Headboat Data for Tilefish in the Southeast US Atlantic

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SEDAR89-WP-01

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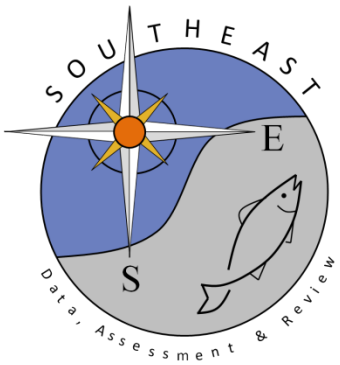

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2024-03-08

Contents

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 assignment of SRHS areas to states and regions are below:

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

Landings in number and weight are confidential for the majority of the years in this assessment. The primary area of tilefish landings was south Florida between 2013 and 2018 (98%). Most years have no tilefish headboat landings. The patchy nature of the headboat landings is most likely due to the fishing behavior changes in limited number of vessels targeting tilefish habitat. There were 1297 tilefish at 8382 pounds estimated over the entire time series (1981 - 2022) and 907 fish were from 2013 to 2018.

A confidental version of this working paper was provided to stock assessment analysts.

3.2 Discards

Discards are also confidential but were primarily from south Florida. 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. Most years have no tilefish headboat discards. The patchy nature of the headboat landings is most likely due to the fishing behavior changes in limited number of vessels targeting tilefish habitat. There were 87 tilefish estimated discards over the entire time series (1981 - 2022) and 81 were from 2013 to 2016.

3.3 Confidentiality

Headboat landings and discards are confidential if fewer than three vessels contributed logbook records for any strata. The annual number of vessels reporting are given in table 2. For tilefish, only 3 years of the annual catch and discards can be released to the public.

3.4 Uncertainty

Annual unweighted proxy CV estimates, CV weighted by regional landings in number, and CV weighted by regional landings in weight are provided in table 3. 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 4 - 5). The same trend is seen in the regional effort estimates but more extreme in the South (Tables 6 - 7, 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 (Tables 8 - 9, 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 tilefish measured for natural total length, number of trips, number of vessels sampled, and mean total lengths (mm) and weight (g) and associated CVs from which tilefish were measured are summarized in Table 10. Patterns in length and weight by year and region are shown in Figures 5 and 6.

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

Table 2: Tilefish number of vessels annually contributing to landings estimates. Strata with less than 3 vessels reporting are considered confidential.

year	n_vessel
1981	0
1982	1
1983	0
1984	0
1985	0
1986	0
1987	2
1988	0
1989	1
1990	1
1991	0
1992	1
1993	0
1994	1
1995	0
1996	0
1997	1
1998	0
1999	2
2000	0
2001	0
2002	0
2003	0
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	0
2011	0
2012	0
2013	4
2014	9
2015	5
2016	2
2017	1
2018	1
2019	1
2020	2
2021	1
2022	1

Table 3: Annual unweighted proxy CV values (cv.unwgt), proxy CV values weighted by regional landings in number (cv.wgt.n), and proxy CV values weighted by regional landings in weight (cv.wgt.w.

year	cv.unwgt	cv.wgt.n	cv.wgt.w
1981	0.277	0.249	0.249
1982	0.450	0.491	0.491
1983	0.358		
1984	0.557		
1985	0.553		
1986	0.472		
1987	0.478	0.549	0.549
1988	0.527		
1989	0.590	0.632	0.632
1990	0.589	0.583	0.583
1991	0.614		
1992	0.372	0.445	0.445
1993	0.324		
1994	0.442	0.538	0.538
1995	0.419		
1996	0.579		
1997	0.408	0.538	0.538
1998	0.416		
1999	0.556	0.754	0.754
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	0.133		
2010	0.100		
2011	0.085		
2012	0.107		
2013	0.110	0.134	0.134
2014	0.054	0.053	0.053
2015	0.064	0.068	0.068
2016	0.170	0.221	0.221
2017	0.058	0.060	0.060
2018	0.058	0.059	0.059
2019	0.058	0.052	0.052
2020	0.054	0.050	0.050
2021	0.050	0.050	0.050
2022	0.050	0.050	0.050

Table 4: Estimates of total effort in angler - days by year.

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	196807
2010	189684
2011	195594
2012	209468
2013	227189
2014	260606
2015	257397
2016	260432
2017	183210
2018	174984
2019	176734
2020	132239
2021	187994
2022	159877

Table 5: Estimates of total effort in angler - trips by year.

year	Angler_Trip
1981	392582
1982	492606
1983	440260
1984	563371
1985	582528
1986	613712
1987	629483
1988	566307
1989	576728
1990	596940
1991	568273
1992	535684
1993	477228
1994	500800
1995	456414
1996	449817
1997	395596
1998	354069
1999	375615
2000	406838
2001	363286
2002	330417
2003	345668
2004	394368
2005	392462
2006	419239
2007	342745
2008	283299
2009	289138
2010	285413
2011	296527
2012	328980
2013	354387
2014	419744
2015	419991
2016	422328
2017	282412
2018	267082
2019	270159
2020	195841
2021	284343
2022	237984

Table 6: Estimates of total effort in angler - days by region.

year	North	South
1981	78404	298883
1982	94478	293133
1983	89563	277863
1984	96179	288994
1985	97385	280845
1986	98414	317058
1987	114067	333041
1988	118889	301775
1989	101386	316864
1990	100391	322895
1991	108918	280022
1992	102966	264523
1993	107243	236973
1994	99922	242781
1995	102034	210714
1996	90071	199857
1997	97339	173273
1998	98741	155341
1999	87095	164052
2000	71642	182249
2001	81044	163389
2002	70068	151546
2003	59554	145011
2004	76018	175400
2005	65609	172839
2006	81810	175522
2007	89731	157150
2008	64445	123943
2009	60387	136420
2010	66022	123662
2011	63102	132492
2012	61769	147699
2013	61510	165679
2014	64716	195890
2015	62418	194979
2016	63772	196660
2017	57084	126126
2018	54424	120560
2019	57022	119712
2020	48234	84005
2021	67627	120367
2022	54888	104989

Table 7: Estimates of total effort in angler - trips by region.

year	North	South
1981	107488	285093
1982	123667	368939
1983	118586	321674
1984	130272	433099
1985	136083	446445
1986	134900	478813
1987	153645	475837
1988	159859	406448
1989	129663	447065
1990	126632	470308
1991	141884	426389
1992	134484	401200
1993	139959	337269
1994	127512	373288
1995	127827	328588
1996	113651	336166
1997	120181	275415
1998	125776	228293
1999	112470	263145
2000	117800	289037
2001	107935	255351
2002	104246	226171
2003	101141	244527
2004	107680	286688
2005	96895	295567
2006	122235	297004
2007	121172	221574
2008	94130	189170
2009	90460	198678
2010	98587	186827
2011	95318	201209
2012	95402	233578
2013	92118	262269
2014	95545	324198
2015	92243	327748
2016	96423	325905
2017	83136	199276
2018	80350	186732
2019	84469	185691
2020	70279	125562
2021	101853	182490
2022	82486	155498

Table 8: Estimates of total effort in angler - days by state.

year	NC	SC	GNFL	SFL
1981	19374	59030	72427	226456
1982	26939	67539	66961	226172
1983	23830	65733	83499	194364
1984	28865	67314	95234	193760
1985	31384	66001	94449	186396
1986	31187	67227	113101	203957
1987	35261	78806	114144	218897
1988	42421	76468	109156	192619
1989	38678	62708	102920	213944
1990	43240	57151	98234	224661
1991	40936	67982	85111	194911
1992	41176	61790	90810	173713
1993	42786	64457	74494	162479
1994	36691	63231	65745	177036
1995	40295	61739	59106	151608
1996	35142	54929	47239	152618
1997	37189	60150	52764	120509
1998	37399	61342	51790	103551
1999	31596	55499	57010	107042
2000	31351	40291	59771	122478
2001	31779	49265	55797	107592
2002	27601	42467	48911	102635
2003	22998	36556	52795	92216
2004	27255	48763	52243	123157
2005	31573	34036	49539	123300
2006	25736	56074	48908	126614
2007	29002	60729	53762	103388
2008	17158	47287	52345	71598
2009	19468	40919	66447	69973
2010	21071	44951	53676	69986
2011	18457	44645	54707	77785
2012	20766	41003	58901	88798
2013	20547	40963	66587	99092
2014	22691	42025	60752	135138
2015	22716	39702	54480	140499
2016	21565	42207	53387	143273
2017	20170	36914	48304	77822
2018	16813	37611	43586	76974
2019	15552	41470	43139	76573
2020	14154	34080	30750	53255
2021	19719	47908	47396	72971
2022	16140	38748	33962	71027

Table 9: Estimates of total effort in angler - trips by state.

year	NC	SC	GNFL	SFL
1981	23236	84252	83851	201243
1982	30016	93651	80231	288708
1983	26254	92332	86734	234940
1984	28101	102171	108836	324262
1985	30138	105945	117459	328986
1986	31157	103743	132626	346186
1987	31967	121679	121517	354321
1988	38650	121209	112748	293699
1989	32154	97509	119207	327858
1990	36733	89899	127075	343233
1991	39724	102160	111168	315222
1992	40004	94480	113529	287671
1993	44312	95647	86316	250953
1994	33949	93563	76874	296414
1995	37666	90161	69107	259480
1996	37243	76408	56284	279882
1997	36906	83275	65080	210335
1998	40456	85320	60663	167631
1999	36054	76416	68043	195102
2000	38531	79269	69309	219728
2001	36618	71318	67778	187573
2002	38772	65474	58012	168159
2003	32010	69131	65684	178843
2004	35808	71872	63829	222859
2005	41262	55633	61316	234251
2006	33776	88459	61358	235646
2007	33576	87596	67112	154462
2008	19948	74182	66304	122866
2009	21675	68785	77866	120812
2010	24330	74256	63650	123176
2011	21976	73343	66461	134748
2012	24233	71169	77490	156087
2013	23139	68979	83043	179226
2014	24838	70707	75363	248835
2015	26233	66010	69339	258409
2016	24808	71615	68132	257773
2017	23349	59788	61860	137416
2018	18752	61598	54714	132018
2019	17401	67068	54001	131689
2020	15225	55054	37451	88111
2021	22098	79755	60033	122457
2022	18482	64004	42221	113277

Table 10: Tilefish number of fish measured (n.fish), number of trips sampled (n.trips), number of vessels sampled (n.ves), mean total length (mm, mean.len), and length CV (cv.len), mean weight (g, mean.wt), and weight CV in g by region (cv.wt).

year	n.fish	n.trips	n.ves	mean.tl	cv.tl	mean.wt	cv.wt
1981	1	1	1	536		1990	
1989	17	10	9	420	0.24	766	1.47
1990	13	6	5	283	0.17	238	0.50
1992	1	1	1	240		220	
1999	2	1	1	548	0.00	1445	0.02
2001	2	2	2	312	0.16	345	0.59
2009	2	1	1	556	0.11	1865	0.27
2013	11	2	1	803	0.17	6065	0.49
2015	13	5	2	568	0.21	2150	0.84
2016	5	2	1	637	0.07	2632	0.14
2017	4	1	1	652	0.16	3130	0.54
2018	3	2	1	637	0.01	2947	0.15
2022	1	1	1	782		5100	

5 Figures

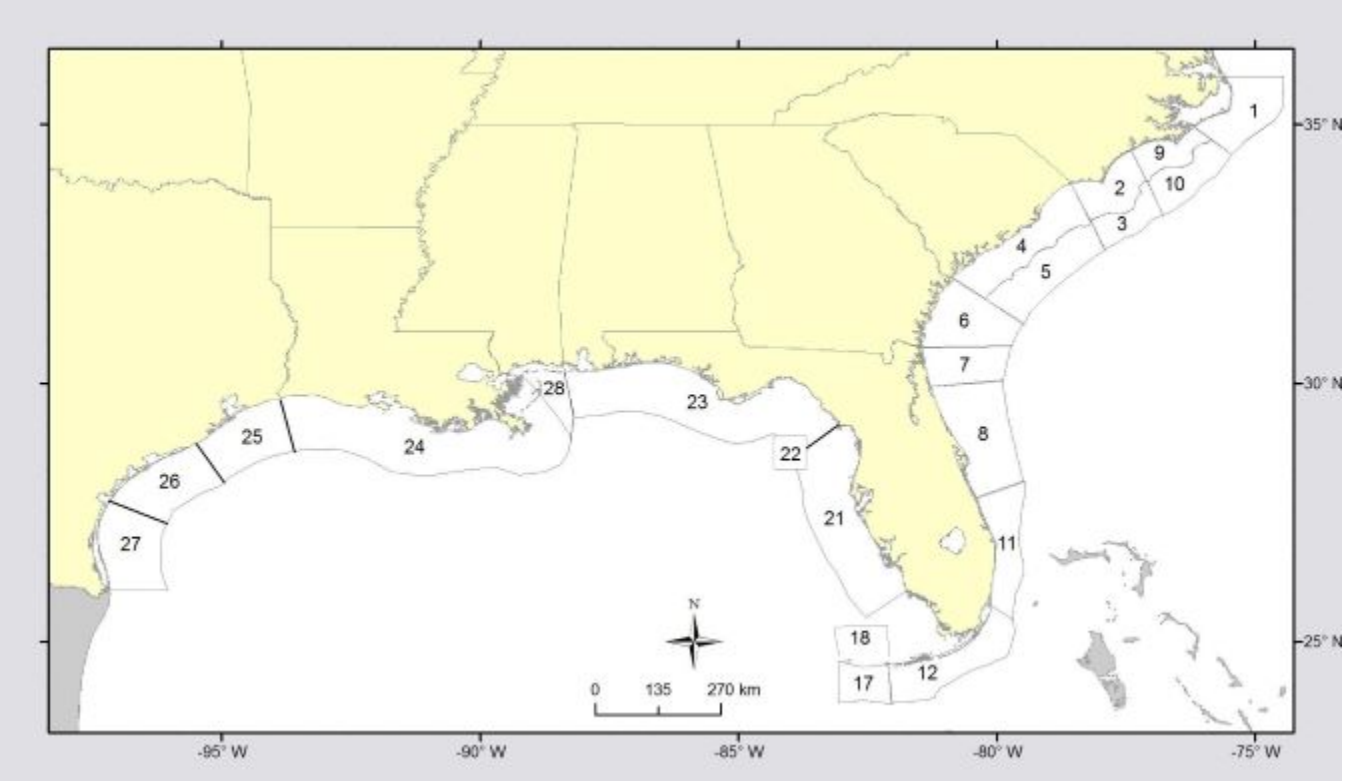

Figure 1: Headboat sampling areas prior to 2013.

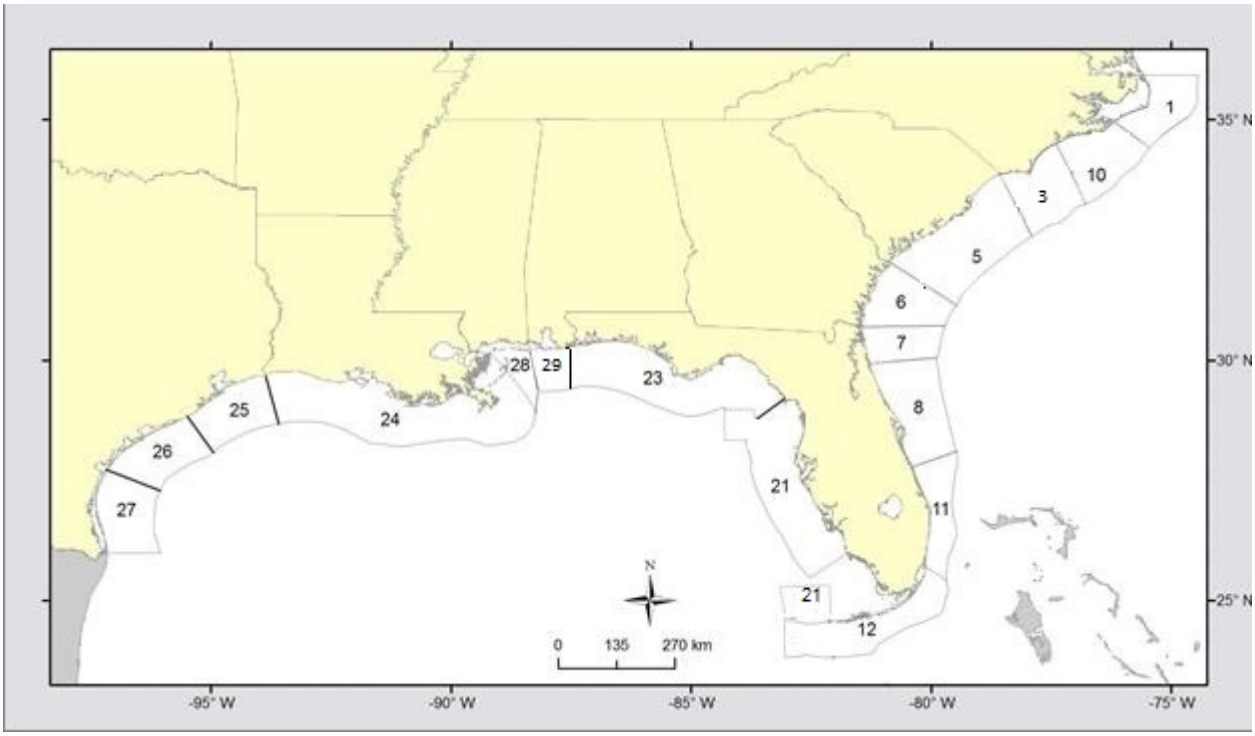

Figure 2: Headboat sampling areas 2013 - present.

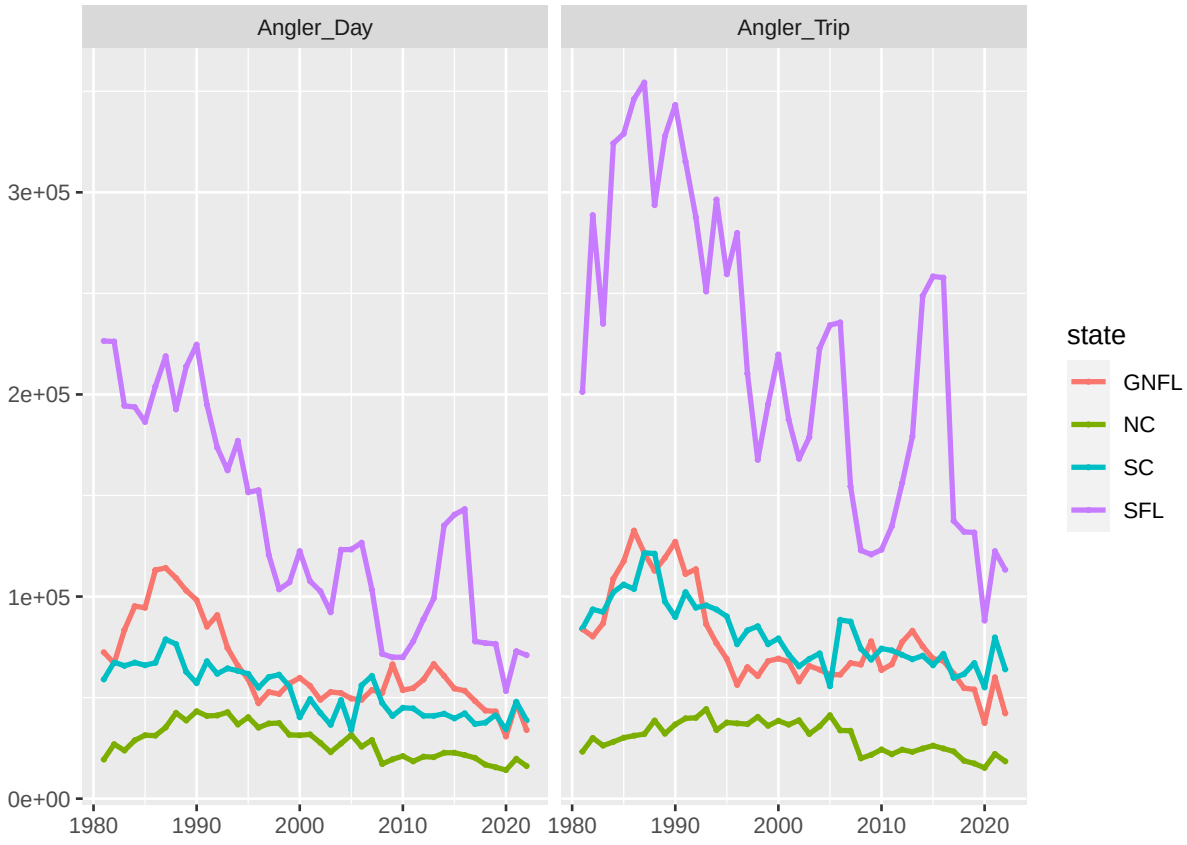

Figure 3: SRHS total estimated angler days and angler trips by state.

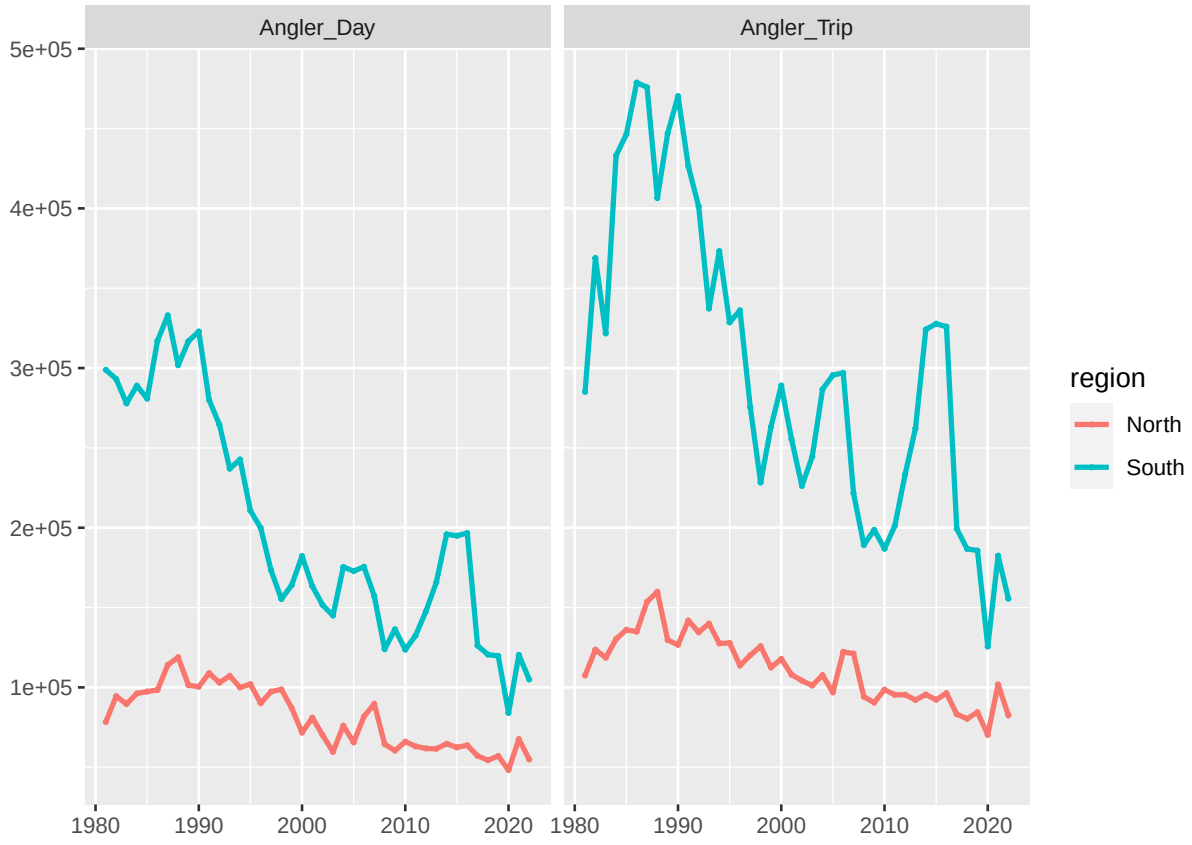

Figure 4: SRHS total estimated angler days and angler trips by region. North represents the Atlantic from NC to SC, South represents the Atlantic from Georgia to the Florida Keys.

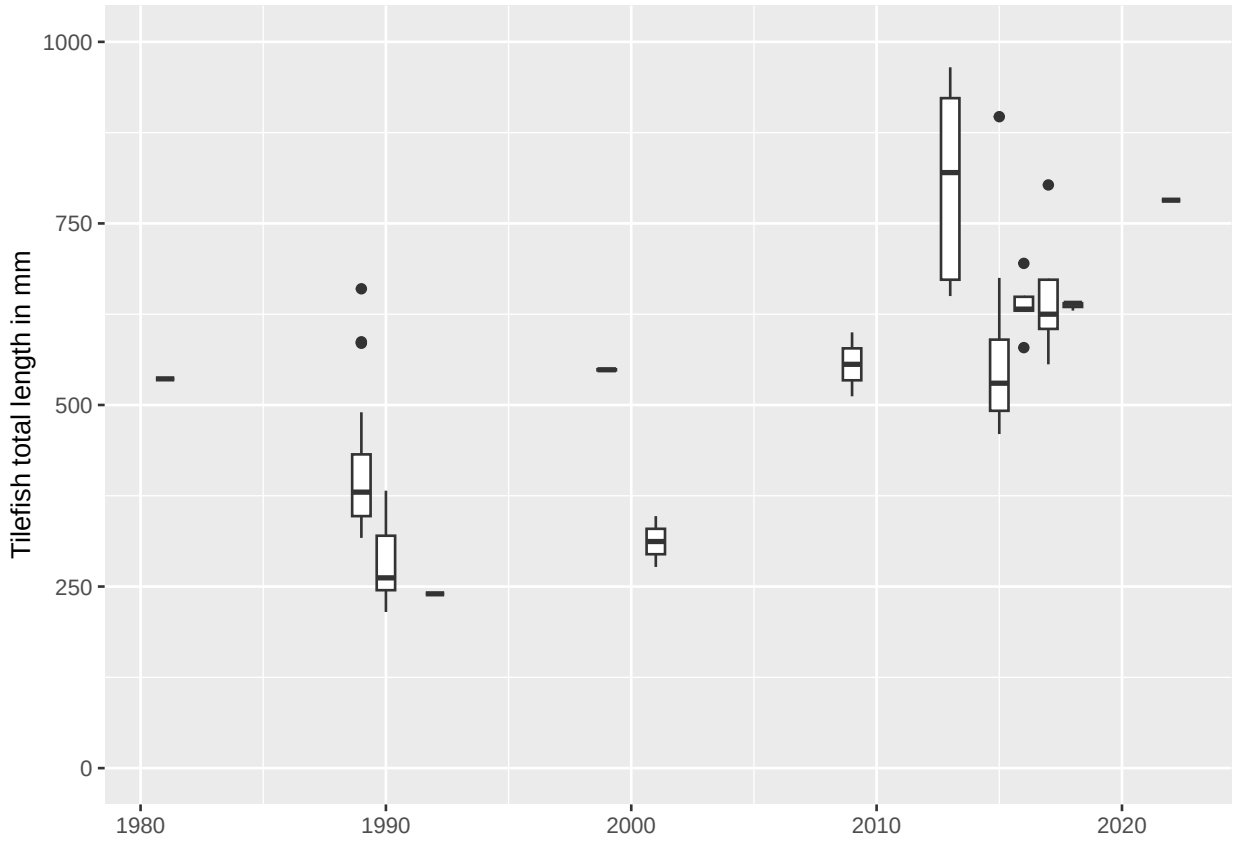

Figure 5: Tilefish total length.

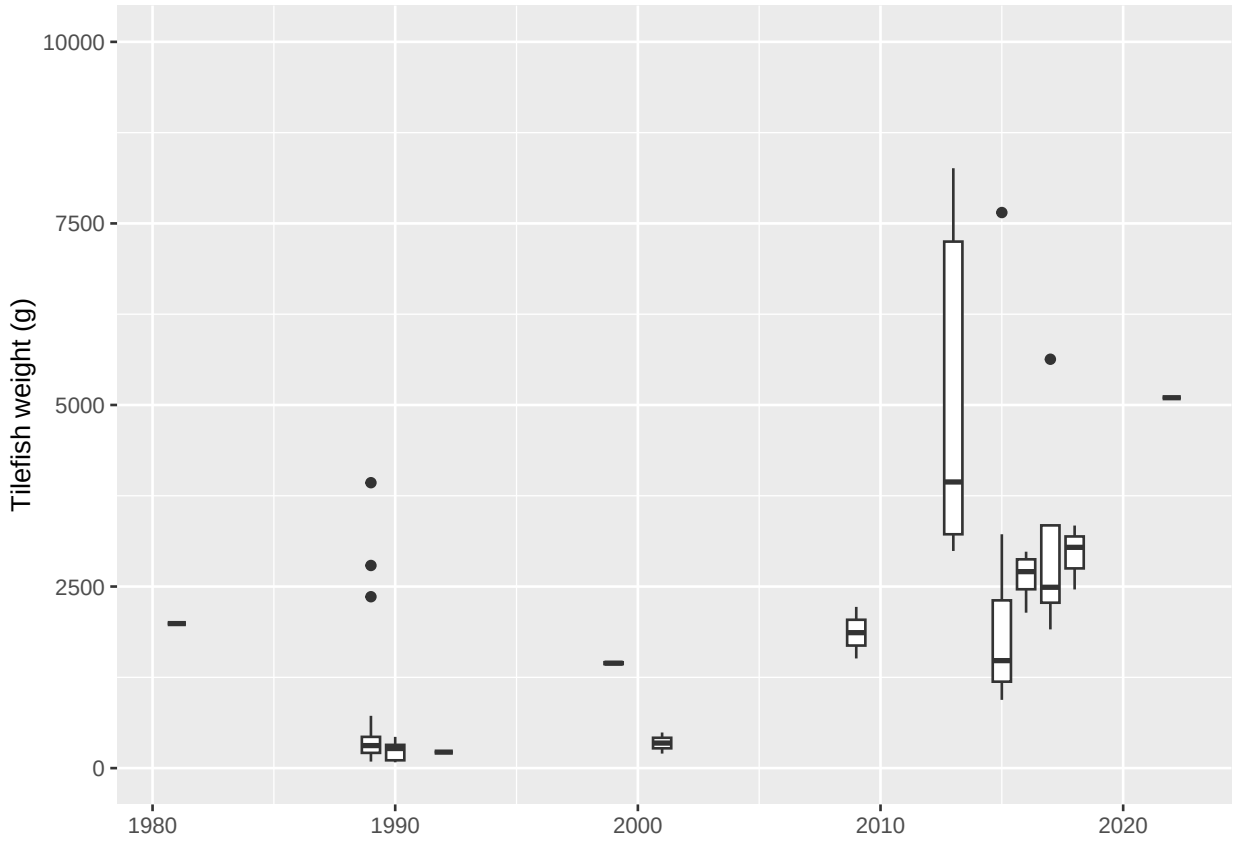

Figure 6: Tilefish weight (g).

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