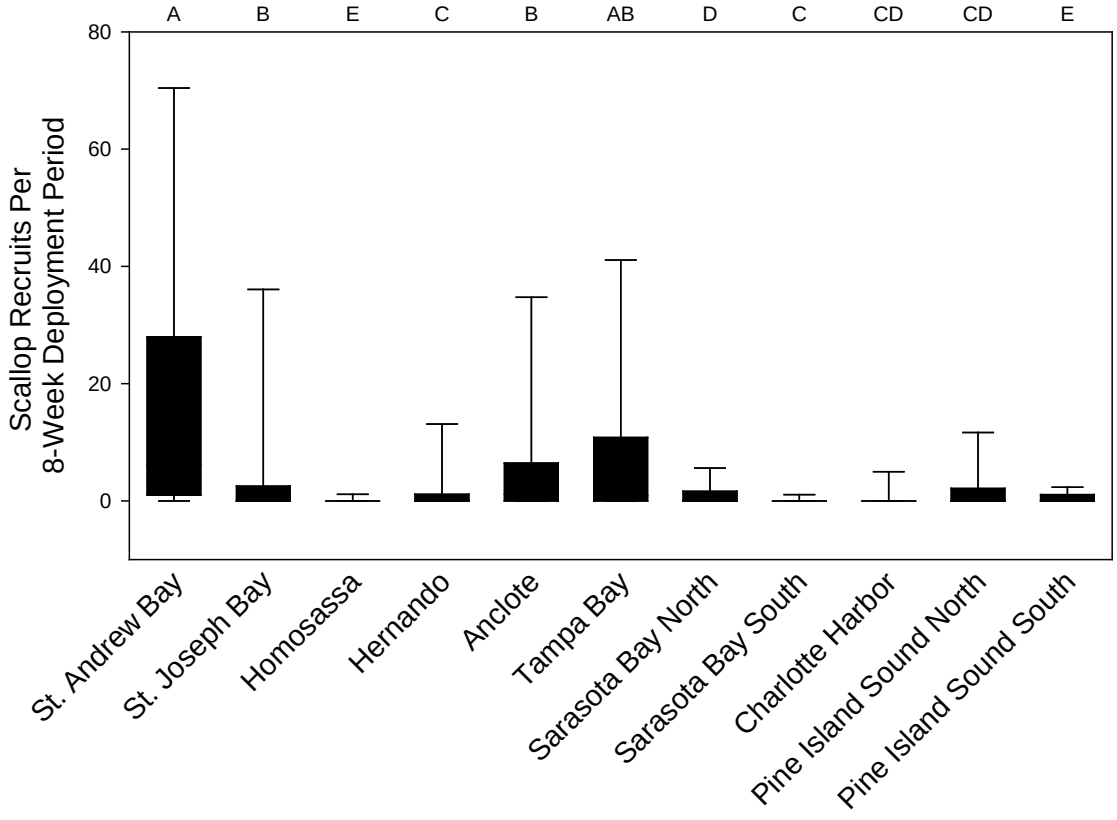

Figure 53. Statistical comparisons of bay scallop recruitment per 8-week deployment period among sites monitored in 2011. The box area represents the 25th – 75th percentiles of the station abundances per site, and the error bars above and below the box represent the 10th and 90th percentiles. Letters above the error bar denote similar averages at a significance level of 0.05.

5.3 Restoration Activities

The harvest of natural recruits for restoration efforts continues to be successful and the number of parties, both scientific and public, willing to participate continues to increase. At this time, scientists have yet to confirm whether or not these minimalistic efforts are in fact boosting local populations, but the annual abundances and recruitment data hint at population rebounds in sites where efforts have been conducted over several years. FWRI scientists have been conducting restoration efforts in both St. Andrew Bay and Pine Island Sound consistently for the past few years, and both abundance and recruitment rates at those sites have increased. Those areas, as well as the other areas south of Pinellas County, are affected periodically by red tide events and as a result, populations will most likely continue to fluctuate. Because of this, FWRI scientists will continue stocking those areas with wild-caught recruits for as long as they are able to do so.

6.0 FUTURE PLANS

6.1 Abundance Surveys

We will continue our summer abundance surveys in 2012 as usual. We will not resample the additional, random stations in either the Steinhatchee or Homosassa areas, dropping back to the traditional 20 stations per site. Finally, if time and funding allows, we would like to add survey stations in Florida Bay.

We are aware of the pressures exerted on management officials related to the bay scallop recreational fishery, and for 2012 we hope to publish some of our long-term data sets to provide another source of information regarding this Florida species. Currently, we have 18 years of abundance data at select sites, as well as 15 years of recruitment monitoring data at many of those same sites. We hope to be able to combine those data sets to not only describe abundance and recruitment trends and projections but to also ascertain adult-recruit relationships.

6.2 Recruitment Monitoring

We plan to statistically evaluate the recruitment stations within each site and determine where stations should be added, relocated, or eliminated in order to adequately capture bay scallop recruitment within that site. All other recruitment monitoring will continue as usual.

6.3 Restoration Activities

We plan to continue with local restoration efforts as long as wild-caught recruits are available. In the southern areas (Sarasota County, Charlotte County, and Lee County), we plan to deploy the cages with scallops earlier in the year to better capture the growth rates of the developing scallops and to reduce mortalities associated with transport during the warm summer months. Cage deployments in St. Andrew Bay will continue as usual. We will also assist with, when needed, any larval releases that may occur in the southern estuaries.

6.4 Outreach

In 2012, we plan to produce and distribute mail-in surveys as well as continue the online survey to address fishing effort in the open and open-adjacent areas briefly before, during, and shortly after the recreational bay scallop season. We plan to partner with law enforcement and members of the Fisheries Dependent Monitoring group working in the Gulf of Mexico's coastal counties in order to increase distribution of the mail-in surveys. The goal is to collect as much information as possible to determine if we can calculate accurate measures of harvest.

7.0 REFERENCES

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8.0 APPENDICES

Appendix 1.

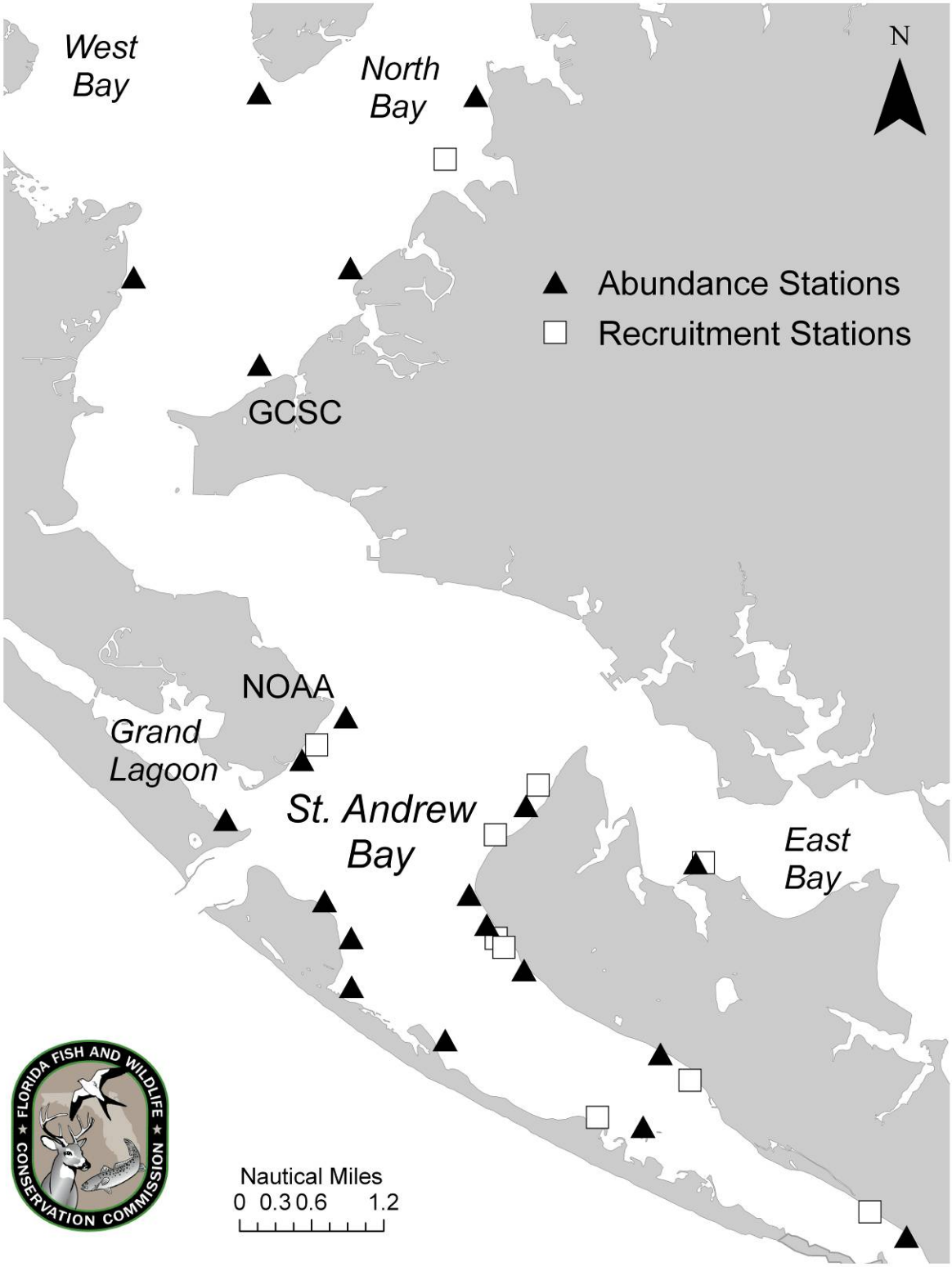
A1. Bay scallop abundance study sites sampled by in 2011. The box represents the area open to recreational harvest (http://www.myfwc.com/fishing/saltwater/regulations).

Appendix 2

A2. Bay scallop recruitment study sites monitored in 2011.

Appendix 3

A3. St. Andrew Bay annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.



Appendix 4

A4. Bay scallop abundance survey shell height minimums, maximums, averages, and standard deviations (mm) observed in the summer by FWRI staff.

Site	Year	Min	Max	Range	Ave	StDev
St. Andrew Bay	2010	19	70	51	41.3	13.5
	2011	11	66	55	44.1	5.2
St. Joseph Bay	2010	22	82	60	43.1	14.5
	2011	15	55	40	43.5	5.4
Apalachee Bay	2010	12	69	57	46.6	9.5
	2011	31	71	40	49.0	6.0
Steinhatchee	2010	21	68	47	43.6	6.3
	2011	23	66	43	44.7	5.3
Homosassa	2010	18	68	50	46.2	6.2
	2011	32	59	27	52.0	3.3
Hernando	2010	20	70	50	47.3	6.8
	2011	22	60	38	44.0	6.2
Anclote	2010	29	76	47	48.1	5.9
	2011	31	63	32	49.6	4.1
Tampa Bay	2010	30	64	34	46.2	7.6
	2011	52	59	7	56.0	3.6
Sarasota Bay	2010	31	63	32	48.2	8.6
	2011	45	50	5	47.3	2.5
Pine Island Sound North	2010	27	73	46	50.1	7.7
	2011	37	72	35	56.1	6.4

Appendix 5

A5. Bay scallop abundance survey shell height minimums, maximums, averages, and standard deviations (mm) observed in the fall of 2011 by FWRI staff.

Site	Min	Max	Range	Ave	StDev
St. Andrew Bay	23	70	47	54.5	5.8
St. Joseph Bay	38	76	38	61.3	6.9
Steinhatchee	32	77	45	61.7	6.8
Homosassa	49	72	23	60.3	4.7
Hernando	45	68	23	56.4	3.8
Anclote	39	68	29	55.7	4.7

Appendix 6

A6. Bay scallop recruitment monitoring spat shell height minimum, maximum, average, standard deviation, total number measured, and percent per size class calculated for each retrieval date. Dash indicates data not applicable.

St. Andrew Bay								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
02/16/11	1.1	10.5	3.3	4.1	5	80.0	20.0	0.0
04/26/11	2.5	15.0	7.3	3.0	70	32.9	67.1	0.0
05/25/11	6.3	30.2	17.4	4.6	79	0.0	34.2	65.8
06/23/11	5.3	23.9	15.0	4.8	71	1.4	45.1	53.5
07/26/11	4.5	26.0	14.5	5.6	125	2.4	54.4	43.2
08/23/11	1.6	21.6	9.4	5.5	156	37.8	46.2	16.0
09/22/11	1.4	24.8	12.7	4.7	309	7.8	63.8	28.5
10/26/11	2.6	27.5	13.0	5.9	243	11.1	53.1	35.8
11/22/11	1.4	18.3	8.8	3.2	229	14.4	83.4	2.2
12/19/11	0.3	11.1	3.0	2.0	261	88.1	11.9	0.0

St. Joseph Bay								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/18/11	0.6	5.7	2.1	1.0	579	99.8	0.2	0.0
02/15/11	1.7	15.5	5.5	5.3	6	66.7	16.7	16.7
03/15/11	2.4	5.6	4.4	1.7	3	66.7	33.3	0.0
04/14/11	17.0	17.0	17.0	-	1	0.0	0.0	100.0
05/11/11	16.8	16.9	16.9	0.1	2	0.0	0.0	100.0
06/24/11	15.6	20.4	18.0	3.4	2	0.0	0.0	100.0
07/25/11	11.0	25.7	15.1	4.3	10	0.0	60.0	40.0
08/24/11	13.3	22.1	17.7	6.2	2	0.0	50.0	50.0
09/22/11	3.0	12.8	9.1	4.4	4	25.0	75.0	0.0
10/26/11	4.6	22.4	11.4	6.0	23	17.4	52.2	30.4
11/21/11	1.7	17.5	7.2	4.0	114	44.7	53.5	1.8
12/19/11	0.6	10.1	2.9	1.5	189	93.7	6.3	0.0

Appendix 6 – Continued

Homosassa								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/01/11	11.8	11.8	11.8	-	1	0.0	100.0	0.0
03/14/11	5.8	12.9	8.6	2.4	11	0.0	100.0	0.0
04/14/11	2.8	6.1	4.0	1.0	15	86.7	13.3	0.0
05/12/11	15.5	25.2	19.2	5.2	3	0.0	0.0	100.0
06/10/11	3.7	3.7	3.7	-	1	100.0	0.0	0.0
08/16/11	8.2	53.6	38.1	25.9	3	0.0	33.3	66.7
10/14/11	1.6	16.8	5.5	3.0	44	63.6	31.8	4.5
11/15/11	1.5	17.4	7.5	4.6	22	40.9	54.5	4.5
12/13/11	3.5	8.0	5.4	1.6	10	50.0	50.0	0.0

Hernando								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/11/11	1.2	5.6	2.9	1.3	15	93.3	6.7	0.0
02/09/11	2.6	3.8	3.2	0.8	2	100.0	0.0	0.0
03/14/11	3.9	21.8	12.9	12.7	2	50.0	0.0	50.0
04/14/11	3.7	6.6	5.1	0.9	21	66.7	33.3	0.0
05/12/11	9.7	12.2	11.0	1.8	2	0.0	100.0	0.0
06/10/11	9.6	9.6	9.6	-	1	0.0	100.0	0.0
09/14/11	11.0	11.0	11.0	-	1	0.0	100.0	0.0
10/14/11	1.2	12.1	3.7	2.5	81	88.9	11.1	0.0
11/15/11	1.0	17.4	7.2	4.1	319	37.9	59.9	2.2
12/13/11	2.5	15.2	6.0	1.9	160	40.6	59.4	0.0

Anclote								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/11/11	0.6	9.7	4.0	1.8	269	81.8	18.2	0.0
02/09/11	6.3	22.2	13.5	8.1	3	0.0	66.7	33.3
03/14/11	1.3	6.4	2.5	1.3	16	93.8	6.3	0.0
04/14/11	2.3	32.1	8.6	4.2	89	15.7	82.0	2.2
05/12/11	4.5	18.6	11.5	4.9	8	12.5	62.5	25.0
06/10/11	4.5	4.5	4.5	-	1	100.0	0.0	0.0
07/19/11	10.8	29.4	18.4	4.9	20	0.0	35.0	65.0
08/16/11	4.3	25.8	17.2	5.9	14	7.1	28.6	64.3
09/14/11	1.2	15.0	6.4	5.3	8	37.5	62.5	0.0
10/14/11	1.4	16.2	5.6	3.7	86	62.8	34.9	2.3
11/15/11	1.0	20.6	8.3	4.6	421	33.7	58.7	7.6
12/13/11	0.8	17.2	5.7	3.2	510	56.7	42.2	1.2

Appendix 6 – Continued

Tampa Bay								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
02/08/11	2.0	5.7	3.6	0.8	57	98.2	1.8	0.0
03/17/11	1.9	20.1	5.8	3.7	23	65.2	30.4	4.3
04/18/11	6.5	24.4	14.7	4.6	30	0.0	50.0	50.0
05/13/11	9.9	23.2	17.2	3.4	46	0.0	23.9	76.1
06/16/11	13.2	19.6	16.4	4.5	2	0.0	50.0	50.0
12/15/11	1.0	15.8	7.1	2.8	259	26.6	73.0	0.4

Sarasota Bay North								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
02/08/11	1.0	8.1	2.6	1.2	74	98.6	1.4	0.0
03/17/11	3.5	14.2	7.8	2.4	31	9.7	90.3	0.0
04/18/11	8.6	18.6	13.9	3.6	6	0.0	66.7	33.3
05/13/11	18.2	18.2	18.2	-	1	0.0	100.0	0.0
12/15/11	1.0	11.8	4.5	2.7	37	70.3	29.7	0.0

Sarasota Bay South								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
02/10/11	0.8	4.2	2.6	0.8	182	100.0	0.0	0.0
03/09/11	2.1	11.9	6.5	2.1	101	35.6	64.4	0.0
07/11/11	12.4	17.8	15.1	3.8	2	0.0	50.0	50.0

Charlotte Harbor								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/29/11	7.3	7.3	7.3	-	1	0.0	100.0	0.0
02/26/11	0.9	11.6	6.4	1.8	263	28.9	71.1	0.0
04/02/11	2.7	21.7	9.9	6.0	14	28.6	57.1	14.3
04/28/11	15.5	17.8	16.7	0.9	6	0.0	0.0	100.0

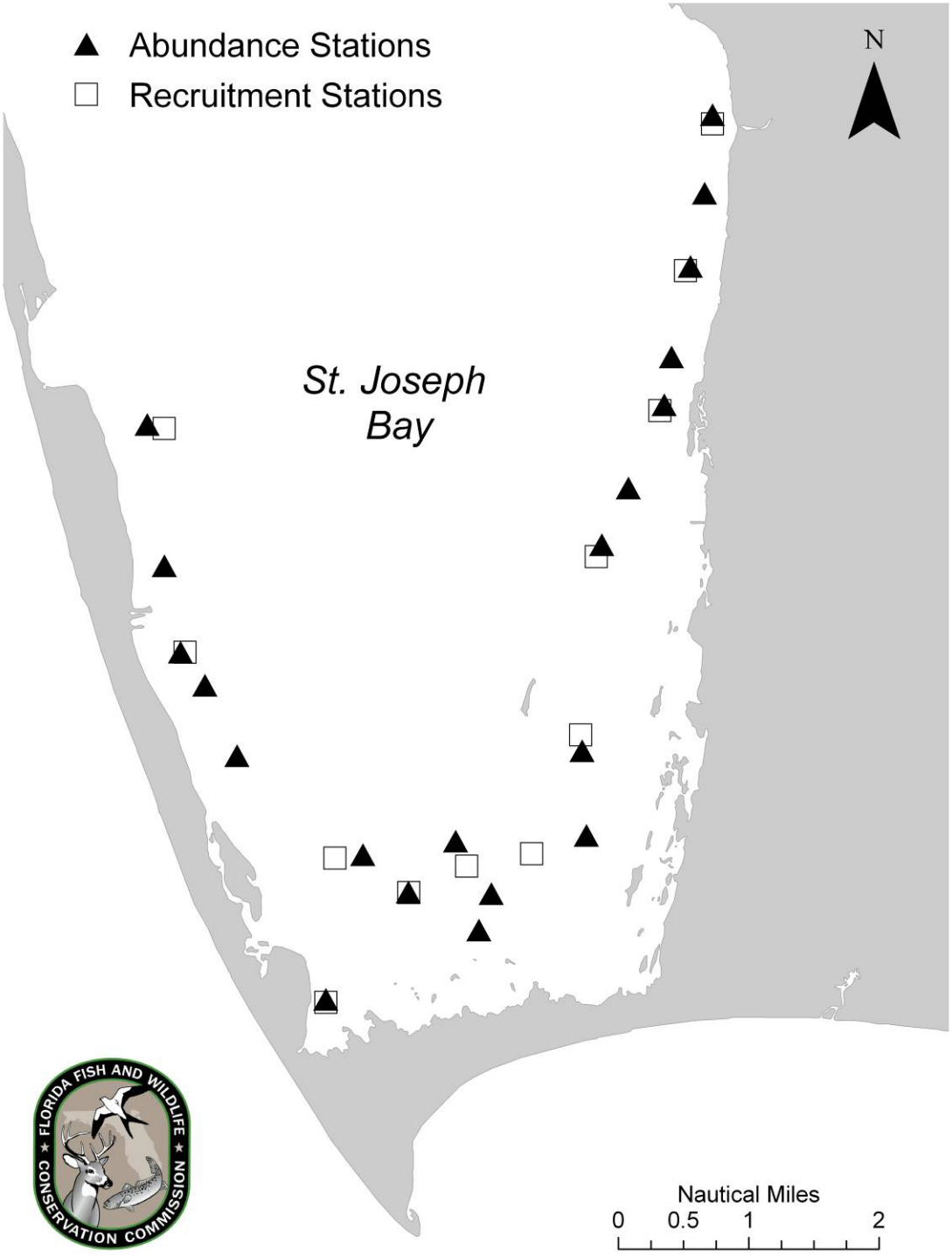
Appendix 6 – Continued

Pine Island Sound North								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/14/11	4.0	8.7	7.1	1.7	6	16.7	83.3	0.0
02/17/11	3.2	4.5	4.1	0.6	4	100.0	0.0	0.0
04/14/11	7.8	7.8	7.8	-	1	0.0	100.0	0.0
06/15/11	2.5	17.2	5.7	4.2	18	72.2	22.2	5.6
07/14/11	4.4	19.7	12.2	3.3	81	4.9	80.2	14.8
08/10/11	11.9	14.7	13.5	1.0	5	0.0	100.0	0.0
10/10/11	3.5	20.4	11.8	4.3	68	7.4	70.6	22.1
11/16/11	2.3	23.5	12.9	4.8	37	8.1	62.2	29.7
12/16/11	2.1	17.8	11.0	3.5	42	2.4	83.3	14.3

Pine Island Sound South								
Date	**Min**	**Max**	**Ave**	**StDev**	**Total**	**% 0-5 mm**	**% 6-15 mm**	**% > 15 mm**
01/20/11	1.4	3.6	2.4	0.9	8	100.0	0.0	0.0
03/16/11	5.6	17.0	9.8	2.4	31	0.0	96.8	3.2
04/26/11	5.8	32.6	22.7	7.7	50	0.0	20.0	80.0
05/18/11	18.8	18.8	18.8	-	1	0.0	0.0	100.0
06/15/11	14.7	14.7	14.7	-	1	0.0	100.0	0.0
07/21/11	19.2	23.1	20.6	1.6	5	0.0	0.0	100.0
10/26/11	23.4	23.4	23.4	-	1	0.0	0.0	100.0
11/17/11	10.2	10.2	10.2	-	1	0.0	100.0	0.0
12/15/11	2.8	4.9	3.9	1.5	2	100.0	0.0	0.0

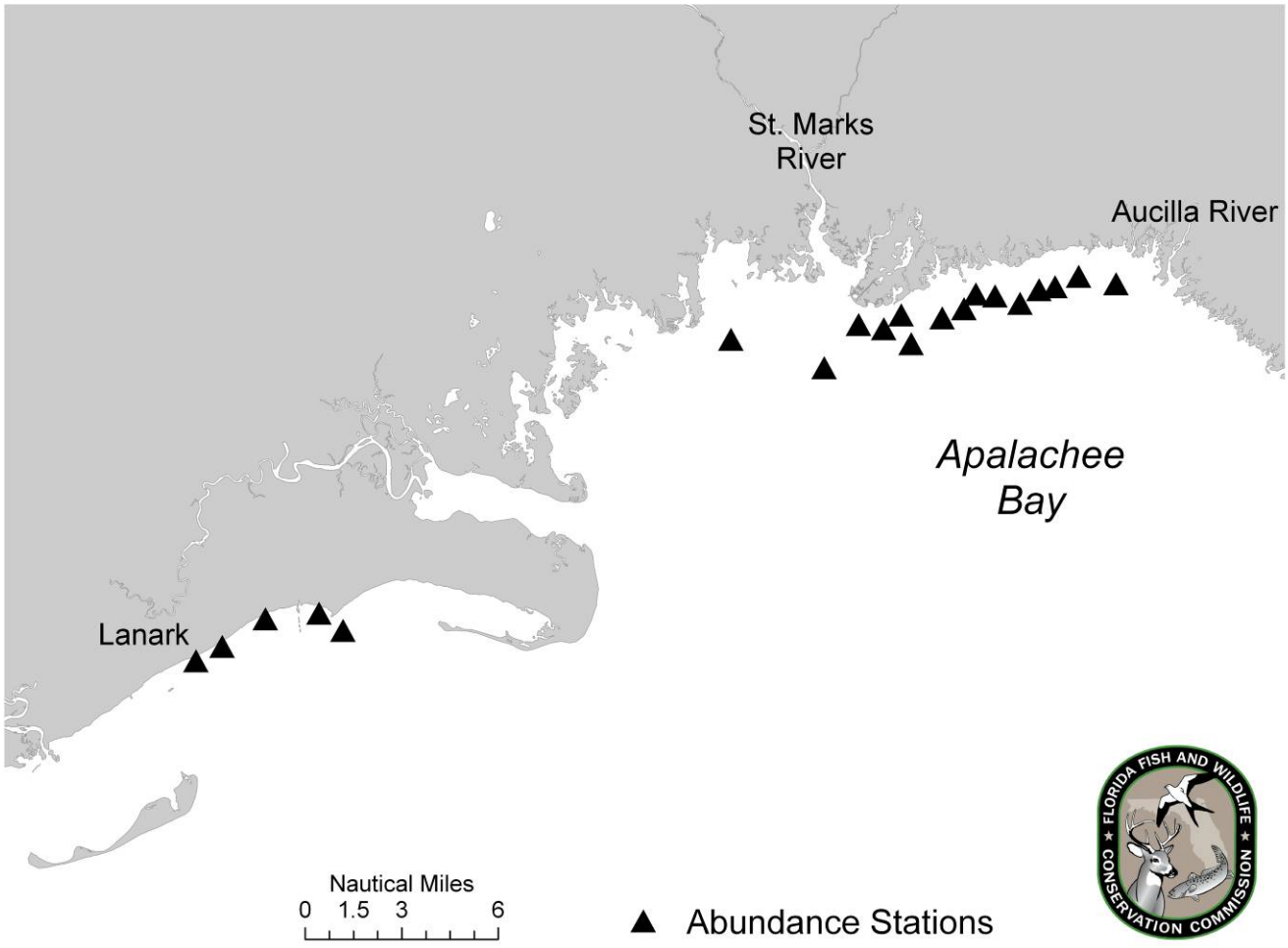
Appendix 7

A7. St. Joseph Bay annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.



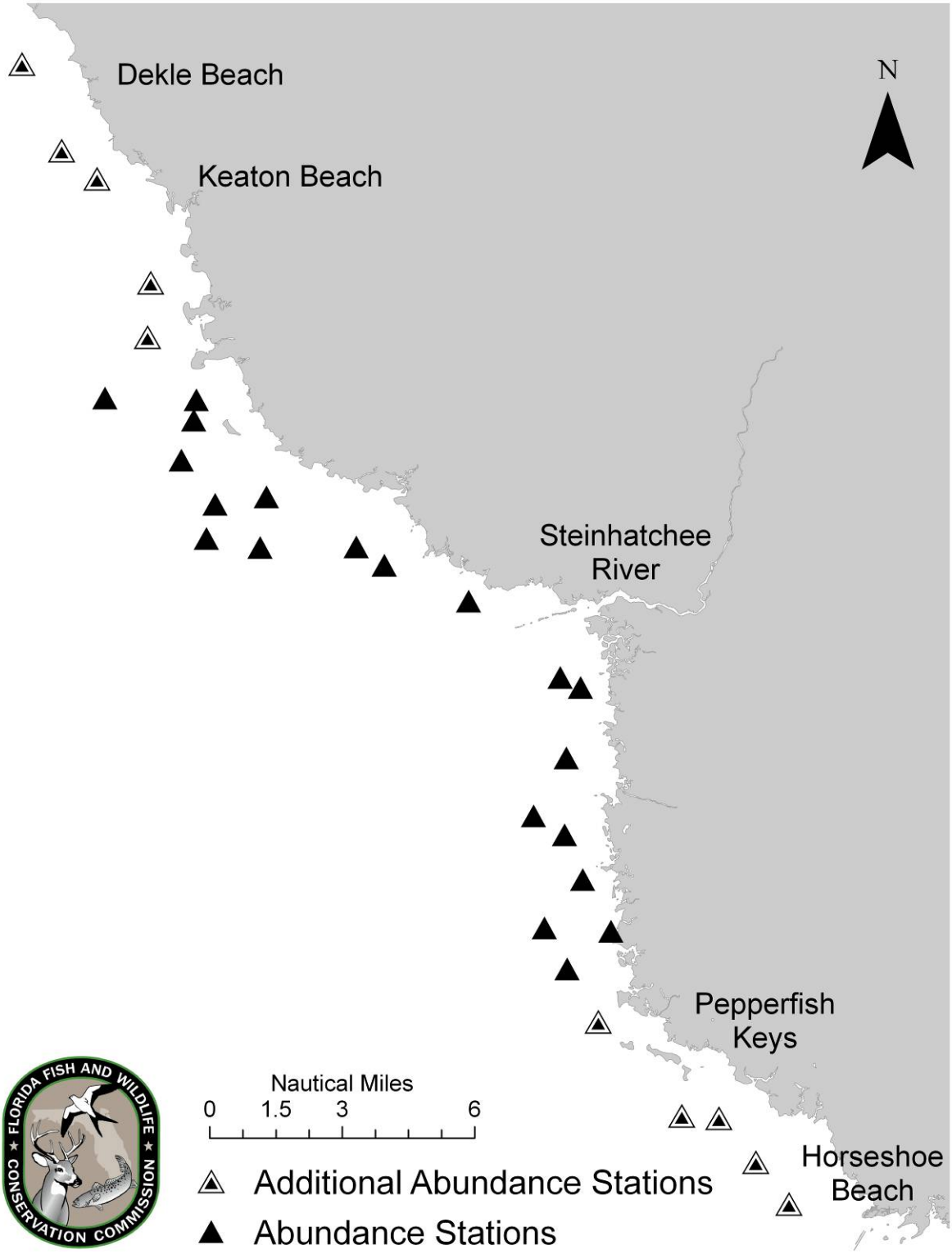
Appendix 8

A8. Apalachee Bay Area annual abundance (triangle) stations sampled in 2011.



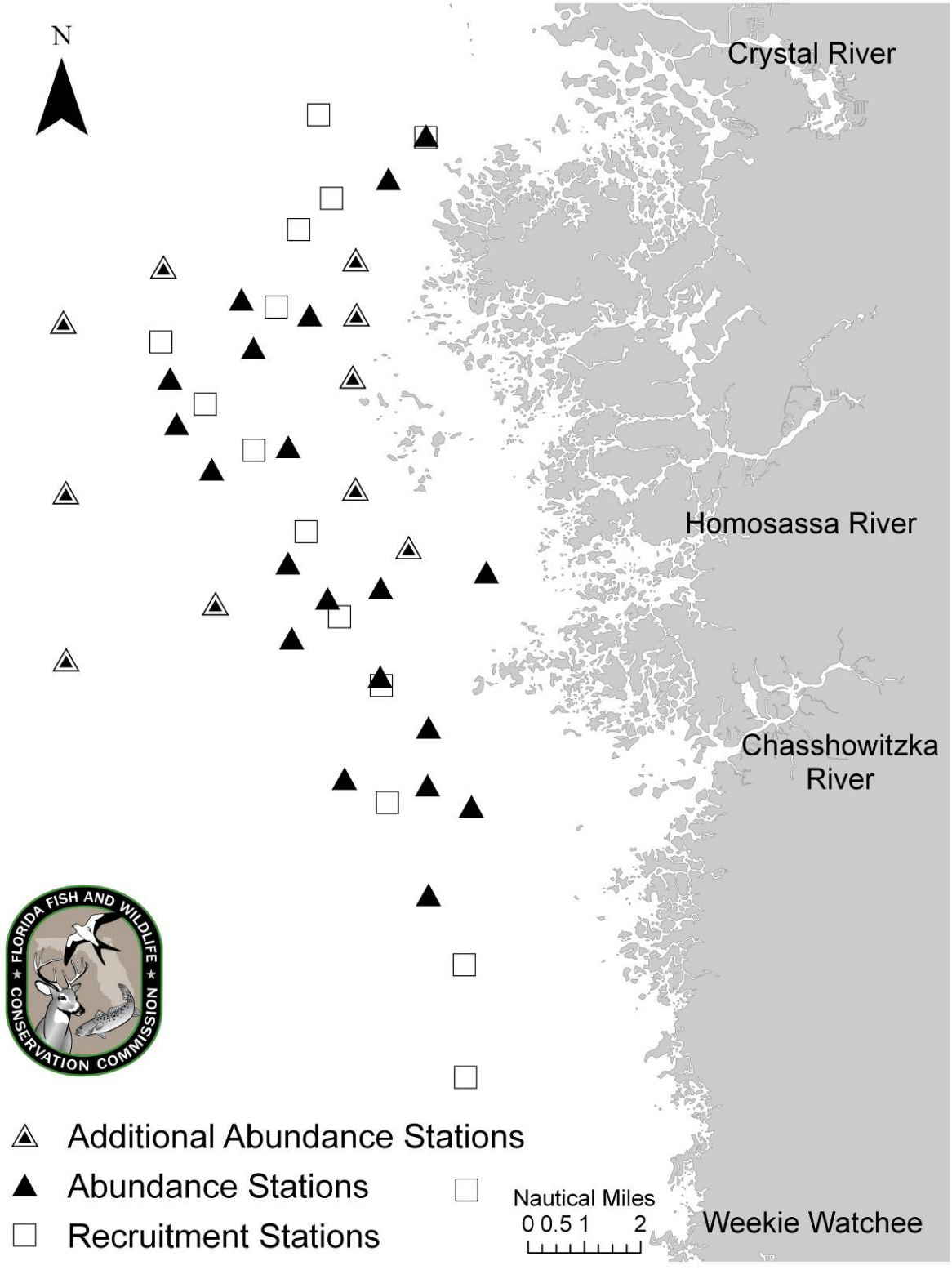
Appendix 9

A9. Steinhatchee annual abundance (triangle) stations sampled in 2011.



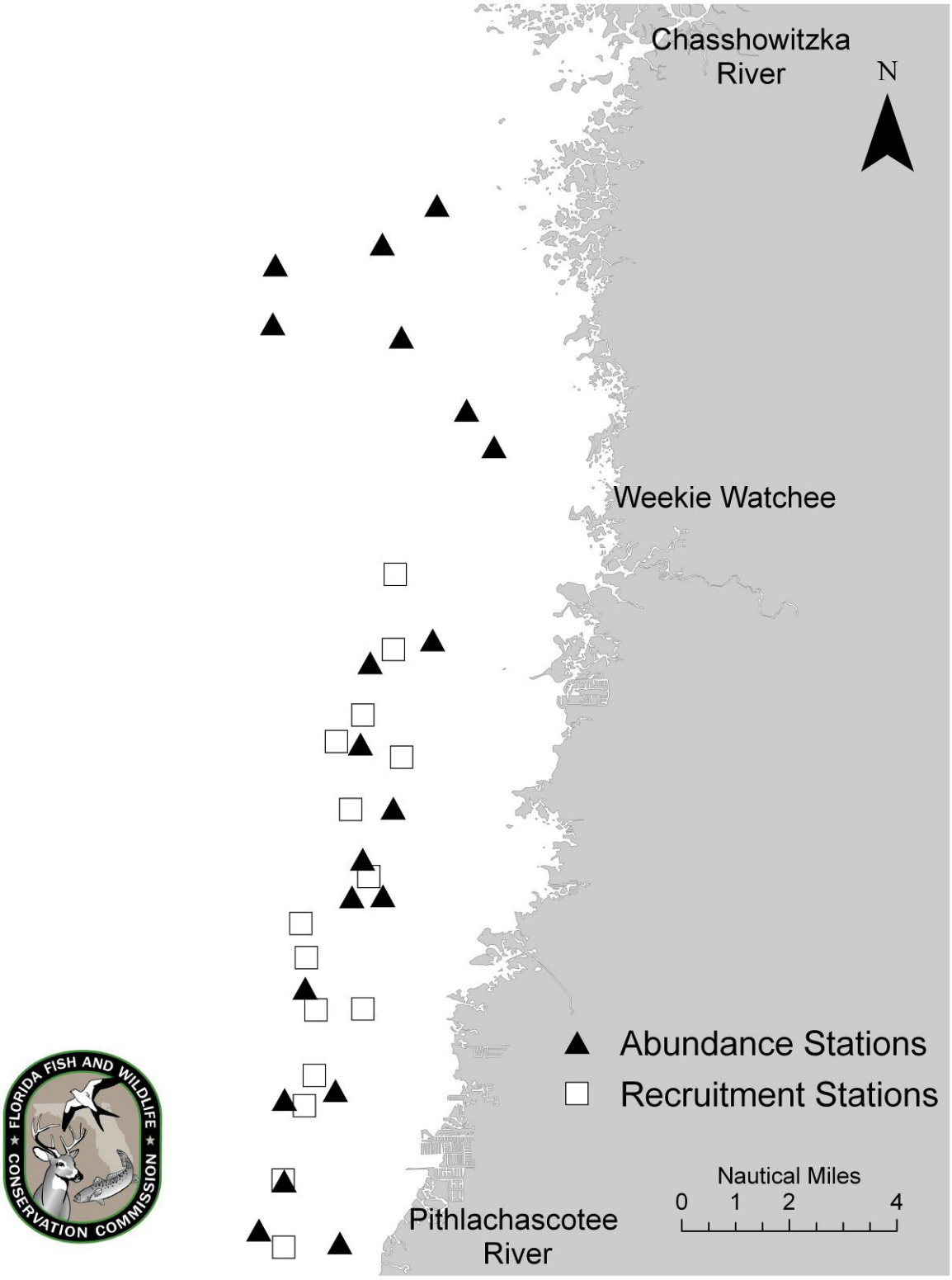
Appendix 10

A10. Homosassa area annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.



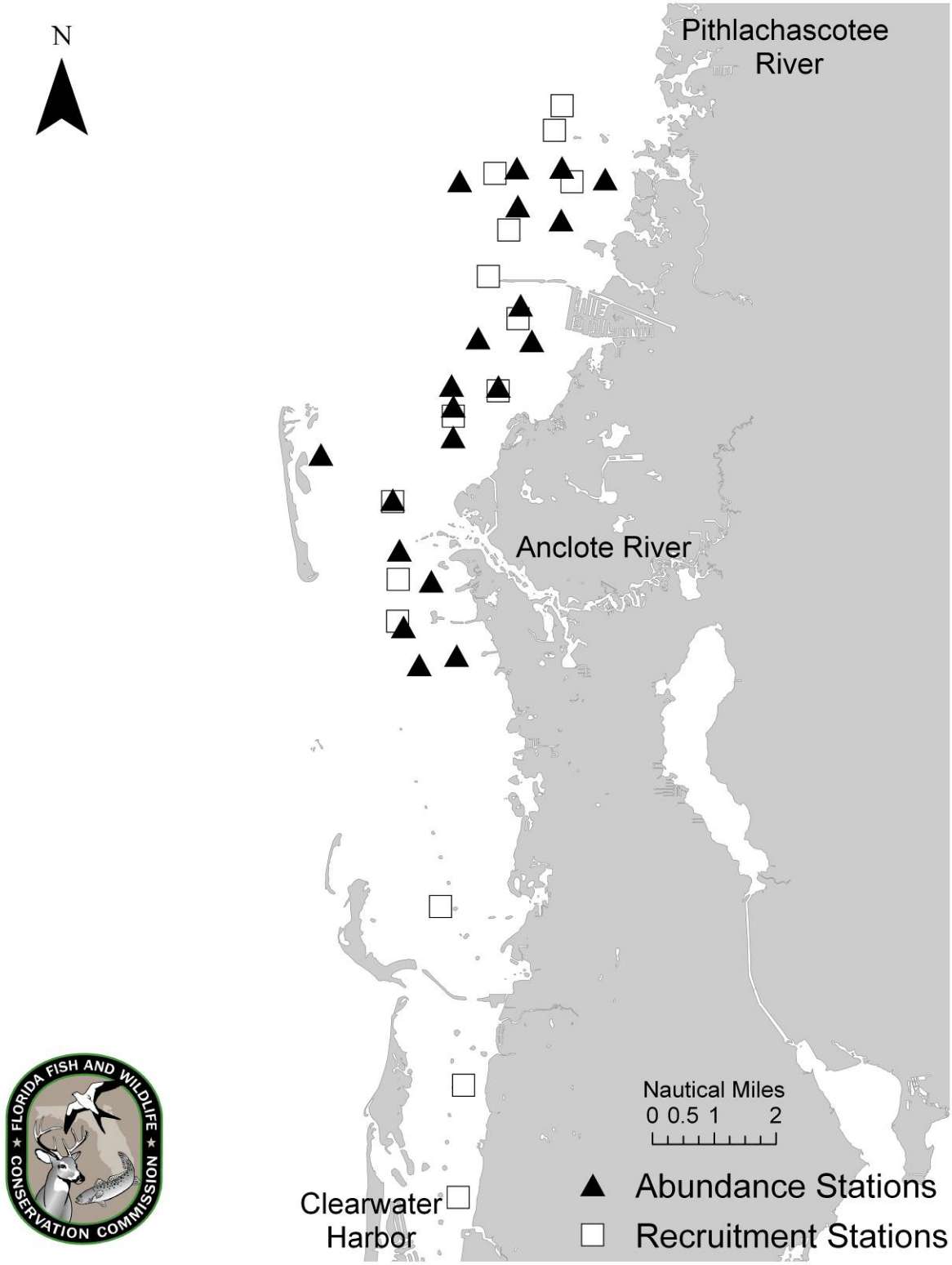
Appendix 15

A15. Hernando area annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.



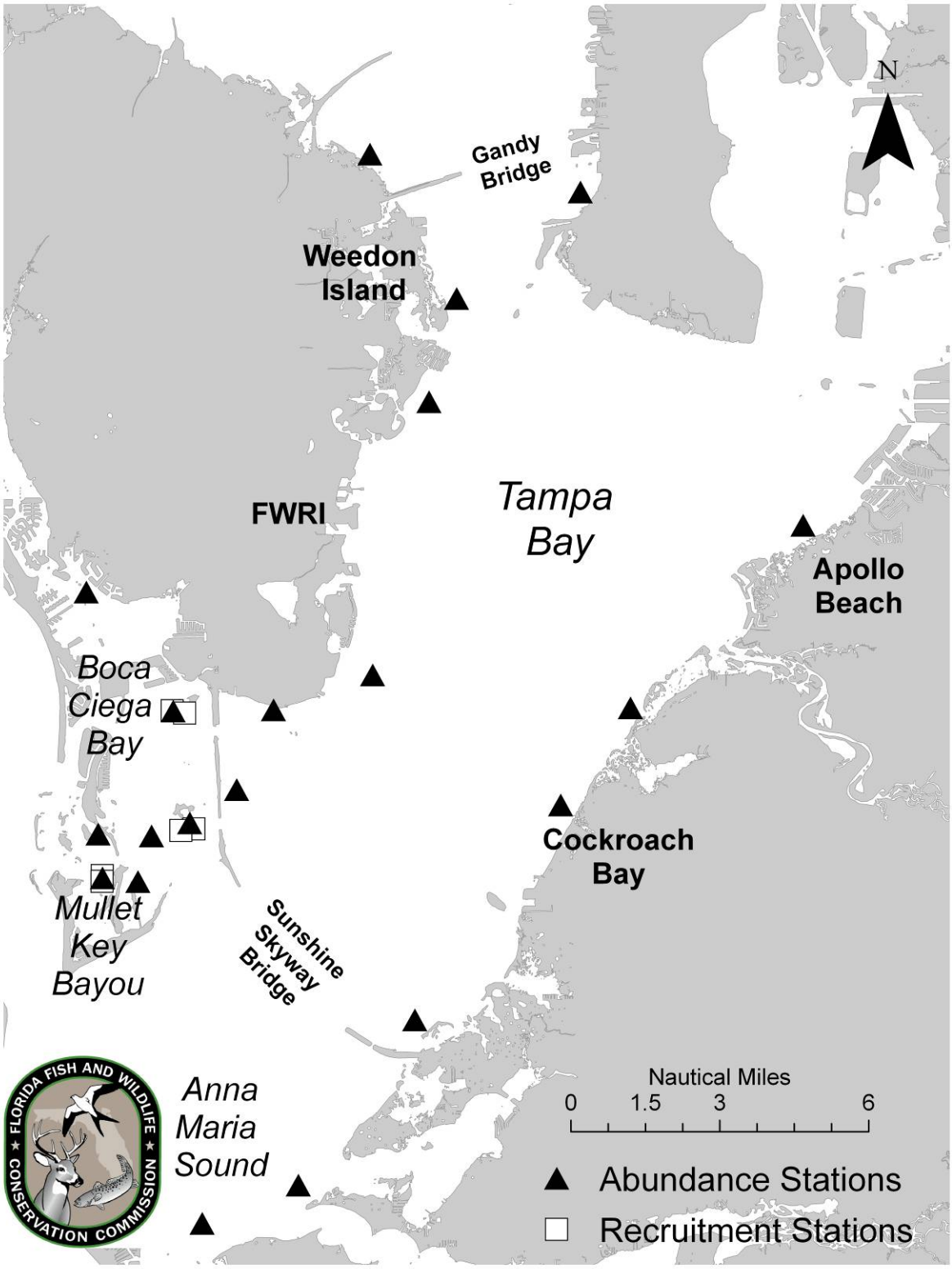
Appendix 16

A16. Anclote annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.



Appendix 19

A19. Tampa Bay annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.



Appendix 20

A20. Pinellas County Environmental Fund (PCEF) annual report for October 2010 through September 2011.

Pinellas County Environmental Fund

Florida Fish and Wildlife Conservation Commission

October 2010 – September 2011 Annual Report

Sarah P. Stephenson

Stephen P. Geiger

Florida Fish and Wildlife Research Institute

100 Eighth Avenue SE

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February 07, 2012

Executive Summary

This report presents the 2010 - 2011 observations on bay scallops in Tampa Bay by the Molluscan Fisheries research group at the Florida Fish and Wildlife Research Institute (FWRI). The two main objectives during this year of the restoration project was to continue monitoring background bay scallop populations and to initiate releases of scallops at each of three size from two separate cohorts into seagrass beds within Tampa Bay. FWRI staff monitored recruitment monthly and abundances annually at several locations around Tampa Bay (Figure 1). Physical parameter data (temperature and salinity) were also collected monthly at the recruitment stations. Three size classes of bay scallops were successfully released into seagrass beds in Tampa Bay during 2011, with each size class released on two occasions, for a total of six releases (Figure 2). The total numbers released per event are listed in Table 1.

Bay scallop recruitment levels on the collectors remained low to non-existent (Table 2), and adult populations observed in the summer of 2011 continued to decline in both abundance and distribution. Temperature and salinity levels remained in the normal range for this species (Figure 3). No scallops were found on post -release surveys conducted at either the restoration release stations or the annual abundance stations.

Methods

Scallop Releases

Since scallops were scarce in Tampa Bay, broodstock scallops were collected from neighboring populations and then delivered to the Bay Shellfish Inc. hatchery in Palmetto, Florida. Once the scallops spawned, the larvae were raised to either the ready-to-set stage (approximately 10 days old) or to the 1-5 mm size range before they were collected by FWRI scientists. The majority of the scallops received from the hatchery were transported by boat to a pre-selected grassflat and gently released into the water. Occasionally a portion of the scallops were retained and hung in mesh bags within cages off the dock at Bayboro Harbor in St. Petersburg, Florida. These scallops were cultured to a shell height size greater than 15 mm and then released at a pre-selected station in Tampa Bay. Two separate locations were chosen for release points for each of the three scallop size classes. Each size class was released over two deployment events.

Scientists deployed additional collectors in Boca Ciega Bay to catch natural bay scallop recruits in order to supplement hatchery-based restoration efforts, and the subsequent field days, scallop culture, and local releases are counted as matching time and efforts.

Recruitment

Juvenile bay scallop (commonly called spat) recruitment was monitored at each of 12 stations around Tampa Bay through November 2010 (Figure 1), and then at six of the stations through 2011. Station numbers 1, 2, 6, 7, 8, and 9 were discontinued due to conditions unsuitable for scallop survival. At each station a spat collector of was deployed and allowed to soak for 8 weeks. A secondary collector was deployed at each station four weeks later to ensure that all recruits settling onto the collectors would be visually detectable at the time of retrieval. Each collector consisted of a citrus bag stuffed with a 0.15-m2 section of 3.2-mm Vexar mesh that was attached to a 5-m piece of polypropylene rope threaded through a cement block and painted surface float. Six additional stations were monitored in the Boca Ciega Bay area in 2011 as part of statewide bay scallop monitoring, and those efforts were included in this report as match.

Adult Abundance

Adult abundance sampling was conducted in the summer of 2011 at 20 stations around Tampa Bay (Figure 1). At each station a 300-m weighted transect line was deployed and divers counted all scallops within a 1-m swath along each side of the line. The shell height of the first 30 scallops encountered, if applicable, were measured and recorded (SH = maximum linear distance from the umbo to the ventral shell margin). Post-release surveys were conducted at the seven locations where scallops were released using the same methods described above, with the exception of transect length. A 100-m weighted transect was sampled at each location.

Water Quality

Monthly water quality sampling was conducted in conjunction with recruitment sampling at all stations within Tampa Bay. Recorded parameters included temperature (C) and salinity (ppt) using a handheld YSI instrument.

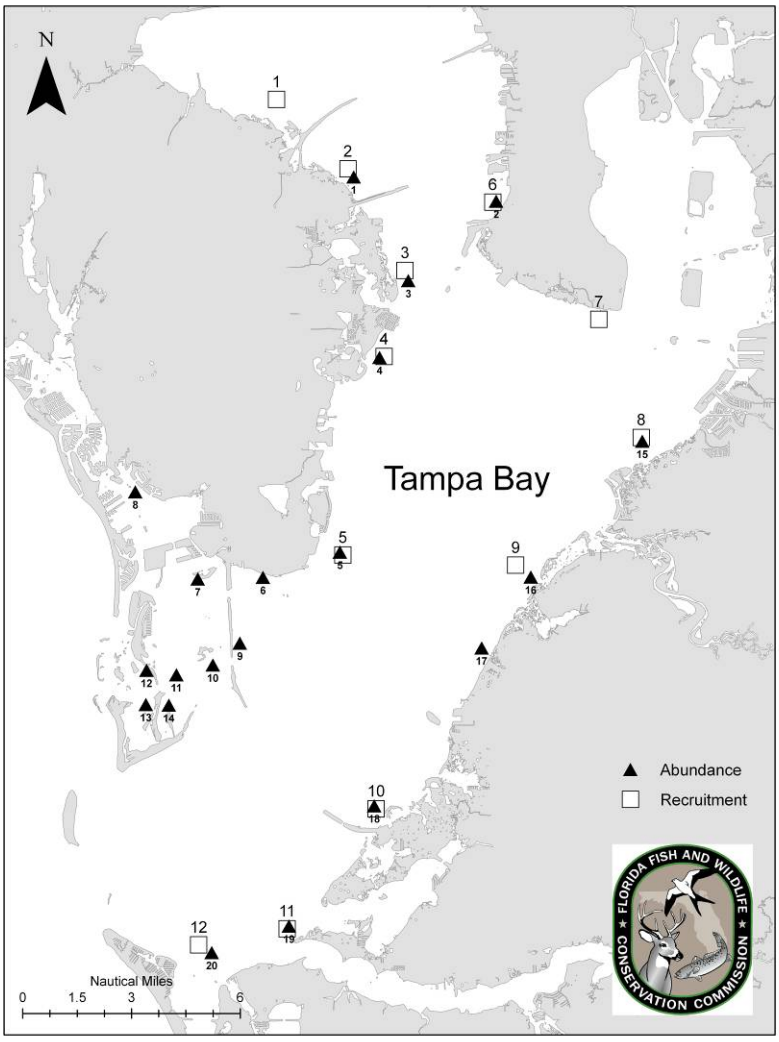


Figure 1. Bay scallop recruitment (white square) and abundance (black triangle) sample stations in Tampa Bay.

Results

Scallop Releases

Scallops were successfully spawned, cultured, and released into Tampa Bay waters near the target release sites (Figure 2). The original proposal called for the release of 1.5 million larvae, 60,000 1-5 mm spat, and 6,000 >15 mm scallops. During this report period the total number of scallops released for each size class was 18 million larvae, 100,000 1-5 mm spat and 8,100 >15 mm scallops, exceeding the initial estimates in each category (Table 1). The final release of >15mm scallops in Tampa Bay included wild-caught recruits collected from supplemental collectors retrieved in January 2011.

Table 1. Dates and amounts of bay scallops released into seagrass beds in lower Tampa Bay.

Deploy Date	Size Class	Amount	Latitude		Longitude	
12/13/2010	Larval	1 million	27	38.60	-82	43.39
12/13/2010	Larval	1 million	27	39.96	-82	42.80
2/4/2011	1-5 mm	10,000	27	38.57	-82	42.54
2/4/2011	Larval	8 million	27	38.43	-82	43.37
2/4/2011	Larval	8 million	27	39.42	-82	42.29
2/4/2011	1-5 mm	10,000	27	42.35	-82	37.40
2/4/2011	1-5 mm	20,000	27	44.41	-82	43.71
4/4/2011	1-5 mm	30,000	27	44.43	-82	43.62
4/4/2011	>15 mm	903	27	39.75	-82	41.25
4/4/2011	1-5 mm	30,000	27	38.66	-82	42.68
4/4/2011	>15 mm	650	27	39.16	-82	43.29
5/26/2011	>15 mm	800	27	39.72	-82	41.22
5/26/2011	>15 mm	1,000	27	38.59	-82	42.61
5/26/2011	>15 mm	750	27	39.20	-82	43.26
5/26/2011	>15 mm	250	27	32.23	-82	38.78
6/30/2011	>15 mm	3,790	27	50.45	-82	35.13

Figure 2. Release sites of bay scallops in 2011.

Recruitment

Bay scallop recruitment to bay wide collectors was minimal during this reporting period, with scallops observed during 2 of 10 sampling periods (Table 2). Out of the 84 collectors deployed 79 were retrieved (94% recovery rate). Of these 79 collectors retrieved, 77 were devoid of scallop spat (97.5%) with the maximum observed on a single collector at 19 (standardized to 0.32 spat/day). Scallops were only observed at stations 5 and 11, and only during the spring retrieval periods of December – February and January - March. The greatest number of scallops (N=19) was observed at station 5 on a single sample date, which mimicked values observed during the previous reporting period (N=55 at station 5 during November 2009 – January 2010). Overall scallop counts on collectors deployed in around Tampa Bay were even lower during this report period than when compared to the 2009-2010 period (N= 20 and 100 respectively).

Collectors deployed in the Boca Ciega Bay area in 2011 were close in proximity to where the restoration scallops were released and to the bulk of the natural population of bay scallops in Tampa Bay. Scallops were observed in those collectors in January through June, and again in December. Recruit levels were low (<1.0 scallop per collector per day deployed) for most of the year until the December retrieval event when a large

pulse of recruits was observed (mean of 2.6 ± 2.8 scallops collector^{-1} day deployed^{-1}). An anecdotal account also came in during this time reporting high numbers of scallops attached to crab traps in Boca Ciega Bay.

Table 2. Bay scallop recruitment totals on collectors deployed in Tampa Bay. Dashes indicate stations that were discontinued during this reporting period, and Zs indicate collectors that were missing on the retrieval date.

Retrieval Date	Station												Total
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
10/21/2010	0	0	0	0	0	0	0	0	0	Z	0	0	0
11/15/2010	0	0	0	0	Z	0	0	0	0	0	0	Z	0
12/29/2010	-	-	0	0	0	-	-	-	-	0	0	0	0
1/24/2011	-	-	0	0	0	-	-	-	-	0	0	0	0
2/24/2011	-	-	0	0	0	-	-	-	-	0	1	0	1
3/24/2011	-	-	0	0	19	-	-	-	-	0	0	0	19
4/25/2011	-	-	0	0	0	-	-	-	-	0	0	0	0
5/26/2011	-	-	0	0	0	-	-	-	-	0	0	0	0
6/30/2011	-	-	Z	0	0	-	-	-	-	0	Z	0	0
7/20/2011	-	-	0	0	0	-	-	-	-	0	0	0	0
8/18/2011	-	-	0	0	0	-	-	-	-	0	0	0	0
9/15/2011	-	-	0	0	0	-	-	-	-	0	0	0	0
Total	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**20**

Adult Abundance

Only 3 scallops were detected during the 2011 summer abundance surveys; drastically fewer than that observed in 2010 (Table 3). Shell heights ranged from 30-64 mm, with an average of 46.2mm. The distribution of scallops within the bay also decreased in 2010, dropping from 70 to 55% of stations with scallops present. No scallops were observed at the seven locations sampled post-release.

Appendix 20- Continued

Table 3. Annual bay scallop abundances in Tampa Bay from 2007 - 2011.

Station	2007	2008	2009	2010	2011
1	0	1	0	0	0
2	0	1	6	0	0
3	0	6	1	0	0
4	0	10	0	1	1
5	16	2	100	0	0
6	1	17	0	2	0
7	6	24	7	6	0
8	0	0	0	0	0
9	26	10	196	16	0
10	0	22	1	0	0
11	1	262	291	0	0
12	0	2	2	2	0
13	0	37	8	1	1
14	2	284	46	12	0
15	0	0	0	0	0
16	3	22	0	0	0
17	11	6	2	3	0
18	3	4	4	2	1
19	33	26	28	2	0
20	4	4	116	19	0
Total	**106**	**740**	**808**	**66**	**3**

Water Quality Monitoring

Monthly water temperature readings were within the range for this species (Figure 3). Salinity values were higher at the mouth of the bay (stations 10-12) and slowly dropped as the latitude increased.

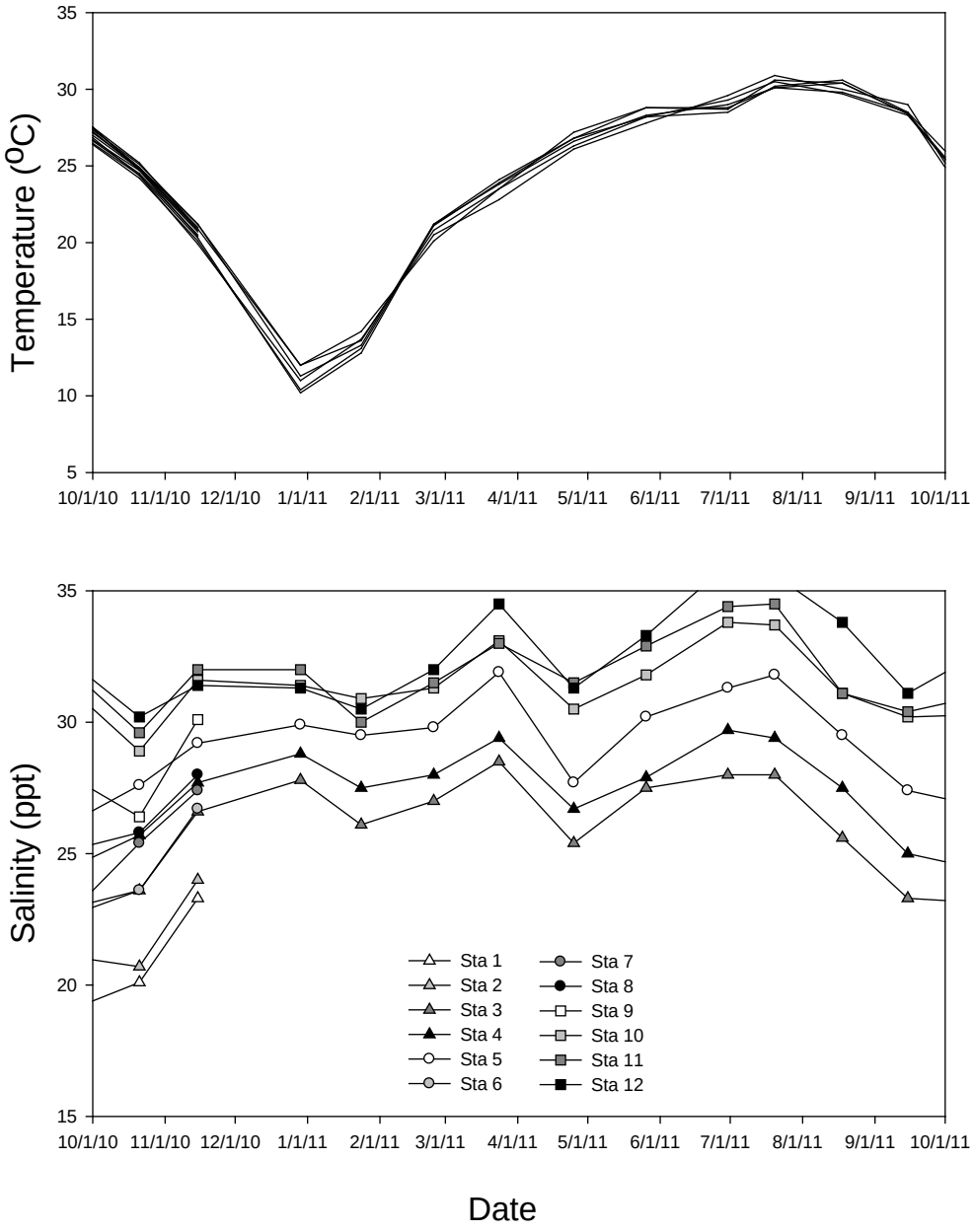


Figure 3. Monthly water temperature and salinity readings recorded at the recruitment stations in Tampa Bay.

Conclusions

Though the numbers of scallops released during this year were more than projected, the response observed on both recruit collectors and during annual and follow-up surveys was a less than anticipated. On a positive note the high number of scallop spat observed on the December (N=5719) and January (N=745) matching and supplemental collectors deployed in Boca Ciega Bay suggests an influx of recruits into Tampa Bay. Since the adult population was so low in the summer of 2011 (N=3 counted by FWRI staff and N= 5 counted by participating Tampa Bay Watch volunteers), it is hypothetical that some of the released scallops were able to survive, mature to adulthood, and successfully spawn, helping to replenish the local Tampa Bay waters. We will continue monitoring recruitment and water quality monthly through October of 2012 and abundances of the Tampa Bay scallop population annually during the summer of 2012. We will also participate as needed in broodstock collection and other hatchery-related tasks as required to fulfill the grant objectives.

Appendix I. Budget expenditures for Annual Year One (October 2009 – September 2010) and for Annual Year Two (October 2010 – September 2011). Italicized totals represent informal match applied before grant funds were in place.

	Expenses		**Salary**		**Total Spent**	
Report Period	**Grant**	**Match**	**Grant**	**Match**	**Grant**	**Match**
Annual Year One	$0	*$6,229*	$0	*$4,804*	$0	*$11,033*
Annual Year Two	$3,189	$0	$15,542	$14,661	$18,731	$14,661

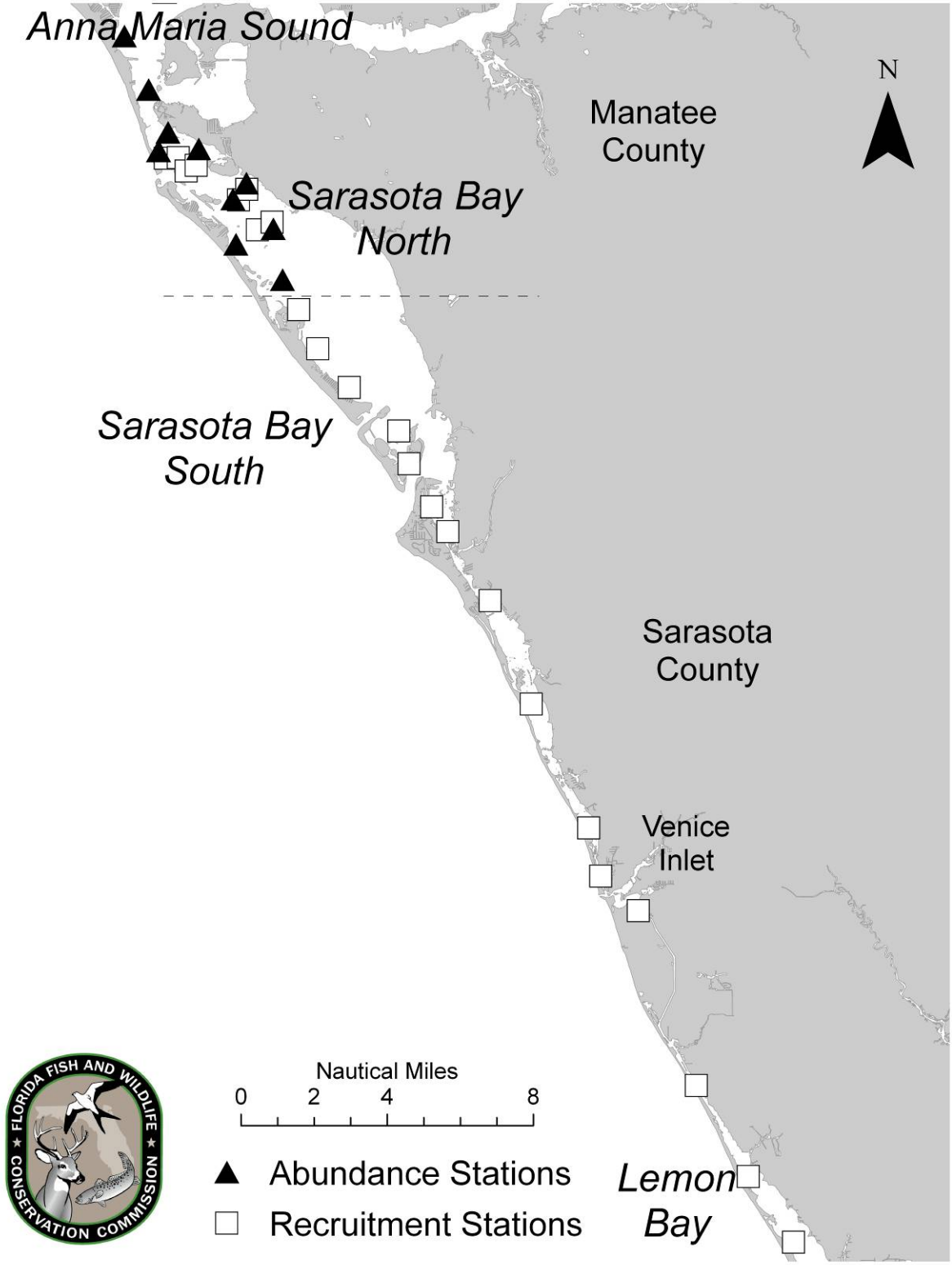
Expenses consist of recruitment collector supplies (blocks, line, citrus bags, Vexar mesh, floats), vessel and vehicle fuels, vessel and vehicle usage and maintenance, and broodstock collection gear.

Salaries are for OPS staff hourly wages (benefits not included) and include field days as well as participation in any recruit rearing or hatchery practices that may be required. Matching salaries are for Dr. Stephen Geiger's time as well as any OPS time acquired not charged to the grant.

For this grant, the remaining salary left to match is $16,046, the remaining salary left to spend is $15,728, and the remaining expense left to spend is $404.

Appendix 21

A21. Sarasota Bay North and South annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011. Dashed line represents boundary between north and south study sites.



Appendix 22

A22. Charlotte Harbor area monthly recruitment monitoring (square) stations sampled in 2011.

Appendix 23

A23. Pine Island Sound North and South annual abundance (triangle) and monthly recruitment monitoring (square) stations sampled in 2011.