

Headboat Data for Yellowedge Grouper in the US Gulf of Mexico

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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.

The SRHS implemented electronic logbook reporting in the South Atlantic and Gulf of Mexico as of Jan 1, 2013. Headboat operators now have 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 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).

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 is considered “released alive” if it is 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 confusion about the condition of the released fish, live and dead releases are typically combined for 2004 to 2012 as total discards 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 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 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 in Table 2. Landings in gutted pounds, the unit of input to the SEDAR 22 assessment model, are shown in Table 3. Yellowedge grouper are a deepwater species and fluctuation in landings can occur with changes in SRHS fishing effort by a small number of vessels. The primary area of yellowedge grouper landings shifted from Texas to West Florida over the course of the survey. The SEDAR 85 landings for yellowedge grouper were nearly identical to the SEDAR 22 landings for overlapping years (Figure 3).

Further investigation into the presence of yellowedge grouper on the Gulf of Mexico logbook forms might be useful to determine if a reporting bias could be an issue for early years. However, yellowedge grouper landings for headboat are trivial relative to other fleets and the outcome would have little influence on the stock assessment.

3.2 Discards

Only 16 yellowedge grouper were estimated to be discarded in the entire Gulf of Mexico from 2004 to 2021. There is no information on the size of these fish with which to convert the discards in number to the assessment model unit of gutted weight. Therefore discard estimates were not provided for the headboat fleet.

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 annually are given in Table 4. For yellowedge grouper, only the annual catch can be released to the public.

3.4 Uncertainty

Unweighted proxy CV estimates by state, region and overall are provided in Tables 5 - 7. Annual weighted proxy CV values weighted by regional landings in number and weight are provided in Tables 8 - 9. Regional weighted CVs can not be released to the public due to confidentiality restrictions. The weighted proxy CVs should provide the best estimate for uncertainty. However, one consequence of weighting proxy CVs by the landings is the CV goes to zero if landings are zero. There is uncertainty in landings estimates of zero. However, adding uncertainty to a zero value would allow the landings estimate to be negative depending on the modeling framework. The application of the uncertainty values within the assessment will determine the best approach for using the estimates provided.

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 10 - 11). The same trend is seen in the East for the regional effort estimates (Tables 12 - 13). The finer scale effort estimates by state show the pattern observed in effort is primarily driven by the Florida - Alabama region but other states have been fairly constant (Tables 14 - 15, Figure 4). 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. One of the caveats with the expansion of angler trips to account for non-reporting is evident for Louisiana in 2002 where the estimation process for angler days used a non-standard process to account for reporting deficiencies. The estimated angler trips for LA in 2002 is zero while the estimated angler days is approximately 6000 angler days. This does not dramatically impact

regional or Gulfwide estimates but demonstrates an issue with the calculation created to combine with the less informative general recreational effort unit.

3.6 Biological Samples

Annual numbers of yellowedge grouper measured for natural total length in the headboat fleet by state and region are given in Tables 16 - 17. The number of trips from which yellowedge grouper were measured are summarized in Tables 18 - 19. Mean total lengths (mm) and weight (g) and associated CVs for the headboat fishery are tabulated by state and region in Tables 20 - 27. Patterns in length and weight by year and region are shown in Figures 5 and 6. The sample sizes are very small for most years. There is a pattern of smaller fish in the Texas in the early years of the survey and larger fish in west Florida in the later years. There are no individual years that meet the SEDAR best practice of 30 fish and 10 trips for developing annual compositions. A length composition of all years of data is likely to be bimodal and not applicable at an annual scale.

3.7 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: Yellowedge grouper landings in number.

year	Total
1986	121
1987	497
1988	949
1989	325
1990	599
1991	364
1992	130
1993	84
1994	57
1995	101
1996	26
1997	73
1998	63
1999	6
2000	6
2001	6
2002	4
2003	11
2004	10
2005	32
2006	21
2007	43
2008	43
2009	29
2010	23
2011	32
2012	29
2013	112
2014	420
2015	225
2016	284
2017	301
2018	65
2019	197
2020	113
2021	164
2022	352

Table 3: Yellowedge grouper landings in pounds gutted weight (whole weight * 0.95 as in SEDAR 22).

year	Total
1986	454
1987	1093
1988	2160
1989	728
1990	1629
1991	1320
1992	485
1993	330
1994	420
1995	600
1996	179
1997	366
1998	442
1999	53
2000	37
2001	49
2002	29
2003	90
2004	68
2005	141
2006	206
2007	201
2008	201
2009	126
2010	100
2011	395
2012	356
2013	1379
2014	5040
2015	1246
2016	2255
2017	3383
2018	728
2019	2729
2020	1531
2021	1215
2022	2896

Table 4: Yellowedge grouper number of vessels annually contributing to landings estimates. Strata with less than 3 vessels reporting are considered confidential.

year	n_vessel
1986	3
1987	6
1988	6
1989	6
1990	5
1991	8
1992	10
1993	13
1994	11
1995	8
1996	7
1997	7
1998	10
1999	3
2000	4
2001	4
2002	3
2003	6
2004	8
2005	6
2006	8
2007	9
2008	3
2009	5
2010	3
2011	6
2012	6
2013	4
2014	10
2015	5
2016	5
2017	11
2018	5
2019	8
2020	6
2021	10
2022	8
2023	7

Table 5: Unweighted proxy CV values by state. These values are based on logbook reporting compliance and are consistent across species.

year	TX	LA	MS	AL	FLW_AL
1986	0.410	0.349	0.000	0.000	0.695
1987	0.322	0.700	0.000	0.000	0.746
1988	0.268	0.685	0.000	0.000	0.551
1989	0.239	0.174	0.000	0.000	0.494
1990	0.272	0.423	0.000	0.000	0.209
1991	0.352	0.135	0.000	0.000	0.140
1992	0.201	0.242	0.000	0.000	0.138
1993	0.170	0.469	0.000	0.000	0.115
1994	0.177	0.357	0.000	0.000	0.226
1995	0.162	0.282	0.000	0.000	0.372
1996	0.252	0.550	0.000	0.000	0.312
1997	0.248	0.223	0.000	0.000	0.253
1998	0.138	0.139	0.000	0.000	0.419
1999	0.152	0.476	0.000	0.000	0.419
2000	0.163	0.371	0.000	0.000	0.436
2001	0.133	0.576	0.000	0.000	0.434
2002	0.088	0.000	0.000	0.000	0.346
2003	0.317	0.955	0.000	0.000	0.340
2004	0.119	0.000	0.000	0.000	0.296
2005	0.067	1.050	0.000	0.000	0.254
2006	0.058	1.050	0.000	0.000	0.323
2007	0.570	0.586	0.000	0.000	0.332
2008	0.273	0.104	0.000	0.000	0.074
2009	0.096	0.055	0.000	0.000	0.055
2010	0.055	0.050	0.145	0.000	0.086
2011	0.051	0.050	0.050	0.000	0.059
2012	0.095	0.050	0.050	0.000	0.066
2013	0.050	0.050	0.050	0.050	0.050
2014	0.050	0.050	0.050	0.051	0.050
2015	0.051	0.059	0.058	0.050	0.051
2016	0.052	0.050	0.050	0.052	0.050
2017	0.074	0.060	0.050	0.051	0.053
2018	0.052	0.050	0.050	0.054	0.051
2019	0.059	0.050	0.050	0.054	0.052
2020	0.050	0.050	0.050	0.050	0.050
2021	0.050	0.050	0.050	0.050	0.050
2022	0.050	0.050	0.050	0.050	0.050

Table 6: Unweighted proxy CV values by region. These values are based on logbook reporting compliance and are consistent across species.

year	West	East
1986	0.399	0.695
1987	0.387	0.746
1988	0.344	0.551
1989	0.233	0.494
1990	0.300	0.209
1991	0.314	0.140
1992	0.209	0.138
1993	0.239	0.115
1994	0.215	0.226
1995	0.185	0.372
1996	0.320	0.312
1997	0.243	0.253
1998	0.138	0.419
1999	0.221	0.419
2000	0.193	0.436
2001	0.211	0.434
2002	0.088	0.346
2003	0.408	0.340
2004	0.119	0.296
2005	0.208	0.254
2006	0.206	0.323
2007	0.571	0.332
2008	0.244	0.074
2009	0.092	0.055
2010	0.059	0.086
2011	0.051	0.059
2012	0.088	0.066
2013	0.050	0.050
2014	0.050	0.050
2015	0.052	0.051
2016	0.052	0.050
2017	0.071	0.052
2018	0.052	0.051
2019	0.058	0.052
2020	0.050	0.050
2021	0.050	0.050
2022	0.050	0.050

Table 7: Unweighted proxy CV values by year. These values are based on logbook reporting compliance and are consistent across species.

year	cv
1986	0.621
1987	0.656
1988	0.496
1989	0.435
1990	0.229
1991	0.181
1992	0.158
1993	0.150
1994	0.222
1995	0.317
1996	0.314
1997	0.250
1998	0.339
1999	0.365
2000	0.376
2001	0.376
2002	0.274
2003	0.363
2004	0.252
2005	0.240
2006	0.284
2007	0.398
2008	0.101
2009	0.063
2010	0.079
2011	0.057
2012	0.071
2013	0.050
2014	0.050
2015	0.051
2016	0.050
2017	0.056
2018	0.052
2019	0.053
2020	0.050
2021	0.050
2022	0.050

Table 8: Annual proxy CV values weighted by regional landings of yellowedge grouper in number.

year	CV
1986	0.399
1987	0.389
1988	0.344
1989	0.235
1990	0.299
1991	0.311
1992	0.207
1993	0.209
1994	0.216
1995	0.185
1996	0.319
1997	0.243
1998	0.143
1999	0.221
2000	0.193
2001	0.211
2002	0.153
2003	0.402
2004	0.172
2005	0.215
2006	0.234
2007	0.465
2008	0.146
2009	0.062
2010	0.059
2011	0.054
2012	0.075
2013	0.050
2014	0.050
2015	0.051
2016	0.050
2017	0.053
2018	0.051
2019	0.053
2020	0.050
2021	0.050
2022	0.050

Table 9: Annual proxy CV values weighted by regional landings of yellowedge grouper in weight.

year	CV
1986	0.399
1987	0.388
1988	0.344
1989	0.235
1990	0.299
1991	0.311
1992	0.207
1993	0.209
1994	0.216
1995	0.185
1996	0.319
1997	0.243
1998	0.142
1999	0.221
2000	0.193
2001	0.211
2002	0.153
2003	0.402
2004	0.172
2005	0.215
2006	0.234
2007	0.465
2008	0.146
2009	0.062
2010	0.059
2011	0.054
2012	0.076
2013	0.050
2014	0.050
2015	0.051
2016	0.050
2017	0.053
2018	0.051
2019	0.052
2020	0.050
2021	0.050
2022	0.050

Table 10: Estimates of total effort in angler - days by year.

year	Angler_Day
1986	302536
1987	286774
1988	274035
1989	274581
1990	278948
1991	240654
1992	270931
1993	300058
1994	317991
1995	283372
1996	257753
1997	240657
1998	270835
1999	242378
2000	222678
2001	218826
2002	215004
2003	225279
2004	223420
2005	190090
2006	199843
2007	203166
2008	174309
2009	196443
2010	158887
2011	207966
2012	217431
2013	233886
2014	245853
2015	253105
2016	257016
2017	251421
2018	247242
2019	240862
2020	193111
2021	270017
2022	230336

Table 11: Estimates of total effort in angler - trips by year.

year	Angler_Trip
1986	330173
1987	351541
1988	359278
1989	358847
1990	374904
1991	318585
1992	343636
1993	362102
1994	390133
1995	364384
1996	337152
1997	299961
1998	326333
1999	219374
2000	298776
2001	271970
2002	260044
2003	276561
2004	275804
2005	240459
2006	248496
2007	329881
2008	214982
2009	264403
2010	209111
2011	281137
2012	301077
2013	293420
2014	312883
2015	320289
2016	326806
2017	321268
2018	316205
2019	303721
2020	237569
2021	352783
2022	317628

Table 12: Estimates of total effort in angler - days by region.

year	West	East
1986	62459	240077
1987	69725	217049
1988	78087	195948
1989	66256	208325
1990	65042	213906
1991	66342	174312
1992	86129	184802
1993	92160	207898
1994	113429	204562
1995	100962	182410
1996	102840	154913
1997	91215	149442
1998	85504	185331
1999	66261	176117
2000	63347	159331
2001	61583	157243
2002	73173	141831
2003	81068	144211
2004	64990	158430
2005	59857	130233
2006	75794	124049
2007	66286	136880
2008	44133	130176
2009	54005	142438
2010	47371	111516
2011	49170	158796
2012	53615	163816
2013	57328	176558
2014	52865	192988
2015	56799	196306
2016	55368	201648
2017	53131	198290
2018	53698	193544
2019	53714	187148
2020	52168	140943
2021	72877	197140
2022	64563	165773

Table 13: Estimates of total effort in angler - trips by region.

year	West	East
1986	70752	259421
1987	81749	269791
1988	83764	275514
1989	75876	282971
1990	76780	298124
1991	81337	237248
1992	96090	247546
1993	100043	262058
1994	118160	271973
1995	105772	258612
1996	107764	229387
1997	94157	205804
1998	90553	235781
1999	48435	170939
2000	72056	226720
2001	64516	207453
2002	69614	190431
2003	82703	193858
2004	65024	210780
2005	62093	178366
2006	77265	171231
2007	144368	185512
2008	29253	185729
2009	58088	206315
2010	49273	159838
2011	51748	229388
2012	61315	239762
2013	60035	233385
2014	56145	256738
2015	60540	259749
2016	58190	268616
2017	56164	265103
2018	55687	260519
2019	54741	248980
2020	52947	184622
2021	86183	266600
2022	79823	237805

Table 14: Estimates of total effort in angler - days by state.

year	TX	LA	MS	AL	FLW_AL
1986	56568	5891			240077
1987	63363	6362			217049
1988	70396	7691			195948
1989	63389	2867			208325
1990	58144	6898			213906
1991	59969	6373			174312
1992	76218	9911			184802
1993	80904	11256			207898
1994	100778	12651			204562
1995	90464	10498			182410
1996	91852	10988			154913
1997	82207	9008			149442
1998	77650	7854			185331
1999	58235	8026			176117
2000	58395	4952			159331
2001	55361	6222			157243
2002	66951	6222			141831
2003	74432	6636			144211
2004	64990				158430
2005	59857				130233
2006	70789	5005			124049
2007	63764	2522			136880
2008	41188	2945			130176
2009	50737	3268			142438
2010	47154	217	498		111018
2011	47284	1886	1771		157025
2012	51776	1839	1841		161975
2013	55749	1579	1827	14454	160277
2014	51231	1634	1623	16766	174599
2015	55135	1664	1923	18008	176375
2016	54083	1285	1670	16831	183147
2017	51575	1556	1633	17841	178816
2018	52160	1538	1697	19851	171996
2019	52456	1258	1374	18607	167167
2020	51498	670	1058	13091	126794
2021	71344	1533	1664	13844	181632
2022	62705	1858	1817	14588	149368

Table 15: Estimates of total effort in angler - trips by state.

year	TX	LA	MS	AL	FLW_AL
1986	65731	5021			259421
1987	74345	7404			269791
1988	76962	6802			275514
1989	73115	2761			282971
1990	69667	7113			298124
1991	75092	6245			237248
1992	86984	9106			247546
1993	89152	10892			262058
1994	106610	11550			271973
1995	95852	9920			258612
1996	96901	10863			229387
1997	85255	8903			205804
1998	82694	7858			235781
1999	42468	5967			170939
2000	67060	4996			226720
2001	57508	7009			207453
2002	69614	0			190431
2003	76160	6543			193858
2004	65024				210780
2005	62093	0			178366
2006	72260	5005			171231
2007	141783	2585			185512
2008	26540	2713			185729
2009	55440	2648			206315
2010	49105	168	652		159185
2011	50165	1583	2140		227248
2012	59623	1692	2241		237521
2013	58489	1546	2193	21045	210147
2014	54625	1520	1998	24417	230323
2015	59048	1492	2421	27054	230273
2016	57038	1152	1989	25108	241519
2017	54738	1427	1868	26497	236739
2018	54349	1338	1992	30639	227887
2019	53639	1102	1675	28188	219117
2020	52415	532	1267	19080	164275
2021	85007	1176	2259	19709	244632
2022	78377	1446	2594	22142	213069

Table 16: Yellowedge grouper number of fish sampled by state.

year	TX	LA	AL	FLW_AL
1986	33			6
1987	22			1
1988	23	1		
1989	12	1		
1990	11			1
1991	1			
1993	4			
1994				1
1995	5			
1998	1			
2001		1		
2003		1		
2005	1			
2009		2		
2011	1			
2012	1			
2013	2			
2014	2			1
2015	2			7
2016				2
2017	5		1	3
2019			3	2
2021	1		8	
2022	1	1	6	13

Table 17: Yellowedge grouper number of fish sampled by region.

year	West	East
1986	33	6
1987	22	1
1988	24	
1989	13	
1990	11	1
1991	1	
1993	4	
1994		1
1995	5	
1998	1	
2001	1	
2003	1	
2005	1	
2009	2	
2011	1	
2012	1	
2013	2	
2014	2	1
2015	2	7
2016		2
2017	5	4
2019		5
2021	1	8
2022	2	19

Table 18: Yellowedge grouper number of trips sampled by state.

year	TX	LA	AL	FLW_AL
1986	12			2
1987	16			1
1988	14	1		
1989	6	1		
1990	5			1
1991	1			
1993	4			
1994				1
1995	5			
1998	1			
2001		1		
2003		1		
2005	1			
2009		1		
2011	1			
2012	1			
2013	1			
2014	2			1
2015	2			2
2016				2
2017	1		1	1
2019			1	1
2021	1		3	
2022	1	1	3	3

Table 19: Yellowedge grouper number of trips sampled by region.

year	West	East
1986	12	2
1987	16	1
1988	15	
1989	7	
1990	5	1
1991	1	
1993	4	
1994		1
1995	5	
1998	1	
2001	1	
2003	1	
2005	1	
2009	1	
2011	1	
2012	1	
2013	1	
2014	2	1
2015	2	2
2016		2
2017	1	2
2019		2
2021	1	3
2022	2	6

Table 20: Yellowedge grouper mean total length in mm by state.

year	TX	LA	AL	FLW_AL
1986	490			696
1987	400			479
1988	363	197		
1989	455	505		
1990	454			490
1991	430			
1993	466			
1994				735
1995	522			
1998	508			
2001		513		
2003		472		
2005	462			
2009		560		
2011	943			
2012	593			
2013	804			
2014	488			305
2015	522			663
2016				740
2017	577		861	634
2019			965	572
2021	665		767	
2022	368	671	714	623

Table 21: Yellowedge grouper total length CV in mm by state.

year	TX	LA	AL	FLW_AL
1986	0.18			0.17
1987	0.26			
1988	0.27			
1989	0.15			
1990	0.10			
1991				
1993	0.14			
1994				
1995	0.44			
1998				
2001				
2003				
2005				
2009		0.10		
2011				
2012				
2013	0.18			
2014	0.10			
2015	0.28			0.15
2016				0.12
2017	0.04			0.13
2019			0.01	0.24
2021			0.04	
2022			0.28	0.21

Table 22: Yellowedge grouper mean weight (g) by state.

year	TX	LA	AL	FLW_AL
1986	1646			10000
1987	1051			1350
1988	818	6500		
1989	1281	2060		
1990	1298			1660
1991	1060			
1993	1130			
1994				5790
1995	4702			
1998	2230			
2001		1650		
2003		1520		
2005	1320			
2009		1865		
2011	10020			
2012	2850			
2013	8710			
2014	1555			350
2015	2005			3585
2016				3620
2017	2334		7760	3233
2019			10697	2725
2021	4650		5142	
2022	650	2480	3930	3448

Table 23: Yellowedge grouper weight CV in g by state.

year	TX	LA	AL	FLW_AL
1986	0.52			
1987	0.80			
1988	0.56			
1989	0.36			
1990	0.28			
1991				
1993	0.30			
1994				
1995	1.61			
1998				
2001				
2003				
2005				
2009		0.38		
2011				
2012				
2013	0.57			
2014	0.23			
2015	0.77			0.53
2016				
2017	0.15			0.35
2019			0.04	0.62
2021			0.12	
2022			0.72	0.70

Table 24: Yellowedge grouper mean total length in mm by region.

year	West	East
1986	490	696
1987	400	479
1988	356	
1989	459	
1990	454	490
1991	430	
1993	466	
1994		735
1995	522	
1998	508	
2001	513	
2003	472	
2005	462	
2009	560	
2011	943	
2012	593	
2013	804	
2014	488	305
2015	522	663
2016		740
2017	577	691
2019		808
2021	665	767
2022	520	652

Table 25: Yellowedge grouper total length CV in mm by region.

year	West	East
1986	0.18	0.17
1987	0.26	
1988	0.29	
1989	0.15	
1990	0.10	
1991		
1993	0.14	
1994		
1995	0.44	
1998		
2001		
2003		
2005		
2009	0.10	
2011		
2012		
2013	0.18	
2014	0.10	
2015	0.28	0.15
2016		0.12
2017	0.04	0.19
2019		0.28
2021		0.04
2022	0.41	0.24

Table 26: Yellowedge grouper mean weight (g) by region.

year	West	East
1986	1646	10000
1987	1051	1350
1988	1065	
1989	1359	
1990	1298	1660
1991	1060	
1993	1130	
1994		5790
1995	4702	
1998	2230	
2001	1650	
2003	1520	
2005	1320	
2009	1865	
2011	10020	
2012	2850	
2013	8710	
2014	1555	350
2015	2005	3585
2016		3620
2017	2334	4365
2019		7508
2021	4650	5142
2022	1565	3600

Table 27: Yellowedge grouper weight CV in g by region.

year	West	East
1986	0.52	
1987	0.80	
1988	1.19	
1989	0.37	
1990	0.28	
1991		
1993	0.30	
1994		
1995	1.61	
1998		
2001		
2003		
2005		
2009	0.38	
2011		
2012		
2013	0.57	
2014	0.23	
2015	0.77	0.53
2016		
2017	0.15	0.56
2019		0.59
2021		0.12
2022	0.83	0.69

3.8 Figures

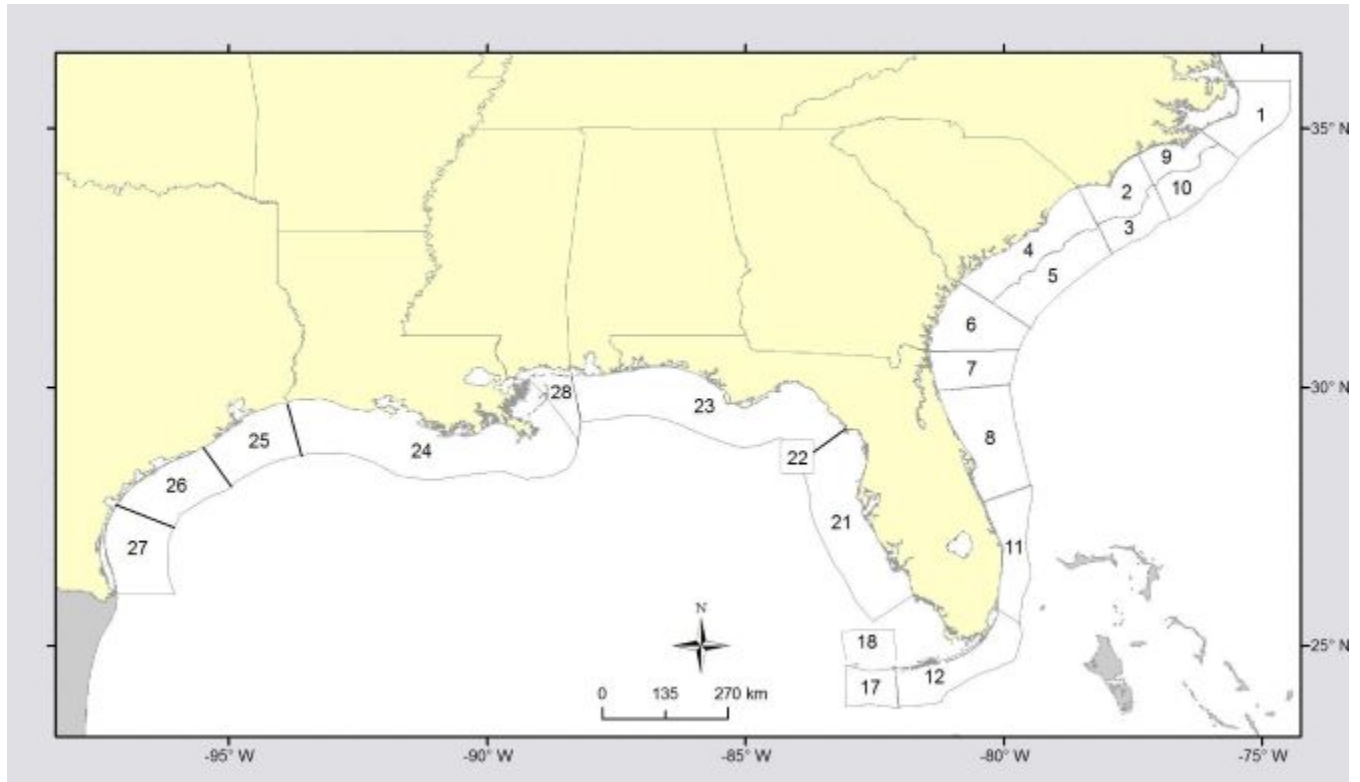


Figure 1: Headboat sampling areas prior to 2013.

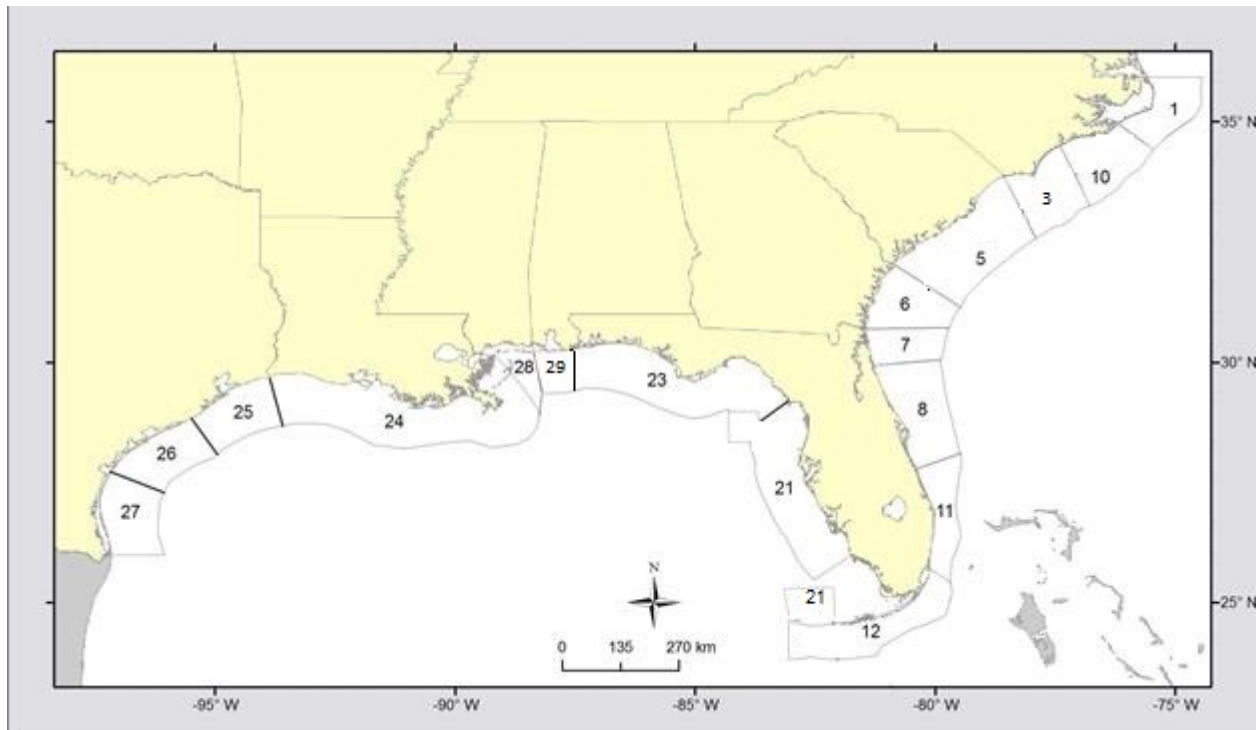


Figure 2: Headboat sampling areas 2013 - present.

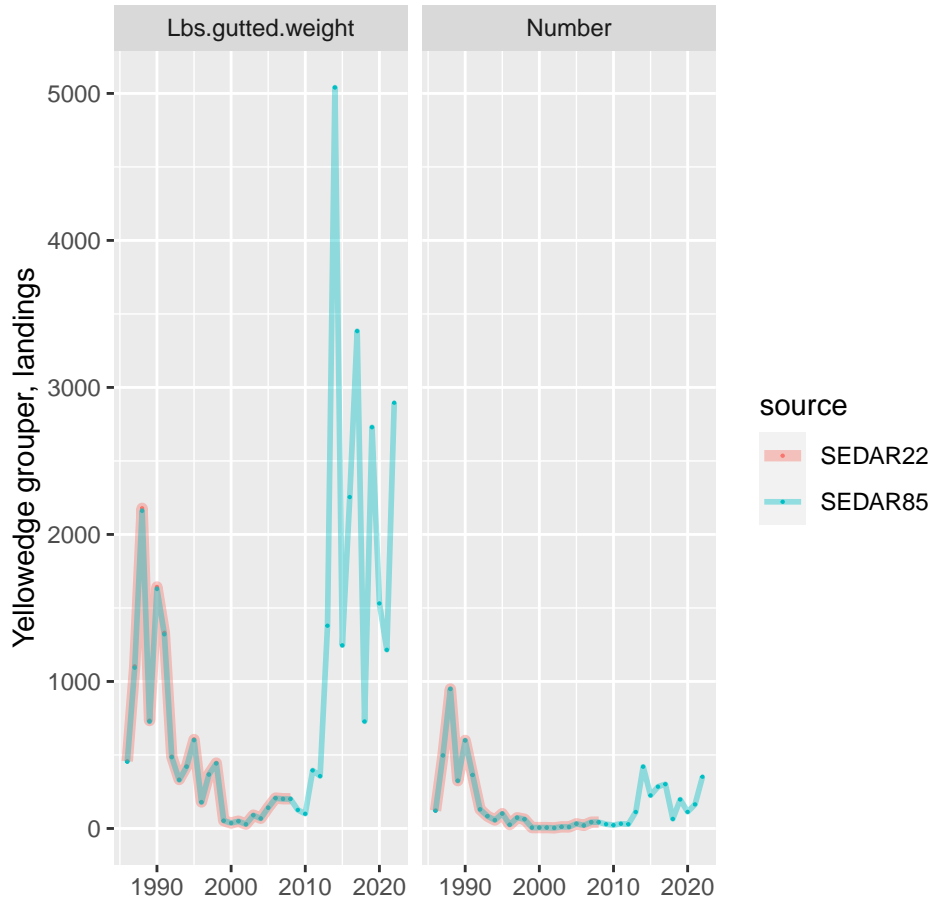


Figure 3: Comparison to SEDAR 22 Yellowedge grouper landings.

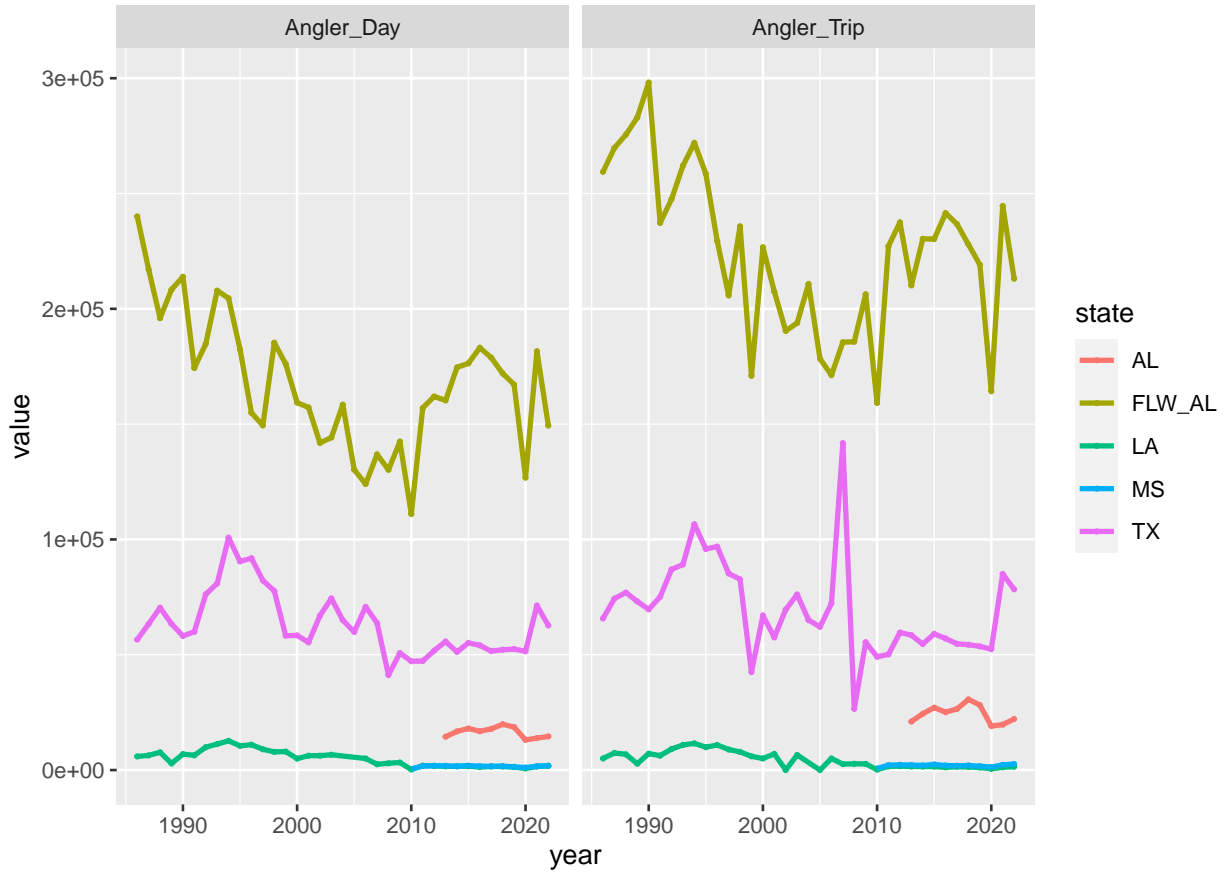


Figure 4: SRHS total estimated angler days and angler trips.

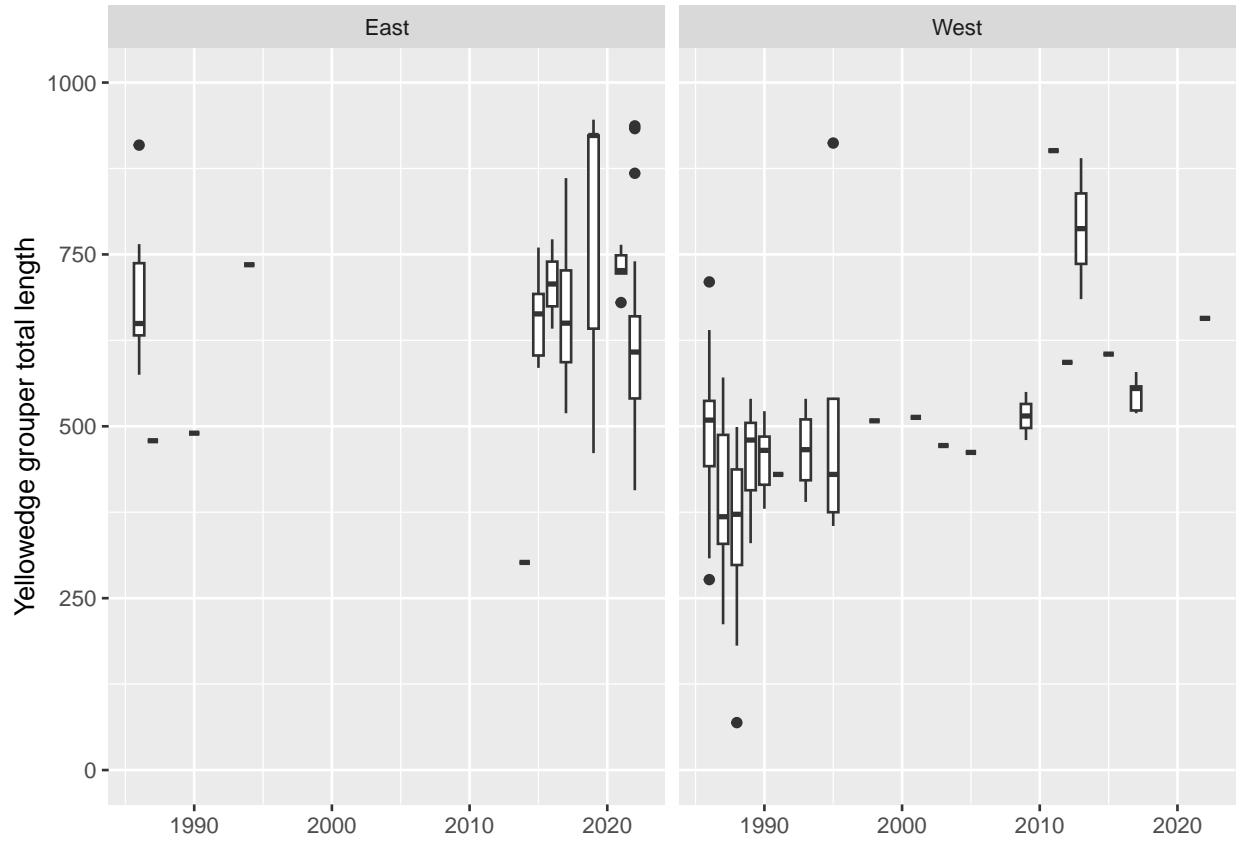


Figure 5: Yellowedge grouper total length by SEDAR region. Texas and Louisiana are considered West. Mississippi, Alabama, and West Florida are considered East.

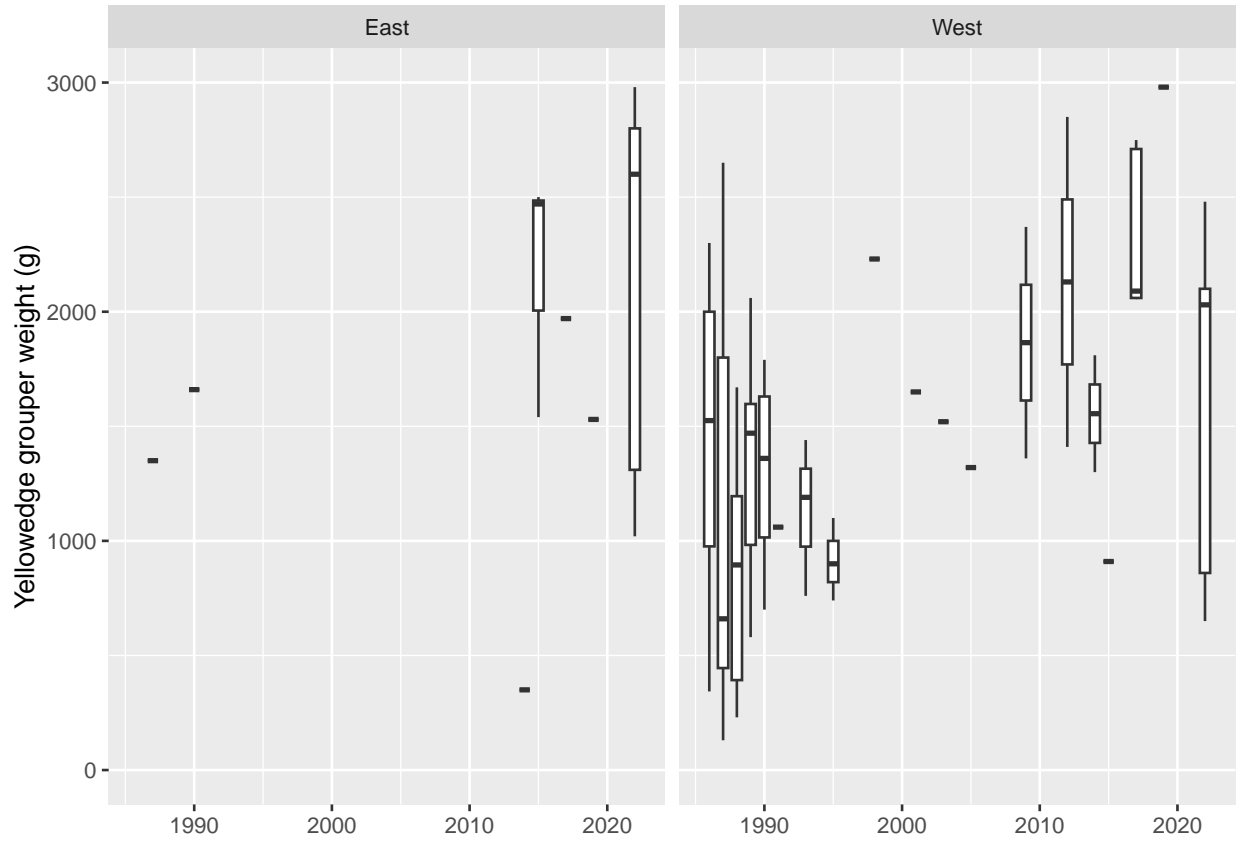


Figure 6: Yellowedge grouper weight (g) by SEDAR region. Texas and Louisiana are considered West. Mississippi, Alabama, and West Florida are considered East.

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References

- Chester, A. J., G. R. Huntsman, P. A. Tester, and C. S. Manooch III. 1984. “The NMFS Southeast Region Headboat Survey: History, Methodology, and Data Integrity.” *Bull. Mar. Sci.* 34: 267–79.
- Fitzpatrick, E. E., E. H. Williams, K. W. Shertzer, K. I. Siegfried, J. K. Craig, R. T. Cheshire, G. T. Kellison, K. E. Fitzpatrick, and K. Brennan. 2017. “The NMFS Southeast Region Headboat Survey: History, Methodology, and Data Integrity.” *Marine Fisheries Review* 79: 1–27.
- Grimes, C. B., and J. E. Hollingsworth. 1979. “An Automatic Data Processing System for Storage and Manipulation of Life History, Catch, and Angler Effort Data.” *Estuaries* 2: 123–26.
- Huntsman, G. R. 1976. “Offshore Headboat Fishing in North Carolina and South Carolina.” *Mar. Fish. Rev.* 1: 13–23.
- Huntsman, G. R., D. R. Colby, and R. L. and Dixon. 1978. “Measuring Catches in the Carolina Headboat Fishery.” *Trans. Am. Fish. Soc.* 107: 241–45.
- Nuttall, M. A., K. Detloff, K. E. Fitzpatrick, K. Brennan, and V. M. Matter. 2020. *SEDAR 86 DW 31: SEFSC Computation of Uncertainty for Southeast Regional Headboat Survey and Total Recreational Landings Estimates, with Applications to SEDAR 68 Scamp and Yellowmouth Grouper*. <https://sedarweb.org/documents/sedar-68-dw-31-sefsc-computation-of-uncertainty-for-southeast-regional-headboat-survey-and-total-recreational-landings-estimates-with-applications-to-sedar-68-scamp-and-yellowmouth-grouper/>.
- SEDAR. 2015. *SEDAR 41 DW 46: Headboat Data Evaluation*. <https://sedarweb.org/documents/s41dw46-headboat-data-evaluation/>.
- . 2022. *SEDAR 74 Gulf of Mexico Red Snapper Data Workshop Report*. <https://sedarweb.org/documents/sedar-74-gulf-of-mexico-data-workshop-report/>.