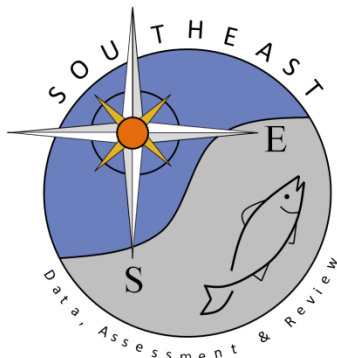


Can SCDNR's Juvenile Sampling Pilot Project be used as an index of Red Snapper *Lutjanus campechanus* Juvenile Recruitment?

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SEDAR90-DW-10

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SEDAR 90-DW-10
MARMAP/SEAMAP-SA Reef Fish Survey Technical Report #2025-05

Summary

During the summers of 2022 and 2023 SCDNR conducted a pilot project to evaluate novel gears directly targeting juvenile reef fish using a fishery-independent framework. Although data similar to those collected may eventually be valuable for stock assessment, only a five immature Red Snapper *Lutjanus campechanus*, were collected during two years of sampling. Therefore, we do not recommend this pilot project, in its current form, as an input to SEDAR 90 for purposes of describing juvenile recruitment.

Background

- Indices of juvenile recruitment can be an invaluable data source for stock assessment
 - Juvenile indices can help managers predict the fishable population in future years
- There are no long-term surveys that target (or effectively sample) the juvenile stage of federally assessed snapper-grouper species in South Atlantic waters.
 - The primary fishery-independent indices (trap and video) for these species sample hard-bottom areas that are known to contain individuals of legal size or approximately legal size
 - Many snapper-grouper species undergo ontogenetic habitat shifts, spending their juvenile phase in areas different from adults
 - The currently employed reef fish fishery-independent gears (traps and videos) have multiple physical hurdles to sampling juveniles
 - The mesh of chevron traps is large enough to allow fish < 150 mm TL to escape in most cases
 - Video reads do not include lengths or maturity assessments, rendering this information uninformative when specifically looking for juvenile fish
- Therefore, we conducted a 2-year pilot project testing four possible gears, three styles of small-mesh trap and one standardized hooked gear, for sampling juvenile snapper-grouper in nearshore, shallower waters of the SEUSA.

Methods

- SCDNR undertook a 2-year pilot study (2022 and 2023) specifically targeting juveniles belonging to federally assessed snapper-grouper species.
- The focal geographic region included the area between northern Florida (approximately 30°N) and Cape Fear, North Carolina (approximately 33.75°N) in depths ranging from 10 to 70 meters.
- We sampled in a truly randomized design which included habitat assessment at each sampling site.
 - The entire survey region was overlaid with a 5 nmi² grid, and individual grid cells were randomly selected for sampling with no prior habitat knowledge.
 - Based on existing surveys, maps of artificial reefs, and other information about bottom habitat types, each cell was assigned a likely habitat type (artificial reef, natural hard bottom, soft bottom, or unknown).

- Exact deployment locations within each selected cell were determined by the distribution of habitat types once the ship had done a preliminary sweep.
- If either artificial reefs or hard bottom was present in a cell, at least some gear deployments were targeted to occur on or near these substrates.
- Two experimental gear types were chosen for their selectivity of smaller reef fish due to their size, and their ability to sample all likely habitat types from a variety of vessels.
 - Small-mesh baited Pinfish traps (PTs) were selected because their shape, volume, and mesh were similar to traps used by Brandt and Jackson (2013) for juvenile Red Snapper (*Lutjanus campechanus*) in the Gulf of Mexico, or to Blackfish traps historically used for Black Sea Bass (*Centropristis striata*) in the Southeast Atlantic.
 - In 2022, three different styles of PTs were used.
 - Preliminary analyses showed no differences in catch rates or compositions, so a single type of PT was selected for 2023 sampling
 - Traps were baited with two clupeids cut into thirds and placed loose in each trap, regardless of the presence of a bait well.
 - All PT styles were deployed within a single grid cell at inshore, nearshore, and offshore sites for ~90 minutes.
 - Nearshore and offshore deployments occurred on hard and soft bottom, as well as artificial reefs, with traps at least 100 m apart.
 - Standardized hook-and-line (SHL), a timed vertical line gear meant to minimize angler influence, similar to one developed for use in indices of abundance and life history sampling of adult reef fish off Florida (Winner et al. 2022) were employed.
 - SHL deployments using Sabiki rigs occurred in the same grid cell (i.e., 40-600 m from inshore traps, 200-800 m from offshore traps) using 2.4-m Sabiki rods (Ahi RSB-800) and conventional reels (Penn 320GTi) spooled with 14 kg clear monofilament.
 - Primary Sabiki rigs were 3.7 m long with a 23 kg clear monofilament mainline and eight #16 gold-colored, semi-circle hooks highlighted with iridescent artificial fish skin and feathers, and green luminescent whipping and beads on 0.15-m branches of 14-kg test (Marathon MSB-119GL-16 or Tsunami Guide Series TSG-119GL-16).
 - Lead sinkers, up to 0.57 kg, were used based on current conditions. All rigs were deployed with the vessel either anchored or drifting.
 - A rotating team of three anglers simultaneously deployed ten 2-minute drops each, retrieving the rigs if a fish was felt, and waiting to proceed until the next interval.
 - Individual angler catches were recorded, but data analysis considered all anglers as a single sampling unit due to proximity and coordination.
 - In conjunction with the SHL, a temperature logger, identical to those on the traps, and a Rod and Reel Camera (RRC), as described by Lee et al. (2015) captured bottom hydrographic information and habitat footage during the timed drops.

- All sampling was conducted during daylight hours to ensure visibility for gear.
- After all gear in a grid cell was retrieved, catches were identified, enumerated, and all fish were measured to the nearest mm for maximum (pinched) total length (TL).
- Following measurements, fish were either released or retained for further life history processing.
- Each piece of gear was fitted with a GoPro camera recording throughout the deployment.
 - Each video was scored for habitat type (artificial reef, natural reef, or neither) and habitat complexity on a scale of 1 (extremely low complexity) to 5 (extremely high complexity)

Results

Out of 652 total gear deployments in appropriate habitats over a 2-year period, a total of 7 Red Snapper *Lutjanus campechanus* were captured. All captured fish were collected on hooked gear. A total of 5 were determined to have not yet reached sexual maturity (Table 1).

Table 1. Numbers of gear deployments of each type, percentage positive for Red Snapper, and percentage of captured fish that were determined to be immature by histological analysis.

Gear	Deployments	Percent Positive	Percent Immature
Black Pinfish Trap	354	0	-
Commercial Pinfish Trap	82	0	-
Key West Pinfish Trap	78	0	-
Standardize Hook and Line	138	2.2	71.4

Red Snapper were incidentally observed on the videos intended to collect habitat information, suggesting that the species was present at several sites. However, a formal analysis of videos for fish species was not part of the scope of work for the project, so a percent positive or estimate of abundance cannot be calculated at this time.

It seems clear from this pilot project that the selected gears were not appropriate for collecting juvenile Red Snapper in the South Atlantic region. It seems clear that Red Snapper juveniles are using the sampled areas; however, none of the selected gears seemed appropriate for consistently collecting Red Snapper.

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