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FINAL REPORT:
2020 SOUTH ATLANTIC FISHERY-INDEPENDENT SURVEYS WORKSHOP

BY

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1. Executive Summary

The 2020 South Atlantic Fishery-Independent Surveys Workshop was convened to evaluate and make recommendations related to regional-scale fishery-independent surveys. The workshop was focused on surveys targeting demersal teleost species in Federal waters of the southeastern U.S. Atlantic (South Atlantic) region.

The broad workshop objectives were to:

- Review and determine the relative priority ranking of current and potential survey activities, and
- Provide recommendations to improve the utility of specific surveys, and surveys overall, to support South Atlantic stock assessments, EBFM, and management.

More specifically, the workshop purpose was to assess the relative importance of ongoing, planned, or potential surveys in terms of their support for stock assessments and fishery management, and to provide recommendations to improve the utility of surveys. In part, the recommendations were intended to provide information that could be utilized as the basis for survey-related decisions under current or similar funding scenarios, as well as reduced and increased funding scenarios.

Workshop participants included representatives from the NOAA National Marine Fisheries Service (NMFS) Southeast Fisheries Science Center (SEFSC), South Carolina Department of Natural Resources (SCDNR), South Atlantic Fishery Management Council (SAFMC) and the SAFMC SSC, Florida Fish and Wildlife Research Institute (FL FWRI), and North Carolina State University. Invited participants were selected for their expertise with fishery-independent surveys, stock assessments, fisheries management, or some combination thereof. To facilitate accomplishment of the workshop recommendations, a "Review Panel", composed of a subset of invited participants and collectively possessing expertise in fishery-independent surveys, stock assessments, and management, was established. The purpose of the Review Panel was to make consensus recommendations related to workshop objectives.

The following ongoing, planned, or potential surveys were considered during the workshop:

- Southeast Reef Fish Survey (the South Atlantic trap-video survey; ongoing)
- SCDNR short bottom longline survey (recent / ongoing)
- SCDNR long bottom longline survey (recent / ongoing)
- Regional scale bottom longline survey (planned)
- Ichthyoplankton survey (potential)
- Hooked gear vertical line survey (potential; ongoing in FL waters)
- Young-of-the-year trawl survey (potential)

Surveys were assigned a priority level (low, medium, or high) in terms of their current or potential support for stock assessments and management, and numerous survey-specific and cross-survey

recommendations were generated, as were agency leads for each recommendation. Workshop recommendations are listed within the main body of the report, and are also compiled in Appendix 1.

2. Workshop Time and Place

The workshop was held Feb. 25-26, 2020 at the SC Department of Natural Resources Marine Resources Research Institute in Charleston, SC.

3. Workshop Focus, Rationale, and Objectives

The workshop focused on South Atlantic fishery-independent surveys targeting demersal teleost species in Federal waters. Surveys focused on sharks, coastal/nearshore species, pelagic species, and protected species were excluded from consideration, as were data management, analysis, and interpretation components of surveys.

The purpose of the workshop was to assess the relative importance of ongoing, planned, or potential surveys and their data collection components in terms of their support for stock assessments and fishery management, and to provide recommendations to improve the utility of surveys. In part, the recommendations were intended to provide information that could be utilized as the basis for survey-related decisions under current or similar-to-current funding scenarios, as well as reduced and increased funding scenarios.

Specific workshop objectives were as follows:

- Objective 1: Review current surveys (Southeast Reef Fish Survey, SCDNR short-bottom longline survey, SCDNR long-bottom longline survey) and make survey-specific recommendations that would improve their efficiency (including cost-effectiveness) and support for stock assessments, EBFM, and management
- Objective 2: Under multiple scenarios, assign qualitative ranks to surveys (high, moderate, low)
    - Why (context for prioritization)?
        - Provide reference information to NMFS SEFSC leadership for consideration when determining funding priorities
    - How (basis for prioritization)?
        - Relative degree of support for stock assessments, EBFM and management
        - Ranking of current surveys assumes surveys in their current form
- Objective 3: Make recommendations for implementing fishery-independent survey funding reductions or increases
- Objective 4: Consider the utility of forming a South Atlantic Fishery-Independent Surveys Coordinating Panel. If recommended, generate recommendations on coordinating panel membership, objectives, and next steps for committee establishment.
- Objective 5: Prepare a draft report summarizing topics covered and recommendations

To facilitate accomplishment of the workshop recommendations, a “Review Panel”, composed of a subset of invited participants and collectively possessing expertise in fishery-independent surveys, stock

assessments, and management, was established. The purpose of the Review Panel was to make consensus recommendations related to workshop objectives.

4. Workshop Participants

*Invited participants. The * symbol indicates participants who were members of the Review (Decisional) Panel*

Nate Bacheler, NOAA SEFSC
Wally Bubley, SCDNR
Jeff Buckel, NC State*
John Carmichael, SAFMC*
Chip Collier, SAFMC*
Christian Jones, NOAA SEFSC
Todd Kellison, NOAA SEFSC
Roger Pugliese, SAFMC
Marcel Reichert, SCDNR*
Kyle Shertzer, NOAA SEFSC*
Tracey Smart, SCDNR
George Sedberry, SSC*
Ted Switzer, FWRI
Erik Williams, NOAA SEFSC*

Additional observers

Joe Evans SCDNR
Margaret Finch, SCDNR
Dawn Glasgow, SCDNR
Homer Heirs, SCDNR
Kevin Kolmos, SCDNR
Stephen Long, SCDNR
Wiley Sinkus, SCDNR
Byron White, SCDNR
Michelle Willis, SCDNR
Dave Wyanski, SCDNR

5. List of Acronyms

ABC: Acceptable Biological Catch; annual catch level recommended for a stock or stock complex by a regional fishery management council's Scientific and Statistical Committee (SSC)
ADCP: Acoustic Doppler Current Profiler
CTD: an instrument used to measure the conductivity, temperature, and pressure (from which depth is calculated) of seawater
EBFM: Ecosystem-Based Fishery Management
FL FWRI: Florida Fish and Wildlife Research Institute
LBLL: Long-Bottom Longline
MARFIN: (NMFS) Marine Fisheries Initiative
MARMAP: Marine Resources Monitoring, Assessment, and Prediction program
MPA: Marine Protected Area
NCEI: National Centers for Environmental Information
NEFSC: Northeast Fisheries Science Center
NMFS: National Marine Fisheries Service
NOAA: National Oceanic and Atmospheric Administration
NOS: National Ocean Service
SAFMC: South Atlantic Fishery Management Council
SBLL: Short-Bottom Longline
SCDNR: South Carolina Department of Natural Resources
SEAMAP-SA: Southeast Area Monitoring and Assessment Program - South Atlantic
SECOORA: Southeast Coastal Ocean Observing Regional Association
SEDAR: Southeast Data, Assessment, and Review process
SEFSC: Southeast Fisheries Science Center
SEFIS: Southeast Fishery-Independent Survey
SERFS: Southeast Reef Fish Survey
SSC: Scientific and Statistical Committee
YOY: young-of-year, referring to age-0 juveniles

6. Background Information

6.1 Prior workshops and reviews

As background information pertinent to workshop objectives, recommendations and outcomes emanating from three prior workshops, listed below, were reviewed and discussed.

- 2009 South Atlantic Fishery-Independent Monitoring Program Workshop (Williams and Carmichael, 2009[1])

[1] Williams, E and J Carmichael, eds. 2009. Final Report: South Atlantic Fishery Independent Monitoring Program Workshop. Nov. 17-19, 2009, Beaufort, NC. Internal report. 85 pp.

- 2012 Review of South Atlantic Fishery-Independent Surveys (Massey, 2012[2])
- 2015 South Atlantic Deepwater Survey Workshop (Carmichael et al. 2015)

Major recommendations from each workshop are summarized in the presentation contained in Appendix 2. Based on workshop recommendations, Williams and Carmichael (2009[1]) provide a blueprint for optimal South Atlantic fishery-independent sampling approaches and efforts, and related costs. Current sampling levels, in terms of the variety of surveys and survey-specific sampling effort, continue to be well below those recommended in Williams and Carmichael (2009), limiting survey-generated data support for stock assessments and management.

6.2 Background Information – Survey Summary Presentations

Background information was provided in the following presentations summarizing ongoing, planned, or potential surveys. Text within parentheses following each listed presentation conveys whether the survey is ongoing, planned, or potential, the last names of the presenter(s), and the appendix containing the presentation.

- Southeast Reef Fish (trap-video) Survey (ongoing; Bacheler / Reichert; Appendix 3)
- SCDNR short-bottom longline survey (ongoing / paused; Reichert / Bubley; Appendix 4)
- SCDNR long-bottom longline survey (ongoing / paused; Reichert / Bubley; Appendix 5)
- Regional scale longline survey (planned; Kellison; Appendix 6)
- Ichthyoplankton survey (potential; Jones; Appendix 7)
- Hooked gear vertical line survey (ongoing in FL waters; potential for regional scale; Switzer; Appendix 8)
- Young-of-year (YOY) trawl survey (potential; Switzer; Appendix 9)

7. Recommendations Addressing the Workshop Objectives

7.1 Survey-Specific Recommendations

Workshop Objective 1 was as follows:
Review current surveys (Southeast Reef Fish Survey, SCDNR short-bottom longline survey, SCDNR long-bottom longline survey) and make survey-specific recommendations that would improve their efficiency (including cost-effectiveness) and support for stock assessments, EBFM and management.

The following sections convey workshop discussion points and recommendations for the Southeast Reef Fish Survey and, in a combined section, the SCDNR short- and long-bottom longline surveys.

[2] Massey, L, ed. 2012. Review of Fishery-Independent Survey Programs In Southeastern U.S. Atlantic Waters. Feb. 28-Mar. 2, 2012, Beaufort, NC. Internal report. 21 pp.

7.1.1 Southeast Reef Fish (Trap-Video) Survey (SERFS)

The Southeast Reef Fish Survey is summarized in Appendix 3. Briefly, SERFS is a regional (NC to central FL) trap-video survey targeting reef-associated species. SERFS-related workshop discussions focused on the following topics:

- Survey capabilities: life-history, trap and video abundance, and potentially stereo-video data
- Support for stock assessments and management
- Potential areas of improvement:
    - Consider refining the current random site selection approach to include (1) survey stratification and (2) fixed-site sampling
    - Add stomach contents / diet analysis component
- Maximize data and biological samples collected from each fish sampled
- Current / recent survey status and efforts:
    - Relatively high levels of sampling; maximizing efficiency of at-sea efforts
    - Insufficient funds for otolith and reproductive sample processing for all priority species
    - Priority: fully fund current efforts (including any backlogs of biological samples or videos) before adding additional efforts (e.g., collecting samples from additional species, or collecting other types of biological samples)
    - Technological advances may increase efficiency (e.g. use of barcoding and automated data entry mechanisms) and affect the cost and effort associated with biological sample processing and analysis (e.g., near-infrared analysis for reading otoliths and reproductive samples; artificial intelligence / machine learning approaches to video-reading)
- Diet studies and constraints (baited-traps, stomach eversion, high digestion rates) – consider approaches used in other regions
- Potential for collecting additional physical data
    - Currently collected: temperature, salinity, dissolved oxygen, photosynthetically active radiation; beam transmission and transmissivity; water clarity data, qualitative current magnitude and direction (relative to mouth of traps) data from video
    - In the past SEFIS has collected current speed and direction using probes mounted on traps, which were closely correlated with the qualitative current magnitude and direction data referenced in the previous bullet. Current direction, relative to the orientation of the mouth of the trap, has an influence on trap catches (important covariate when standardizing abundance values).
    - ADCP used to assess current speed-with-depth profile to determine if conditions are acceptable for trap-video deployments
- Potential use of sound data from videos. A cooperative project (partners: NEFSC, SEFSC, NOS) is underway to assess the utility of SERFS GoPro videos to identify species-specific sounds. Test deployments of SoundTraps on a subsample of SERFS trap-video deployments are planned, for comparison with simultaneously recorded GoPro sound data.
- pH and PCO_2: pH data are collected during CTD casts by SEFIS on the R/V Savannah, but not during SEFIS cruises on the NOAA Ship Pisces, nor by SCDNR on the R/V Palmetto. Collecting

precise PCO_2 data requires precision instrumentation and instrument calibration; a more involved and time-consuming process than could be accomplished during current standard SERFS CTD deployments. PCO_2 data are not currently collected during SERFS. There was general consensus that PCO_2 data should be collected during SERFS if and when feasible and reasonable to do so while maintaining sampling efficiency.

- Multibeam data collection: requirements must be met, including calibration and potentially condition-specific array configuration, vessel speed constraints, and post-collection data processing and filtering.
- Seasonality of sampling
- Assessing temporal and spatial variability
    - Repeated sampling at same site, or use of stationary in situ camera
    - Potential depletion issues due to repeated trap catches
- Surveying MPAs within the SERFS sampling area (predominantly SAFMC Deepwater MPAs)
- Video survey details
- Stereo-video, including (1) the potential for increasing the amount of stereo-video data collected and (2) ensure stereo-video is spread throughout the entire region
    - Stereo-video cameras were included in a subset of deployments in 2019. Efforts are underway to determine best practices for reading / analyzing stereo-videos (e.g., can lengths be generated from a subset of frames / fish?).
- Potential for added instrumentation on trap-video deployments to affect catchability of the trap and video gear. This issue can be addressed experimentally (e.g., comparing catches and video from traps with and without added instrumentation), but this has not been done yet.
- Reconnaissance deployments for adding additional sites to the SERFS survey universe of sampling points
    - Finding and adding sites to the SERFS survey universe is a lower priority, relative to earlier years, as most spatial gaps in the survey universe have been filled. There is a much greater need for habitat distribution information in continental shelf-break and upper slope depths.
    - Survey deployments should be prioritized over reconnaissance deployments

7.1.1.1 SERFS-related recommendations

WORKSHOP RECOMMENDATION 1 (high priority; responsible party = SEFSC & SCDNR): Maintain the current (non-stratified) random site selection sampling strategy. Complete an analysis, for both trap and video and focusing on the ten most abundant species, examining the effect of various spatiotemporal stratification/allocation approaches on variance associated with species-specific metrics.

The workshop participants noted that meeting this recommendation would require additional funding (e.g., for a postdoctoral researcher or contractor), and that the need for accomplishing this recommendation would increase under scenarios of reduced survey funding, which in turn would reduce the annual sample size and spatial coverage of SERFS.

WORKSHOP RECOMMENDATION 2 (moderate priority; responsible party = SEFSC & SCDNR): Assess the temporal and spatial (within-season and interannual) variability of video and trap catches (*editors' note: sampling in pursuit of this objective occurred during 2020*).

The workshop participants noted that meeting this recommendation would require additional funding (e.g., for existing scientific staff, a postdoctoral researcher or contractor, and sea days).

WORKSHOP RECOMMENDATION 3 (high priority; responsible party = SEFSC & SCDNR): Consider collecting biological samples from species in addition to those in the current standard SERFS protocol.

The workshop participants recommended initiating or expanding the collection of fin clips for DNA analyses, stomach contents for diet analyses, muscle tissue (e.g., for stable isotope studies), and aging structures for all managed stocks and potentially all encountered species. The workshop participants noted that meeting this recommendation would require additional funding.

WORKSHOP RECOMMENDATION 4 (priority level & responsible party not identified): Continue exploring emerging technologies.

The workshop participants noted that emerging technologies could include near infrared spectroscopy (NIRS), metagenomics, and artificial intelligence / machine learning for automating analysis (fish identification and enumeration) of videos.

WORKSHOP RECOMMENDATION 5 (priority level not identified; responsible party = South Atlantic Fishery-Independent Surveys Coordinating Panel): Continue to investigate the potential for measuring PCO2.

WORKSHOP RECOMMENDATION 6 (priority level not identified; responsible party = South Atlantic Fishery-Independent Surveys Coordinating Panel): Continue to investigate the potential for mapping during surveys.

WORKSHOP RECOMMENDATION 7 (priority level not identified; responsible party = SEFSC & SCDNR): Consider the potential for change in the catchability of traps with the addition of sampling gear.

7.1.2 SCDNR Short- and Long-Bottom Longline Surveys

The SCDNR short- and long-bottom longline surveys (SBLL and LBLL surveys, respectively) are summarized in Appendices 4 and 5. Briefly, the SBLL survey targets reef-associated species in high-relief habitats along the shelf break and upper slope, while the LBLL survey targets golden tilefish (*Lopholatilus chamaeleonticeps*) in unconsolidated (muddy) habitats. SBLL and LBLL discussions focused on the following topics:

- Spatial and sample size expansion vs. discontinuation of both surveys
- Degree to which long-bottom longline can sample high-relief habitats, and related survey (and data utility) implications

- Species-specific habitat preferences
- Survey sampling implications of reduced funding
- Site selection considerations
- Potential Issues:
    - Assess gear performance and selectivity across habitat types (e.g., long-bottom longline over high-relief habitat, and short-bottom longline over soft-bottom habitat)
    - Depth limitations of video for ground-truthing habitat
    - Issues with current (Gulf Stream) in the Atlantic – greater potential to lose gear, especially off FL and NC
- Habitat Issues (relevant to all regional surveys)
    - Mapping and characterization of survey area to enable habitat stratification - data are currently insufficient and knowledge of distribution of deeper-water habitats is limited
    - Efforts are underway to better estimate regional-scale natural and artificial reef areal coverages
    - Coordination with other (NOAA and non-NOAA) mapping efforts, programs, and initiatives (e.g., NOAA Ships Okeanos Explorer, Nancy Foster, Thomas Jefferson).
    - NOAA has high standards for sonar data, requiring, for example, post processing. That level of precision is not required to identify habitats with vertical relief / hard bottom. Portable multibeam units can be used to identify fish habitat.
    - Where are multibeam survey data housed – centralized location?
        - NMFS, SAFMC, SECOORA, NOAA NCEI repositories
    - Past efforts to secure additional funding for South Atlantic mapping have been generally unsuccessful

7.1.2.1 SBLL- and LBLL-related recommendations

WORKSHOP RECOMMENDATION 8 (low priority; responsible party = SEFSC & SCDNR): Reconsider including artificial reefs in fishery-independent surveys pending results of comparison of artificial and natural reef areal estimates (*editors' note: this recommendation arose from a discussion of the potential for sampling artificial reefs with bottom longline gear, and potentially other gears*).

7.2 Prioritization of Current and Potential Surveys

Workshop Objective 2 was to, under multiple scenarios, assign relative ranks to surveys, in terms of their known or anticipated degree of support for stock assessments, EBFM, and management. Separate prioritizations were completed for (1) current surveys (SERFS, SBLL, and LBLL surveys, at recent historical levels of sampling), and (2) current and potential surveys. Discussion, prioritizations, and related recommendations are presented sequentially below for (1) current surveys and (2) current and potential surveys.

7.2.1 Current Surveys

The following sections convey workshop discussion points, survey-specific rankings, and survey-related recommendations.

Discussion points:

- Prioritization to be utilized for future survey considerations and funding decisions
- Do not need to assign each survey a different level (i.e., tied ranks are acceptable)
- What information do the surveys currently provide?
    - SERFS provides information on a greater number of species than SBLL and LBLL
    - The LBLL survey is currently not occurring due to lack of funding
    - LBLL has been the sole fishery-independent data source (index and biological data) for golden tilefish
    - SBLL has provided information (indices and life-history data) regarding snowy grouper, blueline tilefish, and scamp (although SBLL-generated scamp data were not recommended for use in the ongoing SEDAR68 assessment)
    - Due to lack of funding, in recent years SBLL deployments often occur opportunistically during SCDNR trap-video cruises; thus, there is limited associated cost in terms of funding and time
    - With the exception of a limited number of deployments in 2010, SBLL deployments have not occurred during SEFIS cruises. SBLL deployments could be integrated into SEFIS cruises, with a commensurate decrease in trap-video deployments.
    - Under the current level of effort, indices and data generated from SBLL and LBLL are limited in utility, in terms of support for stock assessments, due to relatively small sample sizes and sub-regional scale spatial distribution
    - Life history data for interim analyses
- Increasing (to regional scale) spatial footprint of SBLL and LBLL surveys
    - Potential pros and cons of performing SBLL andLBLL every 2-3 years, combining funding across years to enable a regional-scale survey
        - Pro: aggregating funding across several years would potentially allow for greater spatial distribution and sample size during survey years
        - Cons: lack of annual index values; longer time required to detect changes in abundance
    - Potential for performing SBLL surveys during SEFIS cruises on the RV Savannah and NOAA Ship Pisces
- Snowy grouper is in a rebuilding plan and is a SAFMC priority. A scamp assessment is underway. Important to have data on priority species.
- Snowy grouper:
    - SBLL index of abundance used in stock assessment but may not be particularly informative (relatively flat and variable, which could be due to lack of trends in abundance in the population)

    - Catches (or catch rates) may change if SBLL spatial sampling distribution or snowy grouper abundance increased
- SCDNR has a MARFIN-funded three-year project to expand the SBLL spatial distribution. Anticipate ~ 17 days at sea per year, 3-4 sets/day over the three-year period – roughly triple past / recent sampling levels. Resulting data should allow a regional-scale survey comparison with the results of the planned cooperative South Atlantic Deepwater Longline survey (see Appendix 6).
- SERFS provides opportunities for deploying SBLL to collect data (samples) that we would otherwise not have access to [e.g., data for diet studies to inform Ecopath model inputs, although deep SBLL deployments typically result in everted stomachs (due to barotrauma) of fish caught]
- Benefits and disadvantages of standardized and unstandardized hook and line sampling

7.2.1.1 Survey-Specific Rankings – Current Surveys

The surveys were ranked in the following order of priority:

1. Southeast Reef Fish (trap-video) survey (SERFS)
2. SCDNR Short-bottom Longline Survey (SBLL)
3. SCDNR Long-bottom Longline Survey (LBLL)

7.2.1.2 Survey-Specific Recommendations

WORKSHOP RECOMMENDATION 9 (priority level not identified; responsible party = SCDNR): Not continue dedicating days at sea for SBLL and LBLL surveys at historical low effort and coverage. Consider opportunistic SBLL efforts.

WORKSHOP RECOMMENDATION 10 (high priority; responsible party = SCDNR & SEFSC): Determine sufficient effort in coverage for SBLL and LBLL surveys.

WORKSHOP RECOMMENDATION 11 (priority level not identified; responsible party = SEFSC & SCDNR): For SERFS, activities should be prioritized (e.g., when funding is limited) according to the following order:

a. Sea days and processing trap catch [highest priority]
b. Post-vessel processing and analysis, in the following order of priority:
    i. Video analysis
    ii. Stereo-video
    iii. Otolith processing and analysis
    iv. Reproductive tissue processing and analysis
    v. Data Analysis
c. Note: the data generated from each of the subcomponents listed in (b) above are important for stock assessments. The relative importance varies among species and management needs.

7.2.1.3 General Recommendation: Generate Annual SERFS Report

WORKSHOP RECOMMENDATION 12 (high priority; responsible party = SEFSC & SCDNR): Provide annual SERFS report to the council regarding status of programs.

a. Rationale: Help inform decisions and expectations
b. Report should include:
    i. Abundance indices of focal species
    ii. Sampling intensity time series
    iii. Funding time series by program (MARMAP, SEAMAP-SA, SEFIS)
    iv. Life History samples collected, processed, and analyzed and archived
    v. Video collected, examined, and analyzed
    vi. Stereo-video collected, examined, and analyzed
    vii. Outlook on future (related activities and developments)
    viii. Implications of funding

7.2.2 Current and Potential Surveys

The following sections convey workshop discussion points and survey-specific priority rankings.

Discussion points:

- SERFS provides critical information for assessments and management. Consider what additional benefits other (current or potential) surveys may have (i.e., how do they supplement information provided by SERFS, or provide information not provided by SERFS?).
- Southeastern FL and FL Keys diver-based survey – not considered as part of this prioritization due to its sub-regional coverage and the fact that it is supported by non-SEFSC funding (it is funded through the NOAA Coral Reef Conservation Program)
- Potential expansion of current surveys (e.g., SERFS and longline survey(s)) south of Port St. Lucie. Noted that Cape Canaveral area is a biogeographic boundary.
- Value of hook-and-line surveys, including provision of life-history data and ability to sample older, larger fish
- Young-of-year (YOY)-focused trawl survey:
    - Potentially useful for generating recruitment indices
    - There is currently limited early life history data (including YOY abundance and habitat utilization) for many species
    - Issues with bottom trawling over hard-bottom habitats, including but not limited to permitting
    - FL FWC/FWRI YOY trawl survey – limited hard-bottom interactions; captured mainly snappers, tomtates, and black sea bass
    - SERFS traps have low selectivity for YOY of many targeted species, due both to trap mesh size and the areas and depths sampled
    - SCDNR has vessels capable of participating in a trawl survey
    - The ongoing SEAMAP-SA Coastal Trawl Survey occurs at a regional scale (NC to FL), but provides limited information on federally managed demersal species, given the habitats and

depths sampled (limited to depths < ~ 10 m). With additional funding, this survey could potentially be expanded into a fully regional-scale (i.e., sampling across continental shelf depths) YOY survey.

- The Gulf of Mexico SEAMAP trawl survey data is used to generate indices of abundance for eight species, although there are interaction issues with hard-bottom habitats. The survey, which occurs out to ~ 100 m depth, also provides information on species-specific biomass.
- From a management standpoint, interim and recruitment analyses are informative, but analyses are often noisy and highly variable. What is the critical stage for each species? Is there another gear that could be used?

- Longline surveys
  - Some species may not be effectively targeted by other gears
  - Did data gaps arise when SBLL or LBLL surveys were paused in the past?
  - SERFS versus SBLL versus LBLL – relative effectiveness in targeting snowy grouper and tilefishes
  - SBLL and LBLL:
    - Differ in terms of gear specifications, deployment methods, and areas targeted, and resulting data generated
    - Optimal approach may be to use SBLL for hard-bottom / natural relief habitats, and LBLL for soft-bottom habitats (Carmichael et al. 2015). Could potentially alternate survey approaches annually (SBLL one year; LBLL the following year)

7.2.2.1 Survey-Specific Rankings – Current and Potential Surveys

The surveys were ranked in the following order of priority:

High priority:

- SERFS (Video Trap Survey)
- Coast-wide LBLL or Coast-wide SBLL
  - Rationale: provides information on a suite of species that are not captured in other surveys

Medium priority:

- YOY Trawl Survey
  - Rationale:
    - Would provide abundance and life-history information for multiple species
    - Ecosystem data (trophic, biomass)
    - Recruitment index for multiple species
    - Some redundancy with SERFS
  - Samples habitat not being surveyed, adds age 0 information

Low priority:

- Ichthyoplankton
  - Rationale: Cost, timeliness of available data, difficult to identify, potential redundancy of information with other surveys. Would require separate (temporal / seasonal) surveys to capture information on multiple FMP species

    - May be useful for spatial distribution of spawning effort
    - Consider novel gear
- Hooked gear vertical line survey
    - Rationale: Redundant with SERFS, may offer a broader size range for some species
    - Could be useful for monitoring age structure of species heavily restricted

7.3 Funding Scenario Discussions and Recommendations

Workshop Objective 3 was to make recommendations for implementing fishery-independent survey funding reductions or increases.

The following sections convey workshop discussion points and recommendations related to potential funding scenarios (reduced, flat, and increased).

Discussion points (note: many of the discussion points included below were covered during the "Current Surveys" portion of the workshop. Those bullets are included in this section, and not the "Current Surveys" section, given their funding-related nature):

- Funding, sampling, and survey priorities
    - Workshop recommendations are intended to provide guidance to inform survey-related decisions, including funding decisions. If funding reductions are necessary, decisions regarding implementation of those reductions should be based at least in part on SEDAR and Council data needs and priorities.
    - Broadly, survey coordinators should have flexibility to respond to changes in data needs over time (e.g., by altering focal species for biological sample collections, or the types and numbers of samples collected)
    - An annual report, specifying metrics such as number of sites sampled, species-specific biological sample collections, the backlog (if any) of biological samples for processing and analysis, and survey-related costs and budget trends, would provide helpful perspective to guide funding decisions. The report could or should include:
        - Funding time series, overall and for specific survey components
        - Number of archived samples that need to be processed
    - Sampling (data collection) is the highest priority
    - Data analysis and data product generation should be included in survey funding (requests)
    - Recent funding levels do not allow completion of all highest post-sampling priorities, specifically processing and analysis of otoliths and reproductive samples, both of which are important for stock assessments. Even with "flat" funding, productivity decreases over time as costs increase.
    - For comparison, discussed the existence of multiple NMFS regional-scale surveys in the Gulf of Mexico

- Importance of obtaining as much information as possible from every fish collected. Supporting funding is sufficiently limited that the following types of data or information are not collected and processed, or are collected and processed to only a limited extent:
    - Stereo-video
    - Fin clips for genetic analyses (e.g., for close-kin analyses)
    - Multibeam or sidescan – bathymetry and backscatter
    - Stomach contents for trophic studies
    - Environmental DNA
    - Stable isotopes
    - Passive acoustic recordings
- Important to document annual, linked (1) funding levels (including shortfalls) and (2) survey-related accomplishments to clarify effects of funding on survey-related products
- Budget cuts resulted in interruption in longline surveys and inability to replace personnel. Current funding for SCDNR longline projects is temporary (2-3 years).
- It is possible to collect biological samples and to defer sample processing and analysis until supporting funding is available. However, it is critical to maintain sample processing and analysis capabilities (including equipment and staff with related expertise), so it is not possible to perform that work in a discontinuous manner (e.g., every third year).
- Research track assessments may require or benefit from biological data generated annually or biannually. With funding reductions, the best approach from a stock assessment perspective may be to reduce efforts across all aspects of surveys – from sampling to data processing and analysis.
- Biological samples collected by SEFIS are processed and analyzed by SCDNR. SEFSC has provided related funding, but recent reductions in funding have limited processing and analysis of SEFIS-collected samples as well as priority processing and analysis of samples for SEDAR needs.
- Potential trade-off of reducing survey days at sea to increase funds available for life-history sample processing and analysis, or vice versa. Potential for alternating annual priority activities (e.g., not performing reproductive sample processing and analysis every third survey year).
- Multiple funding sources complicate determination of annual priorities. SCDNR MARMAP-related decisions re: annual priorities are determined once MARMAP, SEAMAP-SA, and SEFIS-to-SCDNR funding is known each year.
- SEFSC Gulf of Mexico reef fish video survey processes stereo-video data from all video samples, as does FL FWRI. FL FWRI performs video-reading while at sea between sampling events.
- Trap sampling (deployment and retrieval) during SERFS cruises is generally efficient – limited “down” time during which, for example, videos could be read
- Reproductive samples and resulting data: typically not considered as a time series, although reproductive characteristics of populations do change over time [example: South Atlantic red porgy (*Pagrus pagrus*)]. Reproductive characteristics are typically considered static in stock assessments.

- The number of personnel focusing on otolith processing is funding-limited and affects ability to fully process and analyze collected otoliths
- Related to SERFS 2019 sampling season and resulting biological samples and videos:
    - Relatively large number of SERFS stations completed
    - Not all collected otoliths and reproductive tissue samples were processed and analyzed due to insufficient funding (*editors' note: the backlog of life-history samples were subsequently processed with support from grant funding*)
    - Not all videos read (staffing issue)
    - Stereo-video collected but no related funding was available to enable reading of those videos (funding / staffing issue)
    - Reproductive samples collected for only a subset of some species; no reproductive samples collected for some (non-priority) species
- Subsampling should be (and is) clearly documented
- Video: quantitative data collected for priority species; presence/absence recorded for other species (including abundant and likely ecologically important species such as tomtate and scup)
- If video-reading personnel leave program, there is a temporal lag in finding, hiring, and training new personnel; resulting in immediate backlogs in videos and life-history sample processing
- Potential for SCDNR personnel to serve as video readers, as has occurred in the past
- There are time- and funding-related trade-offs between the amount of at-sea sampling, data and samples collected at sea, and related post-cruise sample processing and analysis
- Survey priorities (e.g., in terms of what type of data is most important, and for which species) may vary over time, driven by management priorities
- Current survey efforts maximize efficiency and productivity given funding and logistical constraints
- In the past there has, at times, been considerable variability in funding, particularly MARMAP funds; grant funding can provide additional support but is temporary and uncertain, and takes away from other potentially grant-funded projects
- Potential for alternating surveys between years (e.g., trap survey one year, longline survey the following year, or SBLL one year and LBLL the following year)
    - West coast has triennial survey for long-lived rockfish
    - More feasible for longer-lived, slower-growing species
- Limitations of surveys funded below optimal level
- Potential for establishing a South Atlantic Fishery Independent Surveys coordinating panel, and to capture discussions in an annual report
- Changes in supporting funding are likely to be incremental
- If there is increased funding – priority should be to fully implement all components of SERFS

7.3.1 Funding Scenario-Dependent Recommendations

Under level or reduced funding for regional fishery-independent surveys:

WORKSHOP RECOMMENDATION 13 (priority level not identified; responsible party – South Atlantic Fishery-Independent Surveys Coordinating Panel): SERFS is operating at maximum capacity given the funding constraints; no changes are recommended under current funding levels. Any changes proposed will come at the cost of other activities. Determinations would be best made at the time (e.g., based on data and management needs). Under current (reduced relative to some past years) funding the survey has relied in part on grant funding and other funding sources; this results in a loss of cost efficiency, is a short term and uncertain solution, and redirects funds from intended research.

Under increased funding for regional fishery-independent surveys:

WORKSHOP RECOMMENDATION 14 (priority level not identified; responsible party – SEFSC): Prioritize full implementation of all components of SERFS with base funding.

WORKSHOP RECOMMENDATION 15 (priority level not identified; responsible party = SEFSC): Allocate funding to process SERFS backlog of video and biological samples generated by recent reduced funding (*editors' note: referenced backlogs were generally eliminated during the cessation in on-water sampling during 2020 due to the COVID pandemic*).

WORKSHOP RECOMMENDATION 16 (priority level not identified; responsible party = to be determined): Do not implement new surveys unless they are appropriately designed and funded.

7.4 Consider Establishing a South Atlantic Fishery-Independent Surveys Coordinating Panel

Workshop Objective 4 was to consider the utility of forming a South Atlantic Fishery-Independent Surveys Coordinating Panel. If recommended, generate recommendations on coordinating panel membership, objectives, and next steps for committee establishment.

The following sections convey workshop discussion points and recommendations related to a potential South Atlantic Fishery-Independent Surveys Coordinating Panel.

Discussion points:

- Pros and cons of a coordinating panel
    - Pros:
        - Diversity of perspectives contribute to survey-related decisions and recommendations
        - Clearer process and basis for survey-related recommendations

        - Recommendations anticipated to be helpful in informing funding agency decisions
    - Cons:
        - Additional level of bureaucracy
        - Recommendations not binding; decisions will be contingent on approval or guidance from funding agency
- Group decisions have been made in the past with input from multi-agency survey leads and assessment personnel; essentially an informal coordinating panel
- For MARMAP/SEAMAP-SA, past recommended approaches and changes to operations have been submitted to SEFSC Technical Monitors with very little feedback
- Potential for and likelihood of formal recognition of the coordinating panel
- To whom / what entity would recommendations be made?
- Potential membership: include representatives from:
    - SEFSC
    - SCDNR
    - SAFMC Executive or Deputy Director
    - SAFMC Scientific and Statistical Committee (SSC)
    - SEAMAP-SA
- Focus of potential coordinating panel
    - SERFS
    - Longline survey(s)
- Funding sources for South Atlantic surveys (MARMAP, SEAMAP-SA, SEFSC funds for SEFIS, SEFSC SEFIS-to-SCDNR funds)
        - Timing of availability of funds, and the related timeline for funding-related decisions, varies by funding source
        - Implications for the timing or recommendations relative to the timing of funding-related decisions

7.4.1 Coordinating Panel-Related Recommendations:

WORKSHOP RECOMMENDATION 17 (priority level not identified; responsible party – see below): Form a South Atlantic Fishery-Independent Surveys Coordinating Panel.

SUB-RECOMMENDATIONS:

- Membership:
    - SEFSC
        - Stock assessment (Erik Williams or proxy)
        - SEFIS (Todd Kellison and Nate Bacheler)
    - SCDNR Reef Fish Survey (Marcel Reichert and Wally Bubley)
    - SAFMC directorate (Chip Collier)
    - SAFMC SSC representative TBD
    - SEAMAP-SA (to be discussed)

- Timing of meeting(s): meet annually prior to the upcoming sampling season, and additionally as needed
- Chair: the Group should be chaired by the SAFMC directorate representative (Chip Collier)
- Objective: provide guidance to optimize utility of SERFS

7.5 Research Recommendations

RESEARCH RECOMMENDATION 1 (priority level not identified; responsible party not identified): Conduct a study to evaluate the effectiveness of protected areas. Recommendation for separate survey (*editors' note: see Bacheler et al. 2016 and Pickens et al. 2021*).

RESEARCH RECOMMENDATION 2 (high priority; responsible party = SEFSC & SCDNR): To determine if a single gear can effectively sample across habitats, carry out and compare results from SBLL and LBLL deployments in high-relief, low-relief, and unstructured habitats (See also: Carmichael et al. 2015).

RESEARCH RECOMMENDATION 3 (moderate priority; responsible party = TBD): Explore utility of video and acoustic video as a survey gear in deep habitats.

RESEARCH RECOMMENDATION 4 (priority level not identified; responsible party = SEFSC): Evaluate the optimal use of the stereo-video use in the current survey, including the time needed to read the footage.

RESEARCH RECOMMENDATION 5 (priority level not identified; responsible party = SEFSC & SCDNR): Continue research on the catchability and selectivity of the traps (*editors' note: e.g., see Bacheler & Shertzer, 2020*).

8. Acknowledgements

Sincere thanks to SCDNR MRRI for graciously hosting the workshop and for providing related IT support, and to Dawn Glasgow (SCDNR) and Allie Iberle (SAFMC) for their critical, detailed note-taking during the workshop – those notes served as the basis for this report. Thanks also to all the workshop participants, the majority of whom are pictured below.

9. Literature Cited

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Appendix 1: List of workshop recommendations and research recommendations

WORKSHOP RECOMMENDATION 1 (high priority; responsible party = NMFS-Beaufort): Maintain the current (non-stratified) random site selection sampling strategy. Complete an analysis, for both trap and video and focusing on the ten most abundant species, examining the effect of various spatiotemporal stratification/allocation approaches on variance associated with species-specific metrics.

WORKSHOP RECOMMENDATION 2 (moderate priority; responsible party = SEFSC / SCDNR): Assess the temporal and spatial (within-season and interannual) variability of video and trap catches.

WORKSHOP RECOMMENDATION 3 (high priority; responsible party = SERFS Working Group): Consider collecting biological samples from fish that are in addition to standard SERFS protocol.

WORKSHOP RECOMMENDATION 4 (priority level & responsible party not identified): Continue exploring emerging technologies.

WORKSHOP RECOMMENDATION 5 (priority level not identified; responsible party = SERFS Working Group): Continue to investigate the potential for measuring PCO2.

WORKSHOP RECOMMENDATION 6 (priority level not identified; responsible party = SERFS Working Group): Continue to investigate the potential for mapping during surveys.

WORKSHOP RECOMMENDATION 7 (priority level not identified; responsible party = all): Consider the catchability of traps with the addition of equipment.

WORKSHOP RECOMMENDATION 8 (low priority; responsible party = SEFSC & SCDNR): Reconsider including artificial reefs in fishery-independent surveys pending results of comparison of artificial and natural reef areal estimates.

WORKSHOP RECOMMENDATION 9 (priority level not identified; responsible party = SCDNR / SERFS): Not continue dedicating days at sea for SBLL and LBLL surveys at historical low effort and coverage. Consider opportunistic SBLL efforts.

WORKSHOP RECOMMENDATION 10 (high priority; responsible party = SCDNR / SERFS): Determine sufficient effort in coverage for SBLL and LBLL surveys.

WORKSHOP RECOMMENDATION 11 (priority level not identified; responsible party = SERFS): For SERFS, activities should be prioritized (e.g., when funding is limited) according to the following order:

a. Sea days and processing trap catch [highest priority]
b. Post-vessel processing and analysis, in the following order of priority:
    i. Video analysis
    ii. Stereo-video
    iii. Otolith processing and analysis
    iv. Reproductive tissue processing and analysis
    v. Data Analysis
c. Note: the data generated from each of the subcomponents listed in (b) above are important for stock assessments. The relative importance varies among species and management needs.

WORKSHOP RECOMMENDATION 12 (high priority; responsible party = SERFS): Provide annual SERFS report to the council regarding status of programs

a. Rationale: Help inform decisions and expectations
b. Report should include:
    i. Sampling intensity time series
    ii. Funding time series by program (MARMAP, SEAMAP-SA, SEFIS)
    iii. Life History samples collected, processed, and analyzed and archived
    iv. Video collected, examined, and analyzed
    v. Stereo-video collected, examined, and analyzed
    vi. Outlook on future (related activities and developments)
    vii. Implications of funding

WORKSHOP RECOMMENDATION 13 (priority level not identified; responsible party – recommended South Atlantic Fishery-Independent Surveys Planning Team): SERFS is operating at maximum capacity given the funding constraints; no changes are recommended. Any changes proposed will come at the cost of other activities. Determinations would be best made at the time (e.g., based on data and management needs).

- Under current (reduced relative to some past years) funding the survey has relied in part on grant funding and other funding sources; this results in a loss of cost efficiency, is a short term and uncertain solution, and redirects funds from intended research.

Under increased funding for regional fishery-independent surveys (e.g. apply reductions equally across surveys versus reduce funding to specific surveys):

WORKSHOP RECOMMENDATION 14 (priority level not identified; responsible party – recommended South Atlantic Fishery-Independent Surveys Planning Team): Prioritize full implementation of all components of SERFS with base funding.

WORKSHOP RECOMMENDATION 15 (priority level not identified; responsible party – recommended South Atlantic Fishery-Independent Surveys Planning Team): Allocate funding to process SERFS backlog of video and biological samples generated by recent reduced funding.

WORKSHOP RECOMMENDATION 16 (priority level not identified; responsible party – to be determined): Do not implement new surveys unless they are appropriately designed and funded.

WORKSHOP RECOMMENDATION 17 (priority level not identified; responsible party – see below): Form a SERFS Working Group.

RESEARCH RECOMMENDATION 1 (priority level not identified; responsible party not identified): Conduct a study to evaluate the effectiveness of protected areas. Recommendation for separate survey.

RESEARCH RECOMMENDATION 2 (high priority; responsible party = SERFS): To determine if a single gear can effectively sample across habitats, carry out and compare results from SBLL and LBLL deployments in high relief, low relief, and unstructured habitats.

RESEARCH RECOMMENDATION 3 (moderate priority; responsible party = TBD): Explore utility of video and acoustic video as a survey gear in deep habitats.

RESEARCH RECOMMENDATION 4 (priority level not identified; responsible party = SEFIS): Evaluate the optimal use of the stereo/video use in the current survey, including the time needed to read the footage.

RESEARCH RECOMMENDATION 5 (priority level not identified; responsible party = SERFS): Continue research on the catchability and selectivity of the traps.

Appendix 2: Workshop background and objectives presentation including summary results of prior survey-related workshops.

South Atlantic Fishery-Independent Surveys Workshop

- Welcome
- Thanks to you all for being here
- Thanks to SCDNR for hosting
- Logistics
- Participant introductions

Purpose, Background, Objectives & Structure

- What?
  - Focused on South Atlantic fishery-independent surveys focused on demersal teleost species in Federal waters
    - Provide recommendations – survey-specific and across surveys
    - Assign relative priority levels – current and potential surveys
  - Exclude surveys focused on sharks and coastal/nearshore, pelagic, and protected species
  - Focused on data collection – the surveys themselves. Data management, analysis and interpretation components of surveys are excluded.

Purpose, Background, Objectives & Structure

- Why?
  - Improve (maximize utility of) current surveys
  - Provide reference information to:
    - Survey managers, for consideration when determining balance between ongoing surveys
    - NMFS SEFSC leadership, for consideration when determining funding priorities

Purpose, Background, Objectives & Structure

- How (basis for prioritization)?
  - Relative degree of support (documented or anticipated) for:
    - Stock assessments
    - EBFM
    - Management
  - Reference survey metrics spreadsheet

Purpose, Background, Objectives & Structure

- Background – workshops and reviews
  - 2009 – South Atlantic Fishery Independent Monitoring Program Workshop
  - 2012 - Review of Fishery-Independent Survey Programs In Southeastern U.S. Atlantic Waters
  - 2015 – South Atlantic Deepwater Survey Workshop

Purpose, Background, Objectives & Structure

- 2009 SAFIMP Workshop
  - "…to develop recommendations for the design of a multispecies, fishery-independent survey(s), focused on the snapper-grouper complex within the U.S. South Atlantic territorial waters"
  - NOAA (NMFS & NOS), SAFMC, state agencies, academia, industry (recreational & commercial)

Purpose, Background, Objectives & Structure

- 2009 SAFIMP Workshop
  - Three areas
    - North of Cape Hatteras
    - Port St. Lucie to Dry Tortugas
  - Cape Hatteras, NC to Port St. Lucie, FL
    - Estuarine (5 m) – Channel nets, Witham, bridge net, otter trawl, seine
    - Shelf and Shelf-break (10 - 140 m) - Bongo and neuston sampling
    - Shelf (10 – 70 m) – Z trap, chevron trap, short bottom longline, video-camera array
    - Shelf-break (70 – 140 m) – Z trap (out to 90 m), chevron trap (out to 90 m), short bottom longline, long bottom longline, video array (out to depth limitation)
    - Deep offshore (> 140 m) – Wreckfish reel

Purpose, Background, Objectives & Structure

- 2009 SAFIMP Workshop
  - Three areas
    - North of Cape Hatteras
    - Port St. Lucie to Dry Tortugas
  - Cape Hatteras, NC to Port St. Lucie, FL

9 • Estuarine (5 m) – Channel nets, Witham, bridge net, otter trawl, seine

7 • Shelf and Shelf-break (10 - 140 m) - Bongo and neuston sampling

1 • Shelf (10 – 70 m) – Z trap, chevron trap, short bottom longline, video-camera array

1 • Shelf-break (70 – 140 m) – Z trap (out to 90 m), chevron trap (out to 90 m), short bottom longline, long bottom longline, video array (out to depth limitation)

8 • Deep offshore (> 140 m) – Wreckfish reel

Purpose, Background, Objectives & Structure

- 2012 - Review of South Atlantic Fishery-Independent Surveys
  - "…to review state and federal systems for collecting fishery-independent data on reef fishes in the … South Atlantic bight"
  - Review panel:
    - Dave Somerton (NMFS-Seattle)
    - John Walter (NMFS-Miami)
    - Jeff Buckel (NCSU)
    - Mary Christman (UF; statistical consultant)
  - Recommendations for SERFS, SCDNR SBLL, SCDNR LBLL

Purpose, Background, Objectives & Structure

- 2012 - Review of South Atlantic Fishery-Independent Surveys
  - SERFS
    - Stratify survey based on depth and latitude (NOT DONE)
    - Quantify the area occupied by artificial reefs and compare to total natural hardbottom (IN PROGRESS)
    - Incorporate some fixed stations to be sampled each year (NOT DONE)
    - Write a clear sampling manual of SERFS sampling (DONE)
    - Use zero-inflated models to standardize trap and video data (DONE)
    - Expand spatial coverage into NC like was done over last two years in FL (DONE)
    - Recommend creation of SERFS steering committee (INITIALLY DONE BUT DISCONTINUED)

Purpose, Background, Objectives & Structure

- 2012 - Review of South Atlantic Fishery-Independent Surveys
  - SERFS
    - Traps may be subject to saturation (EVALUATED)
    - Videos can be helpful to assess selectivity, saturation, and detection issues, but you must account for environmental variability that might influence viewing conditions. Stereo-video could be used to obtain fish lengths (IN PROGRESS OR HAS BEEN DONE)

Purpose, Background, Objectives & Structure

- 2012 - Review of South Atlantic Fishery-Independent Surveys
  - SCDNR SBLL
    - The major shortcoming of the SCDNR SBLL survey is spatial limitation - either discontinue or expand survey considerably (perhaps by pooling resources over time and conducting more spatially comprehensive surveys in alternate years). Also low catch rates for all but a few species (THREE YEARS OF FUNDING SECURED TO EXPAND SURVEY – 2020-2022)
    - May be subject to saturation (NOT EVALUATED?)

Purpose, Background, Objectives & Structure

- 2012 - Review of South Atlantic Fishery-Independent Surveys
  - SCDNR LBLL
    - The SCDNR LBLL survey is likewise limited spatially, and often has low catch rates of target species. Recommend industry partnership, perhaps using CRP funds (2020 DEEPWATER LONGLINE SURVEY PLANNED)
    - May be subject to saturation (NOT EVALUATED?)

Purpose, Background, Objectives & Structure

- 2015 – Deepwater Survey Workshop
  - "… to identify optimal approaches and associated costs for surveying (for stock assessment and management) the South Atlantic deep-water species complex"
  - NMFS, SAFMC, SCDNR, NCDMF, industry (recreational & commercial)
  - Recommendations
    - Focal species
    - Gear & methodologies
    - Survey design

Purpose, Background, Objectives & Structure

- 2015 – Deepwater Survey Workshop
  - There was consensus that the focal species inhabited three main habitat types: mud, high relief (reef), and sandy/shell rubble flats
  - Long bottom longline gear was recommended for sampling in mud and sandy/shell rubble flats habitats
  - Short-bottom longline and vertical hook and line were recommended for sampling in high-relief habitats

Purpose, Background, Objectives & Structure

- 2015 – Deepwater Survey Workshop
  - Use of both industry and scientific vessels as survey platforms was discussed in detail and the advantages and disadvantages of each were noted
  - While consideration of industry platforms focused primarily on commercial vessels, participants also noted possible roles of for-hire vessels in sampling areas not suitable for standard gears used in previous deep-water survey efforts
  - Survey approaches using industry vessels, scientific research vessels or a combination thereof could all be successful

Purpose, Background, Objectives & Structure

- Objectives
  1) Review current surveys and make survey-specific recommendations that would improve their efficiency (including cost-effectiveness) and/or support for stock assessments, EBFM and management
     - Southeast Reef Fish Survey (trap-video)
     - SCDNR short-bottom longline survey
     - SCDNR long-bottom longline survey

Purpose, Background, Objectives & Structure

- Objectives
  2) Under multiple scenarios, assign qualitative ranks (high, moderate, low) to surveys
  3) Make recommendations for implementing fishery-independent survey funding reductions or increases
  4) Consider the utility of forming a South Atlantic Fishery-Independent Surveys Steering Committee
     - If recommended, generate recommendations on steering committee membership, objectives, and next steps for committee establishment

Purpose, Background, Objectives & Structure

- Objectives
  5) Prepare draft report summarizing topics covered and recommendations

Purpose, Background, Objectives & Structure

- Workshop structure
  - Participants = all of us
    - Questions, comments, discussion, input, propose recommendations
  - Review panel
    - Complete survey prioritizations; make formal recommendations
    - Strive for consensus
    - Cross bridges as they are encountered
    - Data users
      - Stock assessment (Erik Williams, Kyle Shertzer)
      - SAFMC Director & Deputy Director (John Carmichael, Chip Collier)
      - SAFMC SSC members (Marcel Reichert, George Sedberry, Jeff Buckel)

Purpose, Background, Objectives & Structure

- Workshop structure
  - Rapporteur (thank you!)
  - Draft report as we progress
  - Chair & agenda

Purpose, Background, Objectives & Structure

- Objectives revisited
  1) Review current surveys and make survey-specific recommendations that would improve their efficiency (including cost-effectiveness) and/or support for stock assessments, EBFM and management
  2) Under multiple scenarios, assign qualitative ranks (high, moderate, low) to surveys
  3) Make recommendations for implementing fishery-independent survey funding reductions or increases
  4) Consider the utility of forming a South Atlantic Fishery-Independent Surveys Steering Committee
  5) Prepare draft report summarizing topics covered and recommendations

Purpose, Background, Objectives & Structure

- Short / summary presentations
  - Southeast Reef Fish Survey (trap, video, stereo-video)
  - SCDNR short-bottom longline survey (Reichert / Bubbly)
  - SCDNR long-bottom longline survey (Reichert / Bubbly)
  - Coastwide longline survey (Kellison)
  - Ichthyoplankton survey (Jones)
  - Hooked gear vertical line survey (Switzer)
  - (Young-of-year) trawl survey (Switzer)
  - Other?

- Questions, comments, concerns?

Appendix 3. Presentation on the Southeast Reef Fish (Trap-Video) Survey (SERFS)

Southeast Reef Fish Survey

Review
Fishery Independent Monitoring of
Reef Fish in the SE region
Feb. 25-26, 2020
Charleston, SC

Brief historic overview:

- 1972 MARMAP
  - I : Trawl survey (based on NE trawl survey), ended in 1987
  - II: Ichthyoplankton survey (ended in 1980)
- 1977 Fish trap surveys (blackfish and Florida traps)
- 1979 Short bottom longline survey
- 1982 Long bottom longline survey
- 1988 Chevron trap survey
- 2008/09 SEAMAP-SA supplemental funding
- 2010 SEFIS

Since 2010: Southeast Reef Fish Survey (SERFS)

with vessel days and cost in 2019

36 days

$11,000/day - varies annually)

9 days

$3,400/day since 2016

Possibly new vessel in 2020/21

30 days

Cost unknown, but not paid from SEFIS budget

42 days

$9,500/day since 2016

Survey design:

Random selection from universe (≈ 4,300 locations)

Sampling season

(April) May through September (October)

No sampling Mid-Oct.- Mid-April => Right Whale migration

Currently ≈ 1,500-1,700 traps/yr

CTD for oceanographic information

SCDNR sampling occurs under MARMAP/SEAMAP-SA **LOA**
SEFSC sampling occurs under **SERO Scientific Research Permit**

Chevron trap deployments

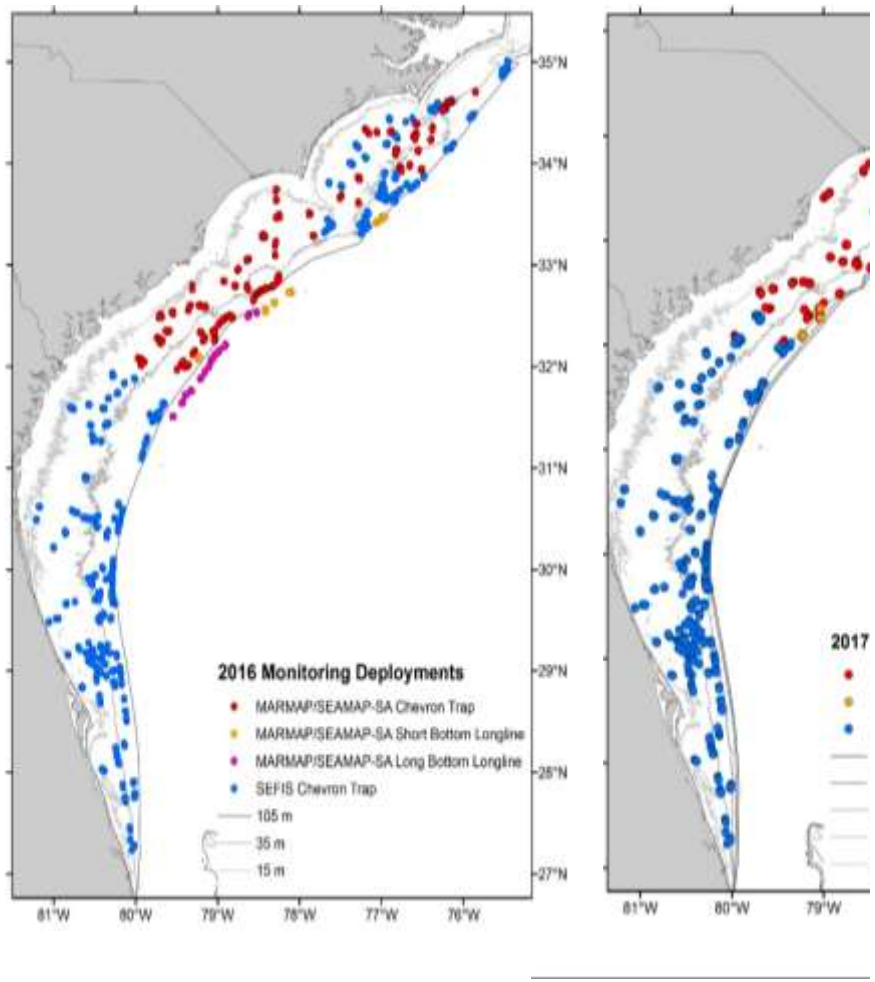
	Palmetto	Lady Lisa	*Savannah*	*Pisces*	total
2013	544	0	573	444	1,561
2014	519	0	610	391	1,520
2015	575	0	626	320	1,521
2016	528*	0	580	429	1,537
2017	520	0	576	478	1,574
2018	680	0	610	494	1,784
2019	675	0	501	569	1,745

*includes Sand Tiger

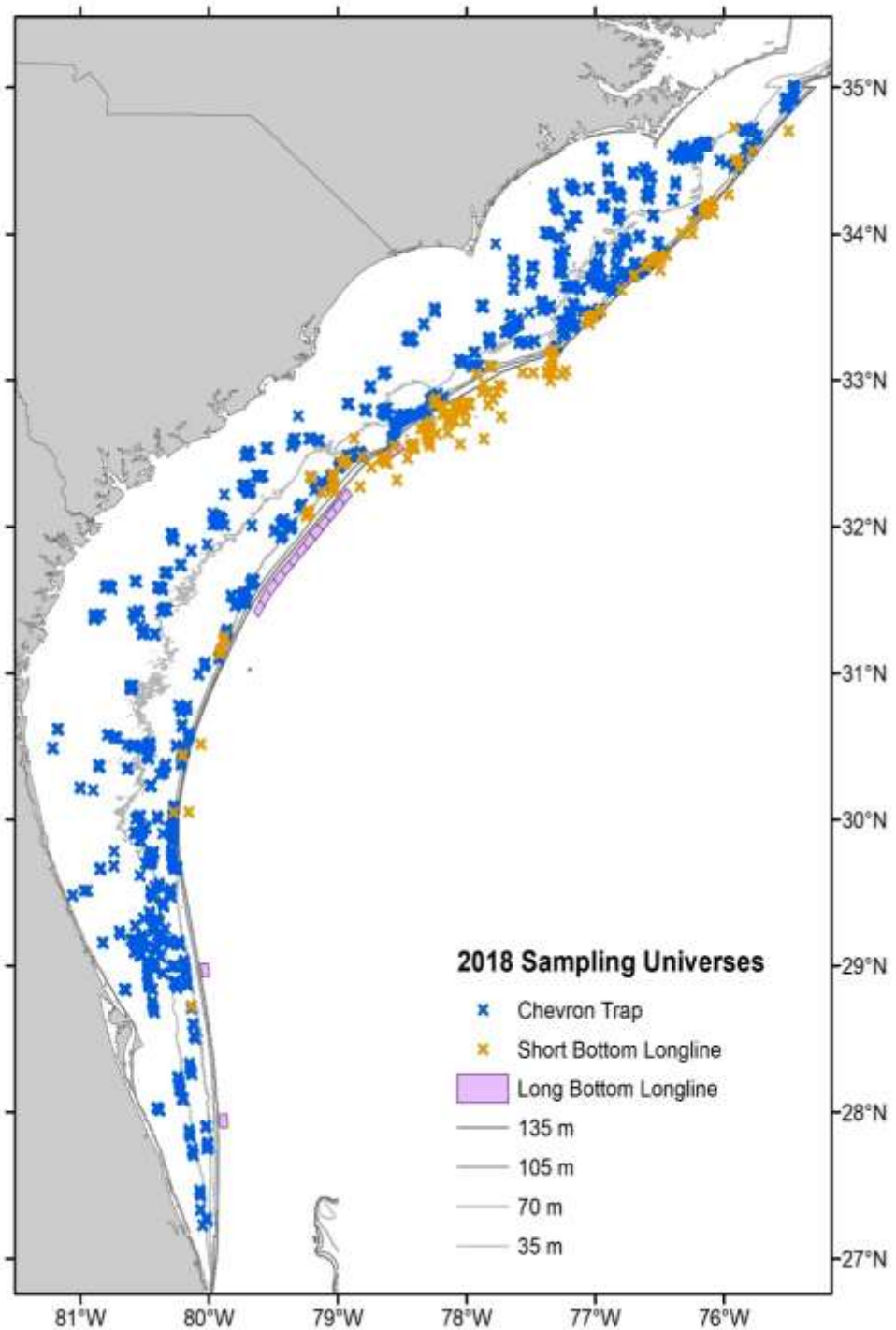
CTD deployments

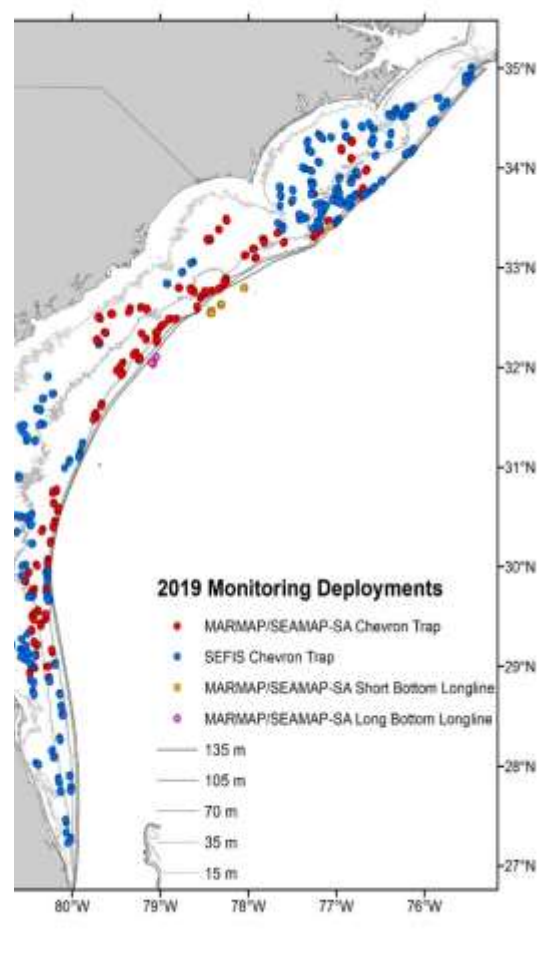
	Palmetto	Lady Lisa	*Savannah*	*Pisces*	total
2013	101	0	109	75	285
2014	97	0	120	66	309
2015	124	0	127	55	306
2016	133*	0	116	75	330
2017	94	0	110	87	291
2018	125	0	112	87	324
2019	119	0	88	97	304

*includes Sand Tiger


2016 Monitoring Deployments
MARMAP/SEAMAP-SA Chevron Trap
MARMAP/SEAMAP-SA Short Bottom Longline
MARMAP/SEAMAP-SA Long Bottom Longline
SEFIS Chevron Trap
105 m
35 m
15 m
35°N
34°N
33°N
32°N
31°N
30°N
29°N
28°N
27°N
81°W
80°W
79°W
78°W
77°W
76°W

2017
81°W
80°W
79°W


2018 Sampling Universes
Chevron Trap
Short Bottom Longline
Long Bottom Longline
135 m
105 m
70 m
35 m
35°N
34°N
33°N
32°N
31°N
30°N
29°N
28°N
27°N
81°W
80°W
79°W
78°W
77°W
76°W


2019 Monitoring Deployments
MARMAP/SEAMAP-SA Chevron Trap
SEFIS Chevron Trap
MARMAP/SEAMAP-SA Short Bottom Longline
MARMAP/SEAMAP-SA Long Bottom Longline
135 m
105 m
70 m
35 m
15 m
35°N
34°N
33°N
32°N
31°N
30°N
29°N
28°N
27°N
80°W
79°W
78°W
77°W
76°W

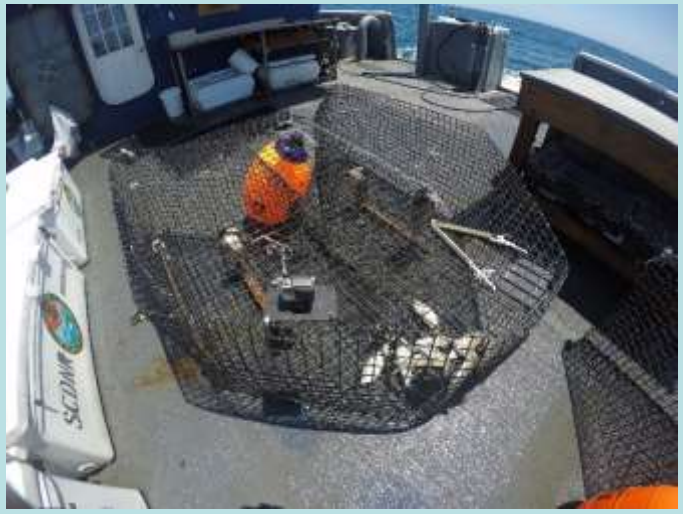
SEA DAYS BY VESSEL

YEAR	Palmetto	Lady Lisa	Savannah	Pisces (NF)	
2009	43.5	12.5			
2010	59	15.5	29	34*	* 34 days on Nancy Foster
2011	54.5	9	50	12	
2012	39.5	0	50	29	
2013	50	0	50	32	
2014	49	0	45	27	
2015	49	16	45	23	
2016	48.5*	12	45	29	* incl. 19 days on SRVx Sand Tiger
2017*	29.5	1.5	40	32	Note: 3 hurricanes in fall
2018	42	4.5	36	28	
2019	41.5	2	30	30	

Chevron (video) trap

In use since 1988 (consistent method since 1990)

- Dimensions: 1.5 m x 1.7 m x 0.6 m.; mesh 35x35 mm
- Volume: 0.91 m^3 with one funnel opening
- Baited with clupeids (menhaden)
- Soak time ≈90 minutes
- Tethered individually to surface with line with buoy and highflyer/bouy
- With escape hatch
- Deployed in sets of up to 6 traps >200 m apart during daytime hrs
- 3 – 4 sets per day (up to 24 traps/day)
- Generally deployed in depths of < 100 m (300 ft.)



Information and samples collected

All Species:
Species composition - Relative abundance - Lengths - Total weight

Priority Species
Ind. weights
Age (otoliths and spines)
Sex, reproductive stage (histology), fecundity

For certain species depending on ongoing studies:
DNA, diet, muscle tissue for isotopes and contaminants

Current priority species:
Black Sea Bass, all groupers and snappers, Red Porgy, Gray Triggerfish, Greater Amberjack, Almaco Jack, White Grunt, Tilefish, Blueline Tilefish, Knobbed Porgy.

Plus a variety of “rare” species
(goal: building LH information over time)

Life history subsampling for priority species

1988 – 2007:

- “Low volume” species: All specimens kept
- “High volume” species: **Subsampling by size class: # / size class / latitude depending on species**

2008 onwards:

- “Low volume” species: All specimens kept
- “High volume” species: **Random selection** (BSB, VS, RP, and GTF - % varied)

2014 onwards (cost reduction):

- Halting gonad sampling for BSB & Gray TF or RP & VS in a 3-year rotation

2017 onwards: (cost reduction)

- No collection of male gonad tissues from gonochorists

2020 onwards: (cost reduction)
Reducing # of “rare” species for which samples are taken

SERFS Specimens collected and processed				
	collected		LH	
	# of fish	# of species	# of fish	# of species
2013	40,366	68	7,620	36
2014	40,991	62	8,993	39
2015	43,237	83	11,142	42
2016	43,896	89	13,611	46
2017	39,932	65	10,513	43
2018	47,342	82	11,367	50
2019	44,082	70	12,151	39

- (2007/08) 2009-2010:
  Equipped with digital still camera
  (NIKON S310 - 8 MP and S320 -10MP
  taking 1 picture every 5 minutes
  during deployment

- Since 2011:
  Video camera added (SEFIS)

- Since 2015 GoPros

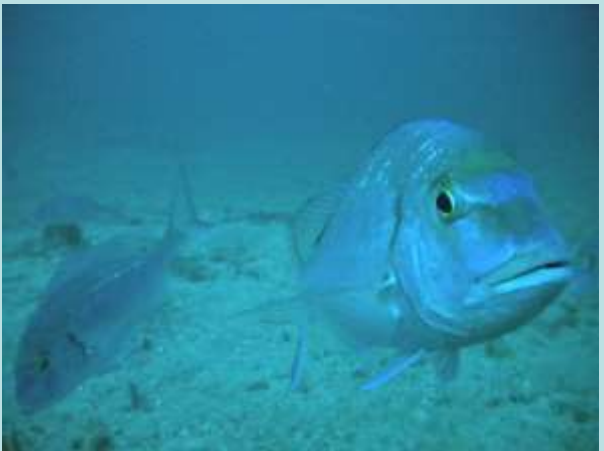
- In 2019 stereo cameras on limited # traps
  (determining fish length)

SCDNR Reef Fish Survey Scientific Personnel

Lady Lisa:	3 – 4	
Palmetto:	7 – 9	
Lab:	Age growth	2.5 perm. + hourly
	Reproduction	2.5 perm. + hourly
	Management and analysis	1.7 perm.
	Scheduling and logistics	1.5 perm.

All are involved in fieldwork activities, which are included in above

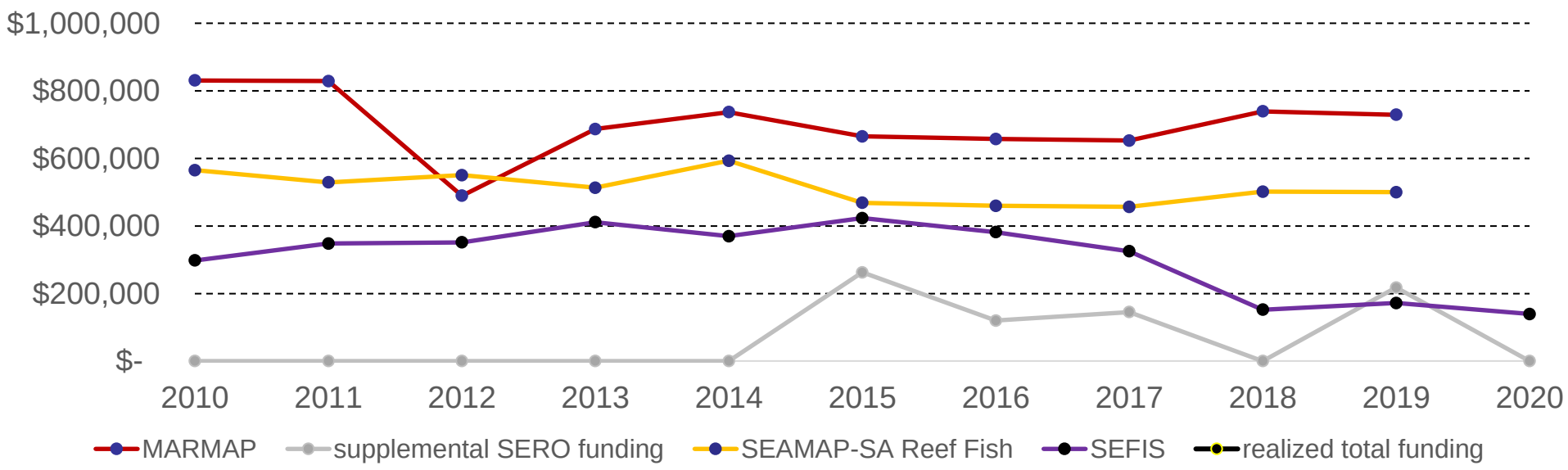
MARMAP	6.0 staff
SEAMAP-SA	3.5 staff
SEFIS	1.7 staff



<u>SCDNR Reef Fish funding 2019/2020</u>

MARMAP	$ 729,218
SEAMAP-SA	$ 499,996
SEFIS	$ 139,434

SCDNR Reef Fish Funding



Not included: SC-DNR contributions through vessel costs

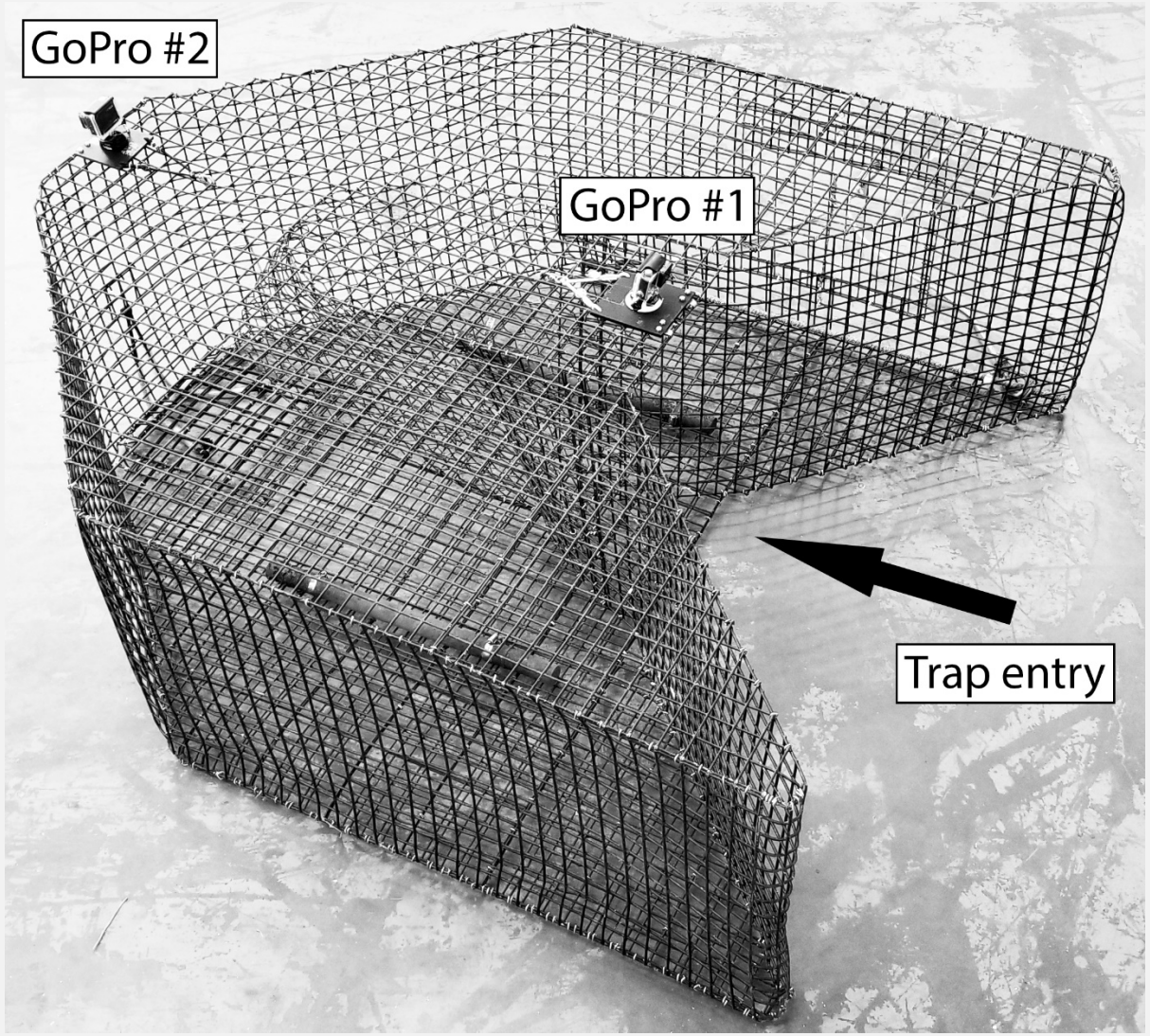
Video recordings (estimated based on 2 cameras per trap)

	Palmetto	Lady Lisa	*Savannah*	*Pisces*	total
2013	1,088	0	1,146	888	3,122
2014	1,038	0	1,220	782	3,040
2015	1,150	0	1,252	640	3,042
2016*	1,056	0	1,160	858	3,074
2017	1,040	0	1,152	956	3,148
2018	1,360	0	1,220	988	3,568
2019	1,350	0	1,002	1,138	3,490

*includes Sand Tiger

Southeast Reef Fish Survey (SERFS)
Video component

- Added to traps coastwide in 2011
- Priority fish counted using MeanCount approach - tracks site abundance
- Canon cameras 2011-2014; GoPro cameras 2015-present (calibrated)



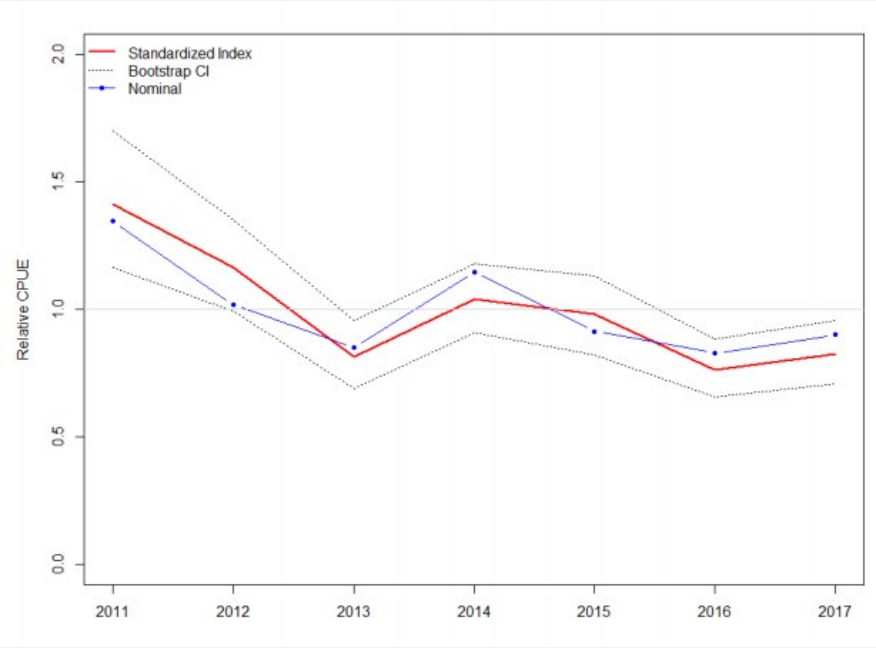
Southeast Reef Fish Survey (SERFS)
Video component

- 5-6 video readers spend a majority of the year reading videos
- Habitat, water clarity, current direction also estimated from each video

Year	SEFIS	MARMAP	TOTAL
2010	472	0	**472**
2011	546	460	**1,006**
2012	945	448	**1,393**
2013	1,017	544	**1,561**
2014	1,001	519	**1,520**
2015	946	575	**1,521**
2016	1,009	528	**1,537**
2017	1,054	520	**1,574**
2018	1,104	680	**1,784**
2019	1,070	675	**1,745**
Total	9,164	4,949	**14,113**

Southeast Reef Fish Survey (SERFS)
Video component

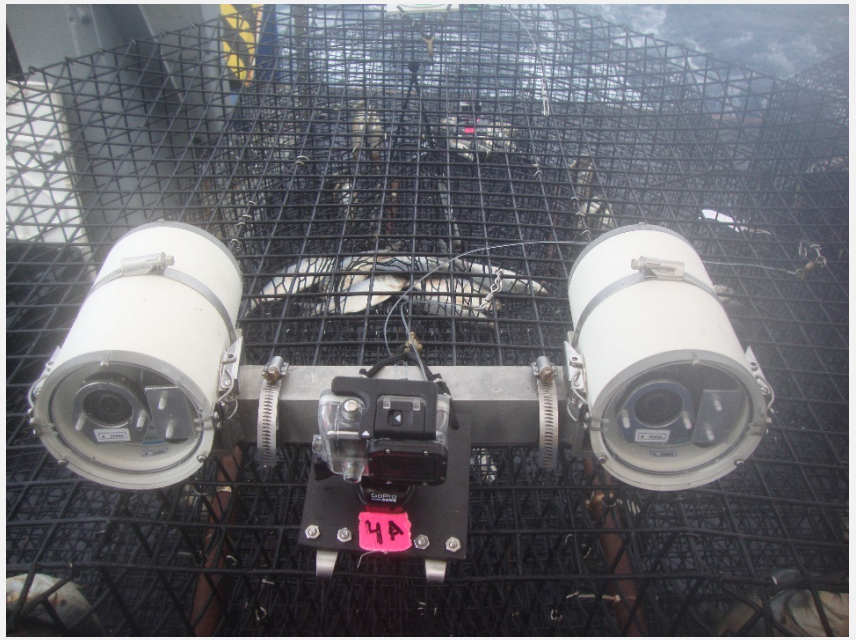
- Video-based indices of abundance included in 8 assessments so far
- CVs really good for most species
- Useful indices probably possible for 20-25 priority species in total based on frequency of occurrence



Species	Years included	CVs
Red snapper	2010-2013	0.11 - 0.17
Gray triggerfish	2011-2013	0.09 - 0.11
Red grouper	2011-2015	0.30 - 0.50
Vermilion snapper	2011-2016	0.10 - 0.13
Black sea bass	2011-2015	0.12 - 0.14
Greater amberjack	2011-2017	0.12 – 0.21
Red porgy	2011-2017	0.07 – 0.09
Scamp	2011-2017	0.11 – 0.14

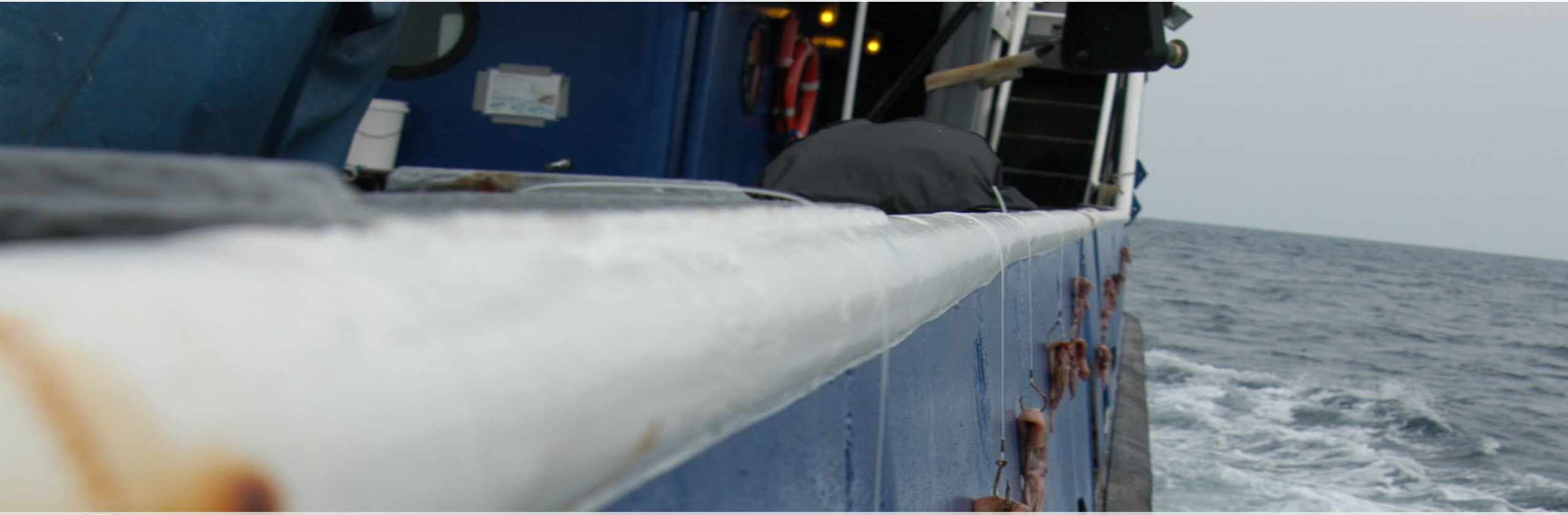
Southeast Reef Fish Survey (SERFS)
Stereo-video pilot study

- Lengths of fish observed on video necessary to estimate selectivity
- A few traps lost each year – rocky habitat and Gulf Stream currents
- Low-cost and small stereo-video systems needed
- Improve a Stock Assessment (FY18)
- Internal MARFIN (FY19)
- 180 stereo-videos collected in FY19, currently being read by NCCOS contractor ($60-80K for 1 year)
- Stereo videos will also be collected in 2020 (*N* = ~200), but no funding yet for reading



Appendix 4: Presentation on ongoing / paused SCDNR short-bottom longline survey (SBLL)

Short Bottom Longline (SBLL)



Walter Bubley, Tracey Smart, and Marcel Reichert

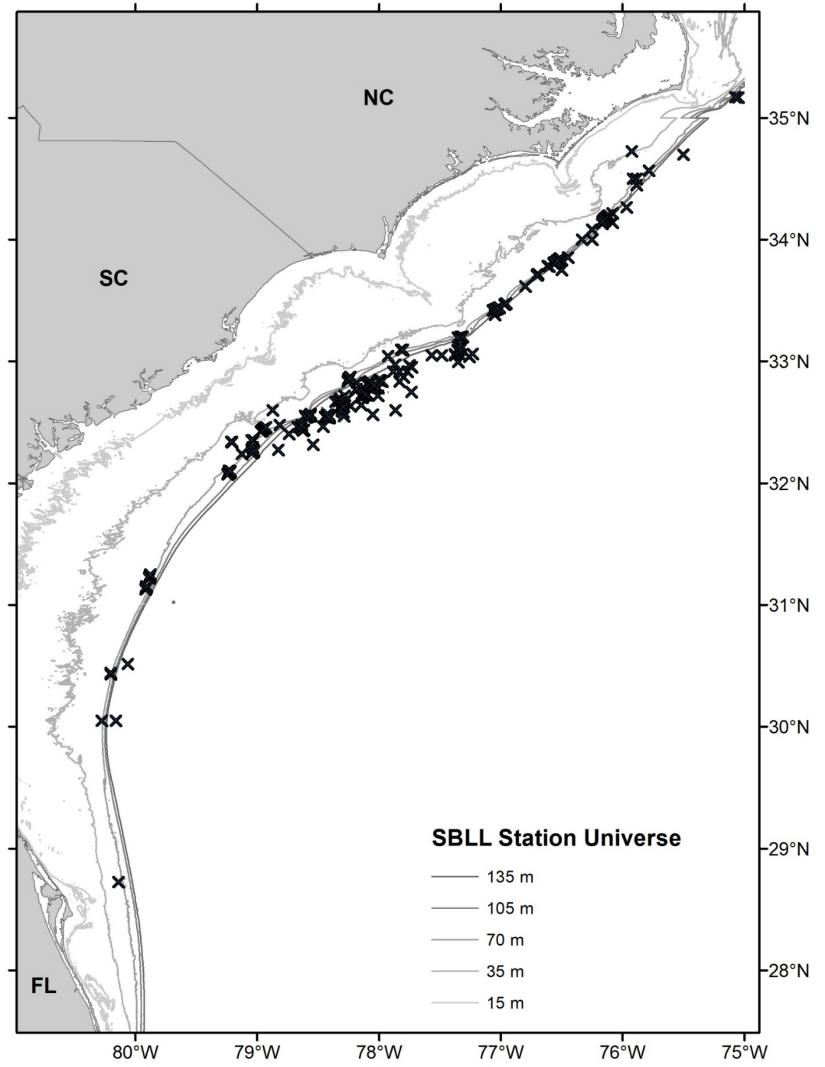
South Carolina Department of Natural Resources

Marine Resources Research Institute, Charleston, SC

Fishery-Independent Survey Review Workshop – February 25-26, 2020

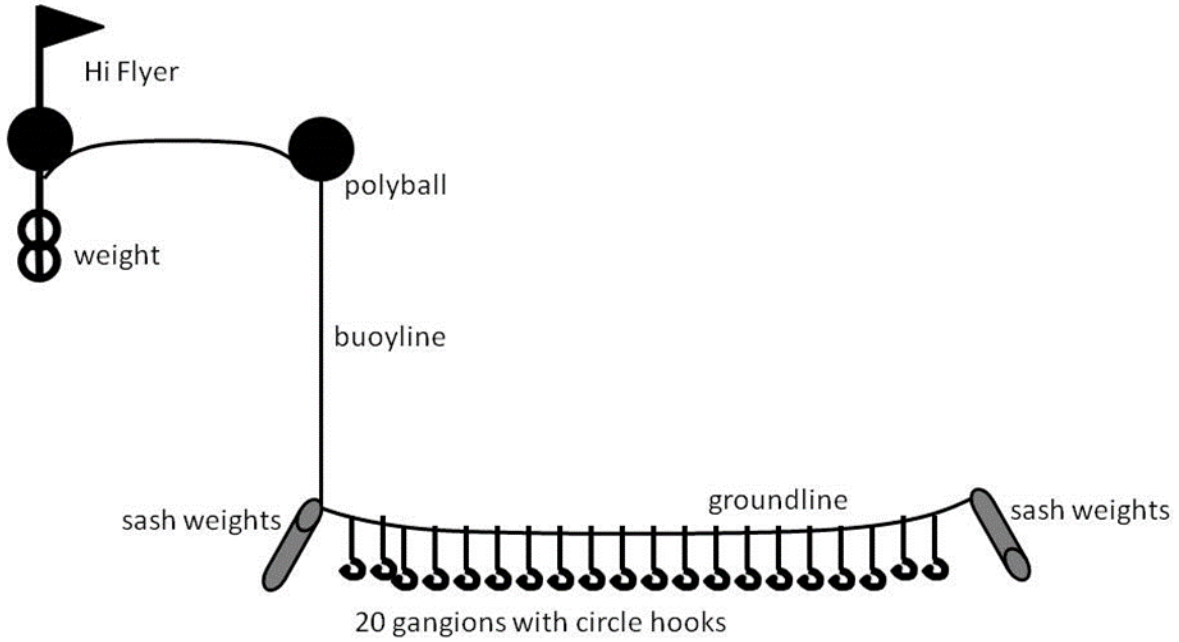
SBLL Survey Design

- **Sampling universe**
  - **~330 stations**
  - **High relief areas**
  - **Majority off North and South Carolina**
- **Stations randomly selected from the universe**
  - **Minimum distance between deployments 200m**
  - **≤250 selected each year**
- **Season**
  - **April - October**



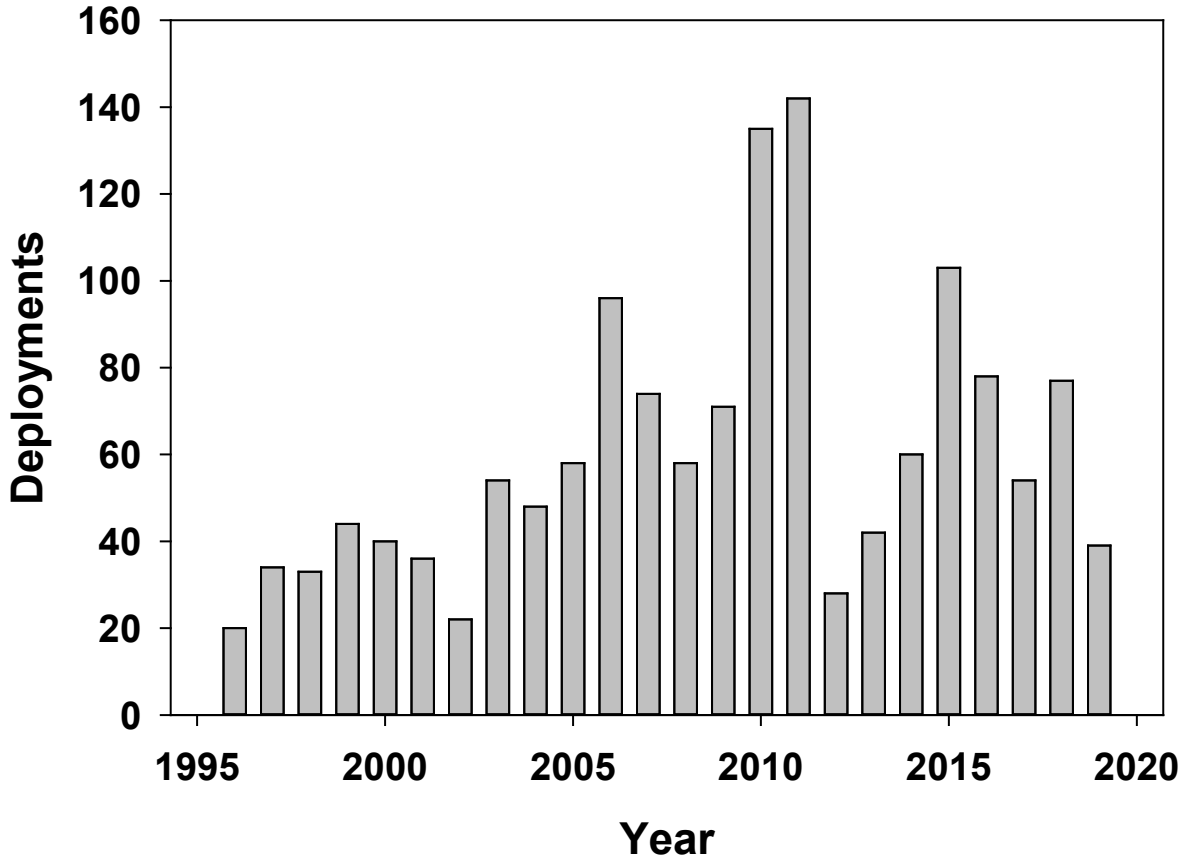
SBLL Gear

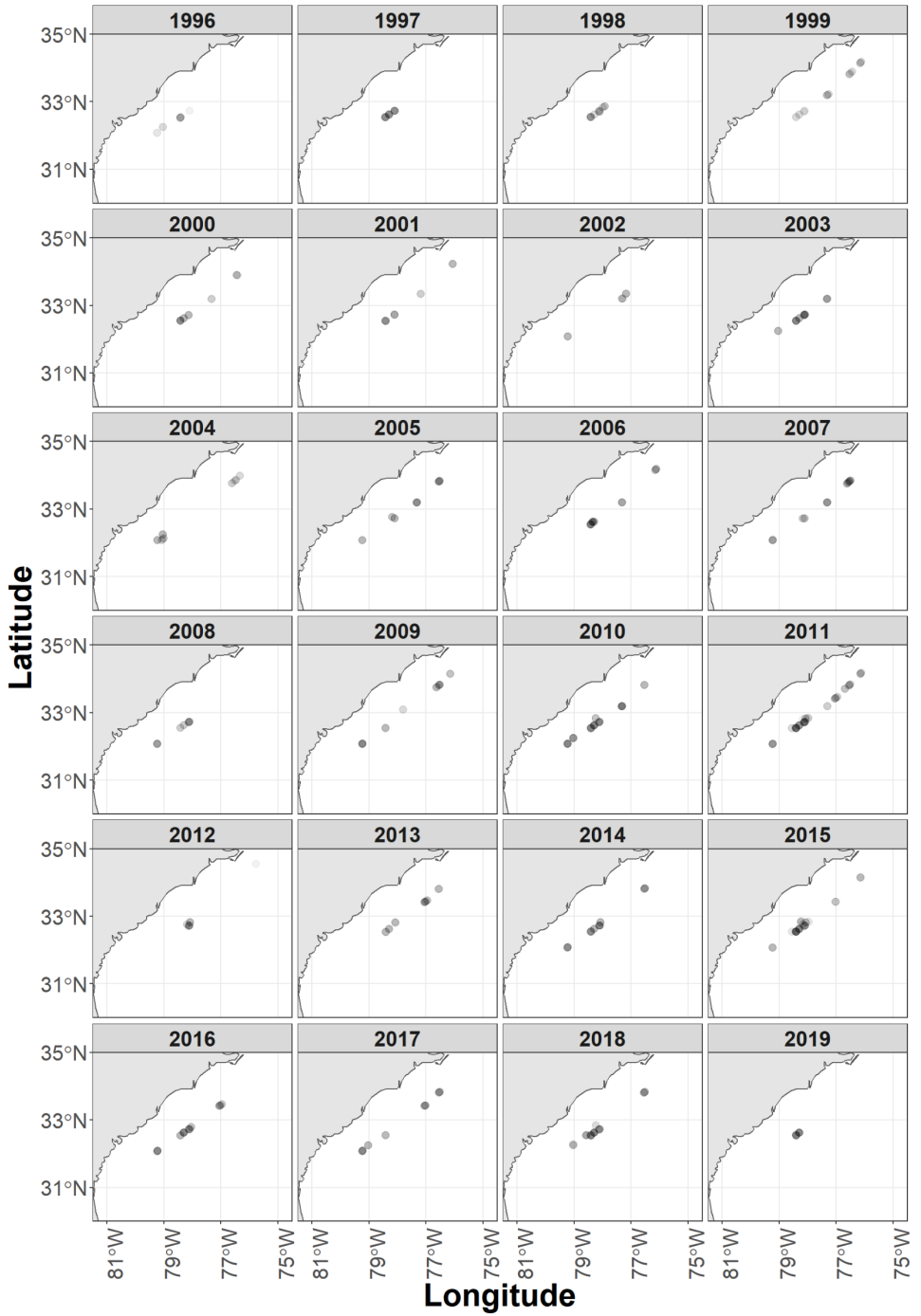
- **Gear**
  - **25.6 m ground line**
  - **Gangion**
    - **0.5 m of 90 kg test monofilament**
    - **Single, 12/0 non-offset circle hook**
  - **Baited with whole squid**
  - **Depths 90 – 220 m**
  - **Daylight hours**
  - **Soak time ~ 90 minutes**



SBLL Time Series

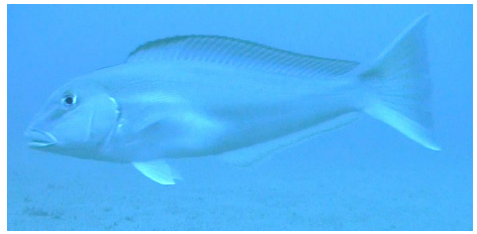
- **1996 - 2019**

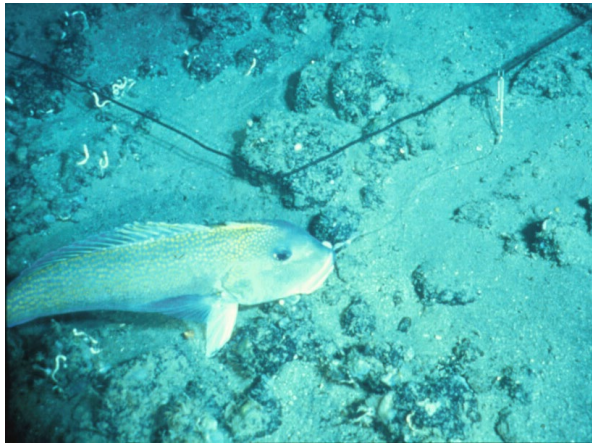


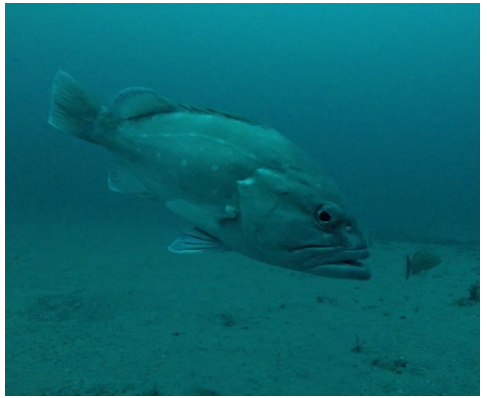


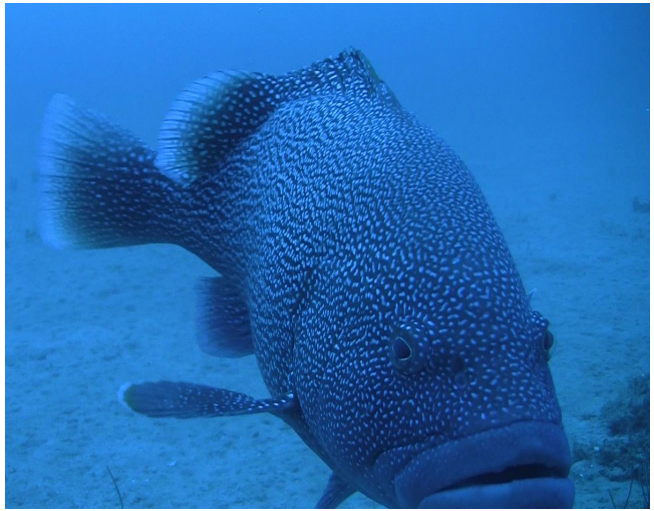
Targeted Species

- **Grouper (Deeper water species)**
- **Tilefish (Blueline and Golden)**
- **Jacks (Almaco and Amberjacks)**



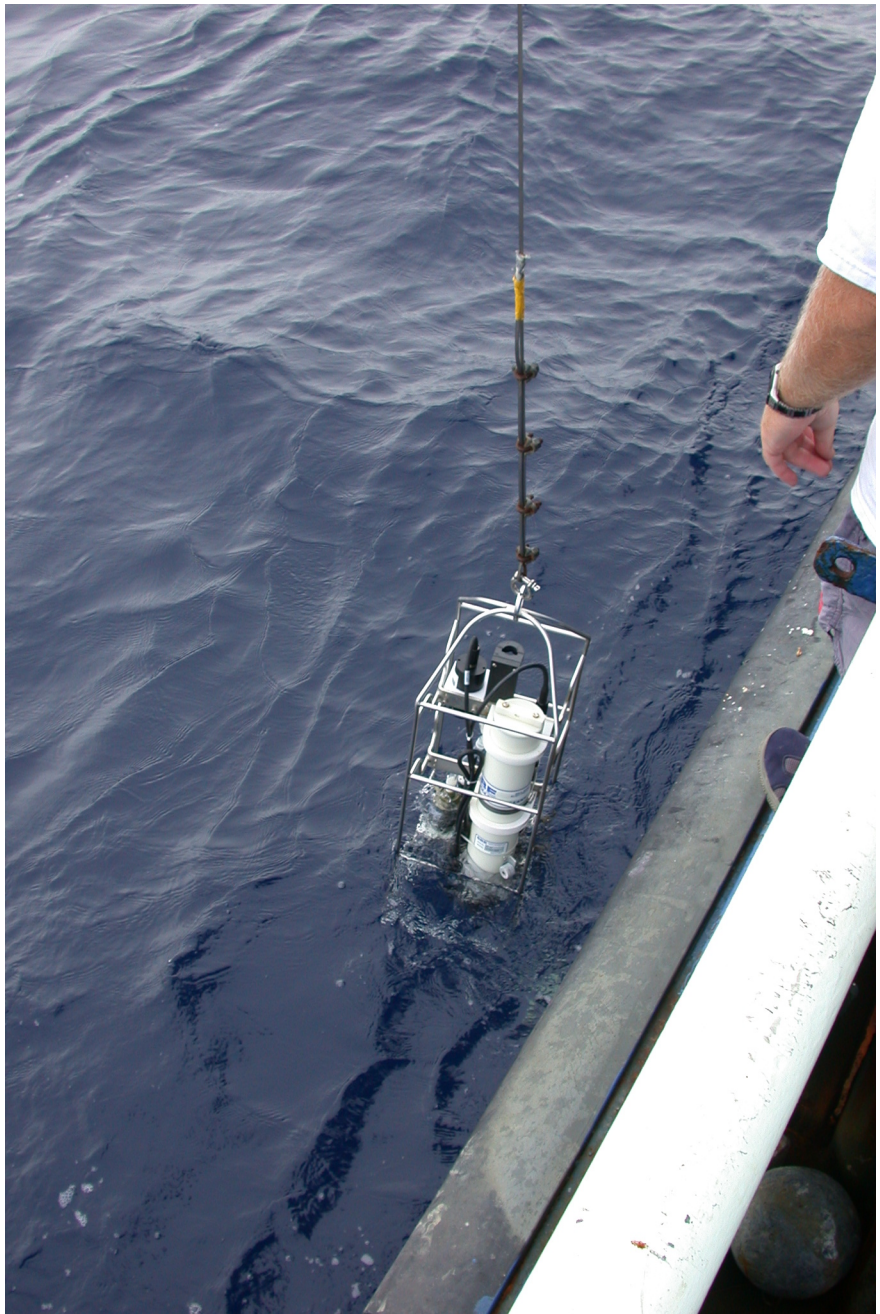






Collection Data (All Surveys)

- **Date**
- **Time**
- **Location**
  - **Latitude and Longitude**
- **Water Depth**
- **Bottom Temperature**
  - **CTD or temperature logger**
- **Salinity**



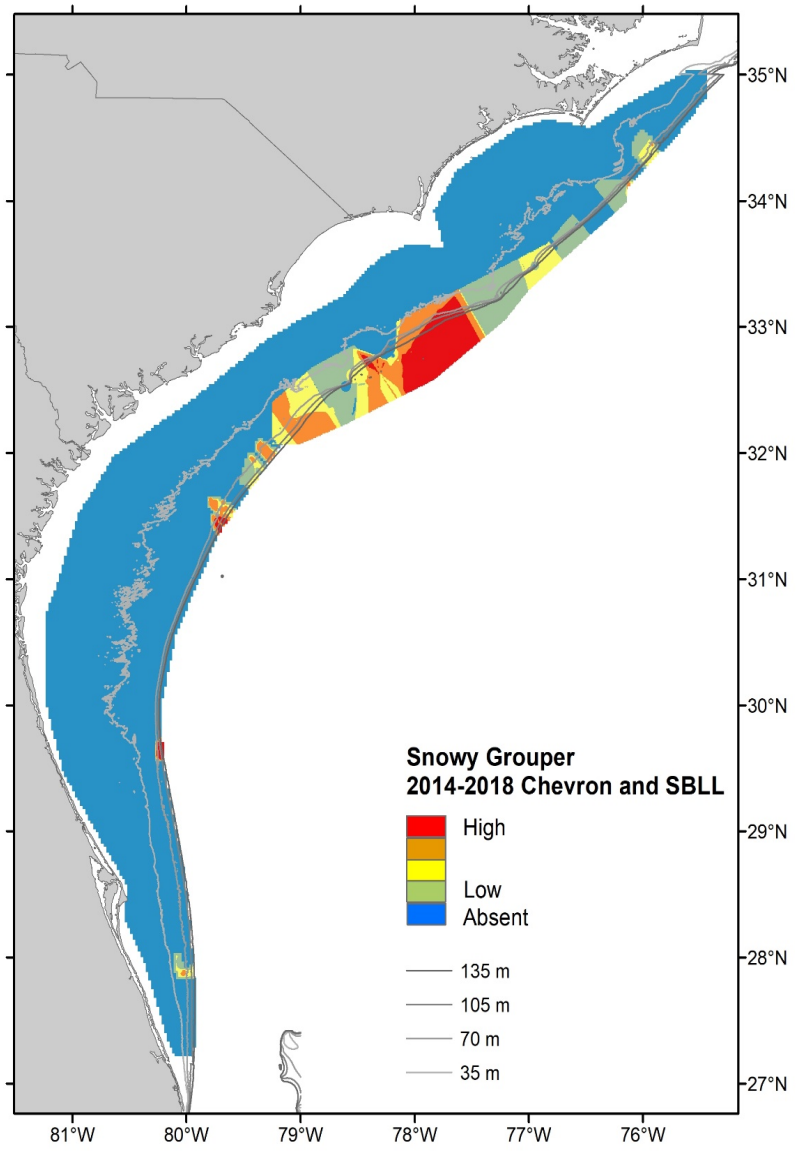
Catch Data

Per longline deployment

- **All catch identified to species**
- **Aggregate weight by species**
- **All individuals counted and measured**
  - **TL or FL for length frequency**
- **Subset of priority species kept for life history**
  - **Individual weights**
  - **TL, FL (if applicable), and SL**
  - **Otoliths, spines, or vertebrae**
  - **Reproductive tissue**
  - **Stomach**
  - **DNA**

Data Uses

- **Fishery-independent indices of relative abundance**
- **Spatial and temporal distribution patterns**
- **Meristic conversions**
- **Length/Age compositions**
- **Life History**
  - **Growth**
  - **Sex-ratio**
  - **Size/Age at maturity and/or transition**
  - **Spawning season, area, frequency, and fecundity**
  - **Diet**
  - **Stock structure**

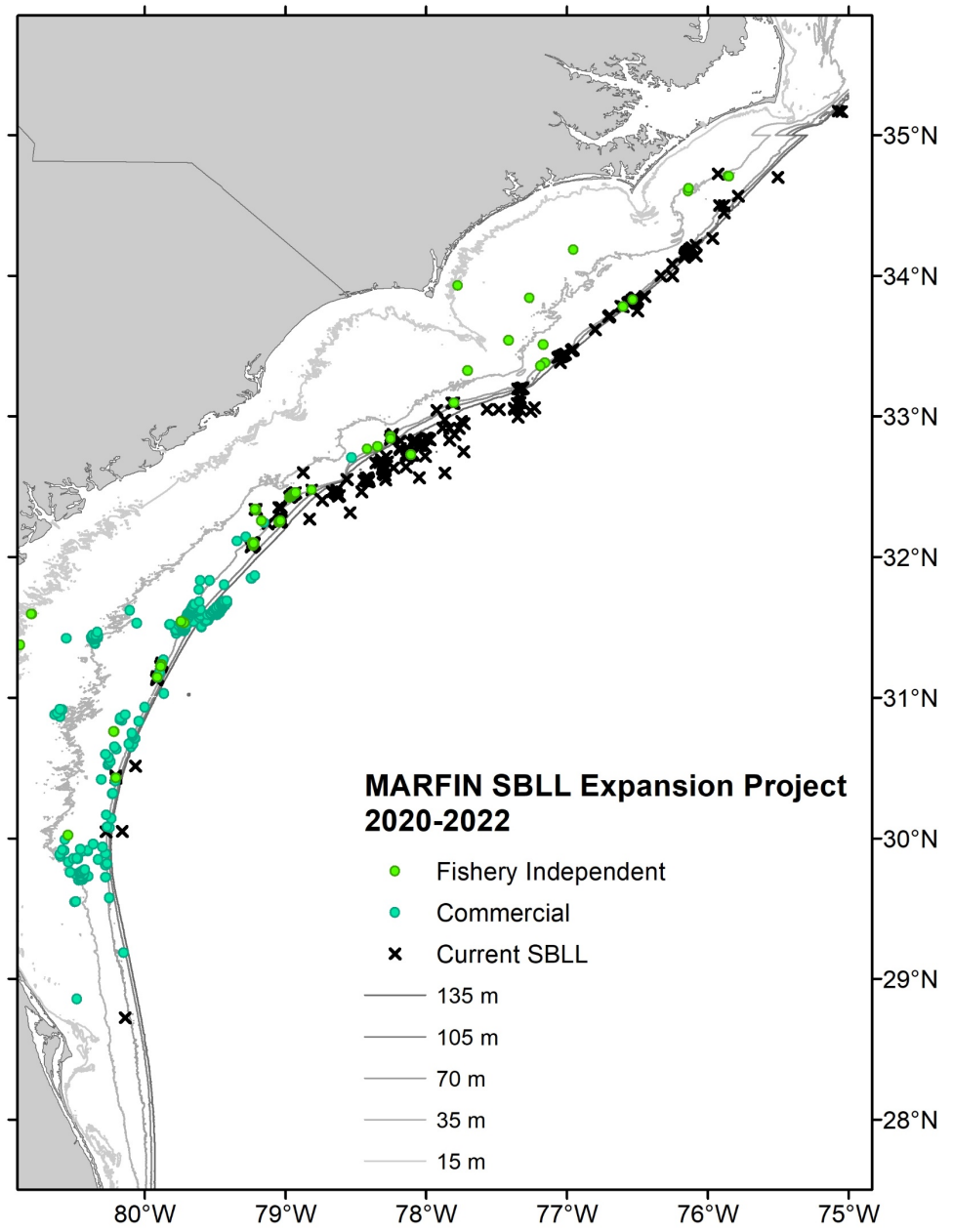


SBLL Survey Costs

- **Vessel**
  - **R/V Palmetto = $9,500**
  - **R/V Lady Lisa = $3,400 per day**
  - **R/V Silver Crescent = $1,800 per day**
- **Scientific Personnel**
  - **R/V Palmetto = 8-9**
  - **R/V Lady Lisa = 4-5**
  - **R/V Silver Crescent = 3-4**
- **Life History Collection**
  - **Range = 56 – 636 specimens**
  - **Mean = 217 specimens**

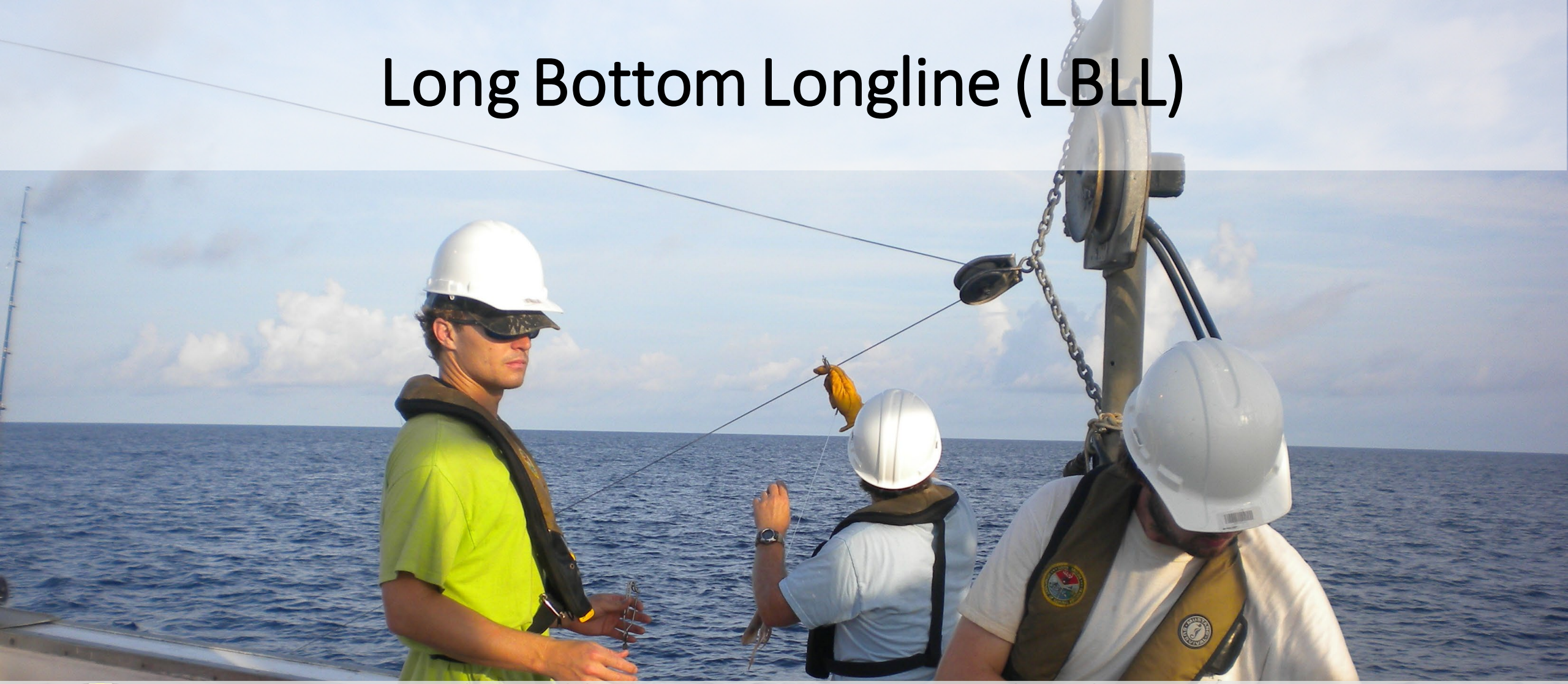
SBLL Moving Forward

- **MARFIN proposal funded**
  - **3 years**
  - **Expand sampling universe**
  - **Increase sample size**
  - **Describe habitat types**
  - **Using multiple vessels**



Appendix 5: Presentation on ongoing / paused SCDNR long-bottom longline survey (LBLL)

Long Bottom Longline (LBLL)



Walter Bubley, Tracey Smart, and Marcel Reichert

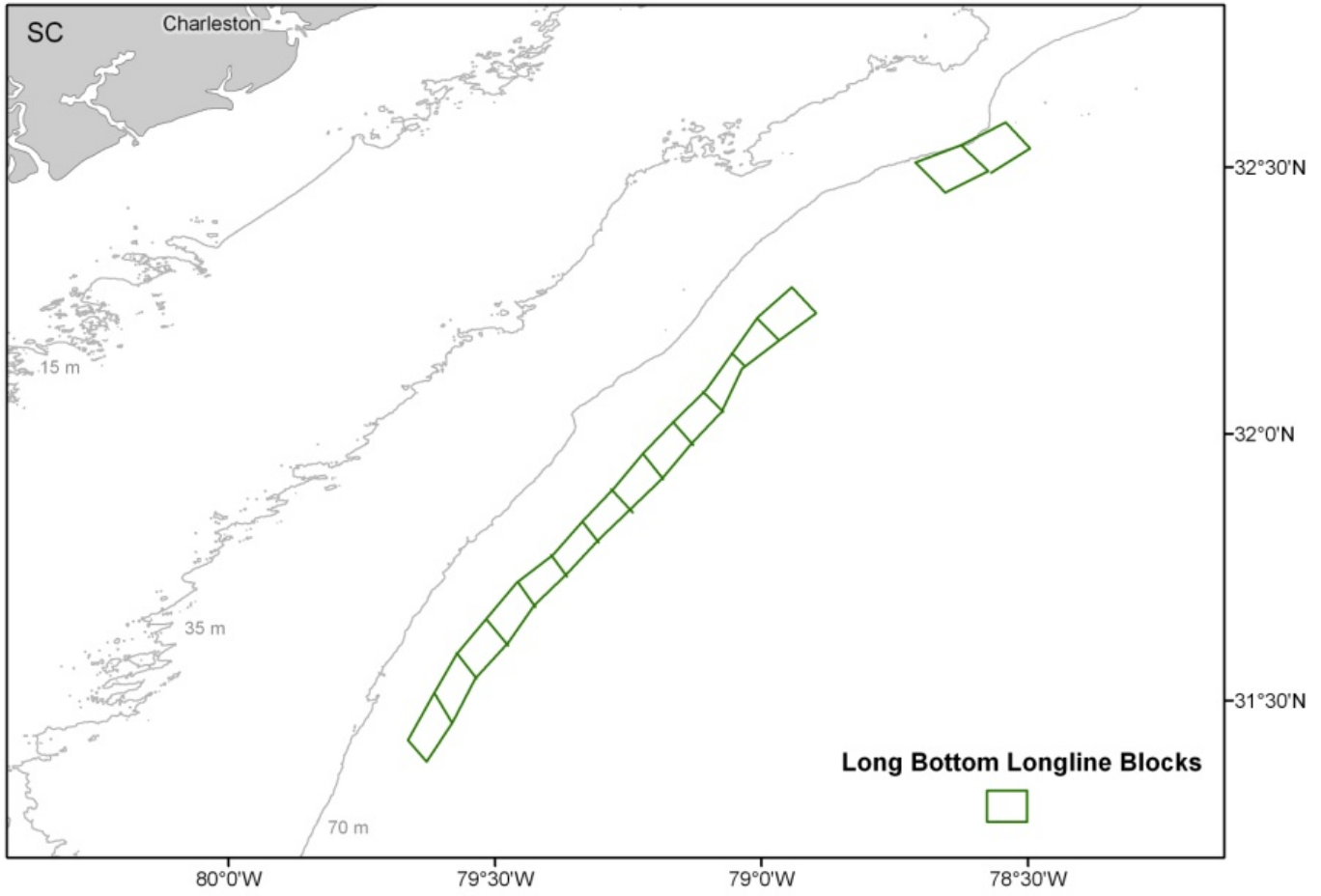
South Carolina Department of Natural Resources

Marine Resources Research Institute, Charleston, SC

Fishery-Independent Survey Review Workshop – February 25-26, 2020

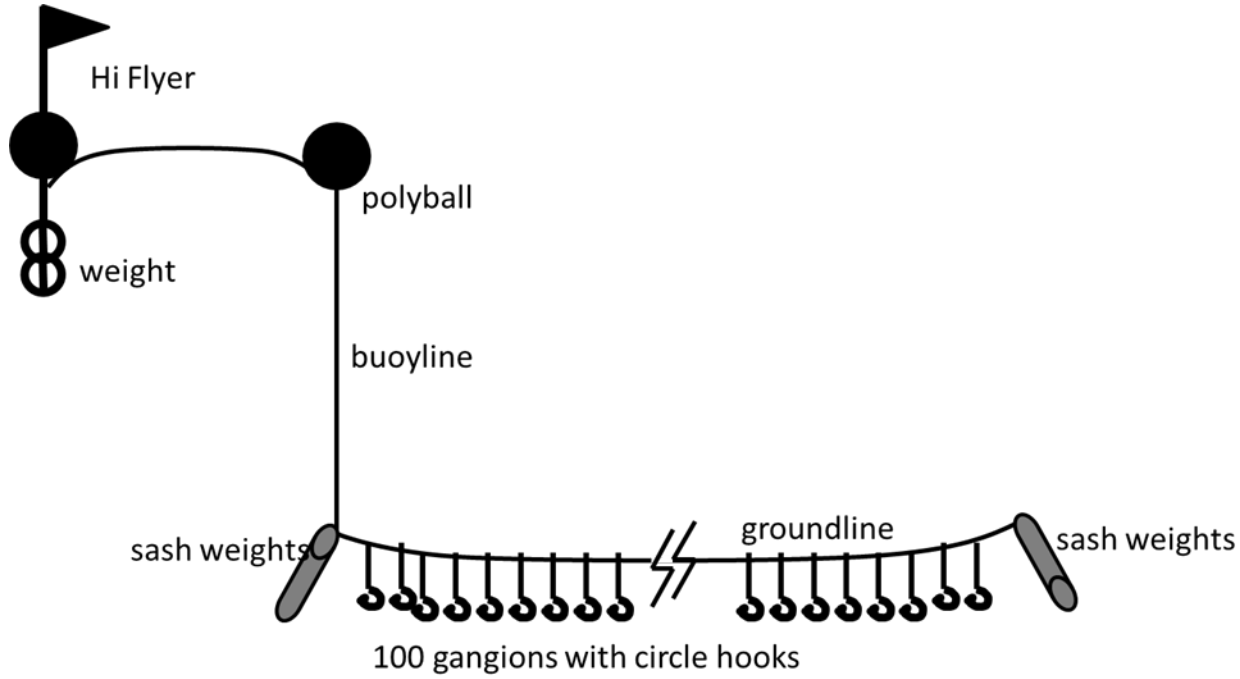
LBLL Survey Design

- **Sampling universe**
  - **15 sampling blocks (GA-SC)**
  - **Areas of low relief**
    - **Smooth mud/sand/shell bott**
  - **2-4 deployments per block/**
- **Season**
  - **Typically August - October**



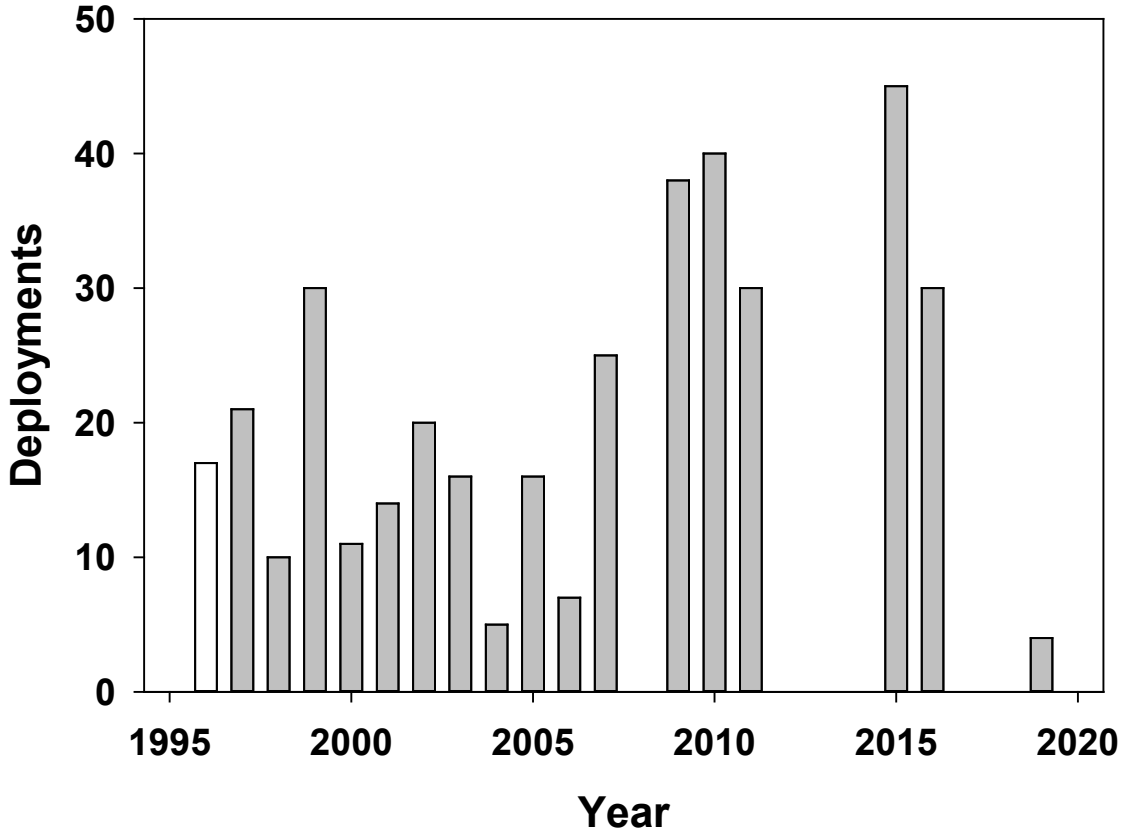
LBLL Gear

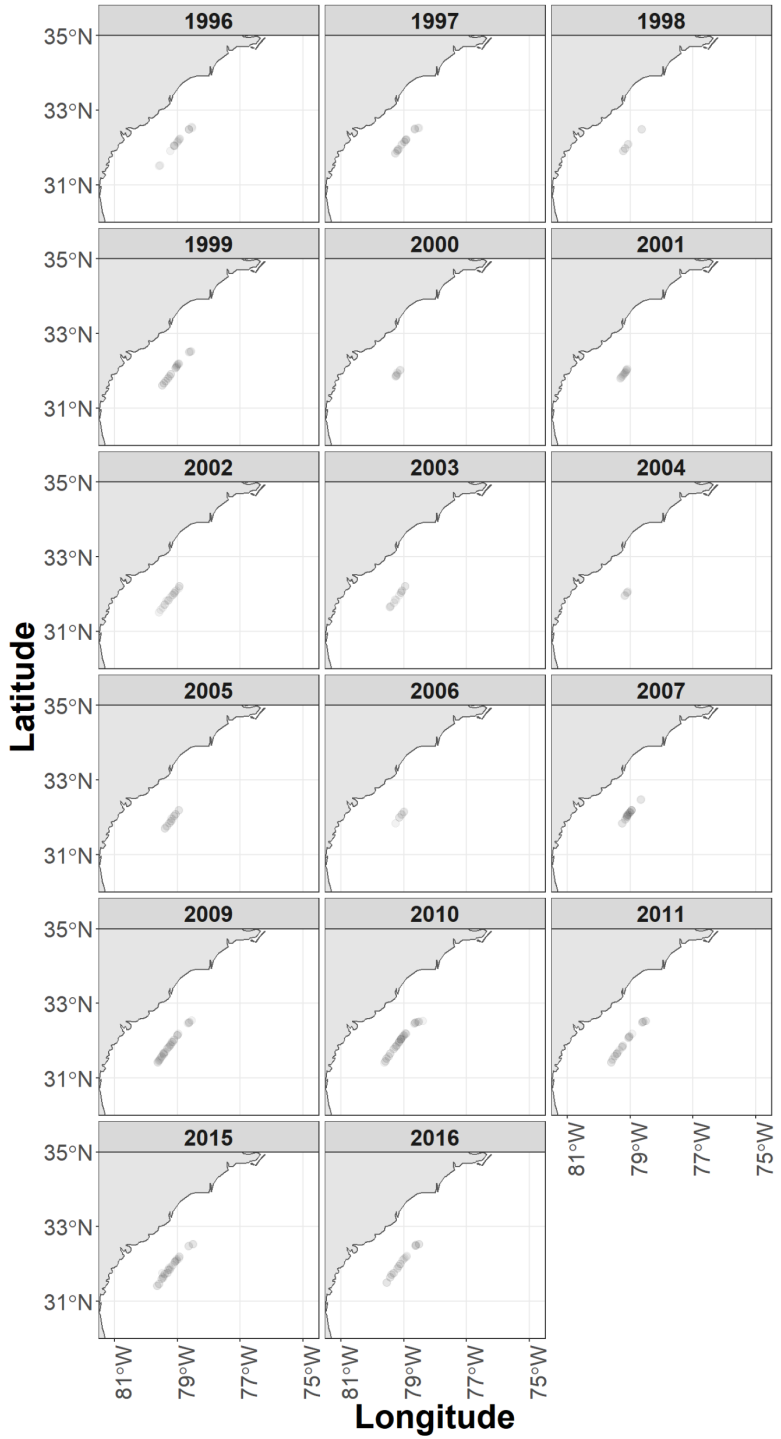
- **Gear**
  - **1,220 m ground line**
  - **Gangion**
    - **0.5 m of 90 kg test monofilament**
    - **Single, 12/0 non-offset circle hook**
  - **Baited with whole squid**
  - **Depths 148 – 348 m**
  - **Daylight hours**
  - **Soak time ~ 90 minutes**



LBLL Time Series

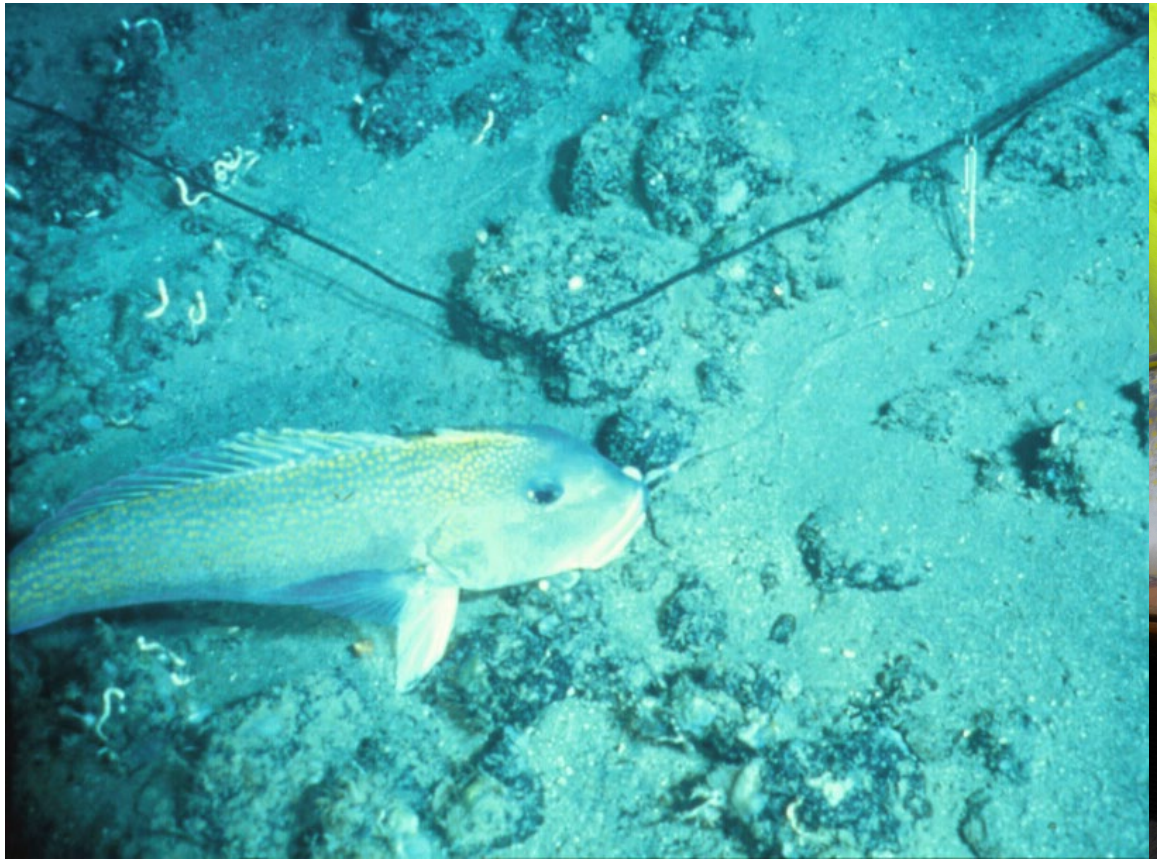
- **1996-2007, 2009-2011, 2015-2016, & 2019**





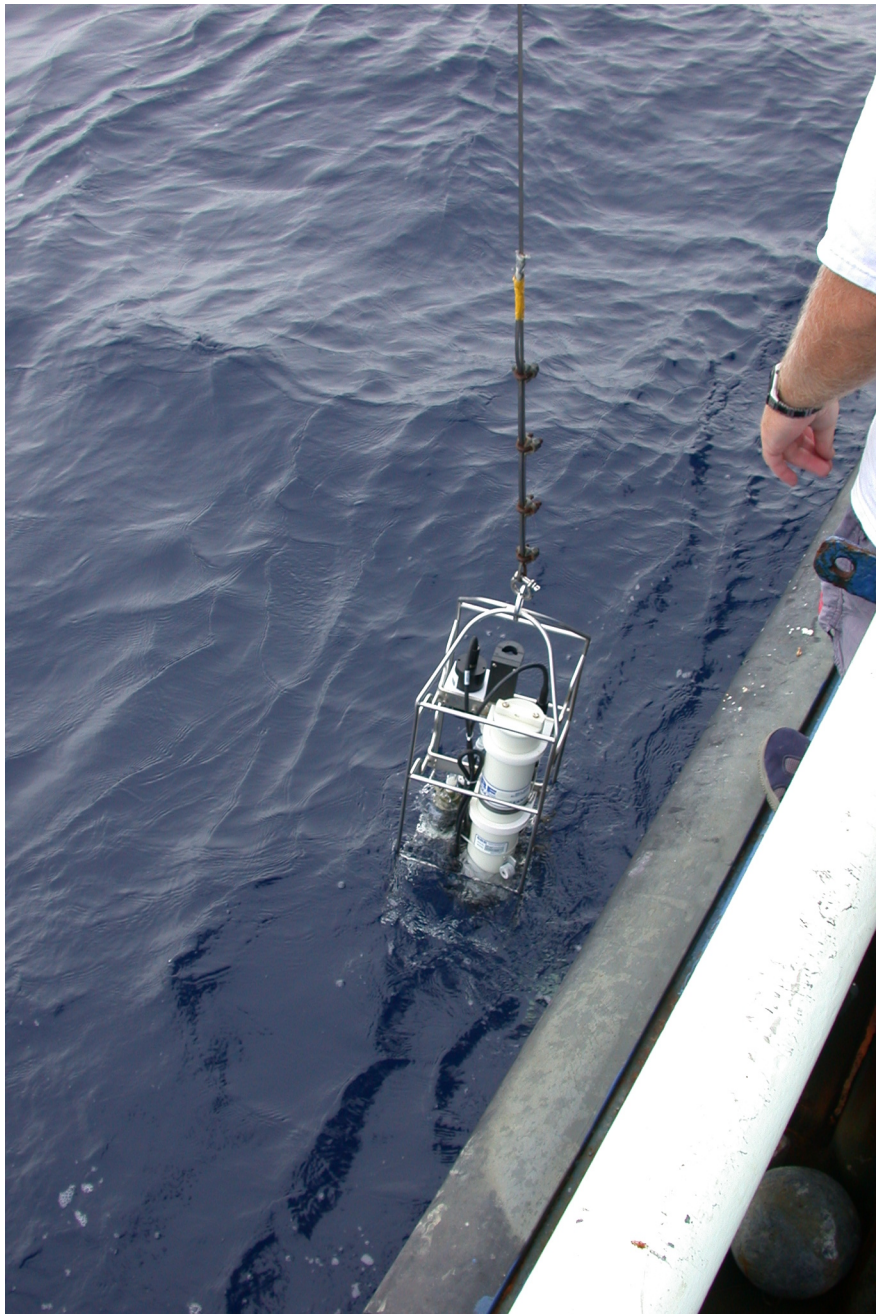
Targeted Species

- **Golden Tilefish**



Collection Data

- **Date**
- **Time**
- **Location**
  - **Latitude and Longitude**
- **Water Depth**
- **Bottom Temperature & Salinity**
  - **CTD or temperature logger**



Catch Data

Per longline deployment

- **All catch identified to species**
- **Aggregate weight by species**
- **All individuals counted and measured**
  - **TL for length frequency**
- **Subset of priority species kept for life history**
  - **Individual weights**
  - **TL, FL (if applicable), and SL**
  - **Otoliths or spines**
  - **Reproductive tissue**
  - **Stomach**
  - **DNA**

Data Uses

- **Fishery-independent index of relative abundance**
- **Meristic conversions**
- **Length/Age compositions**
- **Life History**
  - **Growth**
  - **Sex-ratio**
  - **Size/Age at maturity and/or transition**
  - **Spawning season, area, frequency, and fecundity**
  - **Diet**
  - **Stock structure**

LBLL Survey Costs

- **Days at Sea**
  - Range = 1 - 11 days
  - Mean = 6 days
- **Vessel**
  - R/V Lady Lisa = $3,400 per day
  - R/V Silver Crescent = $1,800 per day
- **Scientific Personnel**
  - R/V Lady Lisa = 4-5
  - R/V Silver Crescent = 3-4
- **Life History Collection**
  - Range = 20 – 215 specimens
  - Mean = 72 specimens

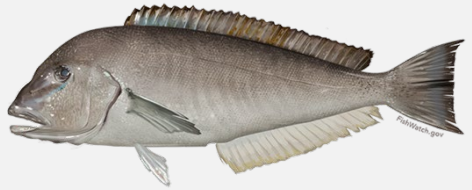
Year	Days at Sea
1996	7
1997	5
1998	5
1999	9
2000	5
2001	5
2002	4
2003	4
2004	1
2005	3
2006	2
2007	6
2009	9
2010	9
2011	7
2015	11
2016	8

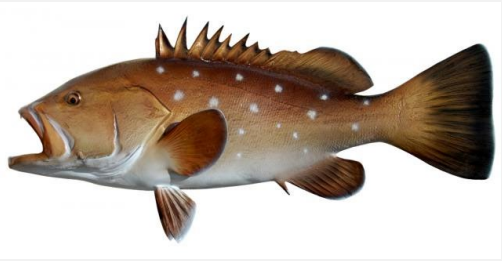
Appendix 6: Presentation on planned coastwide longline survey

South Atlantic Deepwater Longline Survey (SADLS)

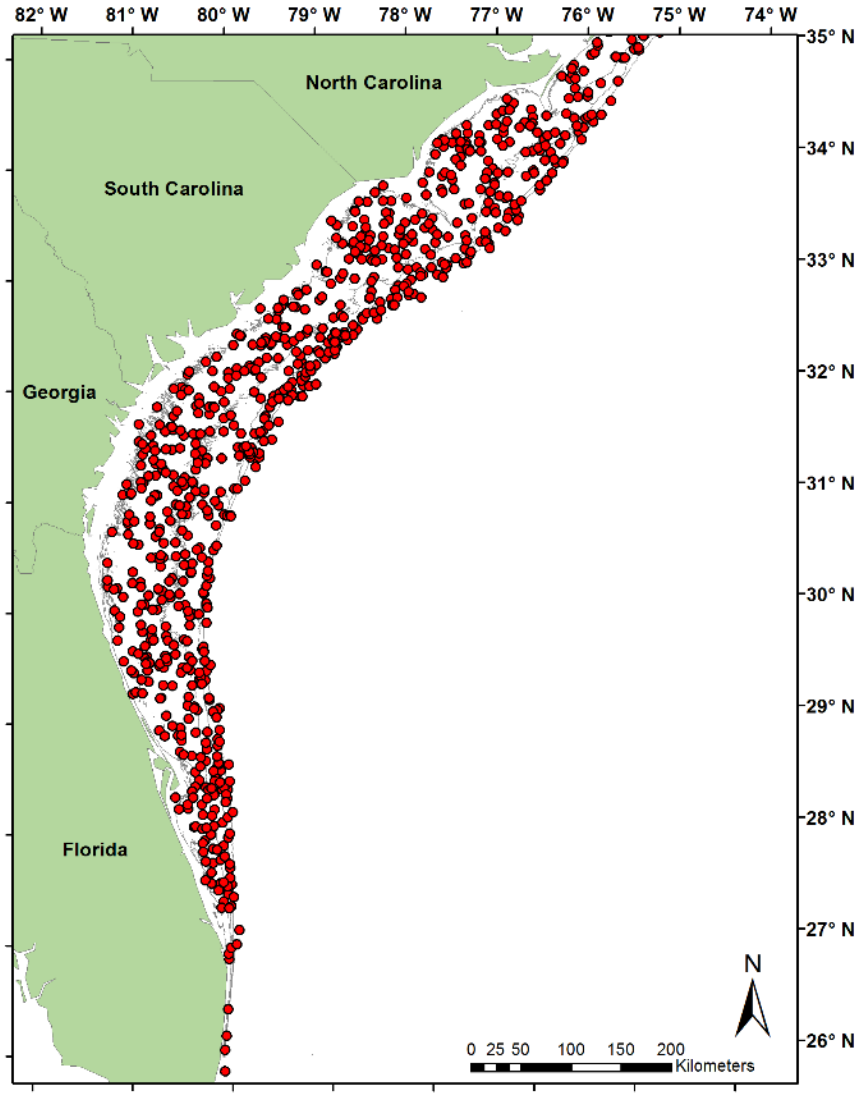
Why?

- Need for fishery-independent data for a suite of deepwater, demersal species (groupers & tilefishes)
  - Blueline tilefish
  - Golden tilefish
  - Snowy grouper
  - Speckled hind
  - Warsaw grouper
  - Other deepwater, demersal teleosts
- Focal species not effectively targeted by SERFS or SEFSC-Pascagoula longline survey



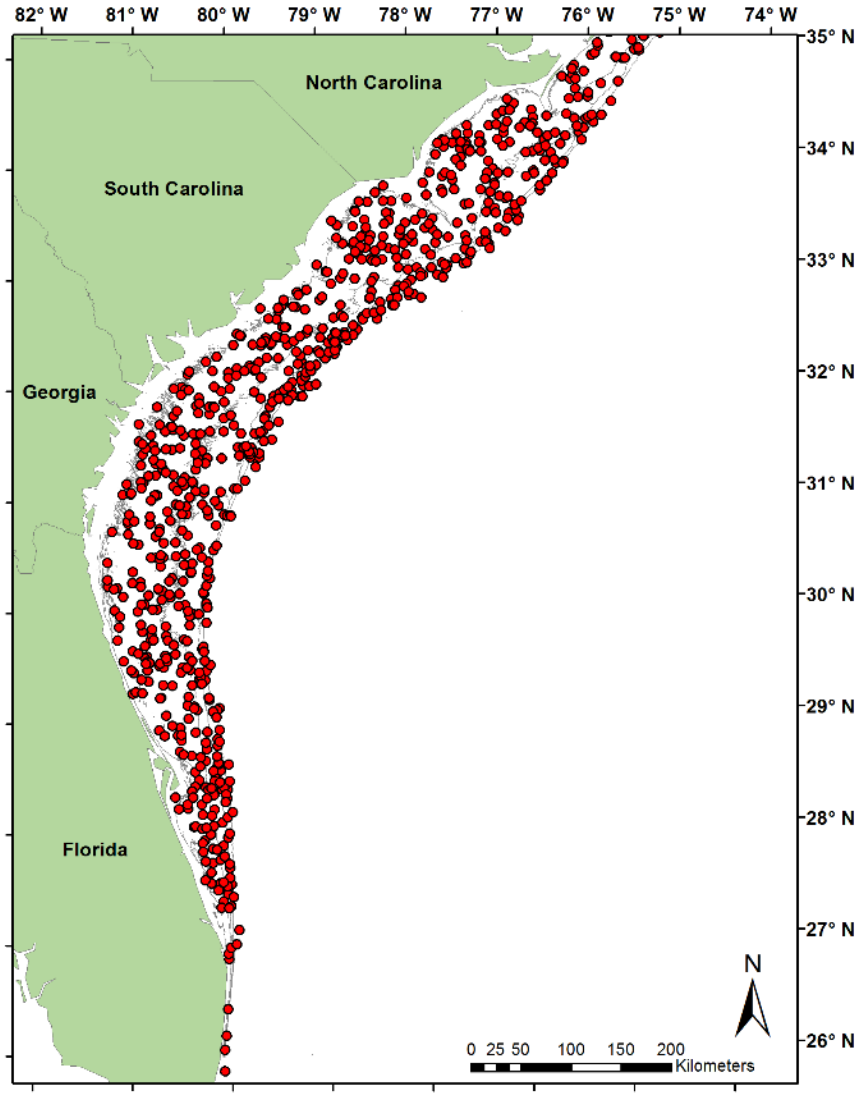


et cetera…



SEFSC-Pascagoula Bottom Longline Survey

- Time series: 1995-present
- Number of stations: (40-60 annually?)
- Timing: late July-September
- Area of focus: Cape Hatteras, NC to West Palm Beach, FL
- Depth: 9 – 183 m
- Design: stratified by depth and latitude with proportional-to-area allocation
- In Gulf of Mexico, the survey results in indices used in assessments for red snapper, red grouper, golden tilefish, and yellowedge grouper, plus multiple shark species



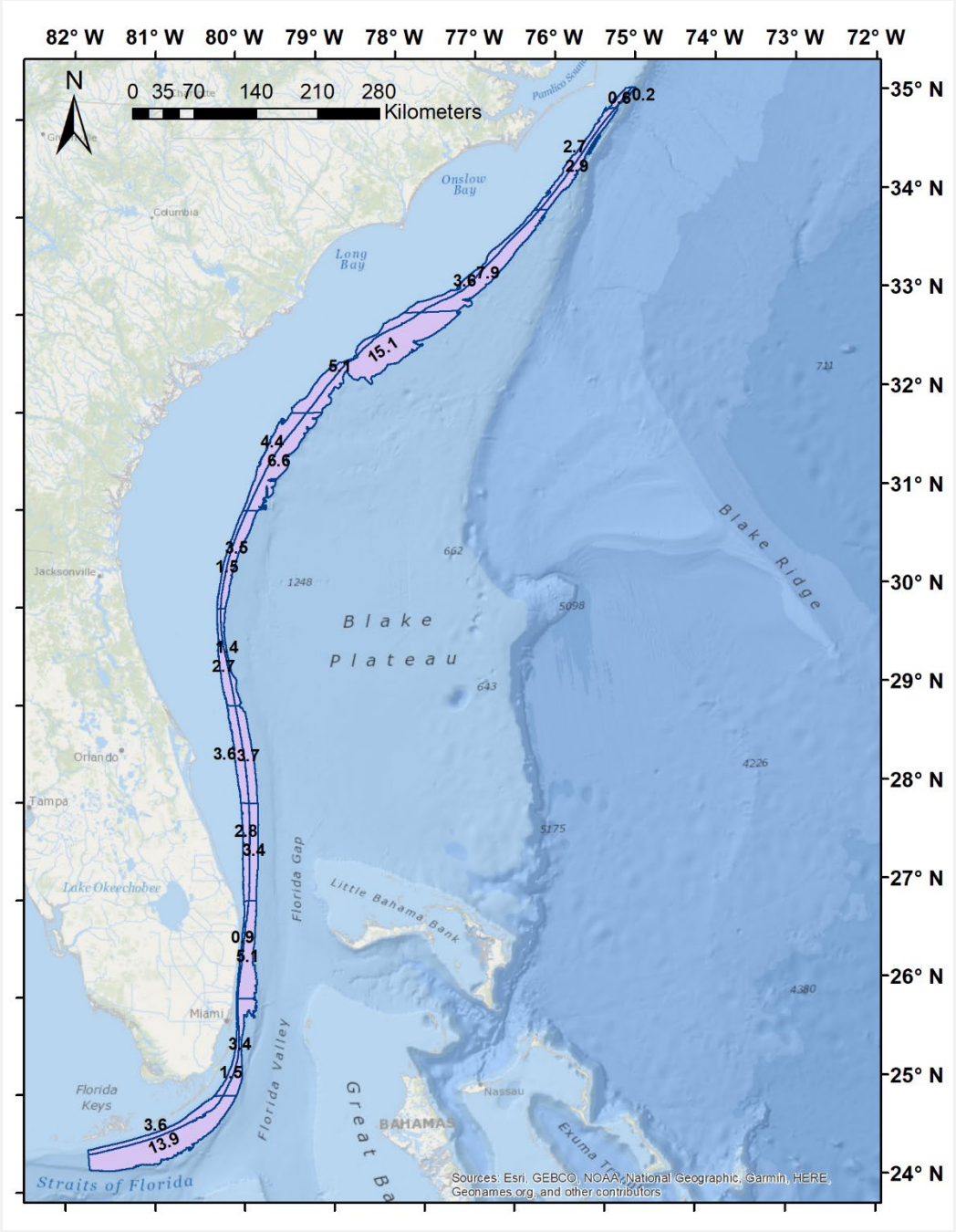
SEFSC-Pascagoula Bottom Longline Survey

- In South Atlantic, very limited teleost catches
- Indices for multiple shark species
- Altering the survey would affect shark time series and assessments
- Could be altered to more effectively target teleosts
- Current plan is for a separate, cooperative-with-industry survey targeting teleosts

South Atlantic Deepwater Longline Survey (SADLS)

How, when, where, and what?

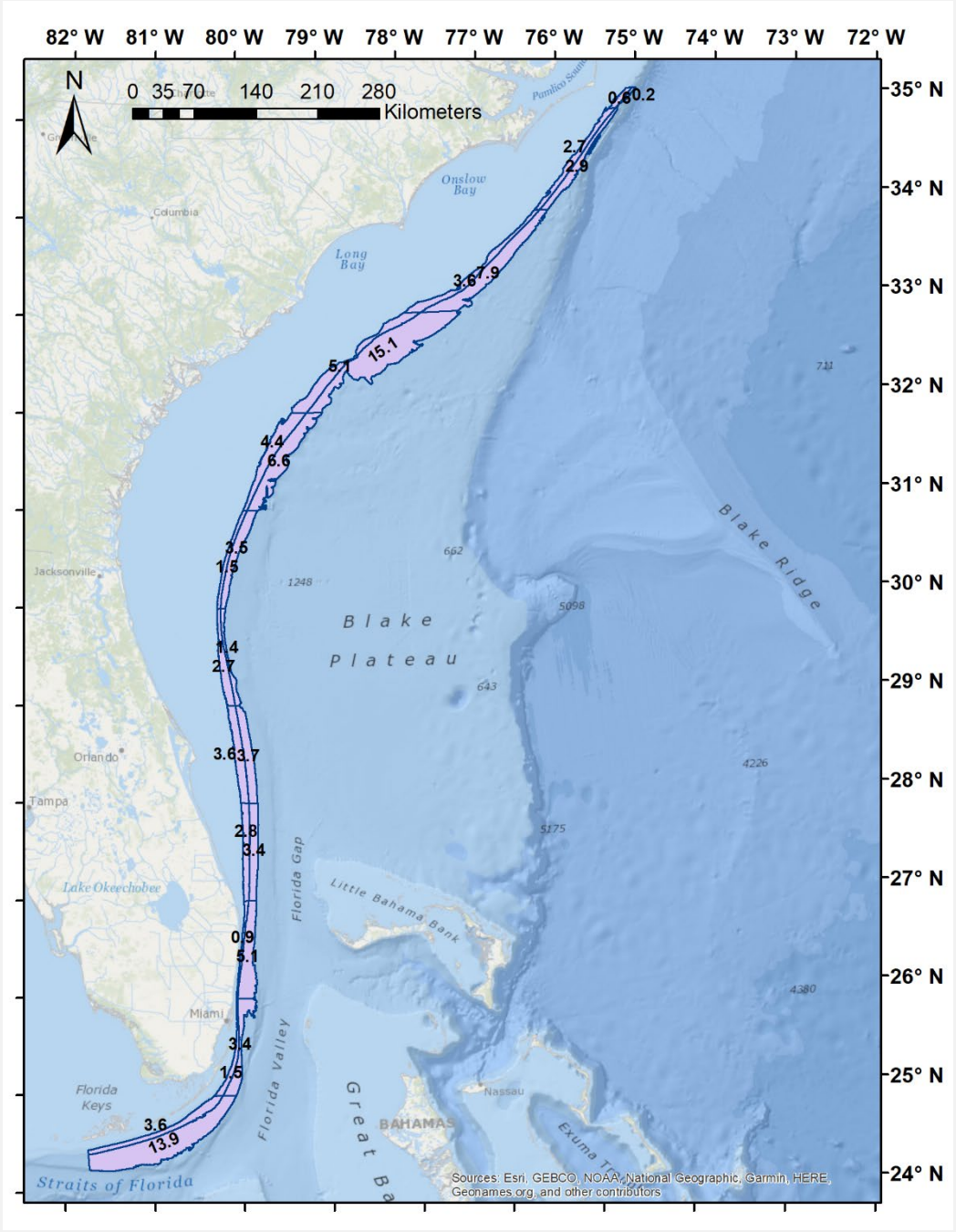
- Funded by NMFS CRP
- Co-coordinated by NMFS & SCDNR
- Summer 2020 (proposed)
- NC-VA border to FL Keys (proposed)
- Bottom longline survey
- Protocols / methodologies based on
  - 2015 longline survey workshop
  - Recent cooperative SCDNR-led projects
  - 2017 MAFMC tilefish survey



South Atlantic Deepwater Longline Survey (SADLS)

How, when, where, and what?

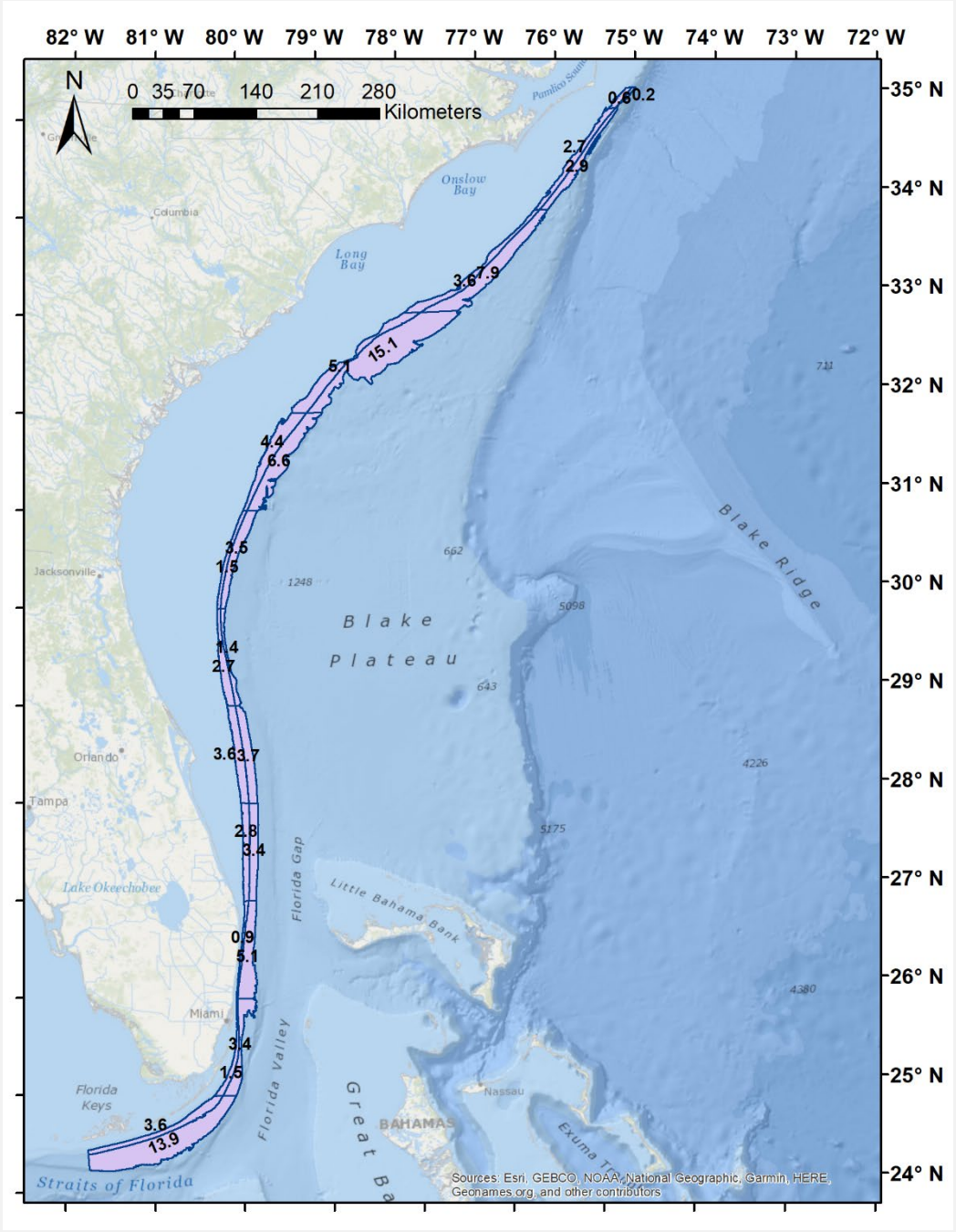
- Protocols / methodologies (proposed)
  - Sampling from industry vessels
  - ~70 - 305 m in depth
  - Not habitat-focused - sample across hard / unstructured bottom
  - NMFS observers
  - Stratified by depth and latitude
  - ~ 50 DAS
  - Proportional-by-area effort allocation?
  - Sample site selection methodology?
- Longline survey planning meeting on Thursday
- Potential coordination with MAFMC survey
- Potential for ongoing (annual) funding support



South Atlantic Deepwater Longline Survey (SADLS)

How, when, where, and what?

- Cost estimate – FY20:
  - ~ $300K for Contracting and observers
  - ~ $125K for NMFS contract coordinator
  - Total estimate: $350K (?)



Appendix 7: Presentation on potential Ichthyoplankton survey

NOAA FISHERIES
SEFSC

SEAMAP Plankton Surveys of the SEFSC in the Gulf of Mexico

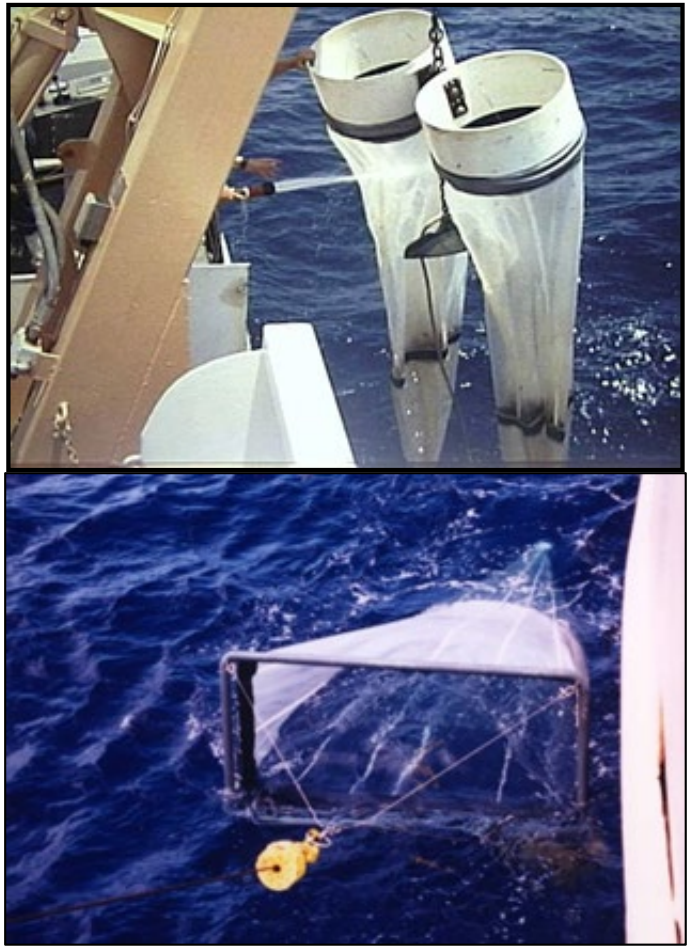
South Atlantic Fishery-Independent Surveys Workshop

Feb. 5th, 2020

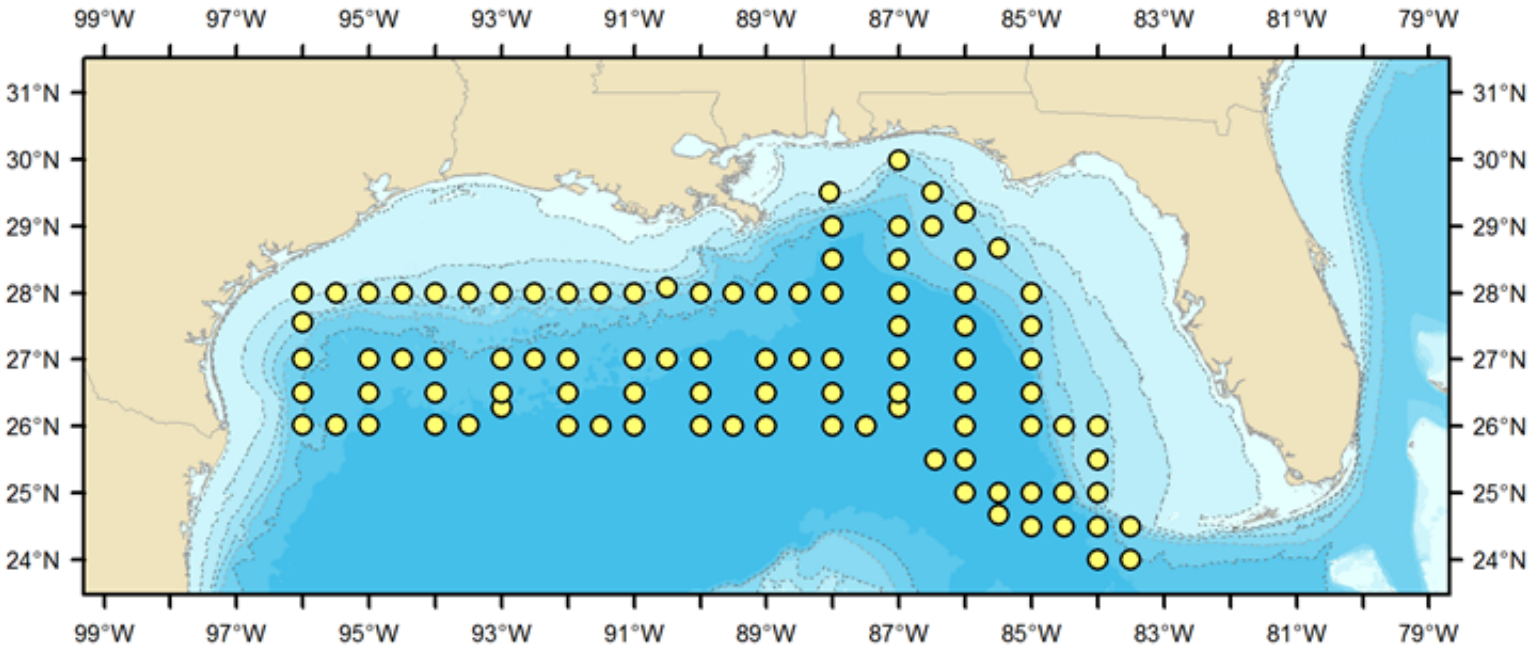
Charleston, SC

SEAMAP Plankton Surveys

- Spring Plankton Survey
- Fall Plankton Survey
- Winter Plankton Survey
- 2 Groundfish ‘Piggyback’ Plankton Surveys

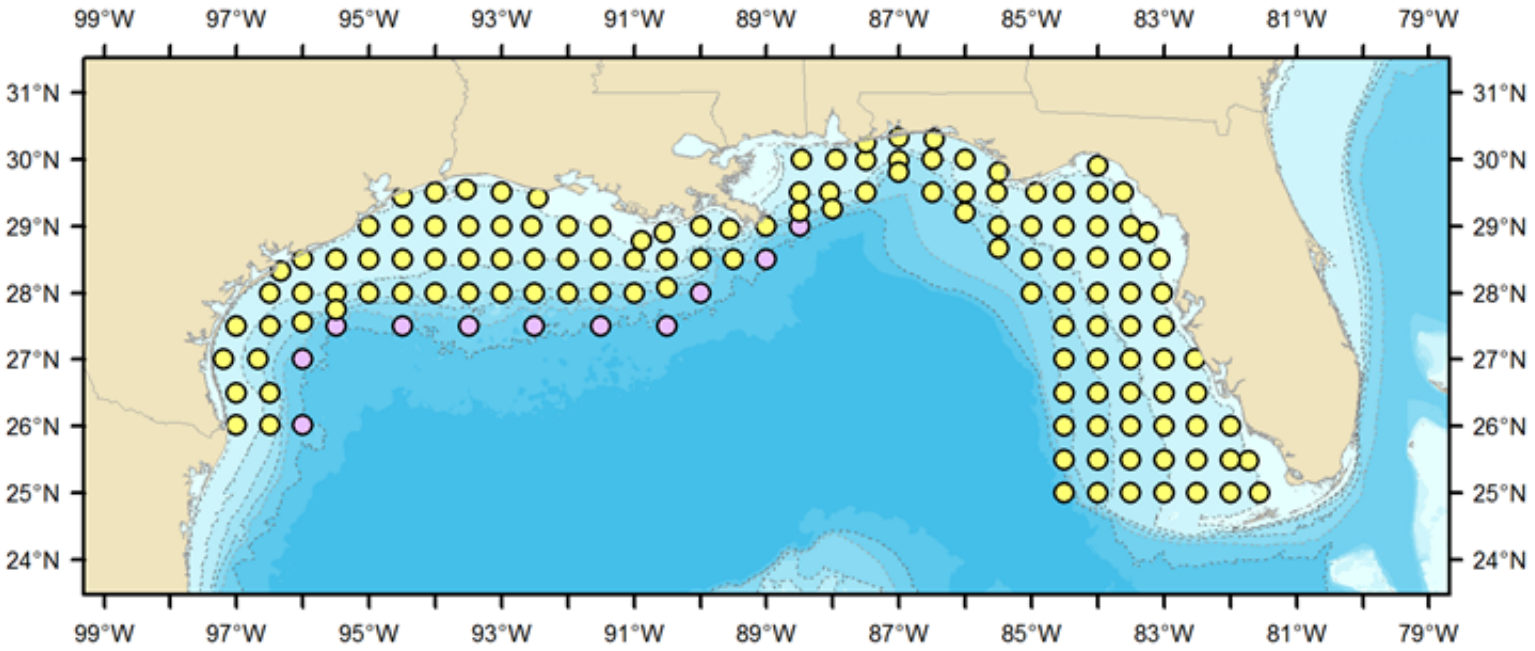


SEAMAP Spring Plankton Survey



- **Time Series:** 1982 - present (April – May)
- **Number of Stations:** 97 / year
- **Days at Sea:** 30
- **Survey Design:** Fixed Grid
- **Area:** Gulf of Mexico Offshore Waters out to U.S. EEZ
- **Gear:** Bongos (Deep and Shallow), Neuston, MOCNESS, CTD, EK60
- **Data:** Abundance, Lengths, Displacement Volume, Chl-a, Zooplankton Abundance, Acoustic Backscatter

SEAMAP Fall Plankton Survey



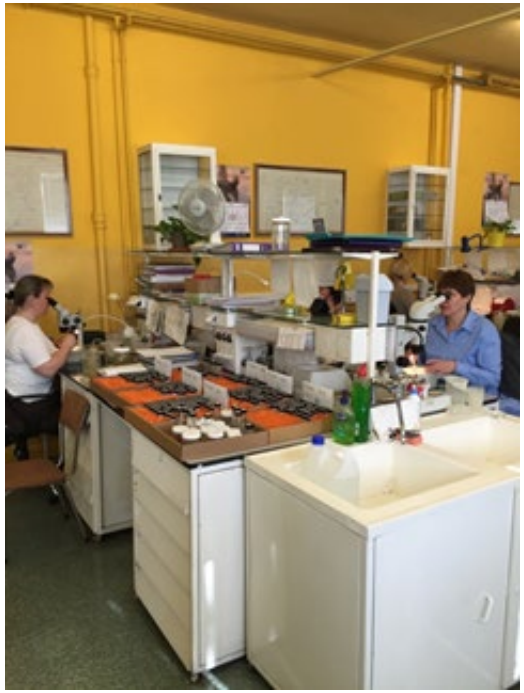
- **Time Series:** 1986 - present (August - September)
- **Number of Stations:** 143 / year
- **Days at Sea:** 36
- **Survey Design:** Fixed Grid
- **Area:** Gulf of Mexico Continental Shelf Waters – Texas to South Florida
- **Gear:** Bongos, Neuston, MOCNESS, CUFES, CTD, EK60
- **Data:** Abundance, Lengths, Displacement Volume, Chl-a, Zooplankton Abundance, Acoustic Backscatter

SEAMAP Plankton Surveys

- Winter
  - **Time series:** 1983 ,1984,1993, 1996, 2007, 2008, 2009, 2012, 2013, 2015 (Dec - Mar)
  - **Number of stations:** up to 128 / year
  - **Days at Sea:** 30
  - **Survey Design:** Fixed Grid
  - **Area:** Continental Shelf Break – Texas to South Florida
  - **Gear:** Bongos , Neuston, MOCNESS, CUFES, CTD, EK60
  - **Data:** Abundance, Lengths, Displacement volume, Zooplankton Abundance, Chl-a, Acoustic Backscatter
- Groundfish 'Piggyback'
  - **Time series:** Summer 1986 – 2016 (June - July) and Fall 1986 – 2014 (Oct – Nov)
  - **Number of stations:** 50 – 100 / year / survey
  - **Survey Design:** Fixed Grid
  - **Area:** Continental Shelf Waters – Texas to South Florida
  - **Gear:** Bongos, Neuston, CTD, EK60
  - **Data:** Abundance, Lengths, Displacement Volume, Zooplankton Abundance, Acoustic Backscatter

SEAMAP Plankton Sample Flow

- **Samples collected at sea**
  - NOAA and State Partners
- **Samples sent to Pascagoula**
  - Right bongo, neuston, MOCNESS, and right shallow bongo samples packed for transport to Poland
  - Left bongo transferred to long-term storage at GCRL/Stennis
- **Shipped to Poland** (~1 month transit by ship)
  - June shipment (Winter and Spring surveys)
  - October shipment (Summer Groundfish and Fall Plankton surveys)
- **Sorted and identified** (~1 year processing time)
- **Data and identified specimens sent back**
  - Most identifications to family level
  - Electronic data entry system (new this year for SEFSC)
- **QA/QC identifications of FMP and ICCAT species**
  - Pascagoula Lab – Lutjanids, Scombrids (Fall), Balistids, Istiophorids
  - Miami Lab – Scombrids (Spring), Istiophorids
- **Separate datasets created**
- **Total time from collection to QA/QC: 1 ½ - 2 years**



Plankton Assessment Support

Data presented to 6 SEDARs and # ICCAT Assessments, used in base model for 6 species/complex assessments

Spring

- Atlantic Bluefin Tuna
- Skipjack Tuna

Fall

- Red Snapper (SEDAR 7, 31, 52)
- King Mackerel (SEDAR 5, 16, 38)
- Gray Triggerfish (SEDAR 9, 43, 62)
- Vermilion Snapper (SEDAR 9, 45, 67)
- Cobia (SEDAR 58)

Notes: Additional species could be available for assessment with more resources for identification.

When these data do not support indices of abundance they still provide information on temporal and spatial distribution of spawning.

Appendix 8: Presentation on FL FWRI hooked gear vertical line survey (ongoing in FL waters; potential for expansion to regional scale)





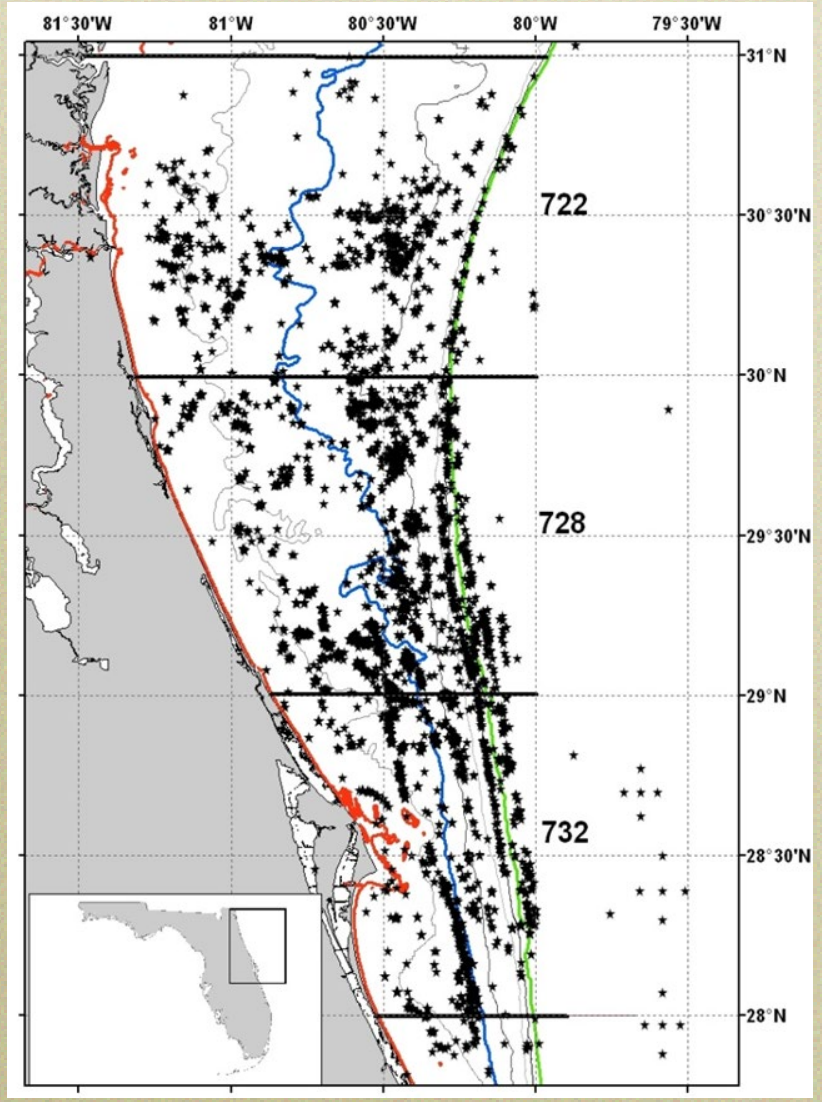
FWC-FWRI Fisheries-Independent Monitoring

Hooked-Gear Research in the South Atlantic (2011 – 2020)

Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute

FWC Repetitive Timed Drop (RTD) Hooked Gear Survey

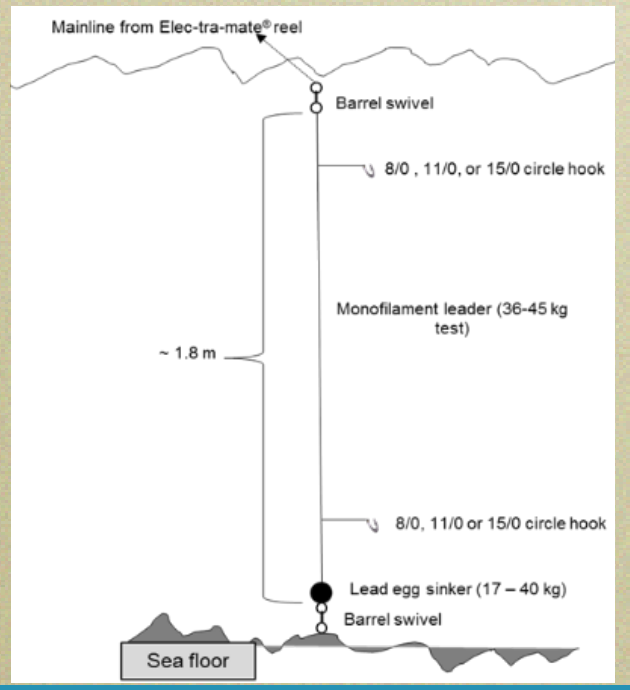
- Geographic coverage restricted to east coast of Florida
  - NMFS Statistical Zones: 722, 728, and 732
  - 2 Depth Strata: <30 m and 30 – 150 m
- Yearly **stratified-random sampling design**
  - Focus on natural hard-bottom sites – some effort on artificial reefs
  - Proportional to available sites in each strata (includes SERFS sites)
- Focal species: Red Snapper
- Sampling Season: April – July
  - Currently utilize industry vessels (commercial/charter) as sampling platforms



FWC Repetitive Timed Drop (RTD) Hooked Gear Survey

- Standardized, active fishing
- Terminal tackle: two-hook “chicken rigs”
  - 8/0, 11/0, or 15/0 Mustad hooks
- Three anglers: ten timed, 2-minute “Team Drops” at each site for each angler

- All fish measured and quantified
- Subset retained for life history analysis
- Other Data:
  - Video habitat
  - Bottom temperature
  - Oceanographic conditions
  - Weather conditions



Timeline: Evolution of FWC Hooked-Gear Sampling

- **2011 – 2013 Cooperative Red Snapper Tagging Study ***
  - Directed Red Snapper collections – inform sampling frame
- **2012 CRP Hooked-Gear Pilot Study**
  - RTD hooked-gear, 12-hook horizonal longline, and 12-hook vertical longline
  - RTD more efficient than other methods
- **2014 – 2015 CRP Spawning Aggregation Study ***
  - Directed RTD sampling targeting Red Snapper and Gag spawning locations
- **2016 CRP Selectivity Study**
  - RTD comparison to SERFS chevron traps and stereo cameras
- **2017 Sportfish Study**
  - Continued time series of RTD Red Snapper sampling
- **2018 CRP RTD Comparison Study**
  - Comparative study (2012 vs. 2018) to examine changes in Red Snapper CPUE and age/size composition

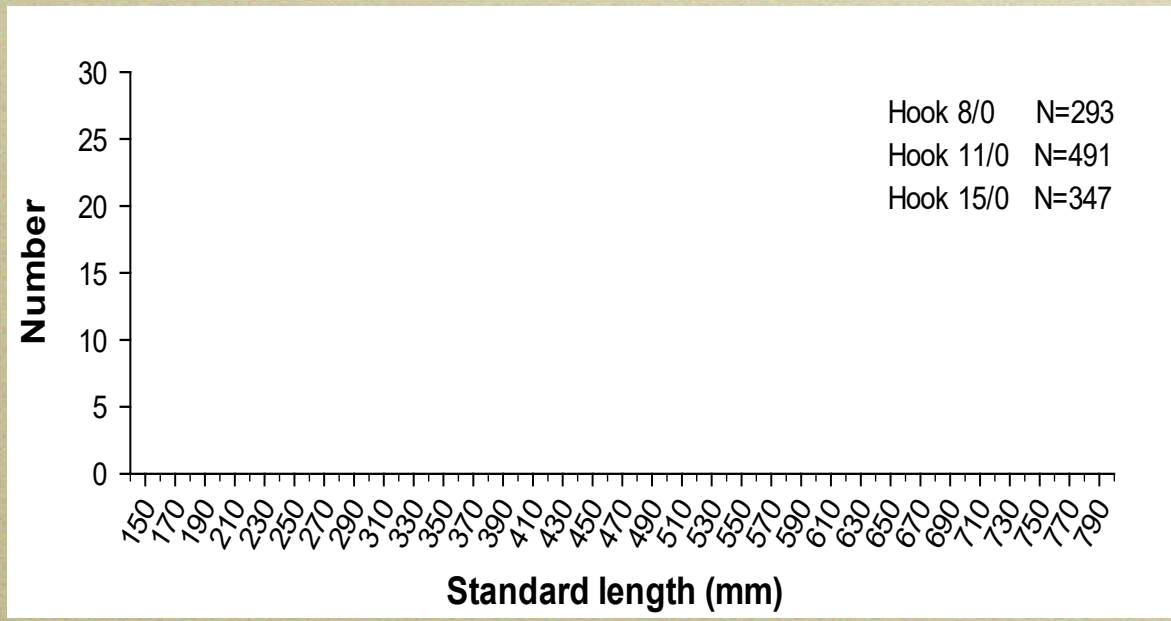
RTD Reef Fish Sampling

- Numerous commercially and recreationally important reef fishes
- Wide size/species range collected utilizing three hook size sampling design
- Life History:
  - Size
  - Age
  - Sex
  - Mercury
  - Gonad weights
  - Spines *



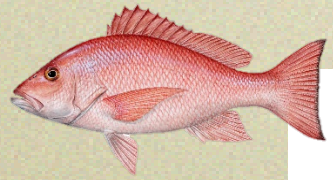


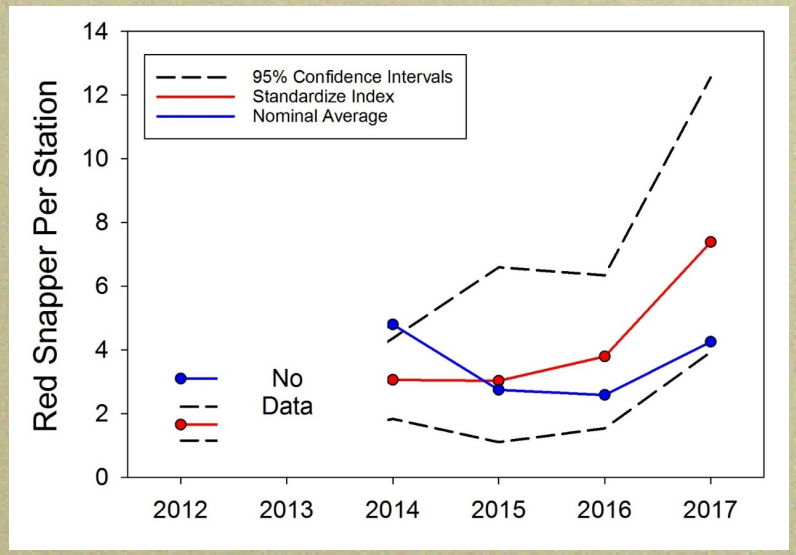

Taxon	Total
Lutjanus campechanus	2,656
Rhomboplites aurorubens	393
Haemulon aurolineatum	358
Centropristis striata	261
Rhizoprionodon terraenovae	55
Pagrus pagrus	51
Seriola zonata	38
Carcharhinus falciformis	35
Lutjanus griseus	26
Balistes capriscus	25
Seriola rivoliana	24
Lutjanus synagris	16
Mycteroperca microlepis	15
Subtotal	3,938
Total	**4,090**

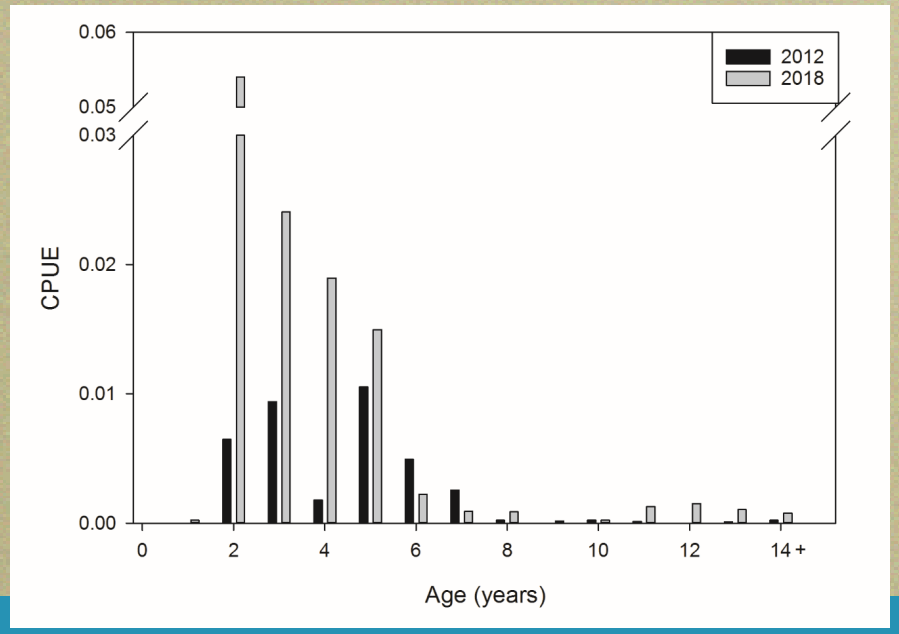


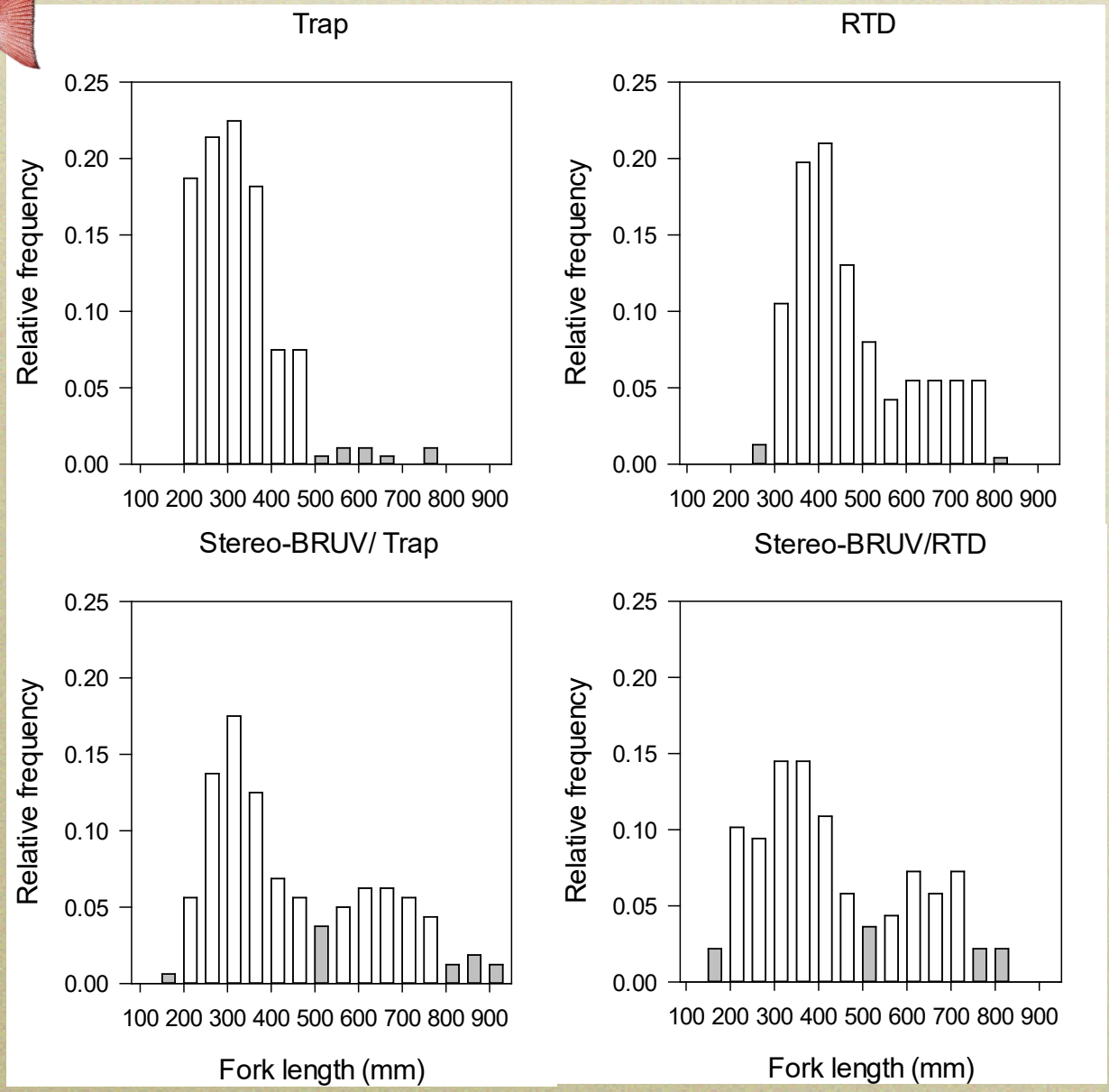
*** Collected for Red Snapper only; currently unprocessed**

RTD Research Results









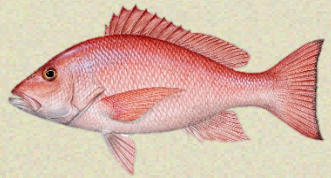
FWC-FWRI Fisheries-Independent Monitoring

Juvenile (age 0-1) Red Snapper Trawl Survey in the South Atlantic (2015 – 2016)

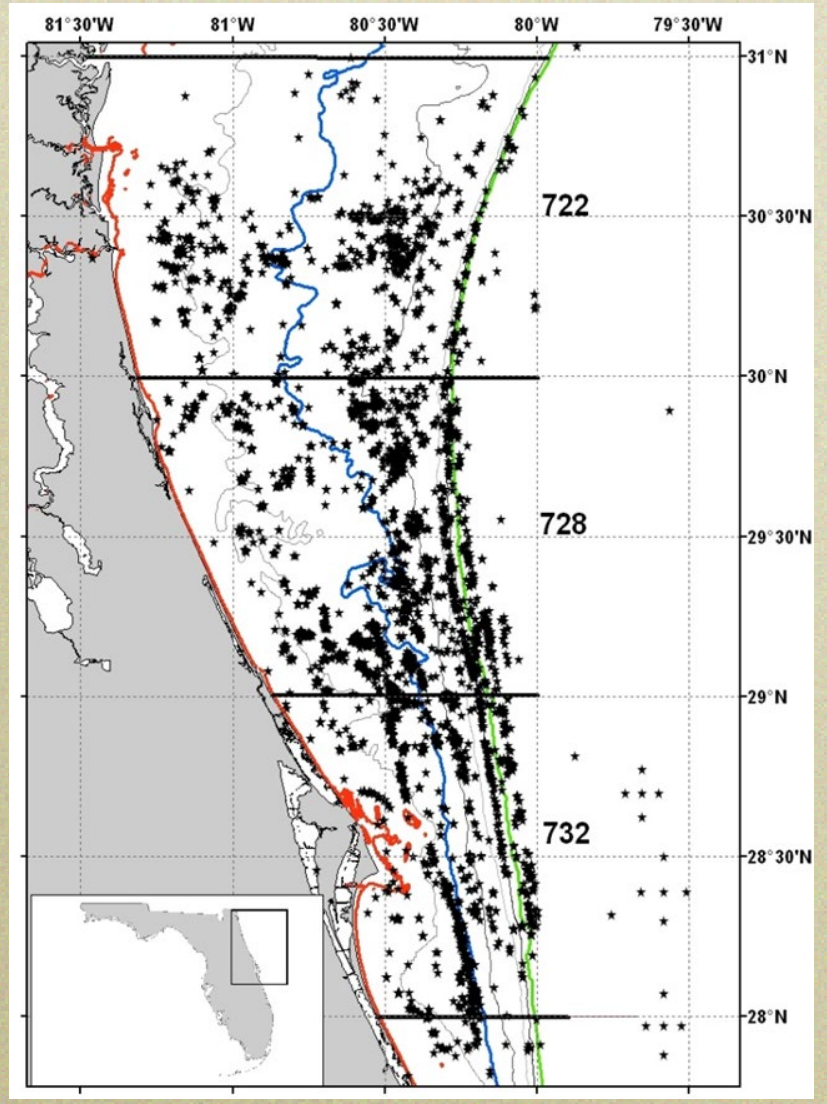
Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute

Appendix 9: Presentation on FL FWRI young-of-the-year trawl survey

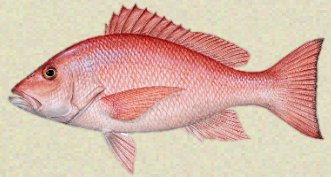
FWC Juvenile Red Snapper Trawl Survey



- Geographic coverage restricted to east coast of Florida
  - NMFS Statistical Zones: 722, 728, and 732
  - 2 Depth Strata: 10 – 30 m and 30 – 70 m
- Yearly **stratified-random sampling design**
  - Low-relief, sediment- or shell-dominated soft-bottom sites
  - Sampling universe divided into 0.3 x 0.1 nm grids
    - All grids containing known hard-bottom points excluded
  - Proportional to available sites in each strata
- Focal species: Red Snapper
- Sampling Season: August – September
  - Daytime (2015)
  - Nighttime (2016)



FWC Juvenile Red Snapper Trawl Survey



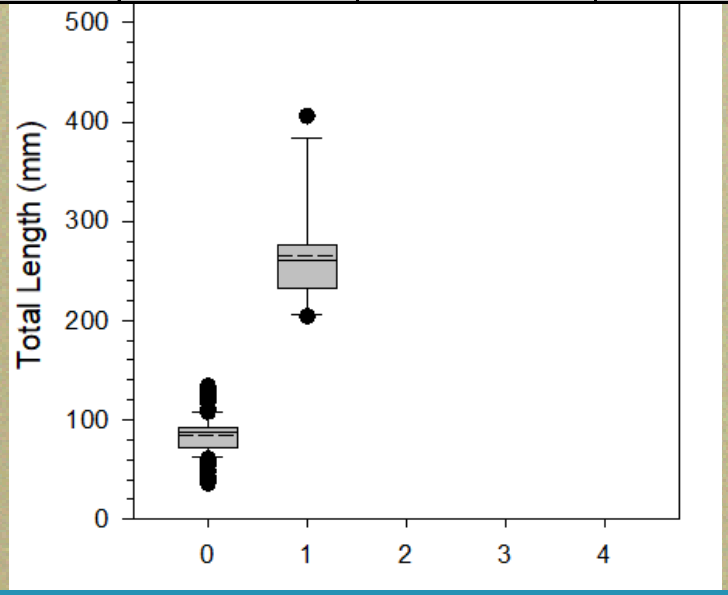
- **Standard GM-SEAMAP Trawl**
  - 12.8-m semi-balloon (stern)
  - 2.4-m x 1.0-m doors
  - 50.8-mm mesh
- 30 minute tows (2.5 – 3.0 knots)
- *RV Georgia Bulldog*
  - 12-hour sampling operations

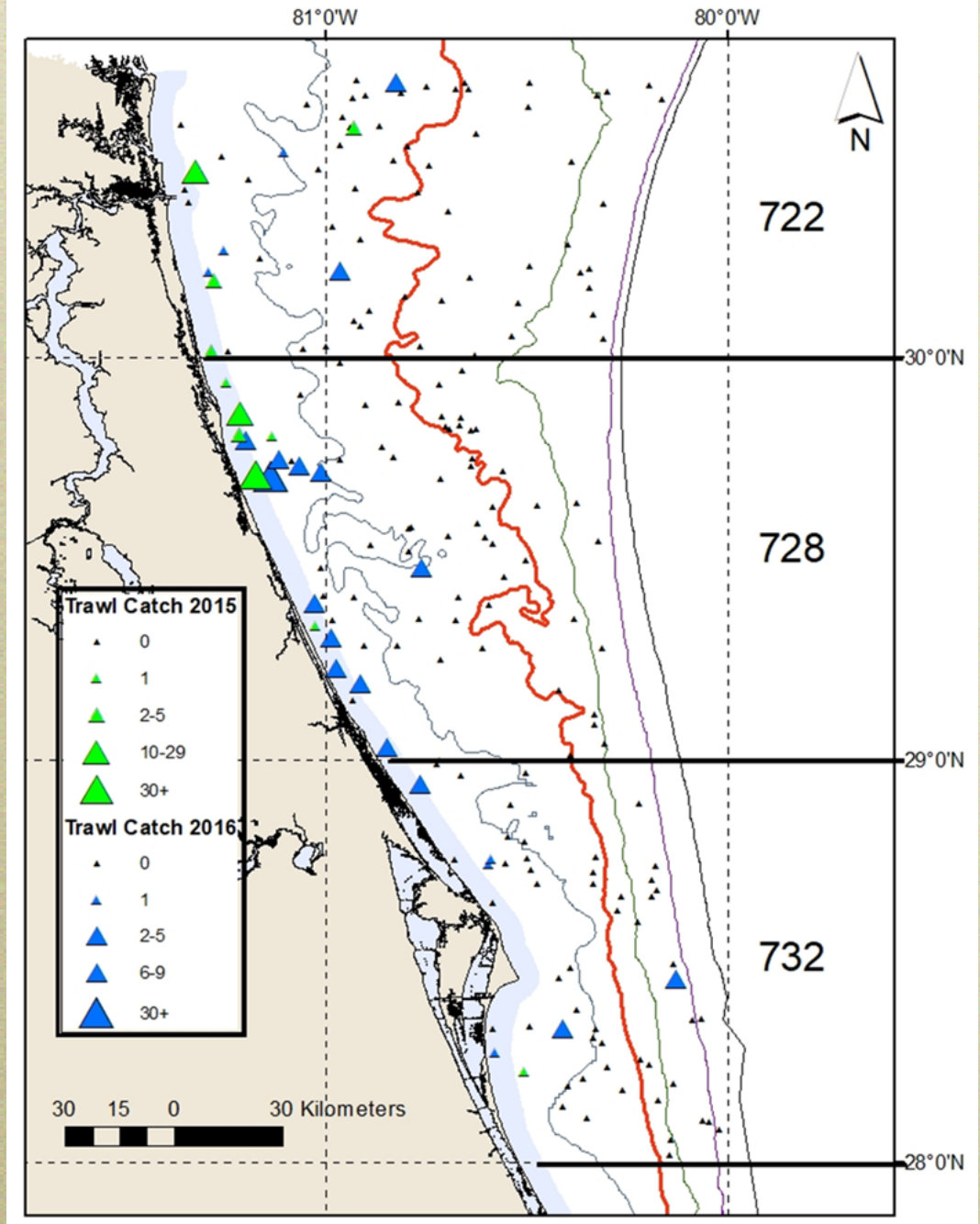
- Standard GM-SEAMAP Protocols
  - Catch sorted by species (fish and select macroinvertebrates)
  - Species aggregate weights
  - Subset of measurements (FL)
- Subset retained for life history analysis
- Other Data:
  - Water quality:
    - Temperature
    - Salinity
    - DO
    - Turbidity
  - Oceanographic conditions
  - Weather conditions

Juvenile Red Snapper Research

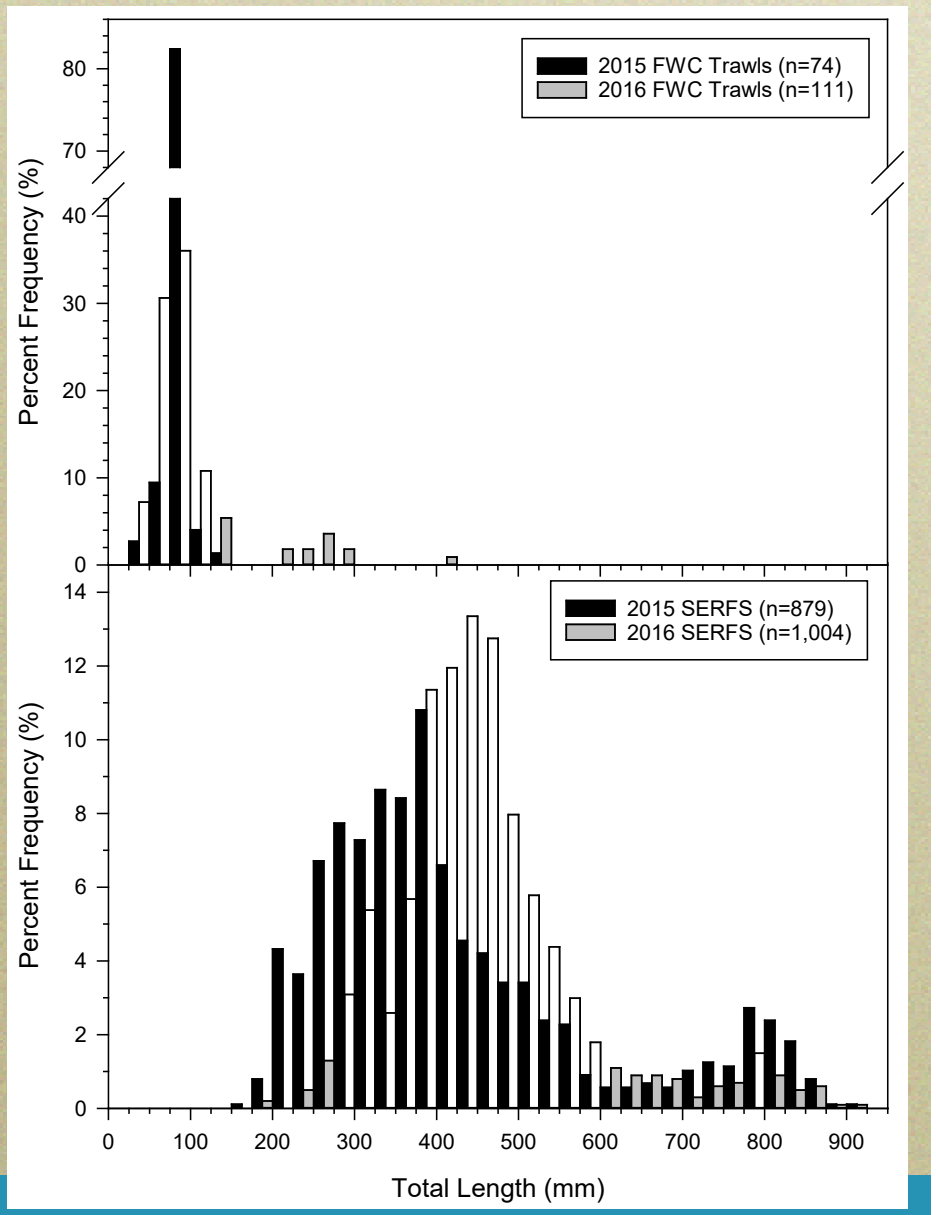
- Red Snapper collected almost exclusively in the nearshore (<30 m) depth strata

NMFS Statistical Zone	2015 Trawl Survey (Day)		2016 Trawl Survey (Night)	
	Nearshore	Offshore	Nearshore	Offshore
722	19 (16)	0 (9)	8 (26)	0 (16)
728	63 (36)	0 (3)	80 (26)	0 (8)
732	1 (18)	0 (11)	14 (17)	9 (10)
Totals	**83 (70)**	**0 (23)**	**102 (69)**	**9 (34)**





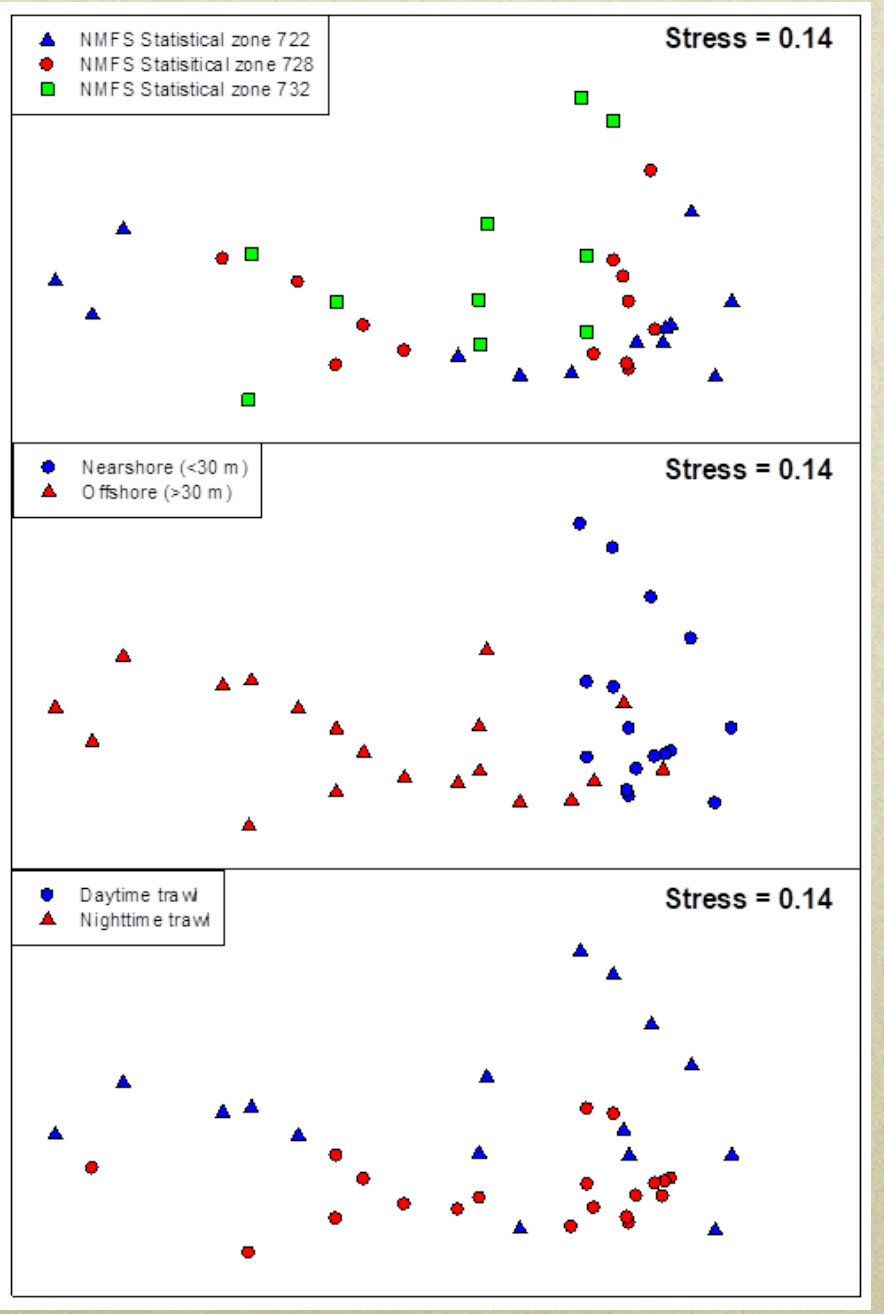
Juvenile Red Snapper Research



Trawl Sampling

- **Catch Data:**
  - 2015 – 96,197 individuals (248 taxa)
  - 2016 – 93,077 individuals (330 taxa)
- Wide size/species range
- Life History

TAXON	Total Catch
ARGOPECTEN GIBBUS	40,629
LEIOSTOMUS XANTHURUS	16,178
MICROPOGONIAS UNDULATUS	13,183
PENAEUS SETIFERUS	10,780
LOLIGO PLEII	7,733
SICYONIA BREVIROSTRIS	6,880
SYNODUS FOETENS	5,390
DIPLECTRUM FORMOSUM	5,272
PENAEUS AZTECUS	5,146
CHLOROSCOMBRUS CHRYSURUS	4,567
PORTUNUS SPINICARPUS	4,029
SYACIUM PAPILLOSUM	3,774
SCORPAENA CALCARATA	3,147
PORTUNUS GIBBESII	2,675
TRACHINOCEPHALUS MYOPS	2,428
DECAPTERUS PUNCTATUS	2,124
LOLIGO	2,100
PORTUNUS ORDWAYII	2,036
PEPRILUS TRIACANTHUS	1,919
EUCIDARIS TRIBULOIDES	1,868



Estuarine Recruitment Survey

- FL Gulf coast – polyhaline seagrass habitats
- Otter trawls – June – November
- Juvenile indices for several reef fishes: Gag, Gray and Lane Snapper, Black Sea Bass, Hogfish
- East coast feasibility of this or similar surveys unknown:
  - Habitat availability
  - Nursery requirements