South Atlantic Deepwater Longline Survey (SADL)

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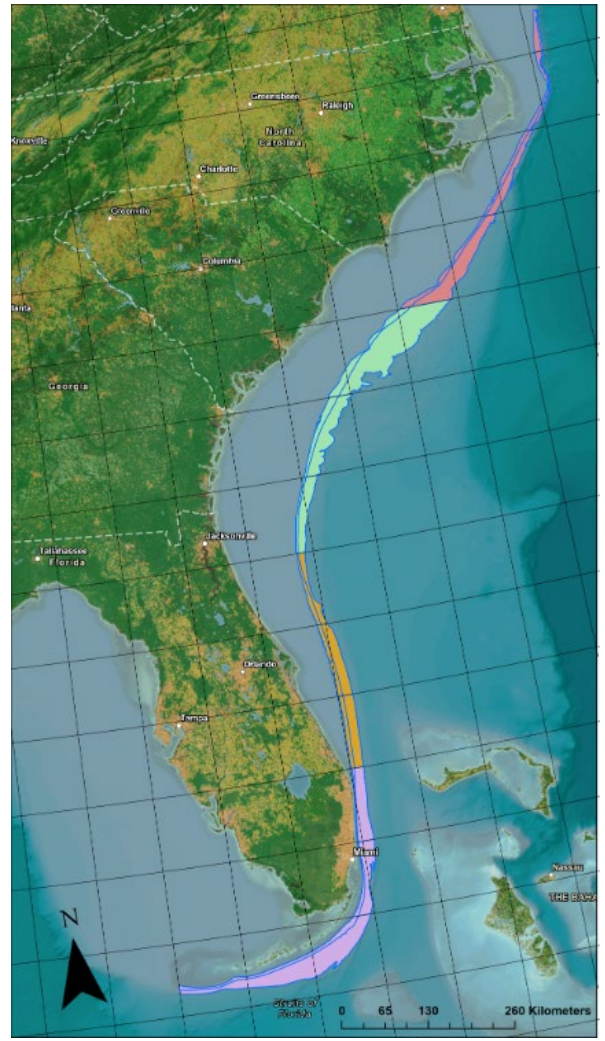
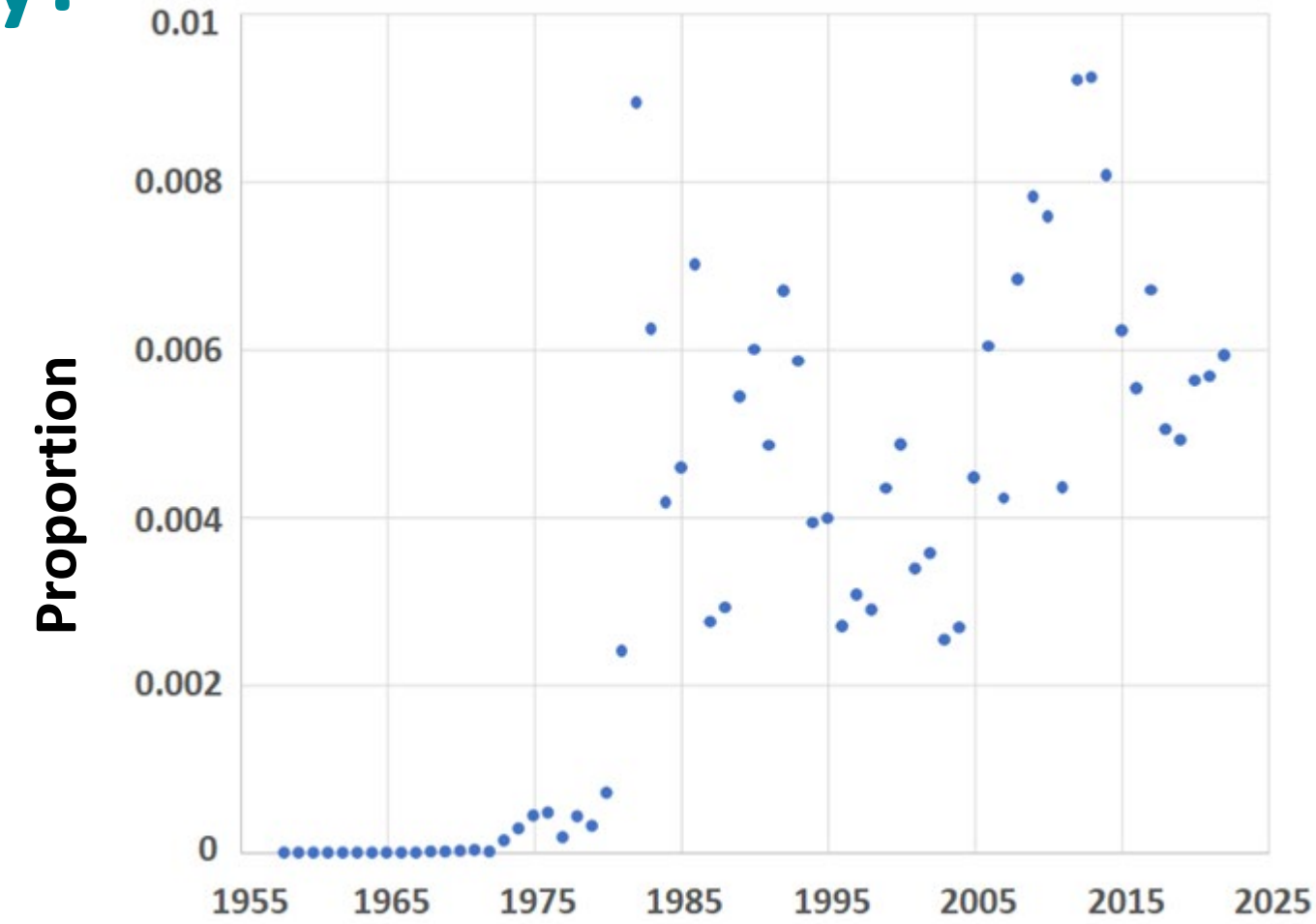


Why a Deep Water Survey?

Deepwater Fisheries

Proportion of landings in Atlantic waters of SE USA increasing



Why a Deep Water Survey?

South Atlantic

Deepwater Landings

(commercial)

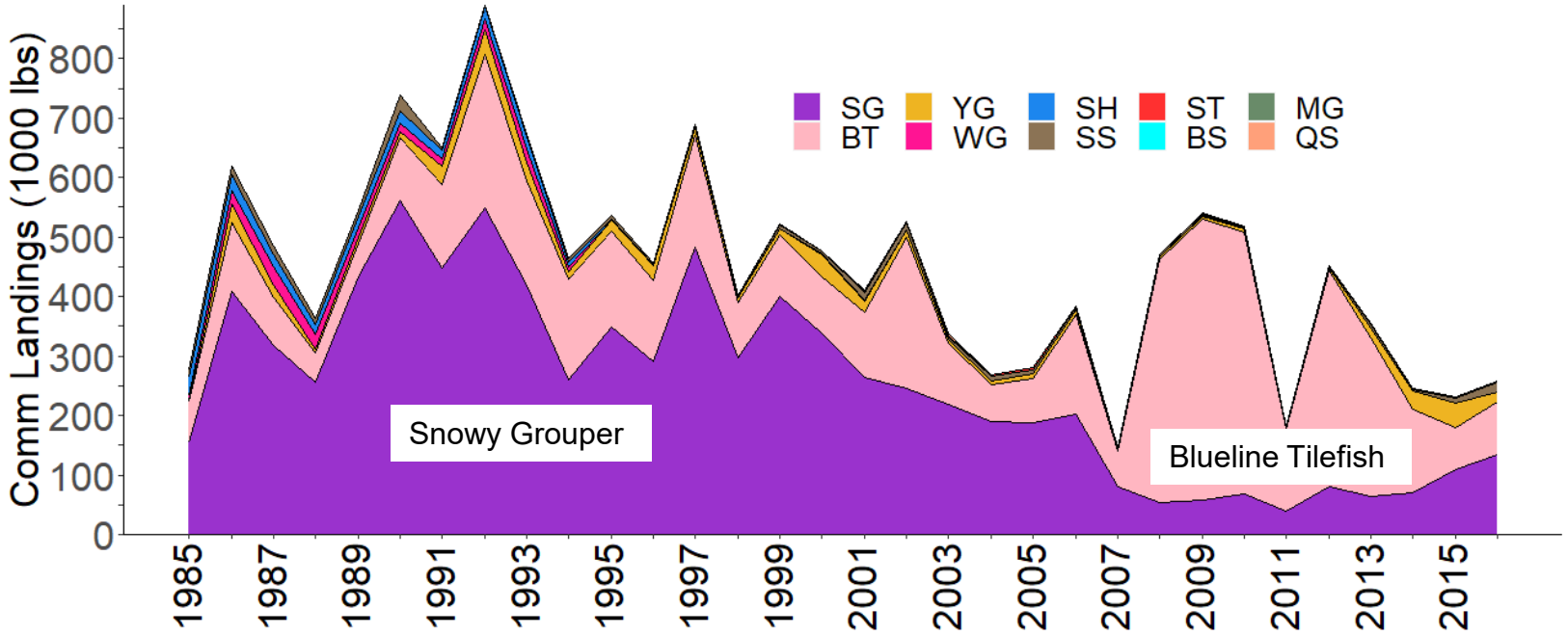


Figure 8.3e. Annual commercial landings (top panel) and species composition (bottom panel) for deep water species in the U.S. South Atlantic. SG = Snowy Grouper, BT = Blueline Tilefish, YG = Yellowedge Grouper, WG = Warsaw Grouper, SH = Speckled Hind, SS= Silk Snapper, ST = Sand Tilefish, BS = Blackfin Snapper, MG = Misty Grouper, and QS = Queen Snapper.

Craig et al. 2021. Ecosystem Status Report for the U.S. South Atlantic Region.
Available at: https://repository.library.noaa.gov/view/noaa/33280

Why a Deep Water Survey?

South Atlantic

Deepwater Landings

(recreational)

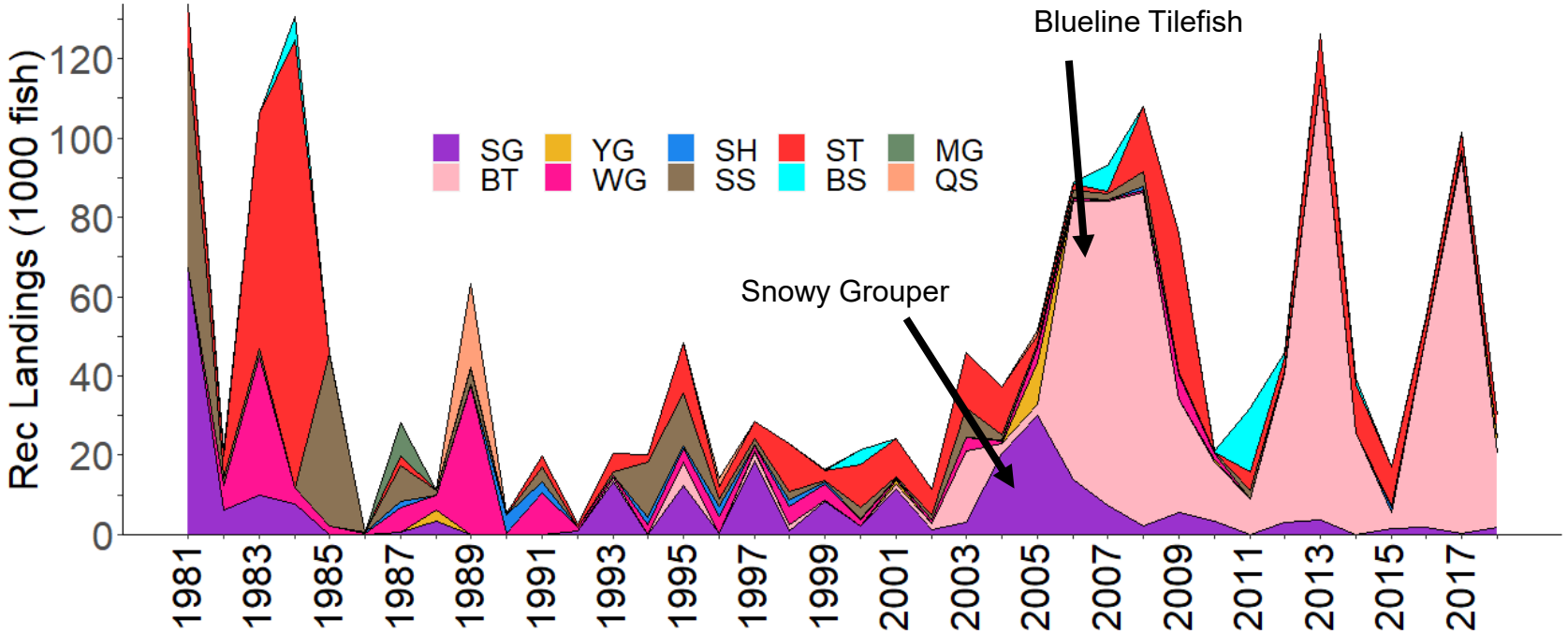


Figure 8.4d. Annual recreational landings (top panel)andspecies composition (bottompanel)for deep water speciesin the U.S. South Atlantic. SG = Snowy Grouper, BT = BluelineTilefish, YG = Yellowedge Grouper, WG =Warsaw Grouper, SH = Speckled Hind, SS = Silk Snapper, ST = Sand Tilefish, BS = Blackfin Snapper, MG =Misty Grouper, and QS = Queen Snapper.

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Growing Recreational Fishing Pressure

Many recreational state records since 2006

- NC 2006, off of Oregon Inlet, 16 lb 8 oz
- VA
  - 2006 records begin
  - 2007-03-10 Norfolk Canyon, 18 lb 10 oz
  - 2007-03-31 100 m depth, 19 lb 14 oz
  - 2009-03-19 Norfolk Canyon, 20 lb 4 oz
  - 2009-06-28 Norfolk Canyon, 20 lb 10 oz
  - 2009-07-04 Norfolk Canyon, 23 lb 5 oz
- MD 2012-09-12 Norfolk Canyon, 20 lb 0 oz
- DE
  - 2015-06-19 Baltimore Canyon, 19 lb 11 oz
  - 2015-07-25 Norfolk Canyon, 21 lb 13 oz
  - 2015-08-18 Baltimore Canyon, 22 lb 3 oz
- NJ
  - 2014-11-09 Wilmington Canyon, 23 lb 1 oz
  - 2015-05-15 Lindenkohl Canyon, 23 lb 4 oz

https://mrc.virginia.gov/vswft/state_records/state-record-blueline_tilefish_03-19-09.shtm

Saba and Kellison. 2023. Summary Report NMFS Atlantic Coast Science Coordination Workshop. Available at: https://repository.library.noaa.gov/view/noaa/55832

Outline

1. Survey evolution
2. Data collection
3. Northward expansion
4. Preliminary analysis
5. Current uses and future plans

Path to Cooperation

How do we survey deep water fishery species in the South Atlantic?

2015 Workshop Participants

- 9 from industry (NC through FL)
  - Commercial captains
  - Charter vessel captains
- 17 from science and management
  - Stock assessment scientists
  - Regional managers
  - State and federal fisheries scientists
  - Research vessel captains

Topics

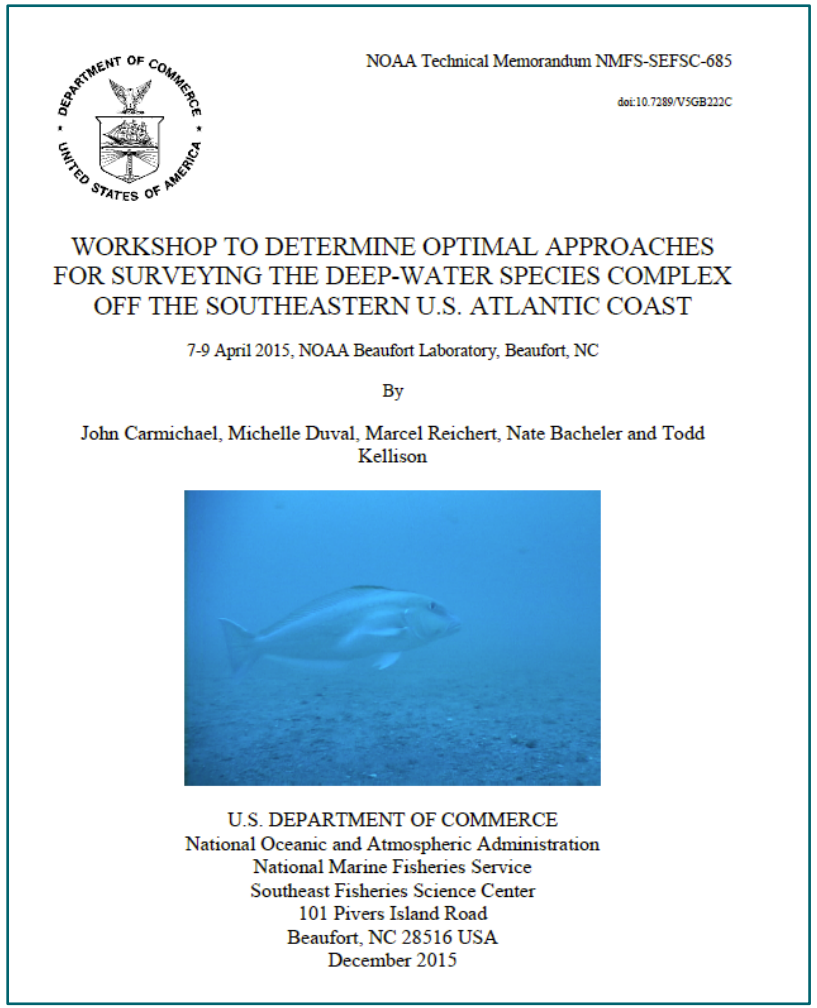
- Focal Species
- Gear
- Habitat
- Survey Design
- Data
- Costs

Cooperative Projects:

- Southeast Fishery Science Center Blueline Tilefish Data Collection Project
- Mid-Atlantic Deepwater Longline Survey

Pilot Studies:

- Gulf and South Atlantic Fisheries Foundation Deepwater Longline Project
- South Carolina Department of Natural Resources Deepwater Longline Project



NOAA Technical Memorandum NMFS-SEFSC-685

doi:10.7289/V5GB222C

WORKSHOP TO DETERMINE OPTIMAL APPROACHES FOR SURVEYING THE DEEP-WATER SPECIES COMPLEX OFF THE SOUTHEASTERN U.S. ATLANTIC COAST

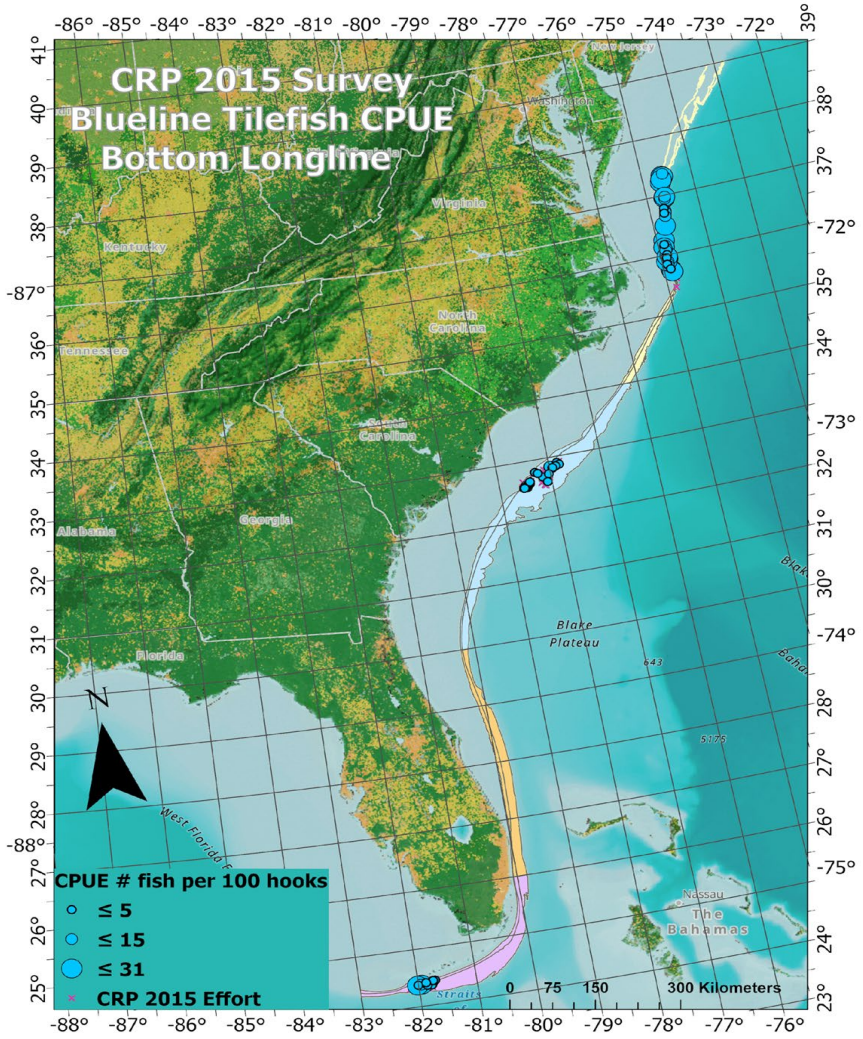
7-9 April 2015, NOAA Beaufort Laboratory, Beaufort, NC

By

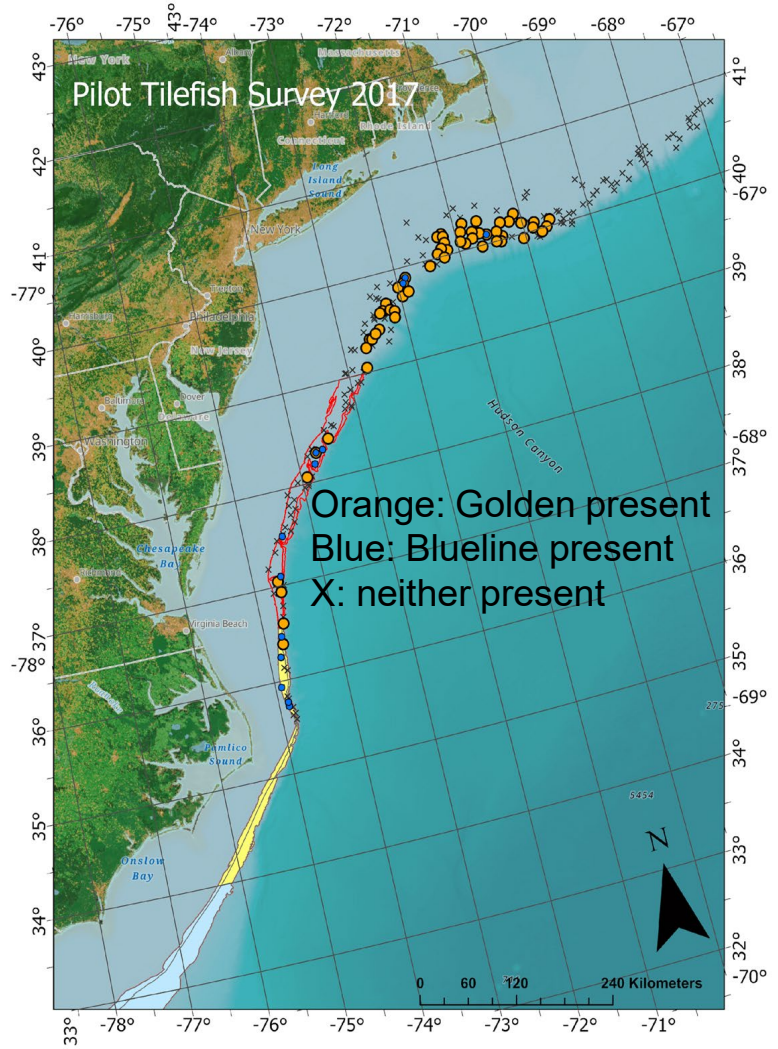
John Carmichael, Michelle Duval, Marcel Reichert, Nate Bacheler and Todd Kellison

Pilot Surveys

2015 SEFSC CRP Pilot



2017 Mid-Atl Pilot



South Atlantic Deepwater Longline Survey (SADL)

What?

- Deepwater longline survey intended to support stock assessments & mgmt
  - Indices of abundance
  - Age and length compositions
  - Life history information (e.g., from otolith and repro samples)
- Focal species – blueline tilefish, golden tilefish, snowy grouper

When?

- Implemented in 2020, repeated annually (2021-2023)
- Sampling typically occurs late July to early October

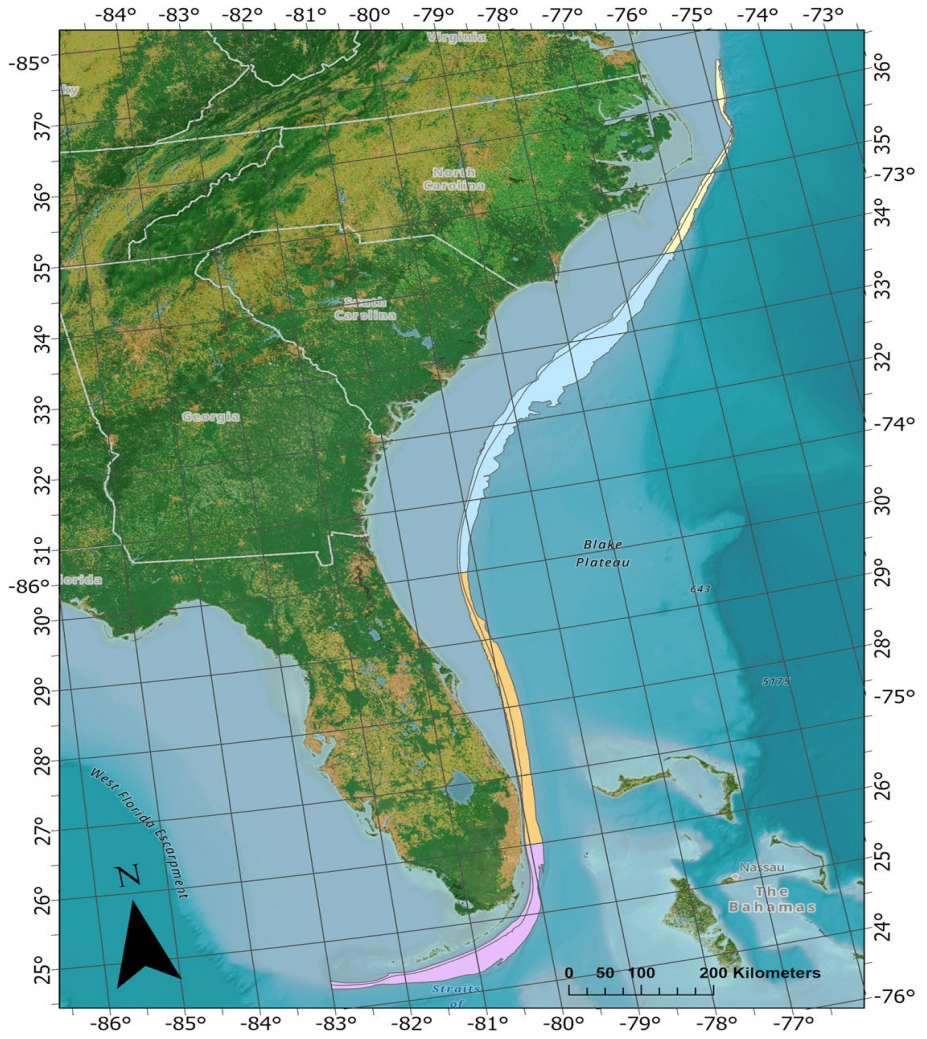
How?

- Cooperative effort with industry
- Sampling using standardized gear and sampling methodologies
- SEFSC observers collects the data; fish donation
- Annual meeting with survey participants

SADL Survey Design

Survey design

- NC-VA border (36.5° N) to Florida Keys (83° W)
- 75 - 366 m depth (246 – 1201 ft)
- 4 zones (NC, SC-GA, Central FL, South FL)
- Bid process: Industry participants sample in a single zone
- Stratified random design:
  - 0.5 ° latitudinal strata
  - 2 depth strata: 75-145 m and 146-366 m
  - Equal allocation of effort (sampling sites) to each strata



Sampling Methodology

- Standardized Gear
  - 3/16 inch main cable (galvanize steel)
  - 3 ft monofilament gangions (300 lb test)
  - 12/0 offset Mustad circle hooks
  - 3 mile mainline
  - 150 hooks per mile
  - Baited squid (2x2 inch square)
  - Temperature logger at end of mainline
- Trips 2-3 d up to 5-8 d in duration
- 3-4 sites per day; sunrise to sunset
- July to mid-October

Site Selection Methods

Mixed site selection approach (2020-21)

1. Random
   - Randomization algorithm in ArcGIS
   - > 2 nm from other sampling sites

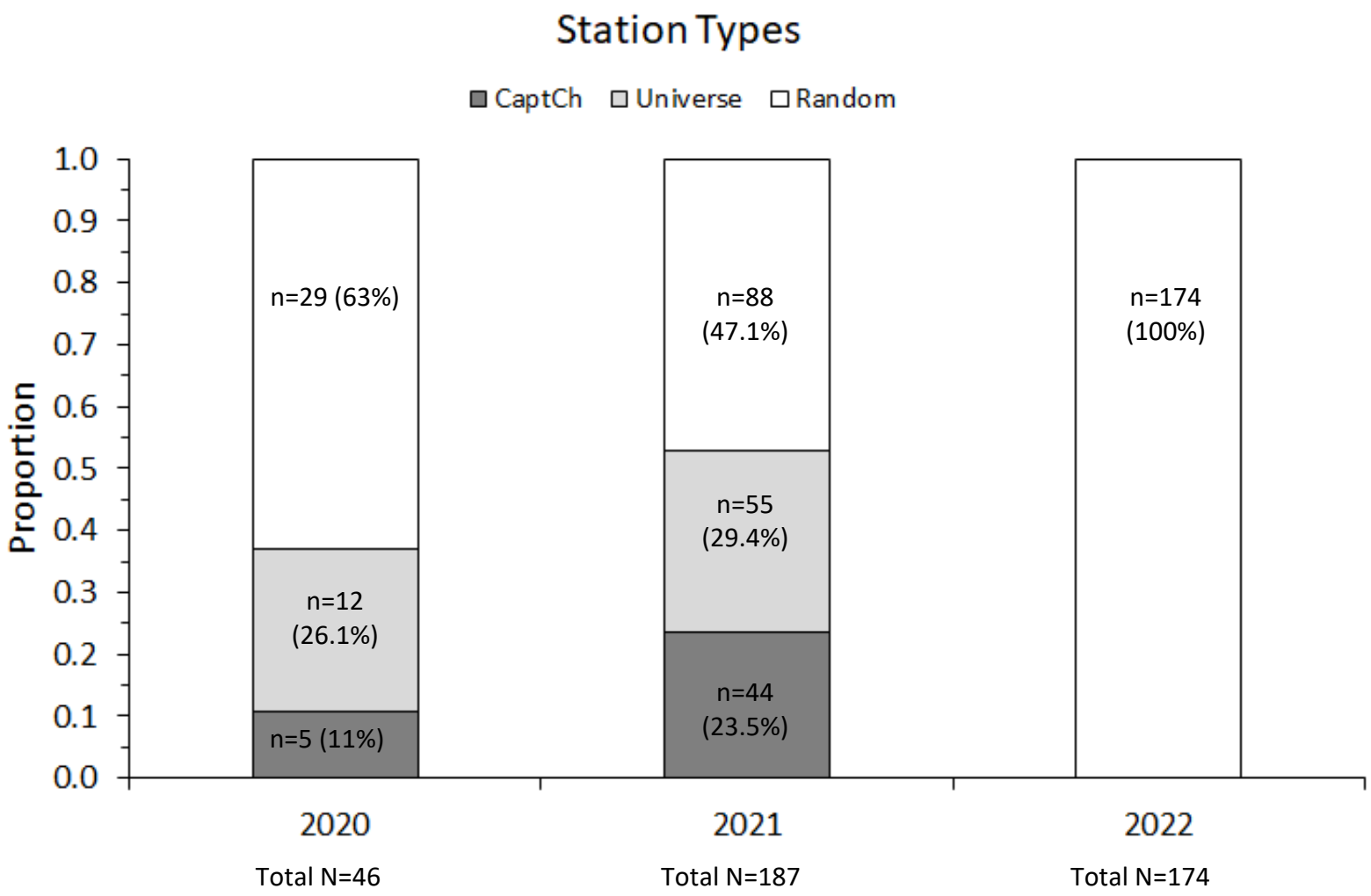
2. Universe random
   - Randomly selected from a database of known hard bottom sites (~1700)
   - Database contains more sites within shallow than the deep strata

3. Captain's choice (CC)
   - Vessel captain chooses sampling site within the strata

Fully stratified random sampling 2022 onward

Known hard bottom site

Proportion of Station Types



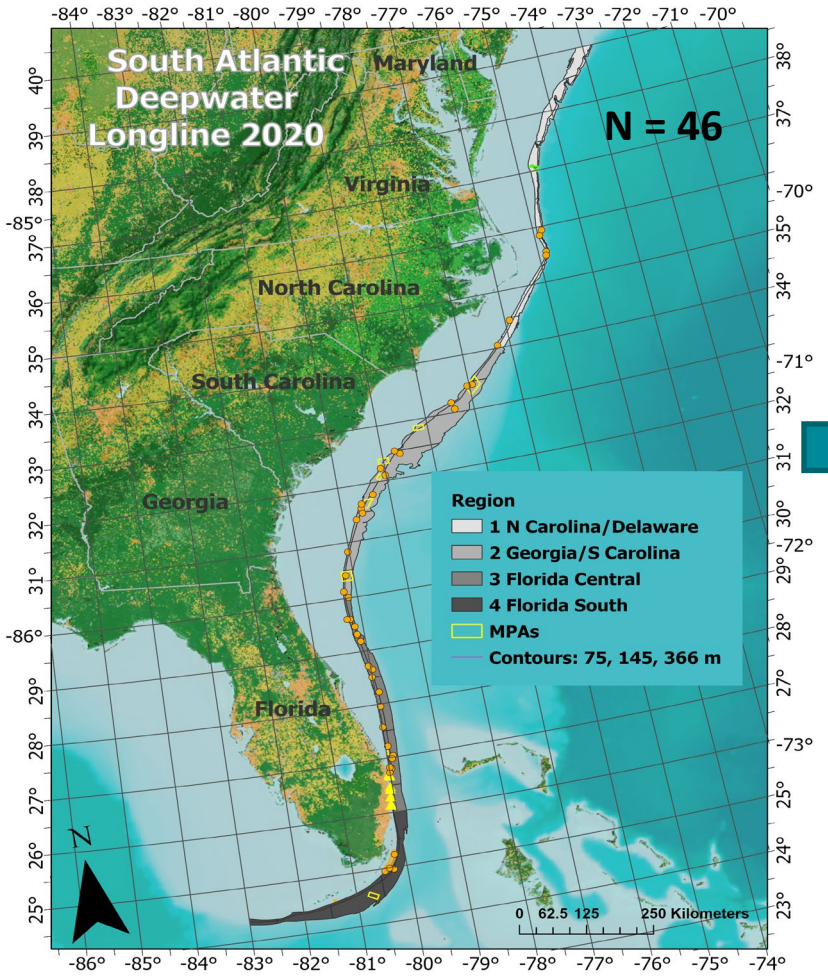
Evolution of Survey Design

2020	2021	2022	2023	2024
Low Effort (n=46)	High Effort (n=187)	High Effort (n=174)	High Effort (n=157+30)	High Effort (n=176+30)
Mixed Site Selection	Mixed Site Selection	Fully Randomized	Fully Randomized	Fully Randomized
2 fishermen, 2 zones	4 fishermen, 4 zones	4 fishermen, 4 zones	4 fishermen, 4 zones	4 fishermen, 4 zones
4 mi longline	3 mi longline	3 mi longline	3 mi longline	3 mi longline
Domain: FL to NC	Domain: FL to NC	Domain: FL to NC	Domain: FL to DE	Domain: FL to DE

Expansion with no change

Increase in Sampling Effort

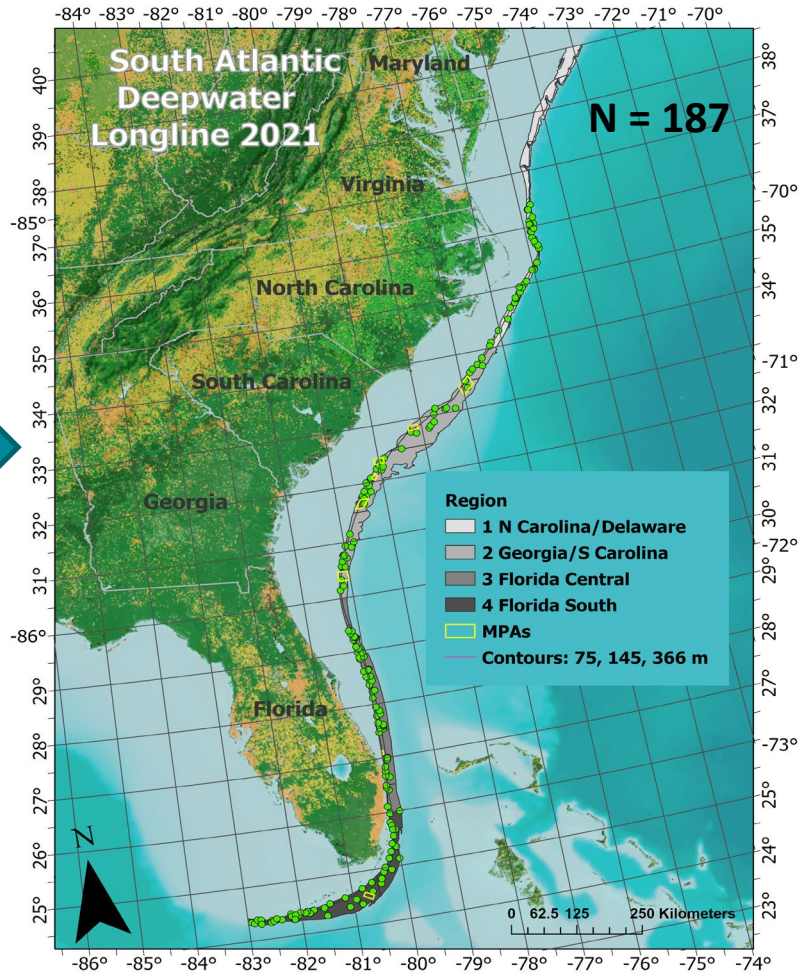
2020



Random = 63%
Universe random = 26%
Captain's choice = 11%

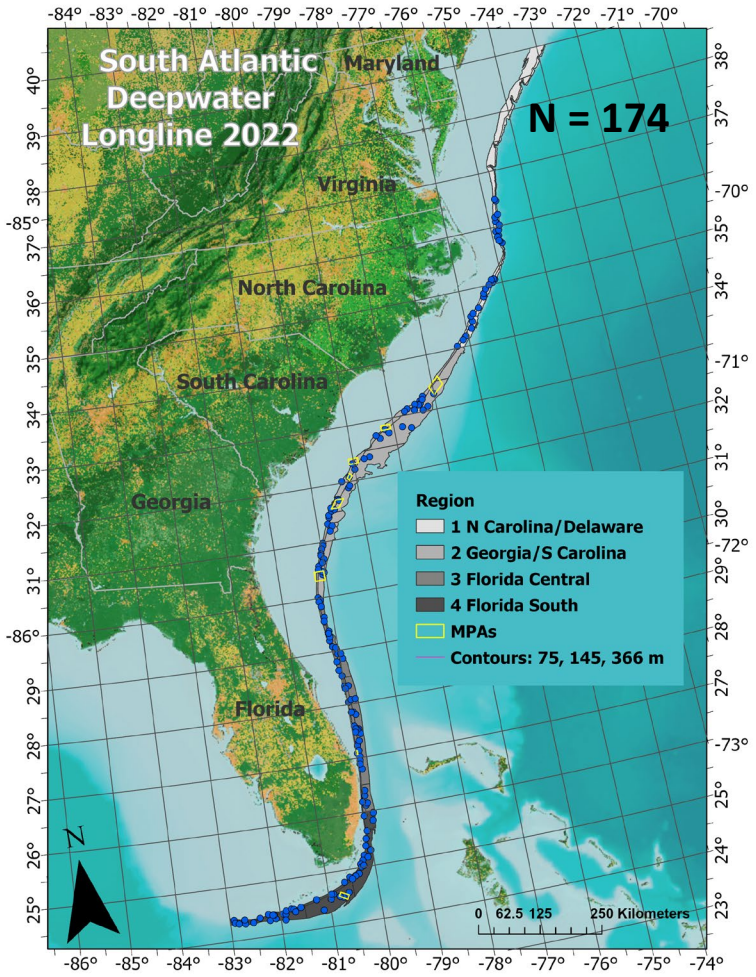
4-fold

2021



Random = 48%
Universe random = 29%
Captain's choice = 23%

2022



Random = 100%

Data Collection

Data collected by NMFS observers:

- Station data (date, lat/lon, depth, and time of day)
- Catch data (All species identified, counted, and measured)
- Biological samples (otoliths, reproductive tissues)
- Bottom temperature recorded (temperature-depth recorder)
- Priority species and non-priority species (i.e., as time permits)

6 Priority Species

Common Name	Scientific Name
GOLDEN TILEFISH	*Lopholatilus chamaeleonticeps*
BLUELINE TILEFISH	*Caulolatilus microps*
YELLOWEDGE GROUPER	*Epinephelus flavolimbatus*
WARSAW GROUPER	*Epinephelus nigritus*
SNOWY GROUPER	*Epinephelus niveatus*
SPECKLED HIND	*Epinephelus drummondhayi*

(Minimum 20 per site)

24 Non-Priority Species

Common Name	Scientific Name
BLACKLINE TILEFISH	*Caulolatilus cyanops*
ANCHOR TILEFISH	*Caulolatilus intermedius*
GOLDFACE TILEFISH	*Caulolatilus chrysops*
GOLIATH GROUPER	*Epinephelus itajara*
NASSAU GROUPER	*Epinephelus striatus*
YELLOWFIN GROUPER	*Mycteroperca venenosa*
YELLOWMOUTH GROUPER	*Mycteroperca interstitialis*
MISTY GROUPER	*Hyporthodus mystacinus*
MARBLED GROUPER	*Dermatolepis inermis*
GRAYSBY GROUPER	*Cephalopholis cruentata*
GAG GROUPER	*Mycteroperca microlepis*
RED GROUPER	*Epinephelus morio*
BLACK GROUPER	*Mycteroperca bonaci*
SCAMP GROUPER	*Mycteroperca phenax*
RED HIND	*Epinephelus guttatus*
ROCK HIND	*Epinephelus adscensionis*
MUTTON SNAPPER	*Lutjanus analis*
YELLOWTAIL SNAPPER	*Ocyurus chrysurus*
QUEEN SNAPPER	*Etelis oculatus*
SILK SNAPPER	*Lutjanus vivanus*
RED SNAPPER	*Lutjanus campechanus*
GREATER AMBERJACK	*Seriola dumerili*
BLACK BELLIED ROSEFISH	*Helicolenus dactylopterus*

(Maximum 20 per site across species)

Managed Species

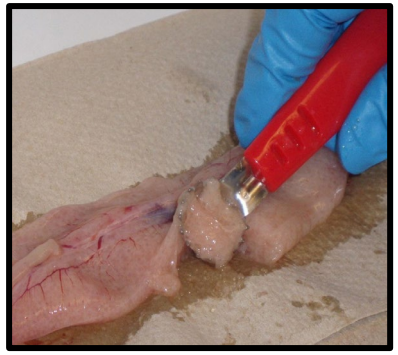
2020-2022

- 126 species total
- 36 managed species caught
- Low samples for some priority species:
  - Yellowedge Grouper (47)
  - Warsaw Grouper (4)
  - Speckled Hind (1)
- Many rare species well-sampled in SERFS trap-video survey (10to 85 m depth)

Species	2021 Abundance	2021 Presence N=187	2021 FO
Blueline Tilefish	1,371	47	25.1
Golden Tilefish	898	46	24.6
Snowy Grouper	229	51	27.3
Almaco Jack	134	30	16.0
Mutton Snapper	82	17	9.1
Red Snapper	73	17	9.1
Red Porgy	58	13	7.0
Greater Amberjack	31	11	5.9
Blackline Tilefish	26	3	1.6
Gag Grouper	18	10	5.3
Yellowedge Grouper	13	7	3.7
Scamp Grouper	11	7	3.7
Silk Snapper	8	5	2.7
Goldface Tilefish	7	3	1.6
Black Sea Bass	7	2	1.1
Rock Hind	7	2	1.1
Lesser Amberjack	6	5	2.7
Gray Triggerfish	6	3	1.6
Red Grouper	6	2	1.1
Bluerunner Jack	5	4	2.1
Jolthead Porgy	5	4	2.1
Knobbed Porgy	5	3	1.6
Cobia	4	4	2.1
Dolphinfish	4	2	1.1
Warsaw Grouper	3	3	1.6
Blackfin Tuna	2	2	1.1
Graysby Grouper	2	1	0.5
Sand Tilefish	2	1	0.5
Saucereye Porgy	2	1	0.5
Vermilion Snapper	2	1	0.5
Whitebone Porgy	2	1	0.5
Blackfin Snapper	1	1	0.5
Coney	1	1	0.5
Creolefish	1	1	0.5
Hogfish	1	1	0.5
Yellowfin Tuna	1	1	0.5

Biological Samples

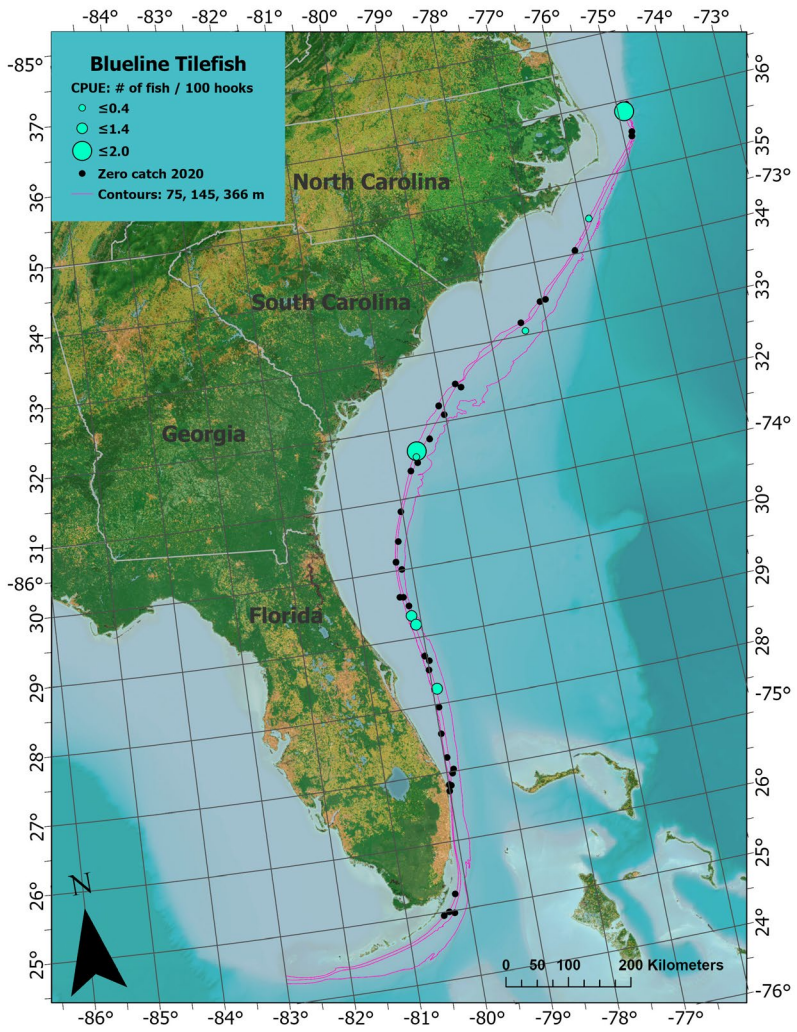
- 2 sagittal otoliths
- Gonad samples (sex and maturation)
- Total length and fork length

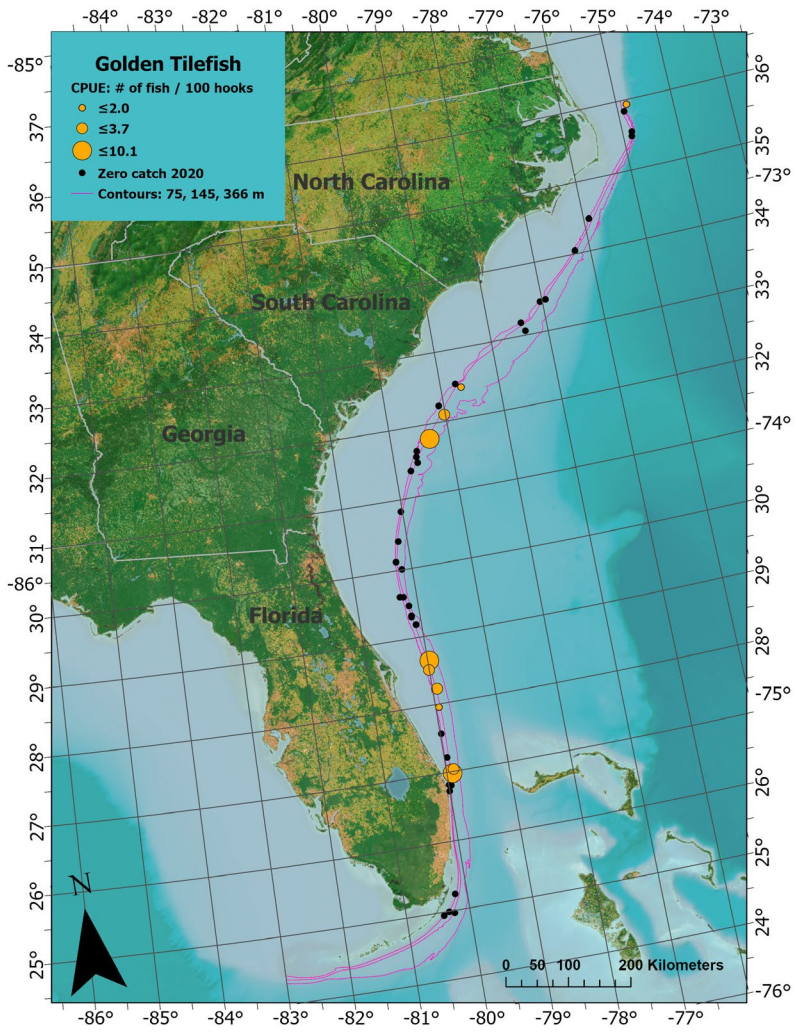


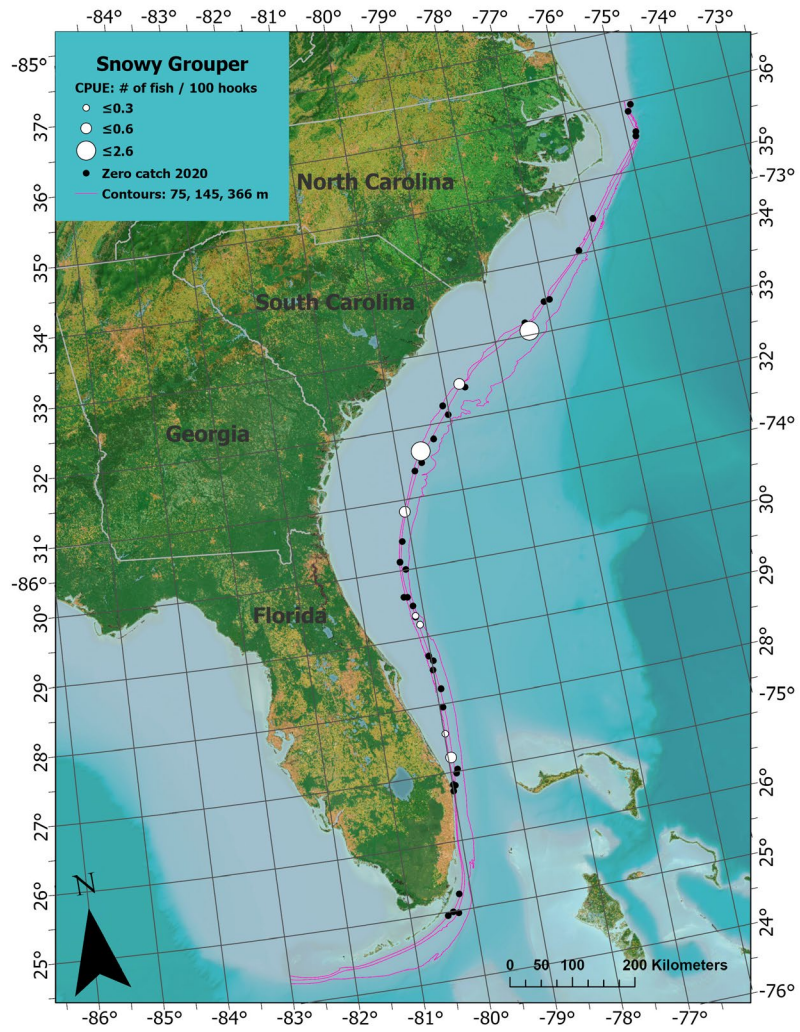
Scientific Name	Common Name	Total	2020	2021	2022
Lopholatilus chamaeleonticeps	Tilefish	1182	128	710	344
Caulolatilus microps	Grey/Blueline Tilefish	786	37	473	276
Epinephelus niveatus	Snowy Grouper	316	29	188	99
Helicolenus dactylopterus	Blackbelly Rosefish	85	3	40	42
Lutjanus analis	Mutton Snapper	65	15	28	22
Lutjanus campechanus	Northern Red Snapper	54	11	28	15
Epinephelus flavolimbatus	Yellowedge Grouper	44	5	11	28
Seriola rivoliana	Almaco Jack	44		27	17
Mycteroperca microlepis	Gag Grouper	25	4	16	5
Mycteroperca phenax	Scamp Grouper	25	9	11	5
Caulolatilus cyanops	Blackline Tilefish	24	1	15	8
Pagrus pagrus	Red Porgy	16		4	12
Seriola dumerili	Greater Amberjack	12	1	7	4
Lutjanus vivanus	Silk Snapper	11	2	8	1
Centropristis striata	Black Sea Bass	9	1	2	6
Epinephelus morio	Red Grouper	9	5	3	1
Epinephelus adscensionis	Rock Hind	8	1	7	
Urophycis floridana	Southern Hake	7		2	5
Etelis oculatus	Queen Snapper	5			5
Epinephelus nigritus	Warsaw Grouper	4	1	3	
Caulolatilus chrysops	Goldface Tilefish	3		3	
Hyperoglyphe perciformis	Barrelfish	3			3
Rhomboplites aurorubens	Vermilion Snapper	3		2	1
Seriola fasciata	Lesser Amberjack	3		3	
Centropristis ocyurus	Bank Sea Bass	2			2
Cephalopholis cruentata	Graysby Hind	2		2	
Balistes capriscus	Gray Triggerfish	1			1
Calamus leucosteus	Whitebone Porgy	1		1	
Carcharhinus falciformis	Silky Shark	1	1		
Carcharhinus signatus	Night Shark	1	1		
Cephalopholis fulva	Coney Hind	1		1	
Epinephelus drummondhayi	Speckled Hind	1			1
Galeocerdo cuvier	Tiger Shark	1	1		
Mycteroperca bonaci	Black Grouper	1			1
Mycteroperca interstitialis	Yellowmouth Grouper	1			1
Neomerinthe hemingwayi	Spinycheek Scorpionfish	1		1	
Ocyurus chrysurus	Yellowtail Snapper	1	1		
Opsanus pardus	Leopard Toadfish	1		1	
Opsanus tau	Oyster Toadfish	1			1
Pseudocaranx dentex	White Trevally	1			1
Rachycentron canadum	Cobia	1		1	
Serranidae	Note: Family (Sea Basses)	1	1		
Sphyraena barracuda	Great Barracuda	1		1	

2020 Species Distributions

n=46 stations

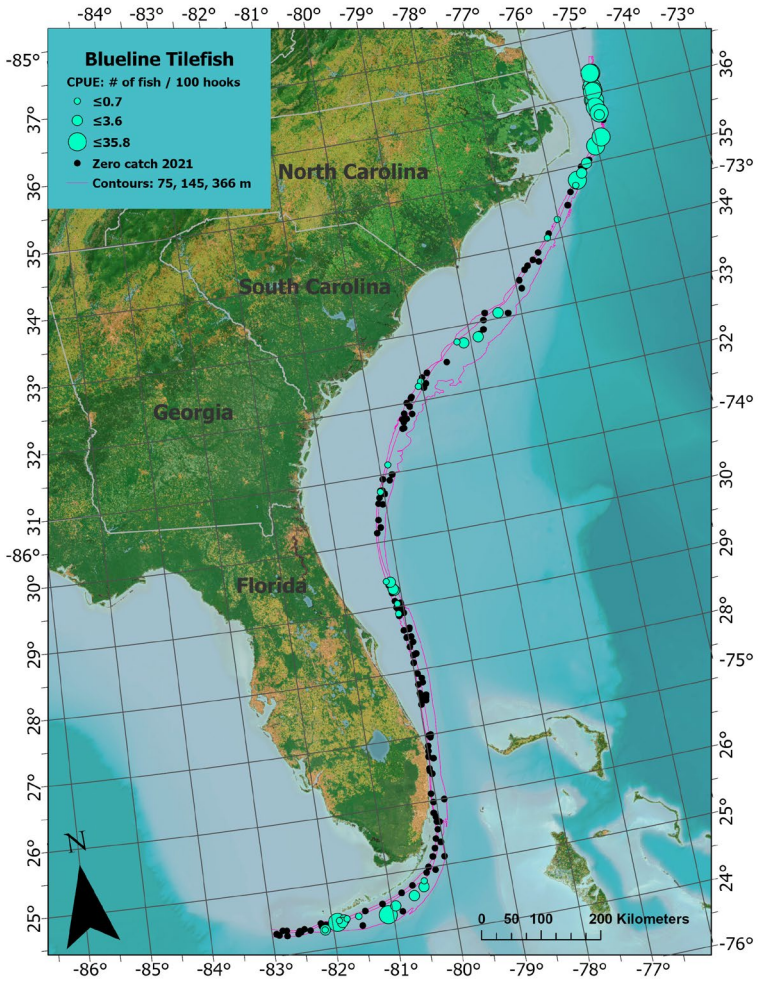


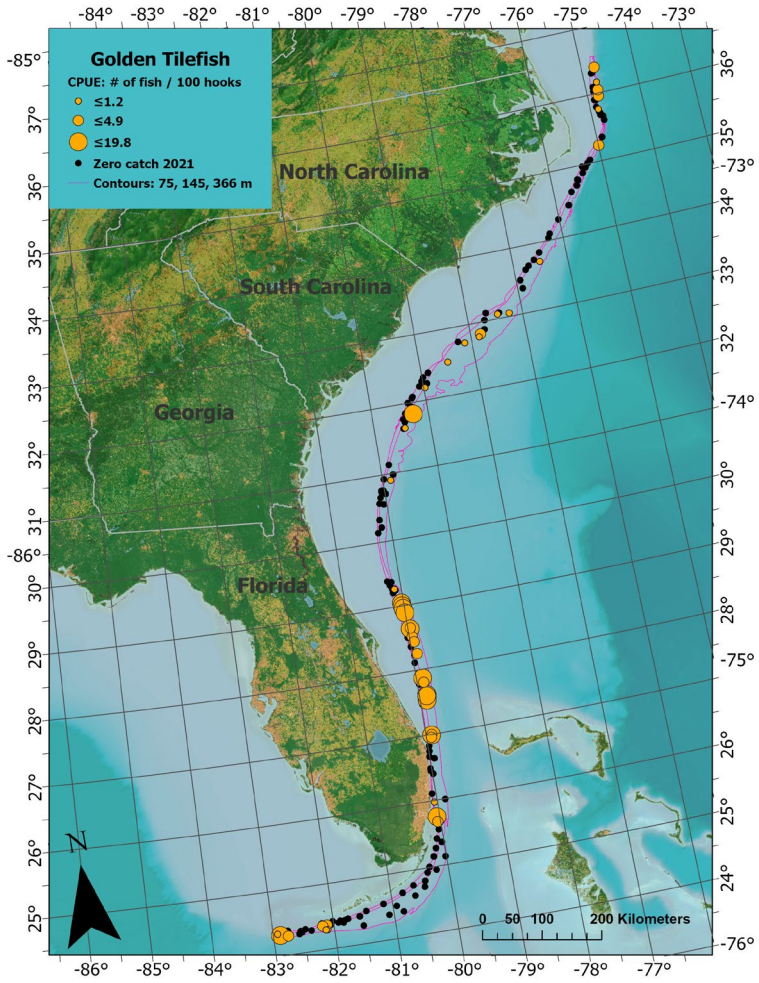


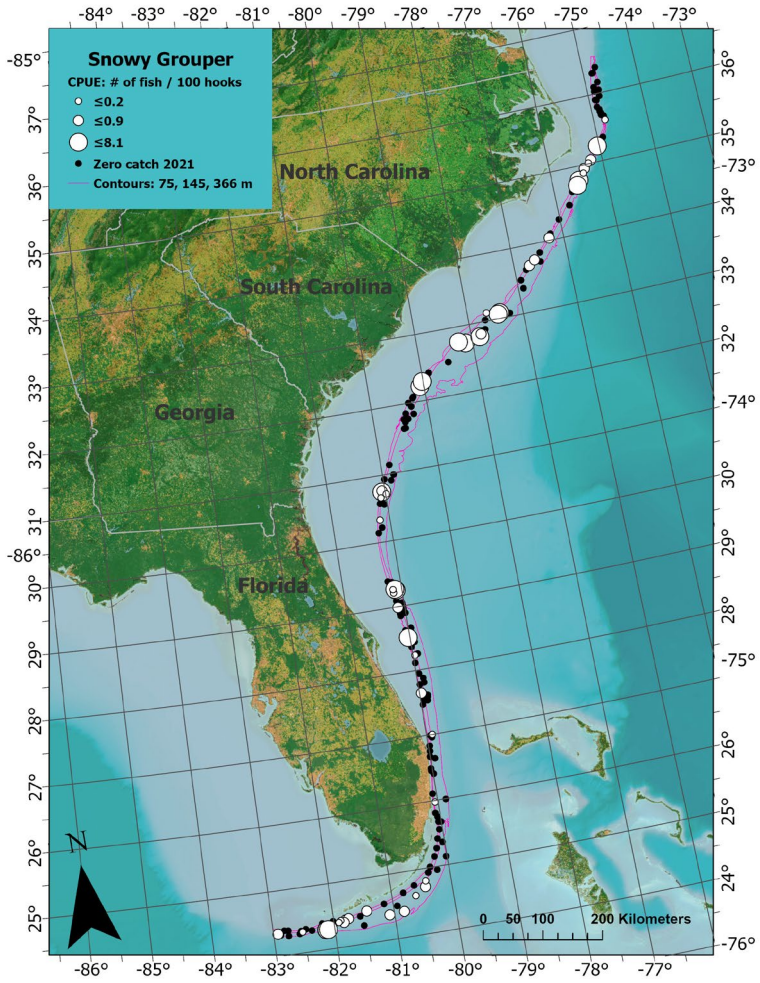


2021 Species Distributions

n = 187 stations

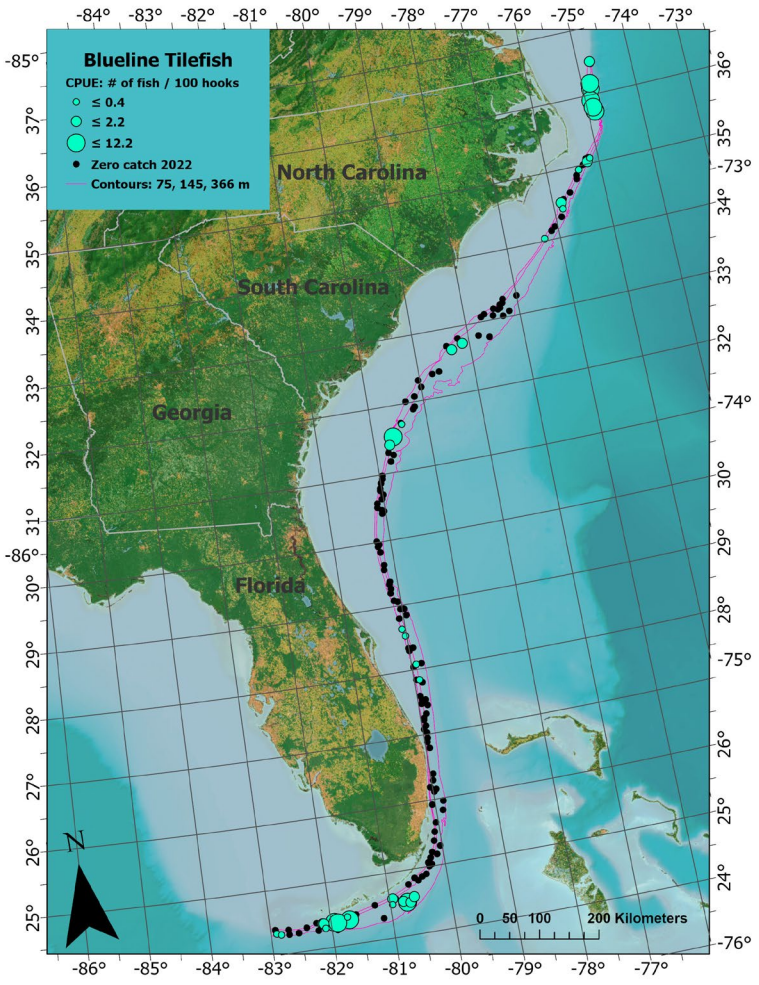


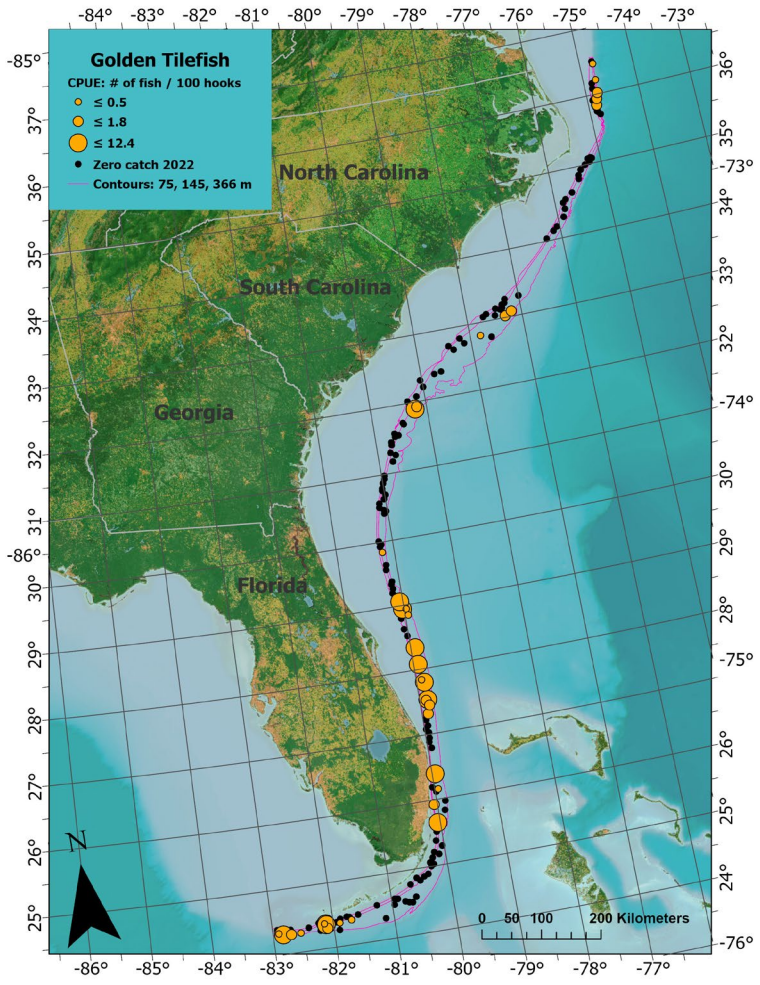


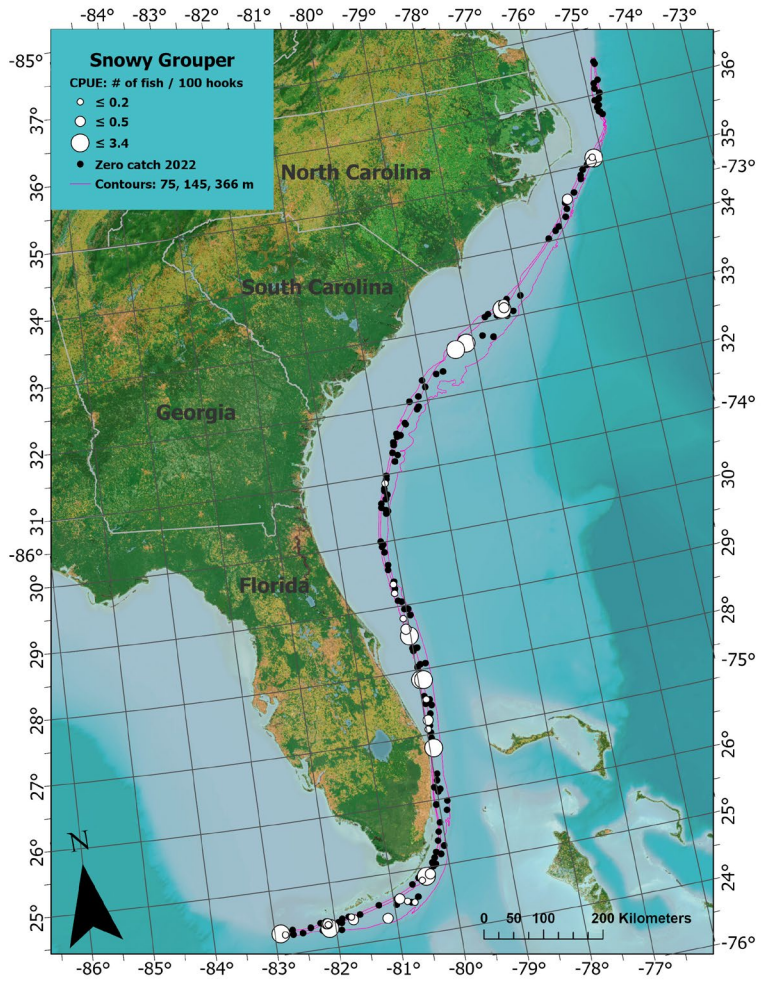


2022 Species Distributions

n=174 stations



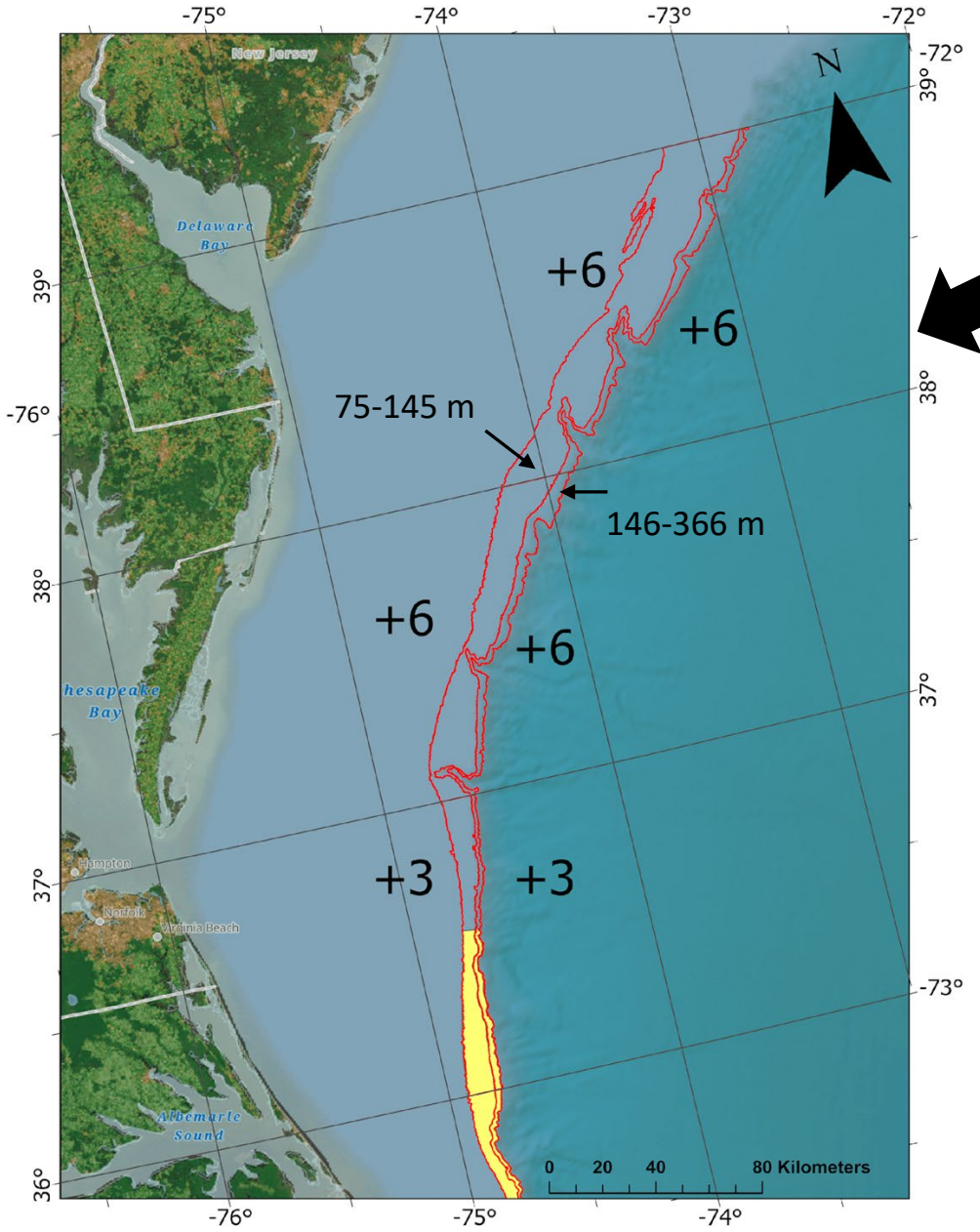


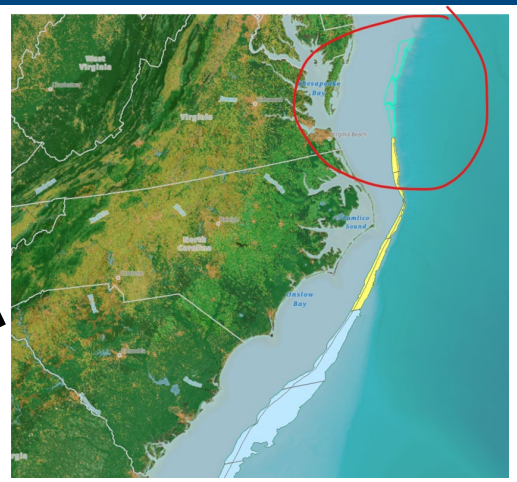


Northern Expansion

Northern Expansion

- 2020-2022: Northern extent 36.5° N (NC-VA border, yellow)
- 2023: Proposed northern extent: 39° N (Delaware Bay, red)
- Added 30 stations north of NC-VA border
- Same stratification (latitude x depth bin), sampling intensity, and methodology

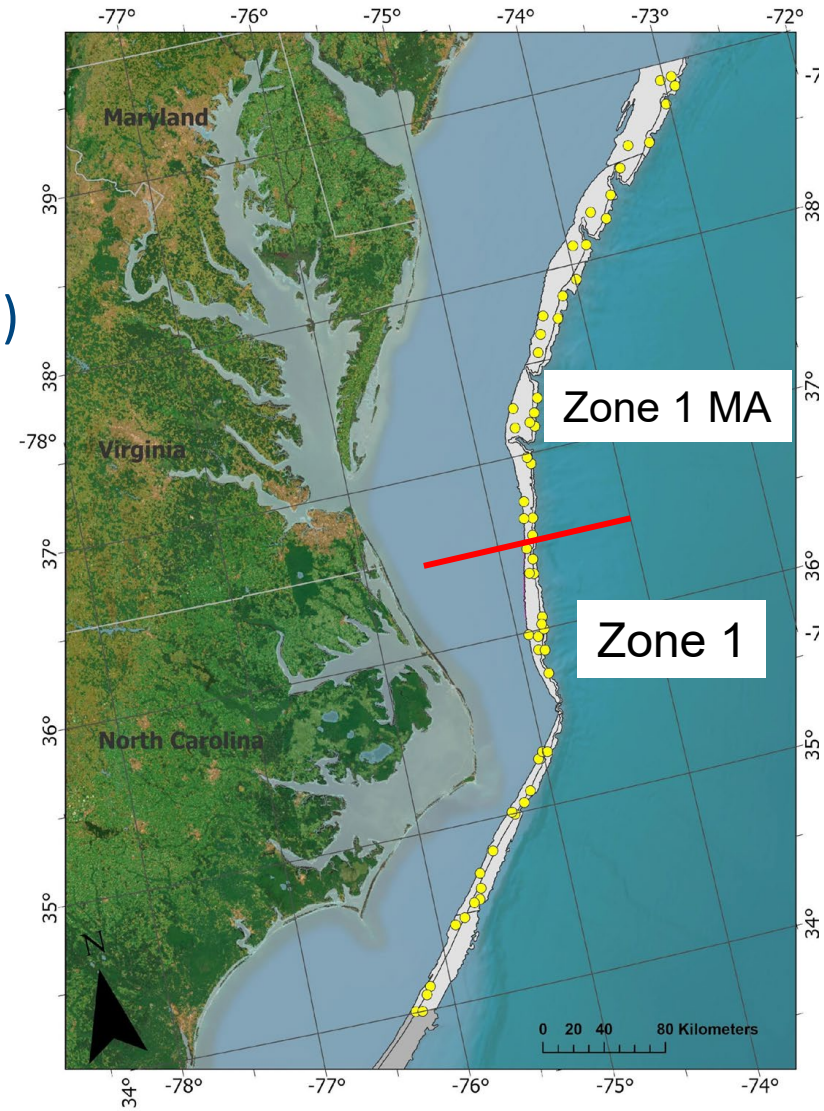




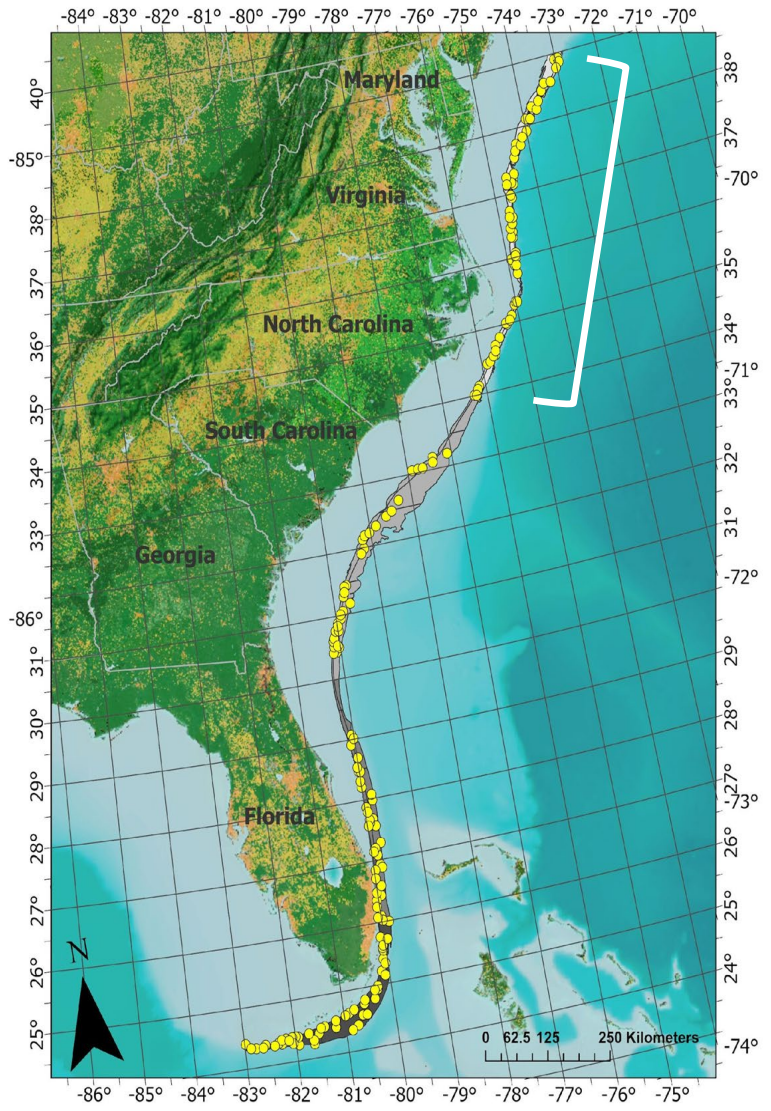
2023 Northern Expansion

- Successful in 2023
- 30 stations in Zone 1MA (36.5-39° N)
- 30 stations in Zone 1 (34-36.5° N)
- Planned for 2024

Northern Sites

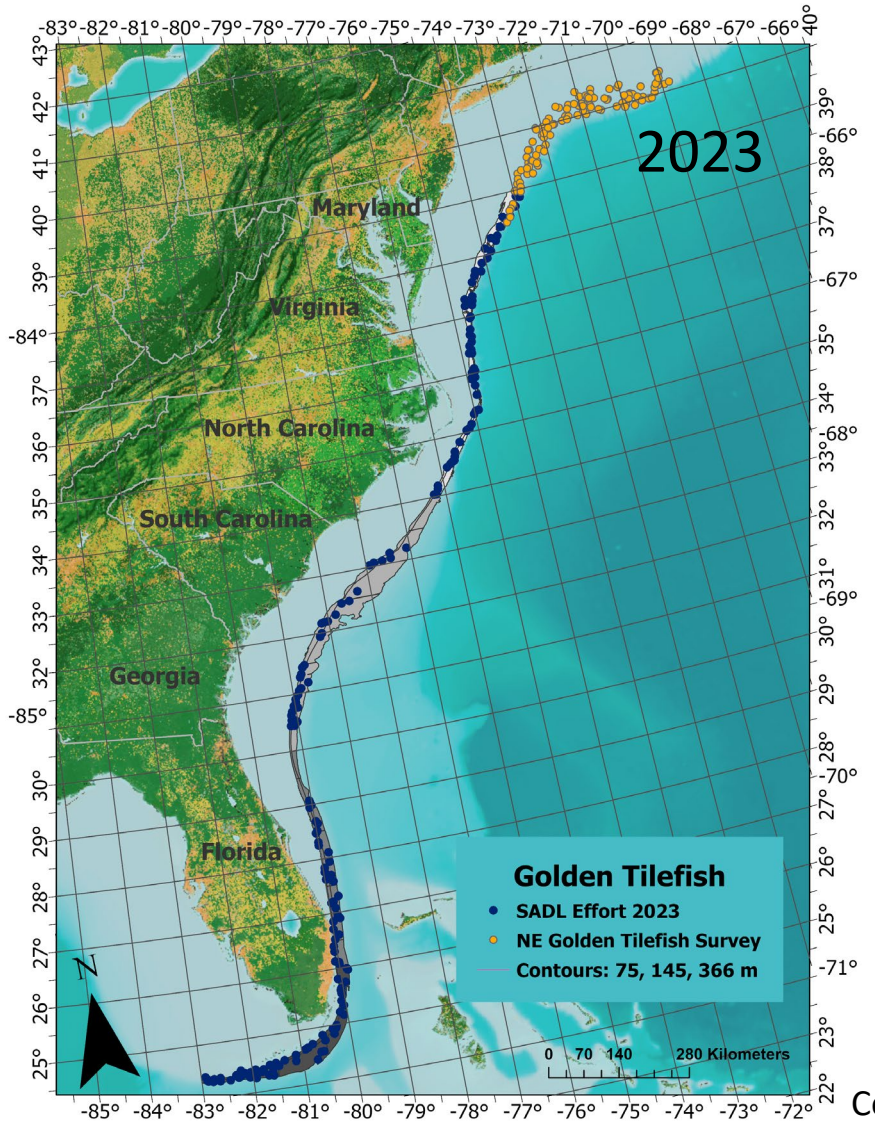


2023 Survey Footprint



Northern Expansion

- Aligns with NEFSC Golden Tilefish survey
- Potential for near coast-wide coverage



Courtesy: Jill Olin (MTU)
Paul Nitschke (NEFSC)

Preliminary Analyses

(QA/QC in progress)

Proportion Positive

- Modest changes in proportion positive with design change (2021 to 2022)
- Sample several species common in shelf trap-video survey (SERFS)

Species	Proportion positive - 2020	Proportion positive - 2021	Proportion positive - 2022	Proportion positive – 2023*
Blueline Tilefish	0.17	0.25	0.21	0.20
Tilefish Golden	0.22	0.25	0.21	0.23
Snowy Grouper	0.17	0.27	0.21	0.13
Almaco Jack	0.13	0.16	0.11	0.14
Mutton Snapper	0.15	0.09	0.06	0.08
Red Snapper	0.13	0.09	0.09	0.09
Red Porgy	0.09	0.07	0.10	0.05
Greater Amberjack	0.11	0.06	0.09	0.05
Blackline Tilefish	0.02	0.02	0.02	0.02
Gag Grouper	0.11	0.05	0.02	0.02
Yellowedge Grouper	0.04	0.04	0.05	0.04
Scamp Grouper	0.07	0.04	0.03	0.02

*Includes Mid-Atlantic sites

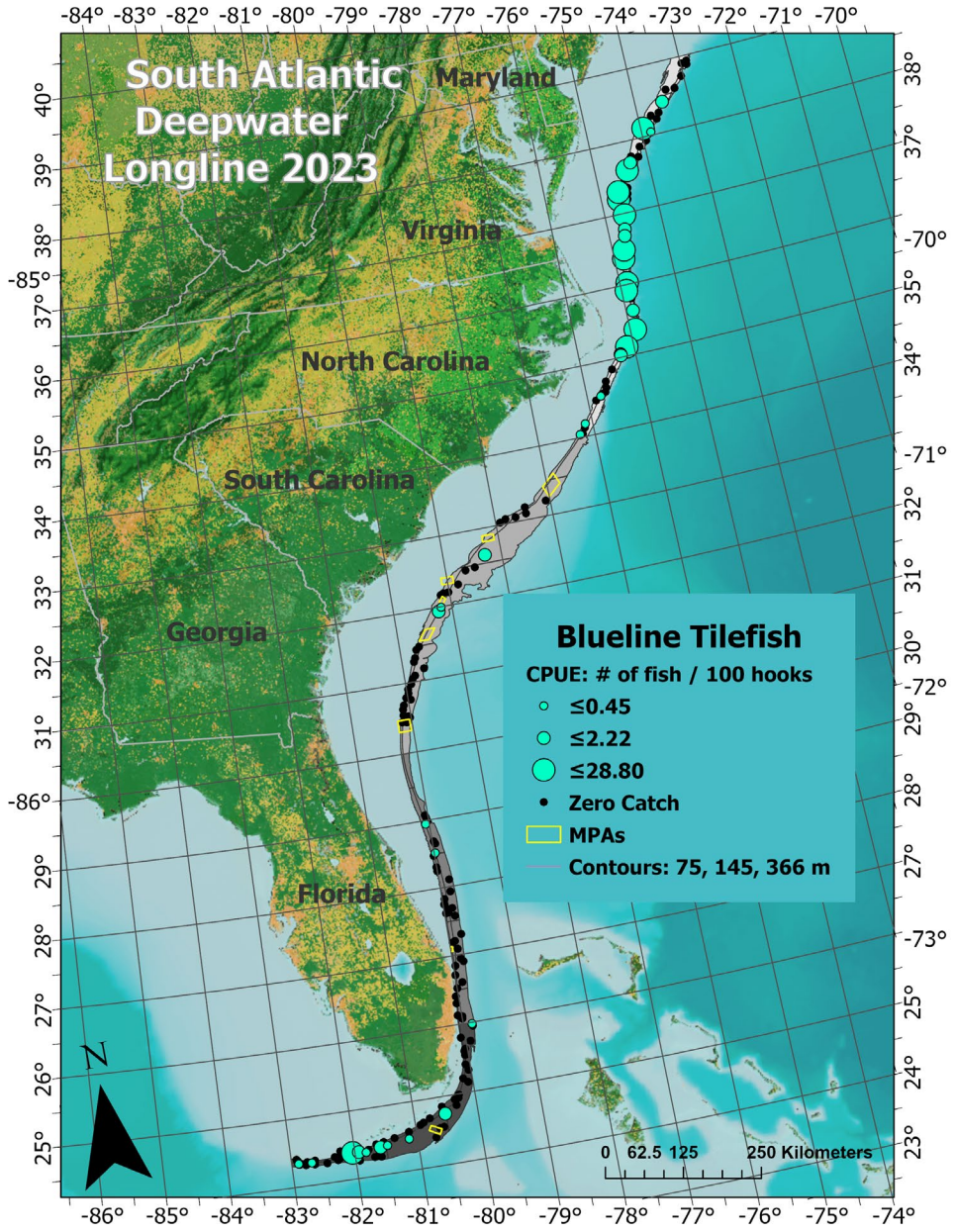
Numbers Caught

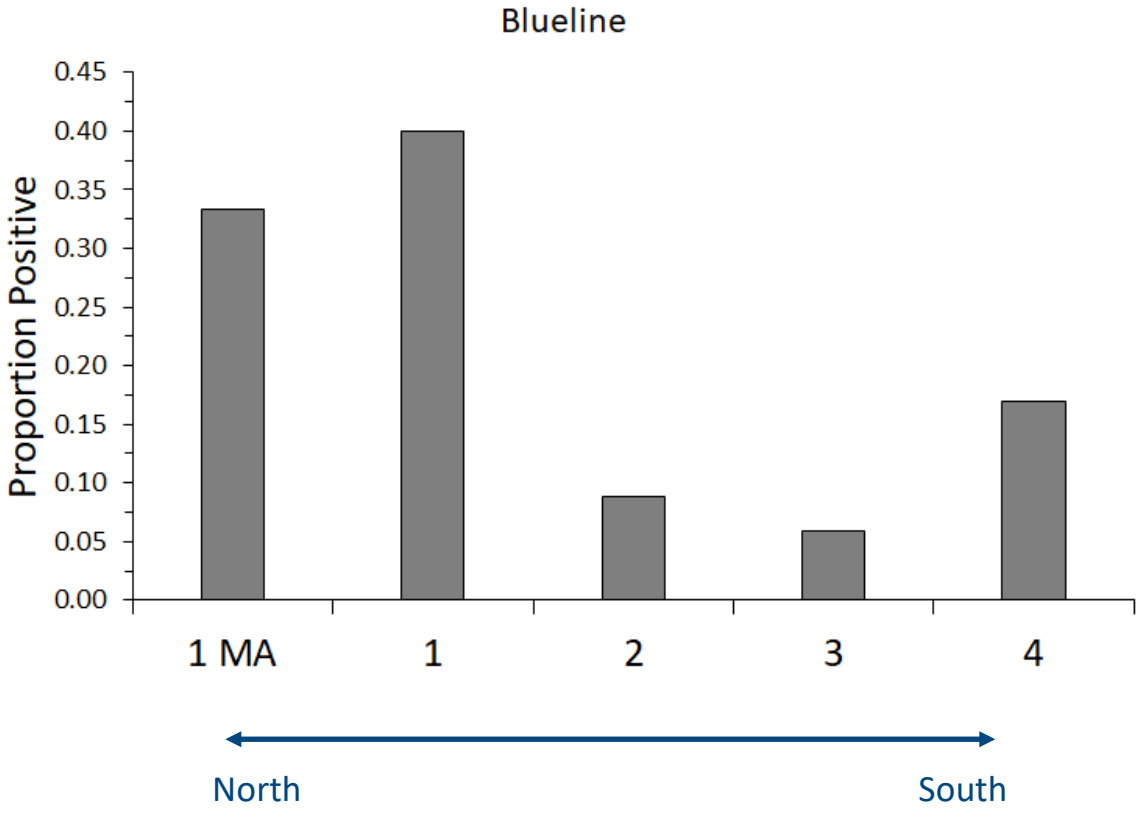
- Drop in numbers with design change (2021 to 2022)
- May affect the precision of abundance indices

Species	Number caught - 2020	Number caught - 2021	Number caught - 2022	Number caught – 2023*
Blueline Tilefish	38	1371	335	579
Tilefish Golden	166	898	434	631
Snowy Grouper	29	229	102	65
Almaco Jack	23	134	137	116
Mutton Snapper	36	82	72	30
Red Snapper	11	73	114	68
Red Porgy	14	58	136	49
Greater Amberjack	5	31	26	20
Blackline Tilefish	1	26	9	25
Gag Grouper	7	18	6	5
Yellowedge Grouper	5	13	29	11
Scamp Grouper	16	11	16	8
	N = 351	N = 2944	N = 1416	N = 1607*

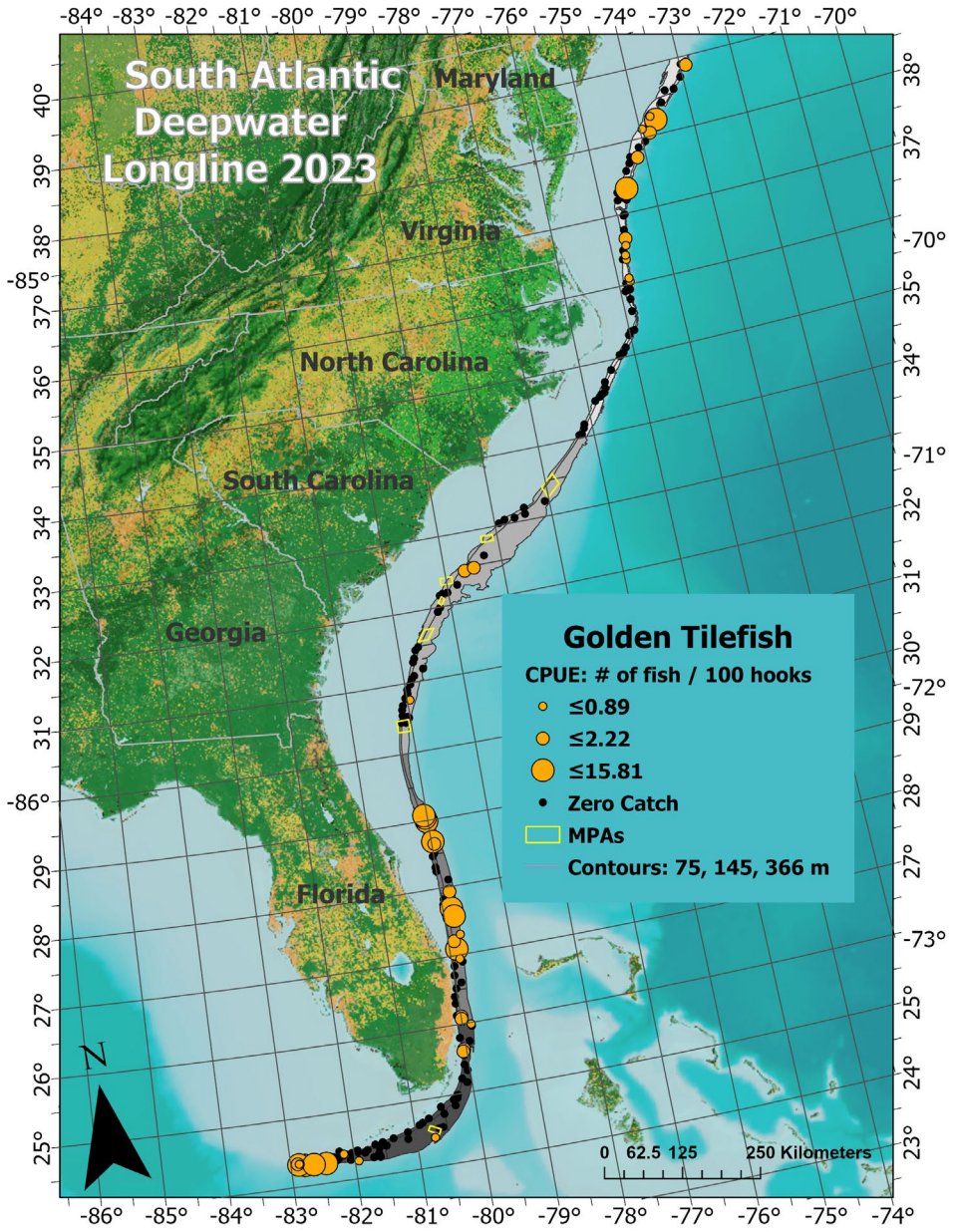
*Includes Mid-Atlantic sites

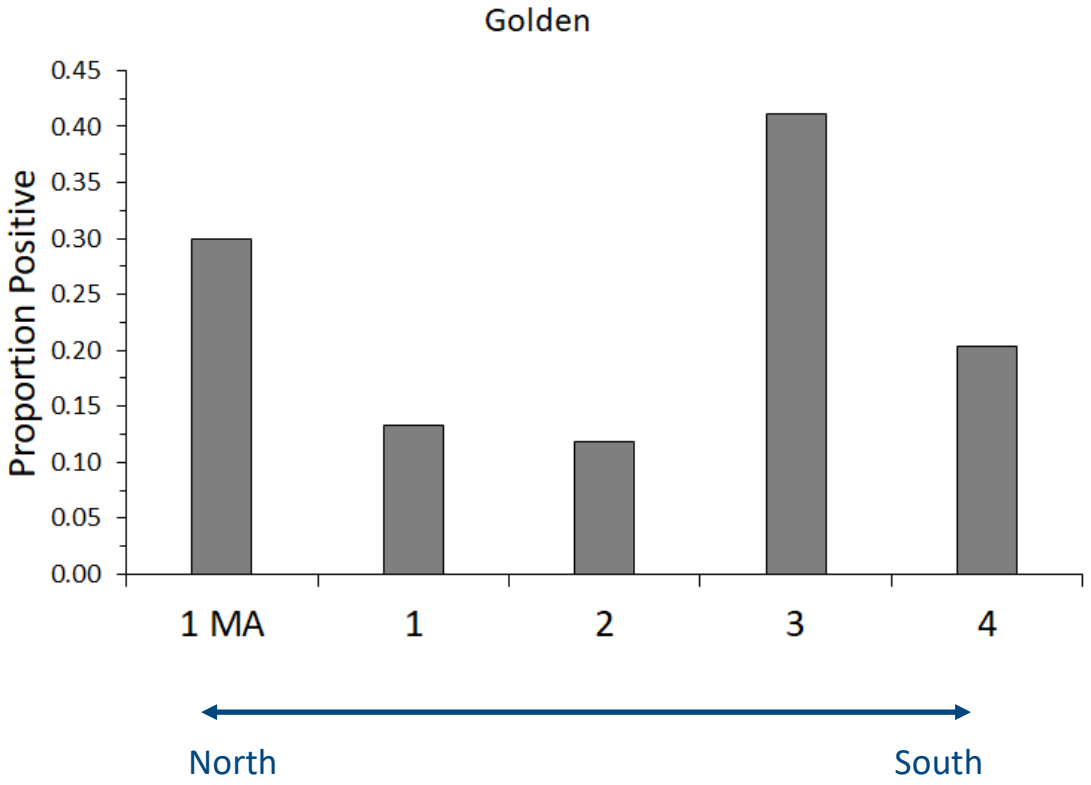
SADL 2023 Blueline Tilefish



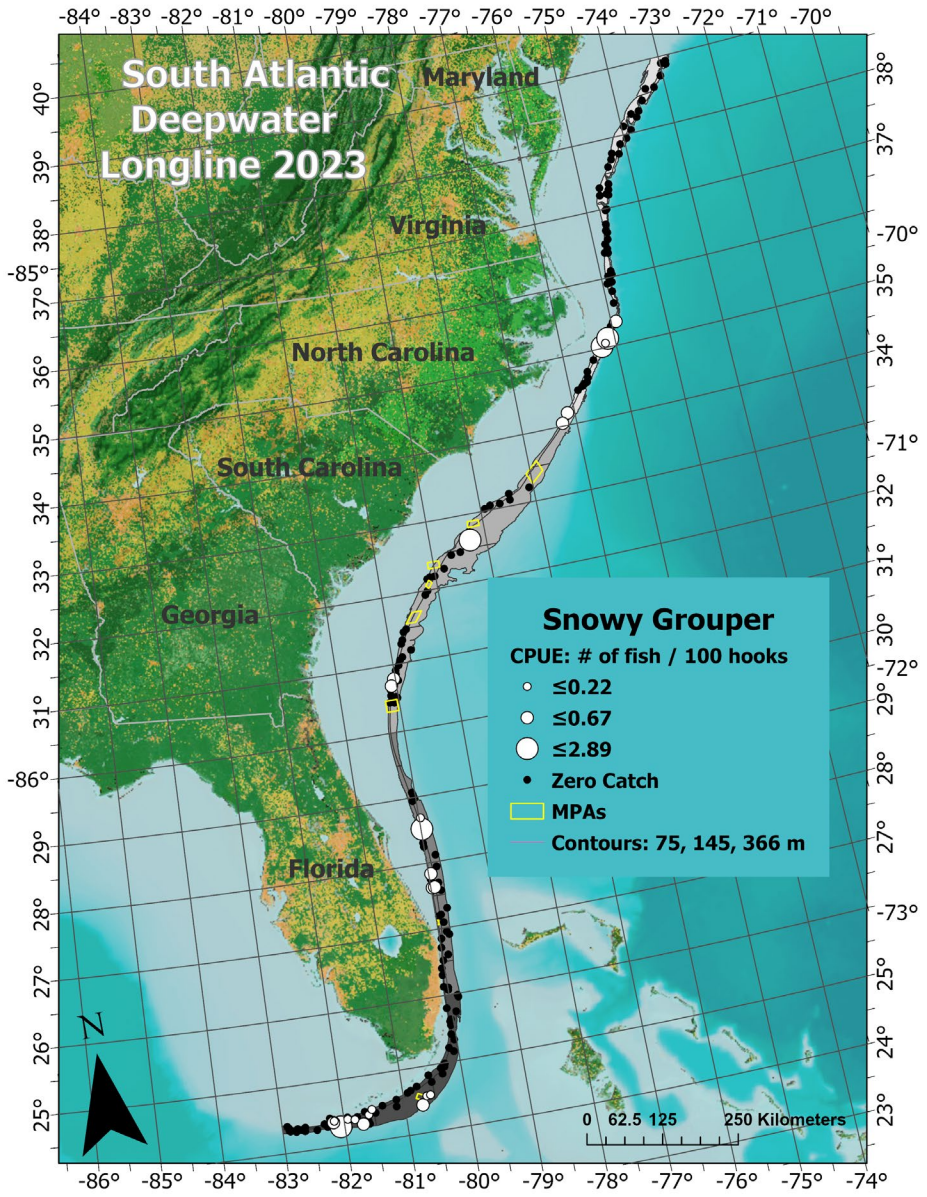


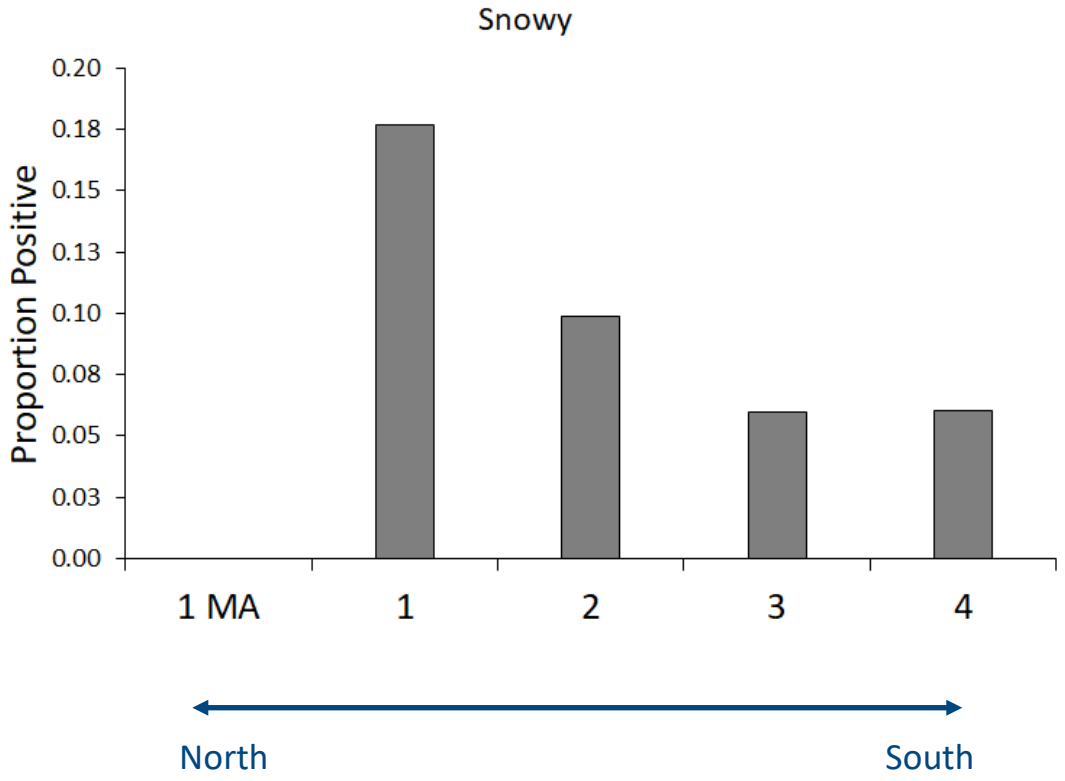
SADL 2023 Golden Tilefish





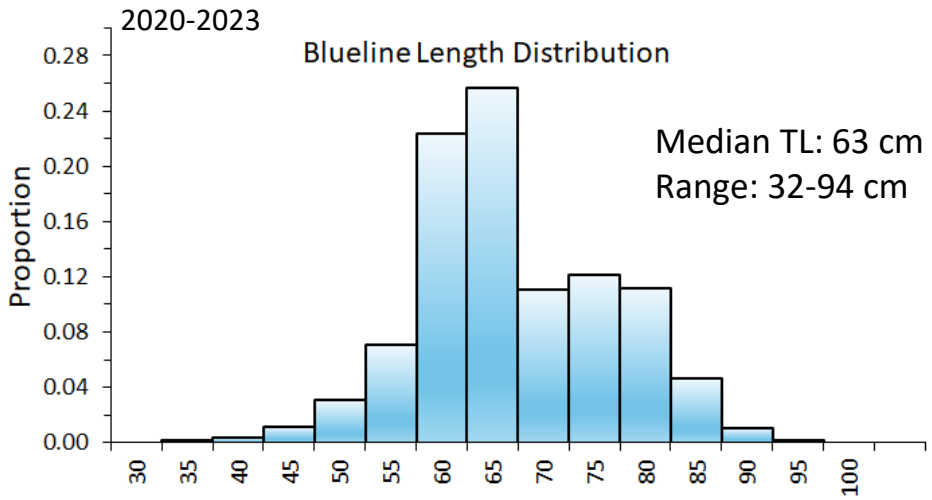
SADL 2023 Snowy Grouper

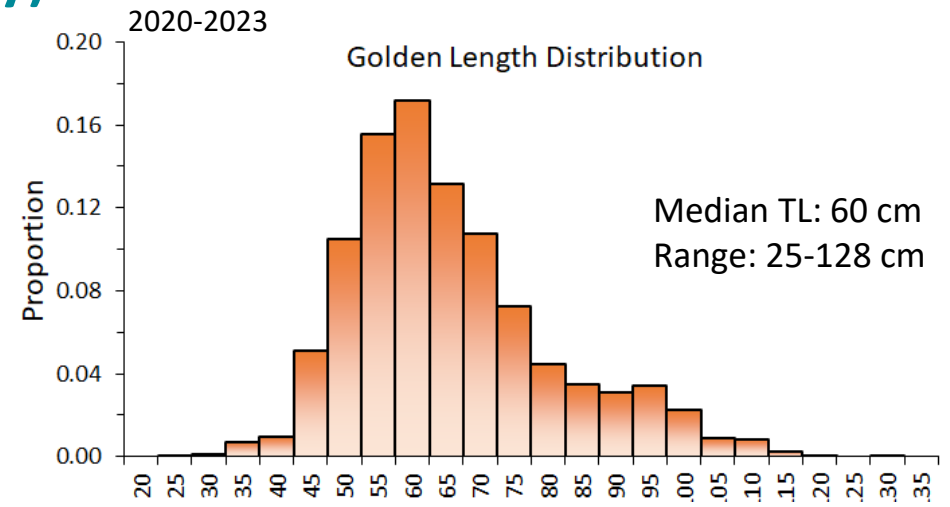


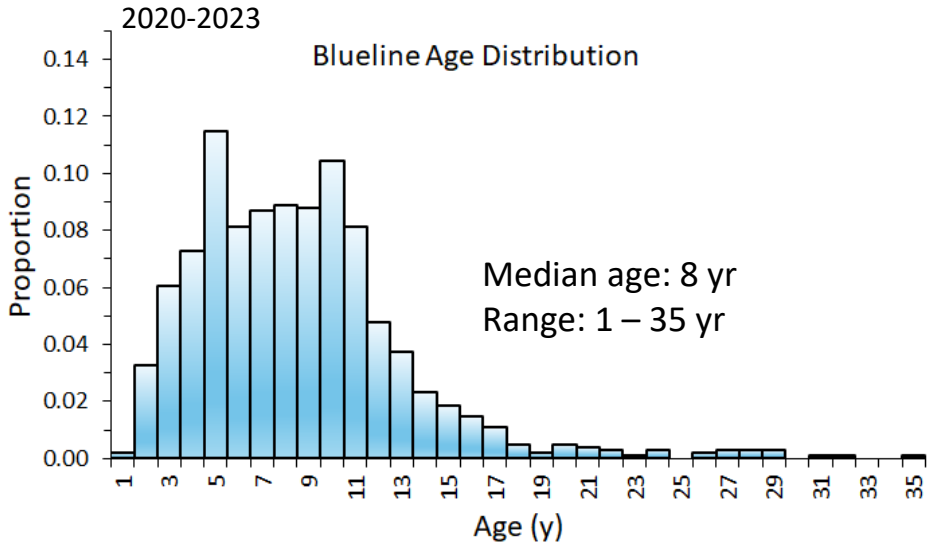


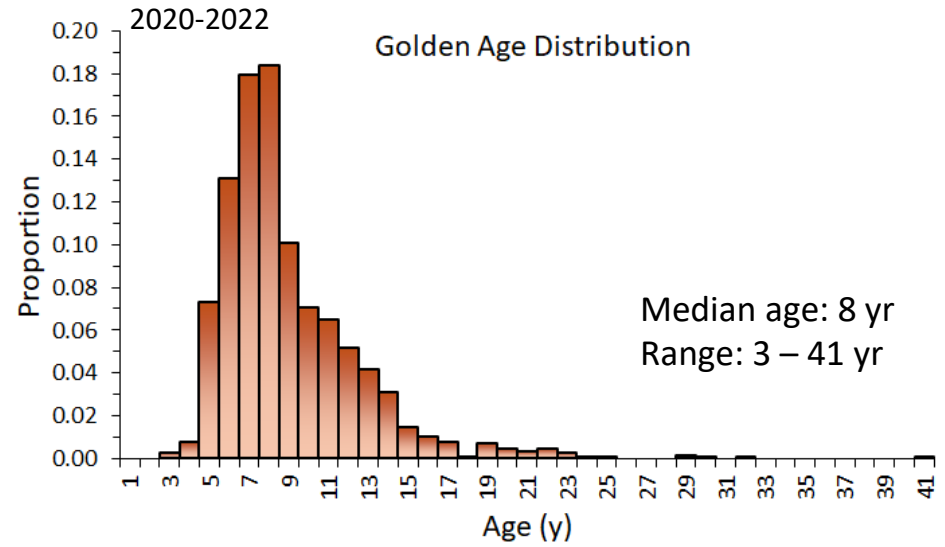
Tilefish Age and Length

(preliminary)



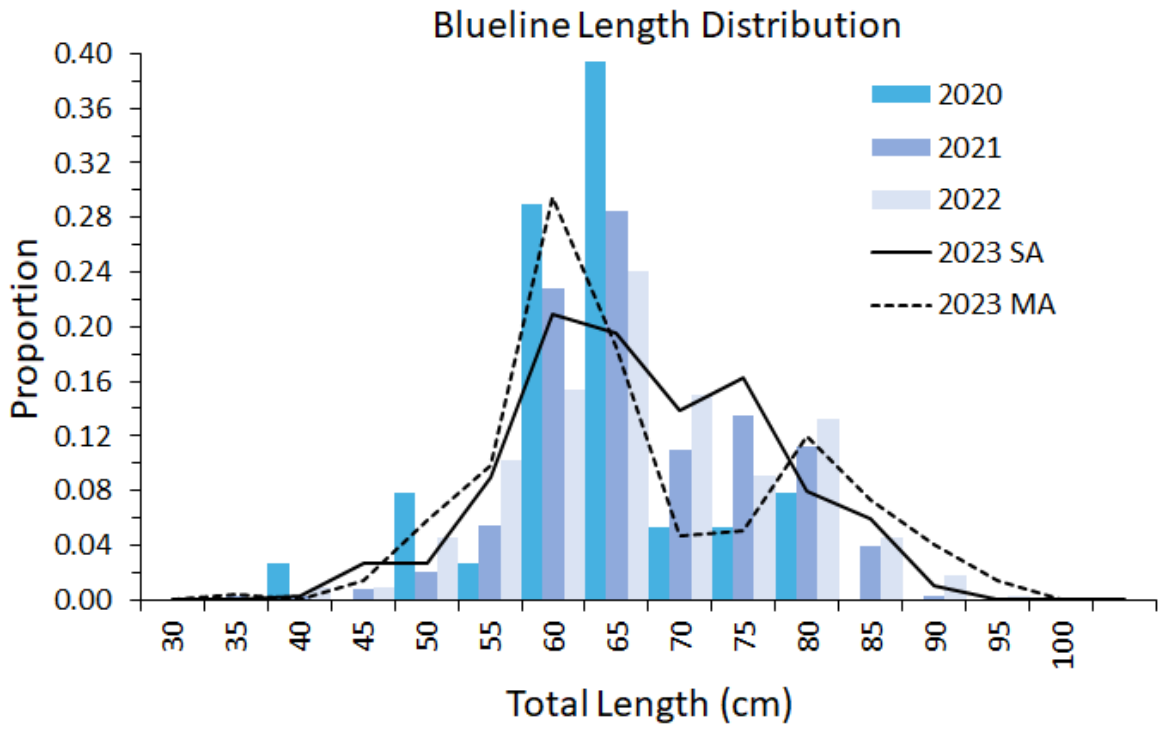


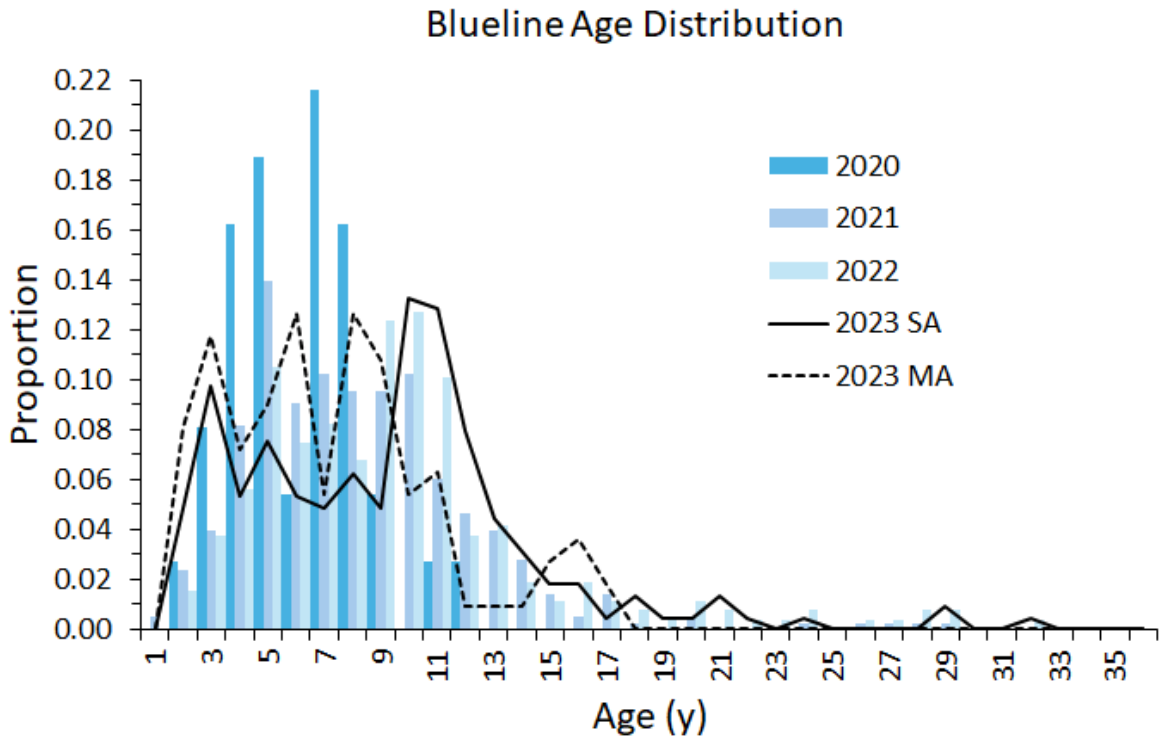




Blueline Age and Length

(preliminary)





South Atlantic SSC Review

Purpose of the SSC Review:

- Assess the appropriateness of the survey design and methodology for generating data to support species-specific data products for use in SEDAR stock assessments

- Provide guidance when considering the survey in operational assessments.

Workgroup Objectives:

- Review the survey design and sampling methodology:

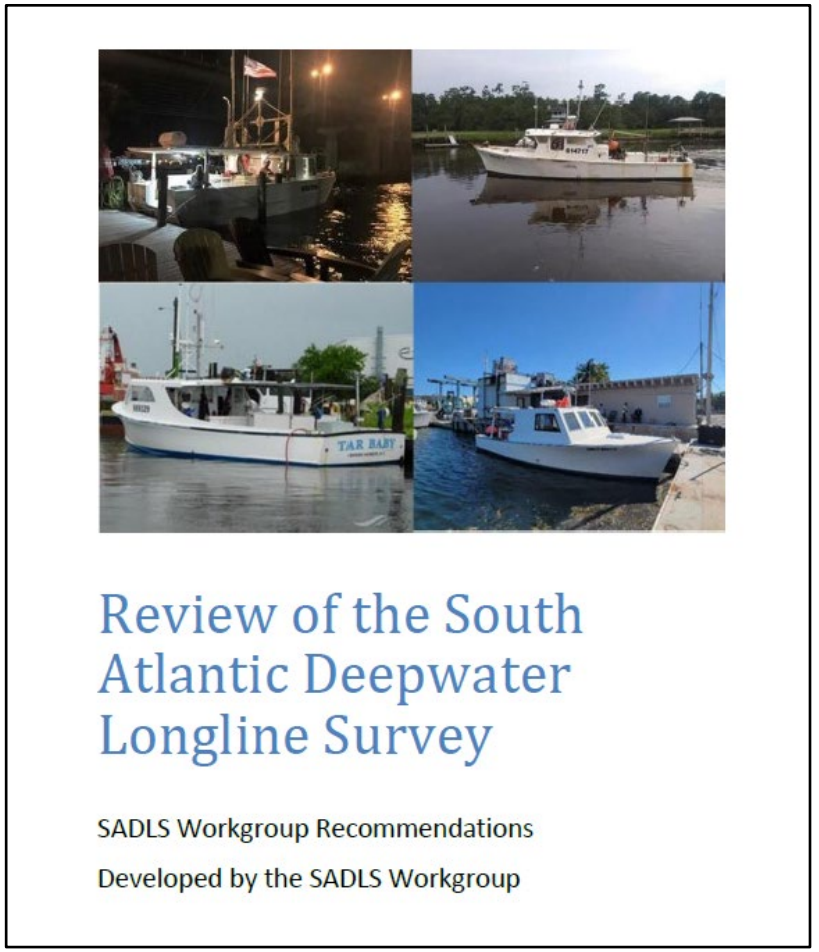
  -Review methods for site selection (e.g., geographic range, stratification)

  -Review sampling methodology (e.g., gear, sampling method, hook sizes, bait)

  -Document differences in year, seasonality, gear, and geographic distribution of the survey and sample collections (i.e., catch and life history data).

  -Describe strengths and weaknesses of the survey design and data collection

  -Develop final report for SSC review that summarizes the workgroup discussions, describes concerns, potential improvements, or recommendations with respect to survey design, data collection, and use in the development of analytical products.



South Atlantic SSC Review

SSC Working Group met 3X, Jun-Aug 2023; Full SSC review at Oct 2023 meeting

- Current stratified random sampling design appropriate
- Current gear and deployment methods appropriate
- Investigate optimization of sample allocation within and among strata
- Investigate potential use beyond focal species (i.e., blueline tilefish, golden tilefish, and snowy grouper)
- Clarify station-level subsampling approach for age data collection (i.e., otoliths)
- Concern about limited habitat information (i.e., only bottom temperature and depth)

- "At least 5 years of survey data should be available before an index of relative abundance should be considered for use in a stock assessment."
- "Use age/biological information as available and appropriate."

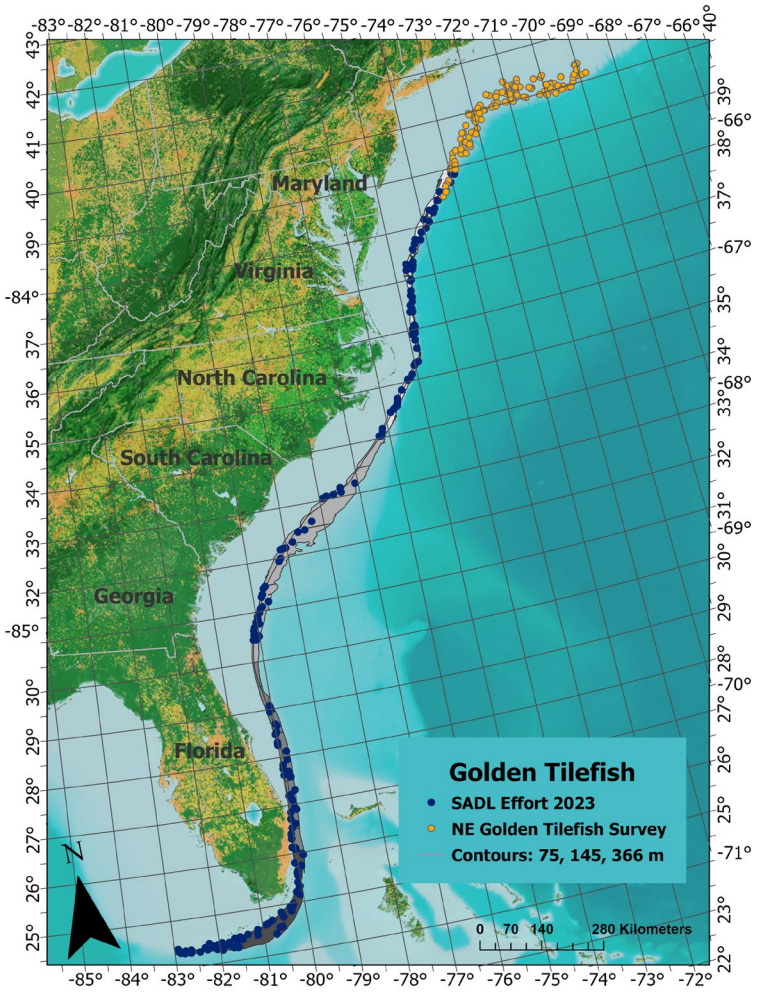
SEDAR 89 (golden tilefish), scheduled completion July 31, 2024
SEDAR 92 (blueline tilefish), scheduled completion Nov 20, 2024

- Continue 2023 northern expansion "..has great potential to track important movement and species distribution changes over time."

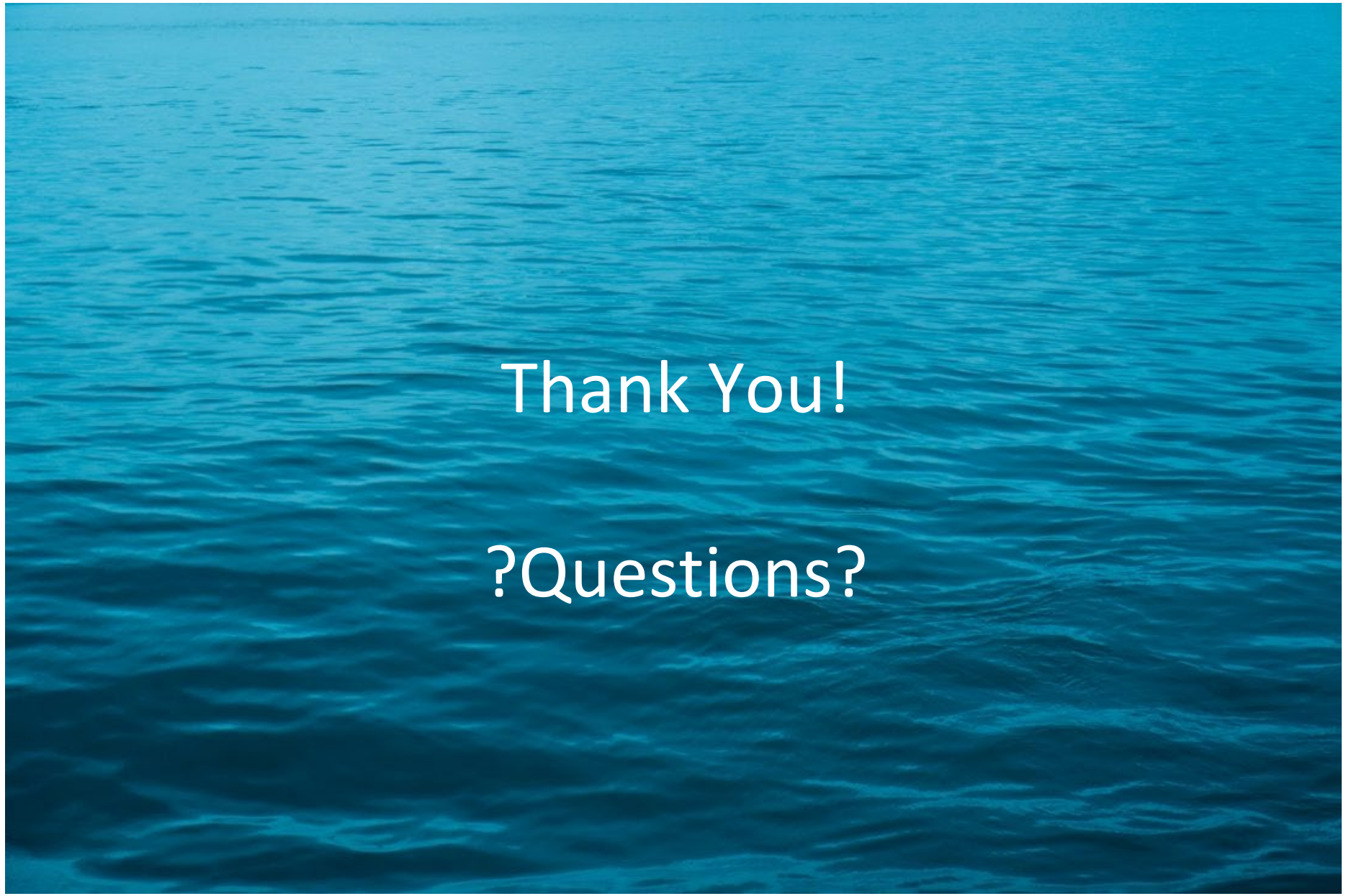
Future Plans

- Continue with northern sampling in 2024 (beyond?)
- Consider calibration study with current Golden Tilefish survey
- 2024 Marfin proposal to address survey optimization issues
- Pursue funding for bottom habitat mapping
- Data QA/QC and analysis
- Some data provided for current Golden and Blueline assessments
- Anticipate Snowy Grouper index in 2026

2023 Golden and SADL Surveys



Courtesy: Jill Olin (MTU) and Paul Nitschke (NEFSC)


Thank You!
?Questions?