Headboat Data for Blueline Tilefish in the Southeast US Atlantic

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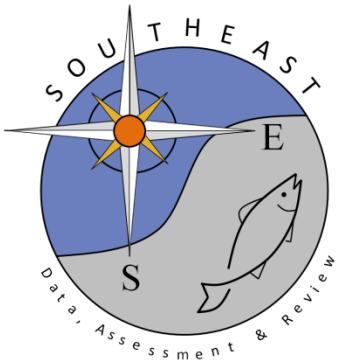

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1 Survey Description

The Southeast Region Headboat Survey (SRHS) estimates landings and effort for headboats in the southeast U.S. Atlantic and Gulf of Mexico. The Headboat Survey began in 1972 in North Carolina and South Carolina. In 1976 the survey expanded to northeast Florida (Nassau-Indian River counties) and Georgia, followed by southeast Florida (St. Lucie-Monroe counties) in 1978 (Chester et al. 1984; Grimes and Hollingsworth 1979;

Huntsman 1976; Huntsman, Colby, and Dixon 1978). The SRHS began in the Gulf of Mexico in 1986 and extends from Naples, FL to South Padre Island, TX. The headboat survey generally includes 70-80 vessels participating in each region annually (Table 1). Headboat data are considered confidential and cannot be publicly distributed if less than three vessels contribute to the data product in any particular strata.

The SRHS implemented electronic logbook reporting in the South Atlantic and Gulf of Mexico as of Jan 1, 2013 which gave headboat operators the ability to report trip information via a website or mobile application. A review of the headboat data methodology and validity was conducted in 2015 for the Atlantic waters of the Southeastern U.S. (Fitzpatrick et al. 2017; SEDAR 2015). Panelists agreed the SRHS data products were the best available information for regional headboat data and should be used in stock assessments. The decision should translate to the Gulf of Mexico since the methodology and data collection are identical.

The paper headboat logbook forms varied by region and year due to space limitation on the forms during the early years of the survey. Predominant species listed on the paper forms varied by region. In general, the number of species listed increased in all regions over the early years. There were blank lines to write in species not listed on all forms. In the electronic logbook entry, starting in 2013, all species are available to users. Reporting of discards was added to the form in 2004.

The area definitions for SRHS were modified in 2013 primarily to remove the inshore - offshore component for the Carolinas and create state-specific areas for the Gulf of Mexico. A few other areas were collapsed in the Florida Keys and west Florida (Figures 1 and 2). For this assessment, state is used to define finer scale regions rather than actual states as advised by the assessment staff. The fine scale spatial strata landings and discards are confidential and can not be published. However, a confidential version of this document with all spatial strata (including the area North of Cape Hatteras, NC) was provided to the stock assessment team. The assignment of SRHS areas to states and regions are below:

- Areas 1 - OBX
- Areas 2,3,9,10 - NC
- Areas 4,5 - SC
- Areas 6,7,8 - GNFL
- Areas 11,12,17 - SFL
- Areas 1 - North Region
- Areas 2,3,4,5,6,7,8,9,10,11,12,17 - South Region

The SRHS dockside sampling was suspended in March 2020 due to concerns about COVID. No biological samples were collected during this time. During the dockside sampling suspension, port agents continued to monitor reporting compliance to ensure captains continued to report trip level catch and effort data via the electronic logbooks. Reported catch and effort data were used to estimate 2020 headboat landings and effort with no disruption. Converting landings in number to landings in weight requires mean weights by species. The logic for determining mean weights expands across strata and backwards in time until a minimum of 10 fish are available. The 2020 landings estimates in weight were derived by applying mean weights from 2019 to 2020 landings in number. Port agents continued to maintain QA-QC checks and validations in the database for their area of responsibility. Port agents also provided outreach and support to captains regarding the new for-hire reporting requirements and changes to the electronic reporting application. Given that headboat dockside sampling necessarily involves interactions between the sampler and headboat anglers and staff, biological samples were not collected until NMFS/SEFSC approved measures to resume sampling in July 2021. However, some port agents are supported by state agencies and returned to dockside sampling earlier.

2 Methods

2.1 Landings

The SRHS incorporates two components for estimating catch and effort. 1) Information about total catch and effort are collected via a logbook form that is filled out by vessel personnel for individual trips. These logbooks are summarized by vessel to generate estimated landings by species, area, and time strata. The compliance in reporting this information has improved over the years of the survey. Port agents are able to identify missing trip reports by contacting the captain or office associated with the fishing vessel, personal observations, reviewing the weekly compliance report, and other methods. If a missing trip is identified, the catch is estimated using a report from the same vessel when possible or a vessel of similar size over the same time and area. Reporting compliance has been near 100 percent since permits were tied to reporting requirements in 2008. The proportion of trips reported is the primary information used to develop a proxy for uncertainty estimates for landings and discards. 2) The size of the fish landed are collected by port samplers during dockside sampling, where fish are measured to the nearest mm and weighed to the nearest 0.01 kg. The mean weights by species, area, and month are used to convert reported landings in numbers of fish to landings in weight.

2.2 Discards

The Southeast Region Headboat Survey logbook form was modified in 2004 to include a category to collect self-reported discards for each reported trip. This category is described on the form as the number of fish by species released alive and number released dead. Port agents instructed each captain on criteria for determining the condition of discarded fish. A fish was considered "released alive" if it was able to swim away on its own. If the fish floated off or was obviously dead or unable to swim, it was considered "released dead". As of Jan 1, 2013 the SRHS began collecting logbook data electronically. Changes to the trip report were also made at this time, one of which removed the condition category for discards i.e., released alive vs. released dead. The new form now collects only the total number of fish released regardless of condition. Due to the subjectivity involved in determining the condition of the released fish from 2004 to 2012, live and dead releases are typically combined for 2004 to 2012 as total discards for consistency to match later years.

Some under reporting and misunderstanding of the data requested were identified in the initial years of the discard data collection (2004 - 2007). Observers with the headboat at-sea program collect catch and discard information from a subset of anglers. Annual catch rates from the observer data can be compared to catch rates reported on logbooks to evaluate the validity of logbook discard data for 2004 to 2007. Starting in January 2023, two fields were added to the logbook form, number of discards descended and number vented. These will be used to quantify the prevalence of use and effectiveness of fish descending devices and venting tools which are required to be onboard in both the South Atlantic and Gulf of Mexico.

2.3 Uncertainty

The first attempt to provide uncertainty estimates for headboat landings were developed for the SEDAR 68 scamp research track assessment (Nuttall et al. 2020). The approach was statistically valid but applied the uncertainty of reported SRHS landings (across areas, months, and vessels) as a proxy for uncertainty in SRHS landings estimates, which produced unrealistic coefficients of variation (CV) in some years. For SEDAR 68 scamp, years with only 60 percent of the vessels reporting had CV values of approximately 0.05. As an alternative, a proxy CV method was developed for the SEDAR 74 red snapper research track data workshop that relies on the proportion of trips reported (N) to total estimated trips (n) and adds a buffer of 0.05 to prevent the CV from reaching zero

$proxyCV = 1 - \frac{N}{n} + 0.05$ (SEDAR 2022).

This proxy CV method was again refined for the SEDAR 82 gray triggerfish research track data workshop to account for any spatial variability in species abundance and reporting compliance. In particular, using

the SEDAR 74 approach, high CVs could be estimated for strata that have low compliance rates across most areas, even if compliance was high in the few areas comprising the majority of catch. To address this concern, compliance rates are now weighted (spatially) by the associated landings estimates:

$$proxyCV_i = 1 - \sum_{j=1}^{n}\left[\left(\frac{N_{i,j}}{n_{i,j}}\right)*\left(\frac{L_{i,j}}{L_i}\right)\right]+0.05$$

where n is the number of reported trips, N is the number of estimated trips, and L is the landings in number for year i and state/region j.

2.4 Effort

Catch and effort data were reported on logbook forms provided to all headboats in the survey until 2012 and electronically since 2013. The information is entered by the owner, captain, or designated crew member after each trip and the total number of all the species landed on a given trip, along with the total number of fish discarded for each species. Data on effort are provided as number of anglers on a given trip. Effort is standardized as angler days by multiplying the number of hours associated with the type of trip (e.g., 40 anglers on a half-day trip would yield $40 * 0.5 = 20$ angler days). Angler days are summed by month for individual vessels. Each month, port agents collect these logbook trip reports and check for accuracy and completeness. Although reporting via the logbooks is mandatory, compliance is not 100% and is variable by location. To account for non-reporting, a correction factor is developed based on sampler observations, angler numbers headboat booking offices, and all available information. This information is used to provide estimates of total catch (expanded or corrected for non-reporting) by month and area, along with estimates of effort. The effort estimates for Louisiana in 2004 and 2005 are zero. During this time period only one or two vessels were active and did not report their catch in 2002, 2004, 2005, or 2006. In 2002, 2004 and early 2005 funding and staffing issues prevented the collection of trip information by port agents necessary to estimate effort and catch. In August 2005, Hurricane Katrina impacted Louisiana fishing operations to the extent it was unlikely there was any fishing effort through the end of the year and some of 2006. Alabama was assigned a separate area code in 2013. In prior years, Alabama was combined with northwest Florida. Mississippi was added to the headboat survey in 2010. In earlier years, there was little to no headboat fishing in Mississippi. Angler Days is the best practice unit of effort for headboat data. Angler trips can be calculated to match units for general recreational effort from the Marine Recreational Information Program (MRIP) for the purpose of combining effort across sectors. There are some caveats with the method because it does not account for all effort expansions in the standard estimation method.

2.5 Biological Samples

Length data has been collected by SRHS dockside samplers since the initiation of the survey, the collection of which coincides with associated catch count. Weights are typically collected for the same fish measured during dockside sampling. Other biological samples and data (scales, otoliths, spines, stomachs, gonads, and sex determination) are collected routinely and processed for ageing, diet studies, and maturity studies. Lists of priority species are provided to port agents but no specific sampling quotas are directed.

3 Results and Discussion

3.1 Landings

Annual landings in number are given for the South region (Table 2). Annual landings in pounds are shown in Table 3. Over the last decade the primary areas of blueline tilefish landings are south Florida and north of Cape Hatteras, NC (not included here). For any year there are only a few vessels targeting deepwater habitat. Over the last decade, only two boats regularly catch more than 50 blueline tilefishin a year. The

fishing behavior of these vessels can strongly influence the overall landings. Snowy grouper management in recent years is also likely to impact headboat operator decisions to target deepwater habitats.

Currently headboat vessels are assigned to an area based on the area where fish are landed. A significant portion of the blueline tilefish catch from south Florida were technically in the Gulf of Mexico but assigned to the Atlantic based on area landed. These were from a single vessel that has both Gulf of Mexico and Atlantic permits.

The landings for the area North of Cape Hatteras, NC can not be shown due to confidentiality. This area was part of the headboat survey prior from 1974 to 1976. However, the area was dropped until 2009 due to the limited number of headboats and logistics of sampling. Dockside sampling resumed in 2010. It is unclear if our how many headboats were operating in this area from 1981-2008.

3.2 Discards

There are relatively few blueline tilefish discarded in the South region (Table 4). There is no information within the SRHS on the size of these fish with which to convert the discards in number to weight. However, the at-sea observer size data may be adequate to inform size compositions and average annual weights for converting discards from number to weight if needed for model input. Some years have no blueline tilefish headboat discards. The patchy nature of the headboat discards is most likely due to the fishing behavior changes in limited number of vessels targeting blueline tilefish habitat.

3.3 Confidentiality

Headboat landings and discards are confidential if fewer than three vessels contributed logbook records for any strata. The number of vessels reporting in the South region are given in table 5. For blueline tilefish, none of the landings north of Cape Hatteras can be released to the public. The landings for the stock defined in SEDAR 50 (south of Cape Hatteras to the Florida Keys) are confidential since 2016.

3.4 Uncertainty

Unweighted proxy CV estimates by state, region and overall are provided in table 6. Annual weighted proxy CV values weighted by regional landings in number and weight are provided in tables 7 and 8. The weighted proxy CVs should provide the best estimate for uncertainty.

3.5 Effort

Total estimated headboat angler days and angler trips decreased until about 2010 followed by an increase until 2015 after which it has been relatively constant (Tables 9 - 10). The same trend is seen in the regional effort estimates but more extreme in the South (Figure 4). The finer scale effort estimates by state show the pattern observed in effort is consistent across states with the exception of NC in the early years (Figure 3). Reports from industry staff, captains or owners, and port agents indicated fuel prices, the economy and fishing regulations are the factors that most affected the amount of trips, number of passengers, and overall decrease in fishing effort through 2010.

3.6 Biological Samples

Annual numbers of blueline tilefish measured for natural total length in the headboat fleet by state and region are given in tables 11 - 12. The number of trips from which blueline tilefish were measured are summarized in Tables 13 - 14. Mean total lengths (mm) and weight (g) and associated CVs for the headboat fishery are tabulated by state and region, but these data are confidential due to the small number of vessels that land

this species. Patterns in length and weight by year and region are shown in Figures 5 and 6. The sample sizes are very small for all states and regions. There are only a handful of years with adequate samples to develop annual headboat length compositions based on the SEDAR best practice minimum sample sizes for compositions development (30 fish and 10 trips).

4 Tables

Table 1: Number of vessels in the SRHS by year and region (Gulf - SW Florida to Texas, Atlantic - North Carolina to SE Florida.

year	Atlantic	Gulf
1980	89	
1981	92	
1982	89	
1983	86	
1984	90	
1985	89	
1986	94	87
1987	94	79
1988	94	72
1989	95	95
1990	93	88
1991	94	80
1992	105	80
1993	95	81
1994	95	84
1995	89	82
1996	90	73
1997	92	70
1998	89	73
1999	86	69
2000	89	72
2001	84	72
2002	77	61
2003	68	65
2004	81	65
2005	76	74
2006	76	70
2007	78	69
2008	84	71
2009	82	76
2010	86	78
2011	77	73
2012	78	71
2013	76	68
2014	76	68
2015	73	68
2016	76	69
2017	66	71
2018	65	72
2019	65	72
2020	66	68
2021	62	70
2022	62	68
2023	61	68

Table 2: Blueline tilefish landings for the South region in number (Cape Hatteras, NC to the Florida Keys).

Year	Kept
1981	1621
1982	2566
1983	3015
1984	389
1985	649
1986	679
1987	475
1988	436
1989	432
1990	209
1991	319
1992	1393
1993	151
1994	98
1995	254
1996	2534
1997	140
1998	94
1999	31
2000	23
2001	166
2002	157
2003	conf
2004	55
2005	223
2006	359
2007	conf
2008	34
2009	26
2010	0
2011	2223
2012	3602
2013	2884
2014	3911
2015	3789
2016	conf
2017	conf
2018	conf
2019	conf
2020	conf
2021	conf
2022	conf
2023	conf

Table 3: Blueline tilefish landings for the South region in pounds (Cape Hatteras, NC to the Florida Keys).

Year	Pounds
1981	7257
1982	9284
1983	13404
1984	1310
1985	2596
1986	2179
1987	2153
1988	1201
1989	431
1990	758
1991	802
1992	2781
1993	250
1994	146
1995	576
1996	11675
1997	269
1998	259
1999	55
2000	32
2001	222
2002	1432
2003	conf
2004	90
2005	838
2006	957
2007	conf
2008	65
2009	51
2010	0
2011	1797
2012	10173
2013	7676
2014	9879
2015	15882
2016	conf
2017	conf
2018	conf
2019	conf
2020	conf
2021	conf
2022	conf
2023	conf

Table 4: Blueline tilefish discards for the South region (Cape Hatteras, NC to the Florida Keys) in number of fish.

Year	Discards
2004	0
2005	0
2006	2
2007	conf
2008	8
2009	3
2010	0
2011	26
2012	103
2013	8
2014	2
2015	0
2016	conf
2017	conf
2018	conf
2019	conf
2020	conf
2021	conf
2022	conf
2023	conf

Table 5: Blueline tilefish number of vessels annually contributing to landings estimates in the South region (Cape Hatteras, NC to the Florida Keys). Strata with less than 3 vessels reporting are considered confidential.

year	n_vessel
1981	20
1982	16
1983	22
1984	11
1985	11
1986	13
1987	16
1988	13
1989	13
1990	16
1991	15
1992	14
1993	7
1994	7
1995	5
1996	12
1997	10
1998	9
1999	7
2000	3
2001	5
2002	5
2003	2
2004	4
2005	6
2006	5
2007	2
2008	8
2009	8
2010	11
2011	8
2012	15
2013	7
2014	8
2015	6
2016	2
2017	2
2018	2
2019	1
2020	1
2021	2
2022	2
2023	1

Table 6: Unweighted proxy CV values for the South region (Cape Hatteras, NC to the Florida Keys) by year. These values are based on logbook reporting compliance and are consistent across species.

year	cv
1981	0.277
1982	0.450
1983	0.358
1984	0.557
1985	0.553
1986	0.472
1987	0.478
1988	0.527
1989	0.590
1990	0.589
1991	0.614
1992	0.372
1993	0.324
1994	0.442
1995	0.419
1996	0.579
1997	0.408
1998	0.416
1999	0.556
2000	0.589
2001	0.571
2002	0.615
2003	0.631
2004	0.620
2005	0.652
2006	0.650
2007	0.560
2008	0.233
2009	0.134
2010	0.100
2011	0.084
2012	0.108
2013	0.110
2014	0.054
2015	0.064
2016	0.172
2017	0.058
2018	0.058
2019	0.058
2020	0.054
2021	0.050
2022	0.050
2023	0.050

Table 7: Annual proxy CV values for the South region (Cape Hatteras, NC to the Florida Keys) weighted by state landings of blueline tilefish in number.

year	cv
1981	0.320
1982	0.138
1983	0.162
1984	0.325
1985	0.246
1986	0.179
1987	0.279
1988	0.262
1989	0.434
1990	0.505
1991	0.573
1992	0.431
1993	0.398
1994	0.490
1995	0.512
1996	0.721
1997	0.516
1998	0.514
1999	0.635
2000	0.594
2001	0.756
2002	0.803
2003	0.855
2004	0.717
2005	0.839
2006	0.559
2007	0.555
2008	0.134
2009	0.163
2010	0.000
2011	0.089
2012	0.129
2013	0.134
2014	0.053
2015	0.068
2016	0.221
2017	0.060
2018	0.059
2019	0.055
2020	0.058
2021	0.050
2022	0.050
2023	0.050

Table 8: Annual proxy CV values for the South region (Cape Hatteras, NC to the Florida Keys) weighted by regional landings of blueline tilefish in weight.

year	cv
1981	0.319
1982	0.134
1983	0.163
1984	0.333
1985	0.244
1986	0.184
1987	0.279
1988	0.263
1989	0.434
1990	0.445
1991	0.483
1992	0.420
1993	0.400
1994	0.403
1995	0.512
1996	0.721
1997	0.492
1998	0.497
1999	0.587
2000	0.605
2001	0.756
2002	0.776
2003	0.855
2004	0.488
2005	0.839
2006	0.540
2007	0.554
2008	0.133
2009	0.163
2010	
2011	0.089
2012	0.129
2013	0.134
2014	0.053
2015	0.068
2016	0.221
2017	0.060
2018	0.059
2019	0.055
2020	0.058
2021	0.050
2022	0.050
2023	0.050

Table 9: Estimates of total effort in angler days for the South region (Cape Hatteras, NC to the Florida Keys).

year	Angler_Day
1981	377287
1982	387611
1983	367426
1984	385173
1985	378230
1986	415472
1987	447108
1988	420664
1989	418250
1990	423286
1991	388940
1992	367489
1993	344216
1994	342703
1995	312748
1996	289928
1997	270612
1998	254082
1999	251147
2000	253891
2001	244433
2002	221614
2003	204565
2004	251418
2005	238448
2006	257332
2007	246881
2008	188388
2009	193253
2010	185426
2011	191933
2012	205476
2013	223145
2014	256625
2015	253415
2016	256600
2017	179720
2018	171864
2019	173462
2020	129690
2021	184432
2022	156376
2023	154662

Table 10: Estimates of total effort in angler - trips by year for the South region (Cape Hatteras, NC to the Florida Keys).

year	Angler_Trip
1981	458456
1982	495343
1983	427974
1984	557752
1985	572046
1986	628524
1987	630526
1988	558613
1989	626099
1990	593392
1991	565857
1992	536891
1993	478958
1994	498539
1995	454080
1996	450262
1997	397754
1998	354201
1999	381392
2000	408143
2001	361590
2002	329979
2003	338475
2004	392408
2005	393321
2006	413287
2007	356013
2008	290508
2009	284297
2010	278320
2011	289339
2012	322983
2013	348661
2014	414296
2015	414455
2016	417144
2017	277779
2018	263053
2019	265808
2020	192588
2021	279797
2022	233553
2023	233474

Table 11: Blueline tilefish number of fish lengths sampled by state.

year	OBX	NC	SC	GNFL	SFL
1972		93	30		
1973		50	29		
1974	1		76		
1975	1	12	28		
1976	10	25	35		
1977		37	12		
1978		2	28		
1979			29	1	31
1980		5	19	4	17
1981		4	6		26
1982			18		
1983		3	40		
1984			26		2
1985		3	16		1
1986			29		1
1987		1	8		
1988		1	5	1	1
1989				3	7
1990			1		5
1991					1
1996			2		
1997			2		30
1998					5
2000					30
2001					8
2003					6
2004					7
2008					2
2010	42				
2011	36				8
2012	160				
2013	181				185
2014	222				111
2015					165
2016					96
2017	11				10
2018	40				47
2019					5
2022					29
2023	3				39

Table 12: Blueline tilefish number of fish lengths sampled by region. North represents the area north of Cape Hatteras, NC, South represents Cape Hatteras, NC to the Florida Keys.

year	North	South
1972		123
1973		79
1974	1	76
1975	1	40
1976	10	60
1977		49
1978		30
1979		61
1980		45
1981		36
1982		18
1983		43
1984		28
1985		20
1986		30
1987		9
1988		8
1989		10
1990		6
1991		1
1996		2
1997		32
1998		5
2000		30
2001		8
2003		6
2004		7
2008		2
2010	42	
2011	36	8
2012	160	
2013	181	185
2014	222	111
2015		165
2016		96
2017	11	10
2018	40	47
2019		5
2022		29
2023	3	39

Table 13: Blueline tilefish number of trips sampled by state.

year	OBX	NC	SC	GNFL	SFL
1972		21	12		
1973		11	18		
1974	1		23		
1975	1	4	15		
1976	4	8	14		
1977		9	5		
1978		2	11		
1979			7	1	2
1980		5	8	2	3
1981		3	3		6
1982			9		
1983		1	18		
1984			10		2
1985		3	11		1
1986			10		1
1987		1	7		
1988		1	2	1	1
1989				1	2
1990			1		1
1991					1
1996			1		
1997			2		6
1998					3
2000					3
2001					1
2003					4
2004					2
2008					2
2010	6				
2011	4				2
2012	8				
2013	8				7
2014	10				9
2015					10
2016					10
2017	2				1
2018	1				2
2019					2
2022					5
2023	1				9

Table 14: Blueline tilefish number of trips sampled by region. North represents the area north of Cape Hatteras, NC, South represents Cape Hatteras, NC to the Florida Keys.

year	North	South
1972		33
1973		29
1974	1	23
1975	1	19
1976	4	22
1977		14
1978		13
1979		10
1980		18
1981		12
1982		9
1983		19
1984		12
1985		15
1986		11
1987		8
1988		5
1989		3
1990		2
1991		1
1996		1
1997		8
1998		3
2000		3
2001		1
2003		4
2004		2
2008		2
2010	6	
2011	4	2
2012	8	
2013	8	7
2014	10	9
2015		10
2016		10
2017	2	1
2018	1	2
2019		2
2022		5
2023	1	9

5 Figures

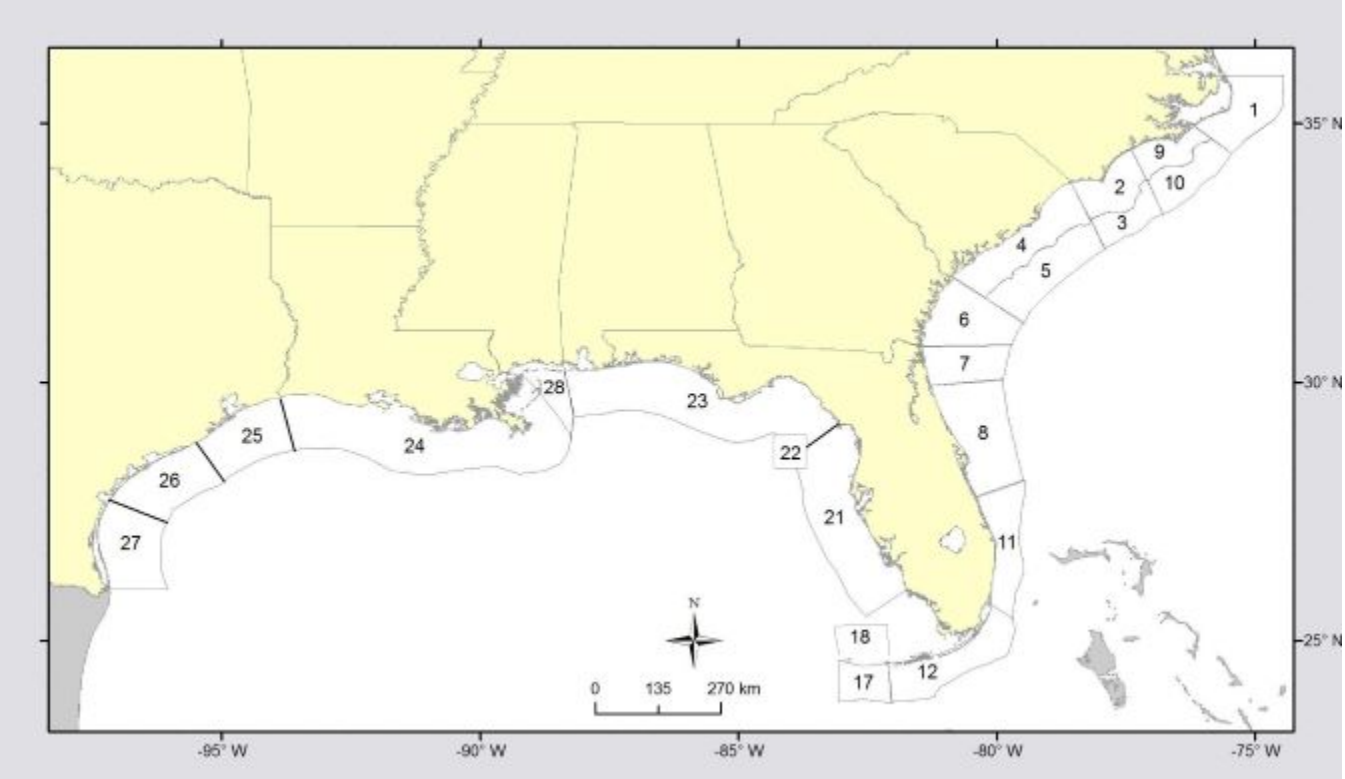

Figure 1: Headboat sampling areas prior to 2013.

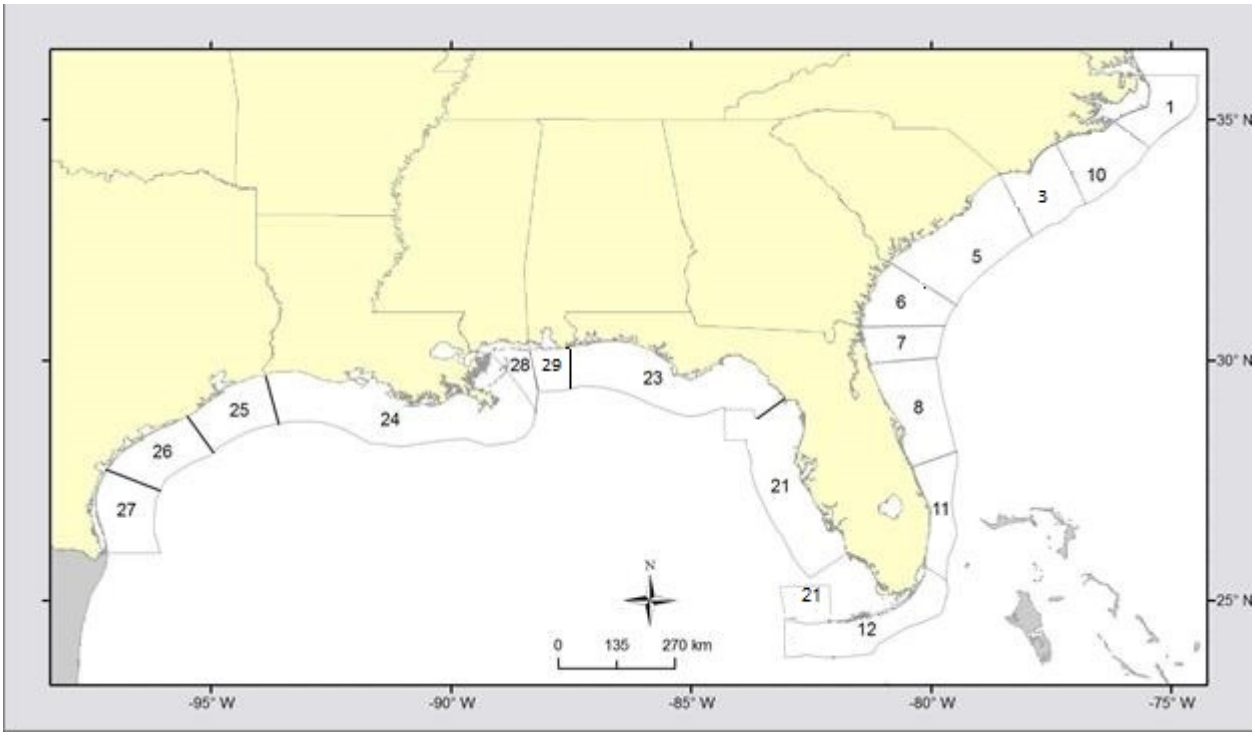

Figure 2: Headboat sampling areas 2013 - present.

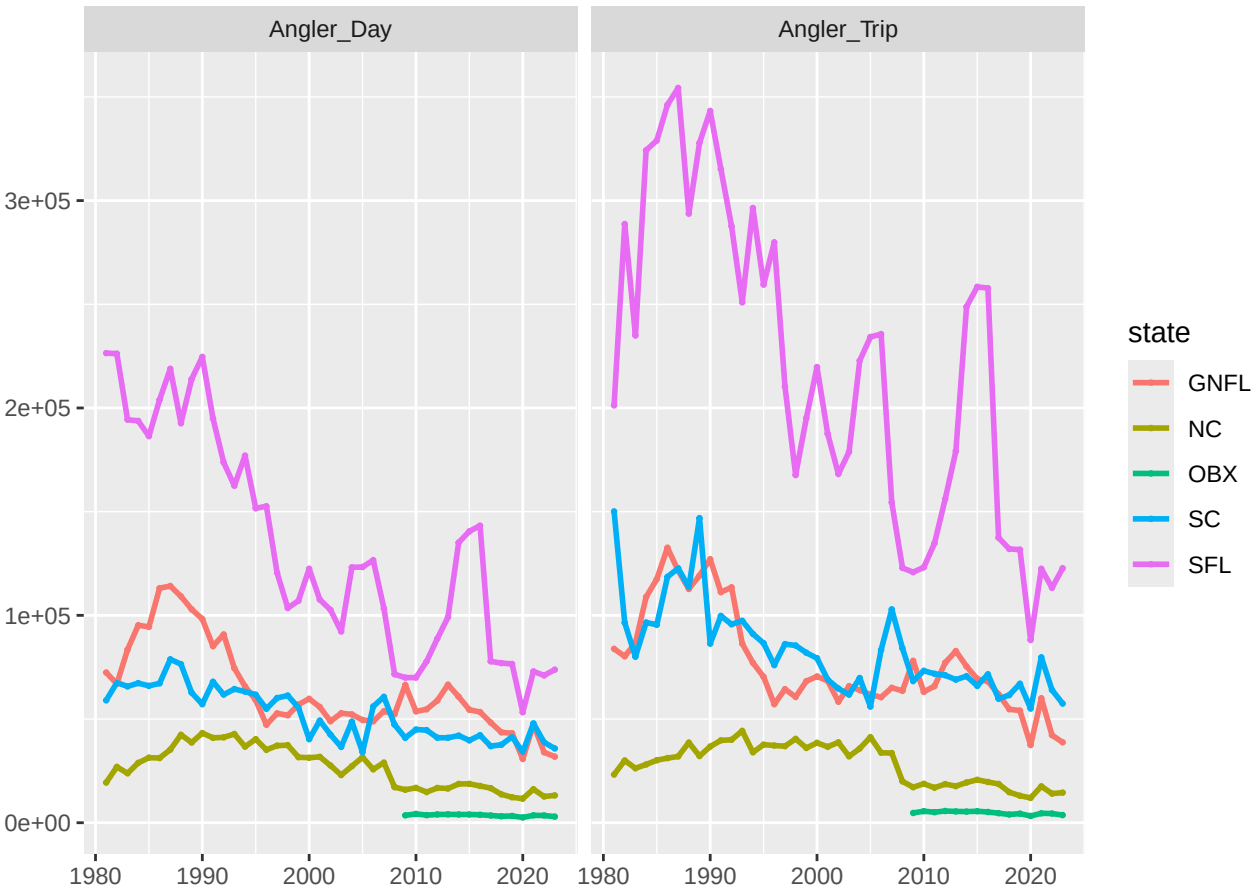

Figure 3: SRHS total estimated angler days and angler trips by state. The South region matches the stock assessment boundaries from the previous assessment and the annual estimates provided in this document.

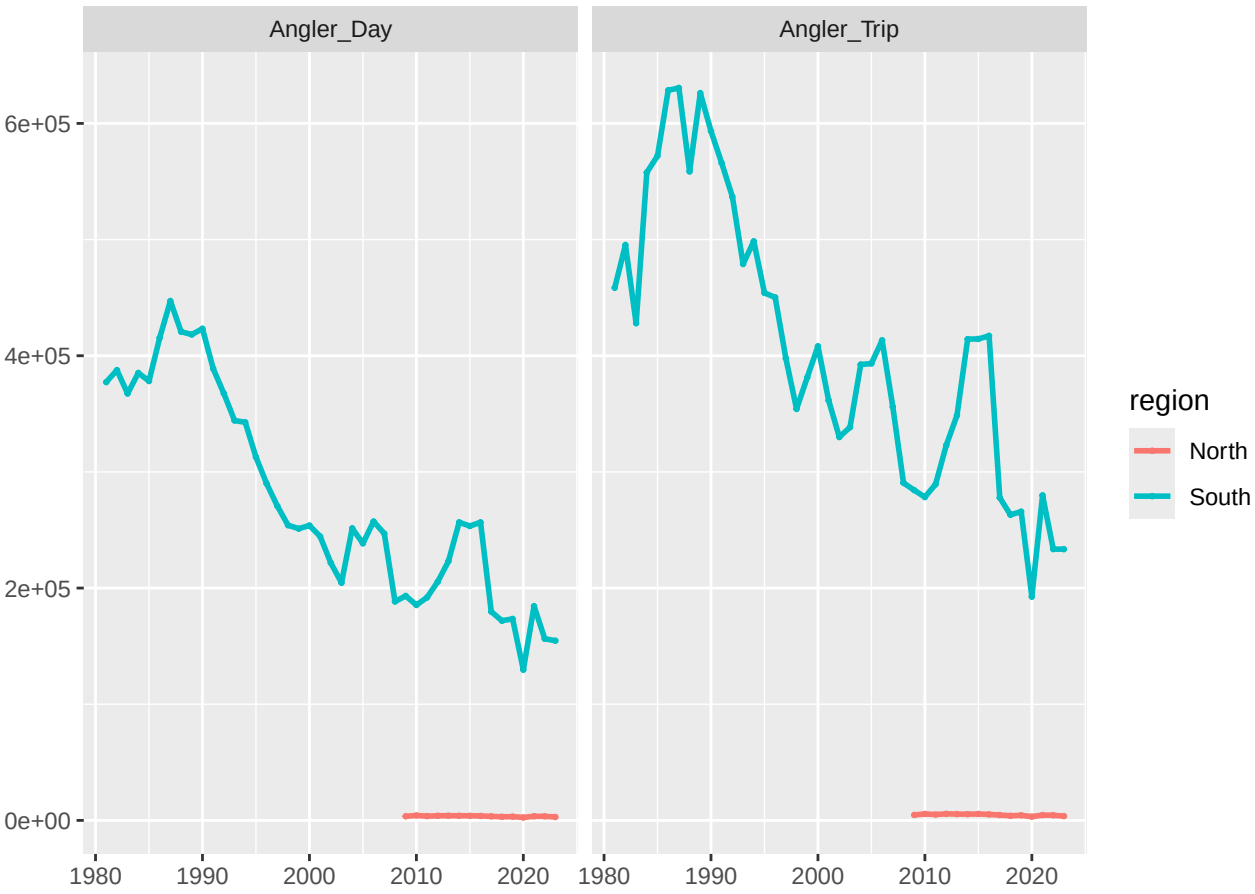

Figure 4: SRHS total estimated angler days and angler trips by region. The South region matches the stock assessment boundaries from the previous assessment and the annual estimates provided in this document. North represents the area north of Cape Hatteras, NC, South represents Cape Hatteras, NC to the Florida Keys.

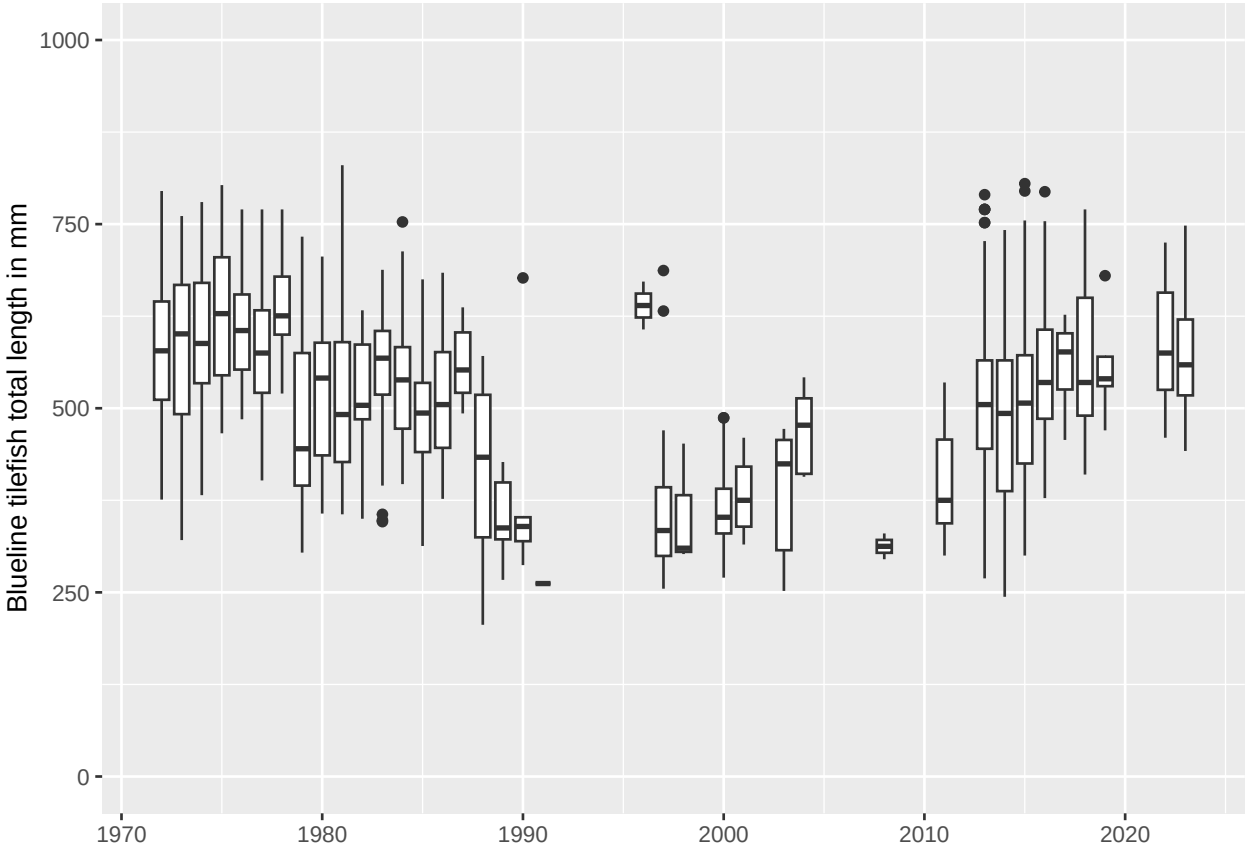

Figure 5: Blueline tilefish total length for the South region.

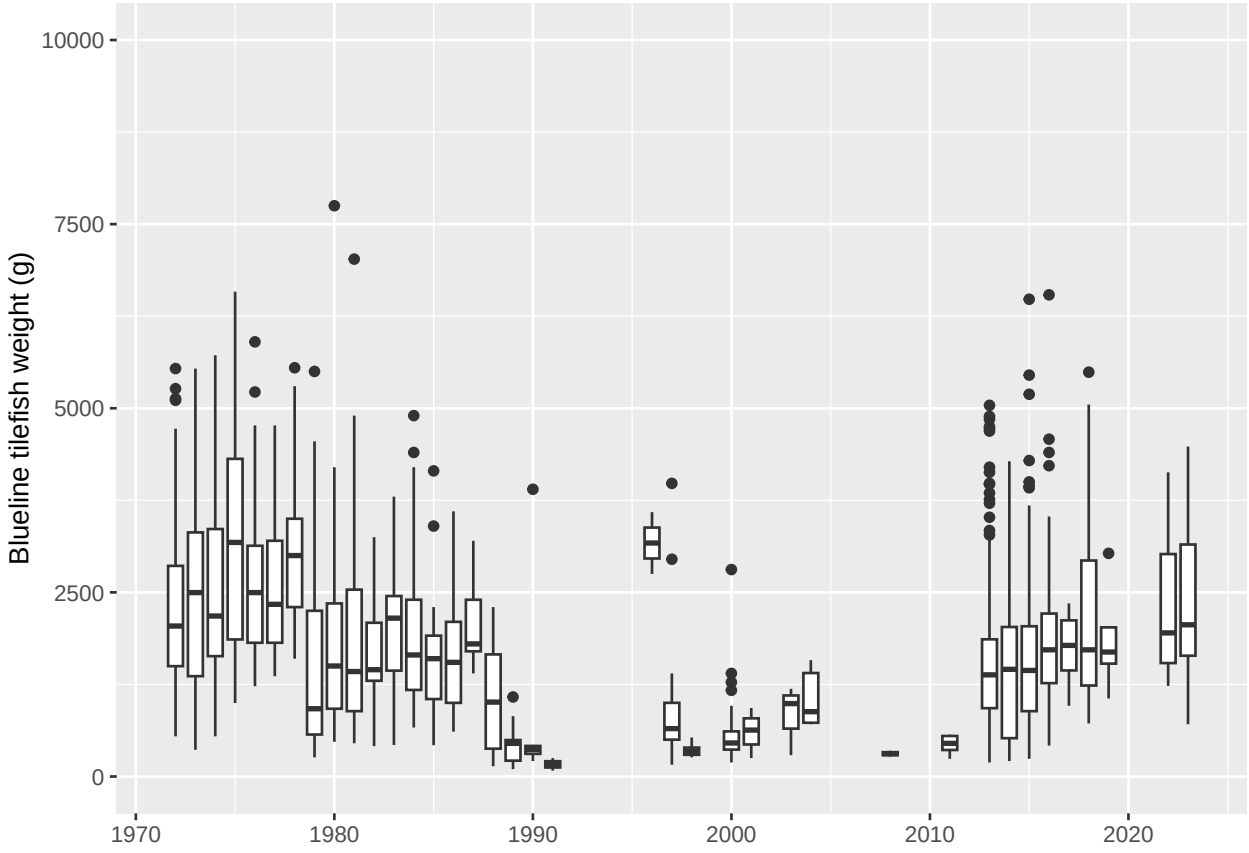

Figure 6: Blueline tilefish weight (g) for the South region.

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