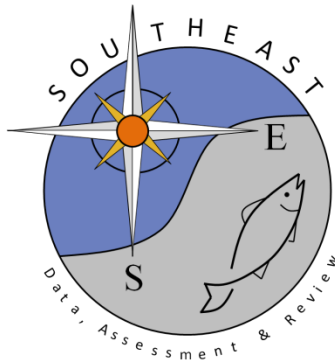


Historical (1955-1980) Recreational Landings for Gulf of America Gray
Triggerfish (*Balistes capriscus*) estimated using the FHWAR Census
Method

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SEDAR100-DW-03

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Introduction

During previous SEDAR Data Workshops, considerable time and effort has been devoted to developing methods for back-calculating recreational landings for years prior to the implementation of modern data collection programs. The historic period is defined as pre-1981 since 1981 is the first year when the continuous time series for the Marine Recreational Information Program (MRIP) is available. Methods used in past stock assessments to estimate historic recreational landings include: ratios of commercial landings to recreational landings, estimates from the U.S. Fish and Wildlife Saltwater Angling Survey (SWAS), U.S. Census data as a proxy for recreational fishing effort to produce regression estimates of catch, and most recently the FHWAR (National Survey of Fishing, Hunting, and Wildlife-Associated Recreation) Census method (SEDAR-PW-07).

During the SEDAR best practices workshop, the FHWAR Census method was determined to be the best practice for estimating recreational landings for the historic time period (SEDAR-PW-07). This paper summarizes the methods used to estimate historical recreational catch for SEDAR 100 Gulf of America Gray Triggerfish (*Balistes capriscus*) and provides preliminary landings estimates for the 1955-1980 time period.

National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR)

The FHWAR survey interviews U.S. residents about their fishing, hunting, and wildlife-associated (e.g. bird watching) activities. The U.S. Fish and Wildlife Service (USFWS) began conducting the FHWAR Survey in 1955 and it is one of the oldest and most comprehensive recreational surveys available. The survey is conducted every 5 years and gathers information on the number of anglers in the United States and their frequency and time spent fishing (FHWAR 1991). For the historical period from 1955-1980, historical estimates of U.S. population and estimates of fishing participation and effort are summarized in tables B-2 and B-3 in the 1991 FHWAR report (FHWAR 1991) and are provided as Tables 1 and 2 in this document. FHWAR provides estimates for the number of saltwater anglers, freshwater anglers, and saltwater fishing days for the entire U.S. (Tables 1 and 2). Angler estimates are also broken down into nine

regions (Figure 1), however, only estimates for total anglers (i.e. saltwater and freshwater combined) are available for these smaller regions.

FHWAR Census Method

To estimate the number of saltwater anglers in each region, the ratio of U.S. saltwater anglers to total U.S. anglers is applied to the total number of anglers for a given region. For Gulf Gray Triggerfish, the East South Central (ESC) and West South Central (WSC) regions are included to provide estimates for the total number of saltwater anglers from Texas (TX) to Alabama (AL). The total number of saltwater anglers in ESC and WSC is then divided by the total number of U.S. anglers to obtain the proportion of saltwater anglers in ESC and WSC. This proportion is then multiplied by the total number of U.S. saltwater days to estimate the number of saltwater days in ESC and WSC, which are used as our effort estimates for TX-AL during the historical period.

Effort for Florida (FL) is calculated separately because in the FHWAR survey FL is included in the South Atlantic (SA) region (Figure 1). The above process is repeated for the SA region to estimate the number of saltwater days in the SA. Then the saltwater days for FL need to be apportioned from the SA. For Gulf Gray Triggerfish, only saltwater days in west FL (WFL) are needed. Combined effort data from the Marine Recreational Information Program (MRIP) and Southeast Region Headboat Survey (SRHS) from 1984-1986 was used to calculate the mean ratio of WFL angler trips to the total number of angler trips in the SA. This ratio is then used to delineate the number of WFL saltwater angler days from the SA. WFL saltwater angler days were combined with the saltwater angler days from TX-AL for the total number of saltwater days in the Gulf of America.

From 1955-1985, the FHWAR survey was based on a 12-month recall period for respondents. As part of the 1991 FHWAR survey, a study was conducted comparing estimates using the 12-month recall period versus a 4-month recall period. Recall bias was adjusted for by reducing saltwater angler days by 46%, since that is the average estimate for recall bias between the 12-month and 4-month surveys. After effort is adjusted for recall bias, then the ratio of MRIP and SRHS 1985 effort to adjusted FHWAR 1985 saltwater days is applied to adjusted saltwater days to calibrate FHWAR units to modern survey units (Table 3).

The mean CPUE for MRIP, SRHS, and Texas Parks and Wildlife (TPWD) landings from 1981-1989 was then applied to the calibrated FHWAR saltwater days to estimate historical landings. There were no management regulations during this time period that would have impacted recreational angler behavior. The CV of the CPUE used to estimate the mean CPUE which is applied to FHWAR saltwater days is used as the CV for historical landings estimates.

Historical Landings Estimates

Historic recreational landings estimates for Gulf of America Gray Triggerfish are presented in Table 4 and Figure 2. Historical recreational landings from 1945-1980 were estimated for SEDAR 43 using a different method called the FHWAR Index Method. These historical landings estimates were not updated during SEDAR 62. For SEDAR 62 recreational landings beginning in 1981 were obtained from MRIP-FES estimates, whereas SEDAR 43 recreational landings

were in CHTS units. Historical landings estimates in SEDAR 43 (and 62) were lower than estimates for SEDAR 100 (Figure 3), and this can be attributed to the differences in scale between MRIP-FES and CHTS. There is no clear documentation for the methods used in SEDAR 43, so it is not known how estimates were produced for years prior to the onset of the FHWAR survey in 1955.

For SEDAR 100, it was requested to delineate Gulf-wide catch estimates into East (MS-FL) and West (TX-LA) stock regions. Historic catch was delineated by applying the average proportion of landings for the East and West from the MRIP, SRHS, and TPWD catch data from 1981-1989 to the Gulf-wide time series. The average proportion for the East was 0.809 and for the West was 0.191. Landings by stock region are shown in Figure 4.

Works Cited

SEDAR Procedural Workshop (PW) 7. 2015. Data Best Practices. SEDAR, North Charleston. 151 pp. Available at <https://sedarweb.org/documents/sedar-pw-07-data-best-practices-final-report-sept-2015/>

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Tables

Table 1: Numbers (in thousands) of sportsman, anglers, and hunters in the United States and by FHWAR Survey region from 1955-1985. Table copied from FHWAR 1991.

(U.S. population 12 years old and older. Numbers in thousands)

Year	Population		Sportsmen (fished or hunted)		Anglers		Hunters	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, United States								
1955	118,366	100	24,917	21.1	20,813	17.6	11,784	10.0
1960	131,226	100	30,435	23.2	25,323	19.3	14,637	11.2
1965	141,928	100	32,881	23.2	28,348	20.0	13,585	9.6
1970	155,230	100	36,277	23.4	33,158	21.4	14,336	9.2
1975	171,860	100	45,773	26.6	41,299	24.0	17,084	9.9
1980	184,691	100	46,966	25.4	41,873	22.7	16,758	9.1
1985	195,659	100	49,827	25.5	45,345	23.2	16,340	8.4
New England								
1955	7,919	100	1,224	15.4	1,002	12.7	589	7.4
1960	8,349	100	1,368	16.4	1,205	14.4	517	6.2
1965	9,256	100	1,650	17.8	1,488	16.0	583	6.3
1970	8,652	100	1,579	18.3	1,430	16.5	582	6.7
1975	9,910	100	2,004	20.2	1,861	18.8	566	5.7
1980	10,205	100	1,974	19.3	1,788	17.5	572	5.6
1985	10,554	100	2,058	19.5	1,914	18.1	552	5.2
Middle Atlantic								
1955	24,869	100	3,539	14.2	2,811	11.3	1,608	6.5
1960	26,493	100	3,432	13.0	2,569	9.7	1,723	6.5
1965	27,346	100	3,602	13.2	2,760	10.1	1,631	6.0
1970	26,244	100	4,539	16.1	4,504	14.4	1,731	6.1
1975	30,449	100	5,919	19.4	5,097	16.7	2,096	6.9
1980	30,256	100	5,181	17.1	4,332	14.3	2,001	6.6
1985	31,099	100	5,565	17.9	4,820	15.5	1,972	6.3
East North Central								
1955	25,733	100	5,489	21.3	4,583	17.8	2,538	9.9
1960	26,833	100	6,316	32.5	5,317	19.8	2,985	11.1
1965	26,124	100	6,214	22.1	5,336	19.0	2,563	9.1
1970	31,550	100	7,284	23.1	6,899	21.2	2,812	8.9
1975	32,796	100	9,049	27.6	8,181	24.9	3,392	10.3
1980	33,526	100	8,725	26.0	7,891	23.5	2,955	8.8
1985	33,747	100	8,973	26.6	8,270	24.5	2,814	8.3
West North Central								
1955	9,201	100	2,913	31.7	2,346	25.5	1,534	16.7
1960	10,149	100	3,383	33.3	2,855	28.1	1,709	16.8
1965	11,681	100	3,678	31.5	3,226	27.6	1,620	13.9
1970	12,904	100	4,000	31.0	3,579	27.7	1,783	13.8
1975	13,564	100	4,524	33.3	4,089	30.1	1,863	13.7
1980	13,826	100	4,770	34.5	4,220	30.5	1,965	14.2
1985	14,137	100	5,140	36.4	4,681	33.1	1,971	13.9
South Atlantic								
1955	14,336	100	3,223	22.5	2,805	19.6	1,449	10.1
1960	17,798	100	4,423	24.9	3,895	20.8	2,045	11.5
1965	20,593	100	5,626	27.3	5,054	24.5	1,900	9.2
1970	23,539	100	5,461	23.2	5,129	21.8	1,904	8.1
1975	27,127	100	7,110	26.2	6,479	23.9	2,484	9.2
1980	30,512	100	7,769	25.5	7,086	23.2	2,444	8.0
1985	33,636	100	8,721	25.9	8,056	24.0	2,467	7.3
East South Central								
1955	7,959	100	1,963	24.7	1,665	20.9	989	12.4
1960	9,277	100	2,778	29.9	2,207	23.8	1,510	16.3
1965	9,652	100	2,587	26.8	2,201	22.8	1,294	13.4
1970	9,862	100	2,860	27.0	2,464	25.0	1,162	11.8
1975	10,798	100	3,007	27.8	2,689	24.9	1,355	12.5
1980	11,771	100	3,614	30.7	3,173	27.0	1,567	13.3
1985	12,364	100	3,671	29.7	3,308	26.8	1,441	11.7

Continued

Table 1(continued)

(U.S. population 12 years old and older. Numbers in thousands)

Year	Population		Sportsmen (fished or hunted)		Anglers		Hunters	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
West South Central								
1955	10,250	100	2,560	25.0	2,237	21.8	1,165	11.4
1960	11,837	100	3,666	31.0	3,133	26.5	1,750	14.8
1965	12,724	100	3,713	29.2	3,278	25.8	1,571	12.3
1970	14,624	100	4,380	30.0	4,006	27.4	1,918	13.1
1975	16,628	100	5,781	34.8	5,267	31.7	2,563	15.4
1980	19,136	100	5,862	30.6	5,136	26.8	2,456	12.8
1985	21,184	100	6,418	30.3	5,704	26.9	2,572	12.1
Mountain								
1955	4,529	100	1,369	30.2	1,112	24.6	796	17.6
1960	5,222	100	1,646	31.5	1,372	26.3	1,120	21.4
1965	5,029	100	1,565	31.1	1,261	25.1	968	19.6
1970	5,656	100	2,044	36.1	1,769	31.3	960	17.3
1975	7,576	100	2,570	33.9	2,252	29.7	1,159	15.3
1980	9,160	100	2,903	31.7	2,500	27.3	1,268	13.8
1985	10,215	100	3,128	30.6	2,765	27.1	1,241	12.1
Pacific								
1955	13,570	100	2,637	19.4	2,252	16.6	1,116	8.2
1960	15,268	100	3,422	22.4	2,971	19.5	1,279	8.4
1965	17,523	100	4,246	24.2	3,744	21.4	1,433	8.2
1970	20,199	100	4,332	21.4	4,030	20.0	1,466	7.3
1975	23,012	100	5,811	25.2	5,366	23.4	1,607	7.0
1980	26,299	100	6,168	23.5	5,747	21.9	1,531	5.0
1985	38,725	100	6,154	21.4	5,829	20.3	1,310	4.6

Table 2. Comparison of major finding from the 1955-1985 FHWR surveys. Numbers are in thousands. Table copied from FHWR 1991.

(U.S. population 12 years old and older. Numbers in thousands)

Sportsmen, expenditures, and days	1955	1960	1965	1970	1975	1980	1985
Total sportsmen	24,917	30,435	32,881	36,277	45,773	46,966	49,827
Anglers	20,813	25,323	28,348	33,158	41,299	41,873	45,345
Freshwater	18,420	21,877	23,962	29,363	36,599	35,782	39,122
Saltwater	4,557	6,292	8,305	9,460	13,738	11,972	12,893
Hunters	11,784	14,637	13,583	14,336	17,094	16,758	16,340
Small game	9,822	12,105	10,576	11,671	14,182	12,496	11,130
Big game	4,414	6,277	6,566	7,774	11,037	11,047	12,576
Waterfowl	1,966	1,955	1,650	2,894	4,284	3,177	3,201
Expenditures	13,904,225	17,010,944	18,282,320	23,925,058	40,730,094	42,094,416	51,101,515
Anglers	9,336,002	11,882,891	12,137,086	16,706,477	28,656,715	28,521,304	34,731,608
Freshwater	6,951,447	9,117,627	8,819,330	12,580,446	21,138,064	20,321,023	23,014,603
Saltwater	2,384,556	2,765,259	3,317,773	4,126,031	7,518,651	6,807,268	8,737,535
Hunters	4,568,222	5,128,045	4,651,589	7,218,581	12,073,379	13,185,436	12,461,852
Small game	2,409,399	3,206,537	2,552,606	3,185,841	5,519,441	4,068,112	2,846,575
Big game	1,579,704	1,526,585	1,737,452	3,209,185	5,168,708	6,876,092	6,494,911
Waterfowl	579,119	394,927	361,527	823,555	1,385,230	934,186	951,728
Days	566,870	658,308	708,578	909,876	1,459,551	1,300,983	1,415,379
Fishing	397,447	465,769	522,759	706,187	1,058,075	952,420	1,064,986
Freshwater	338,826	385,167	426,922	592,494	890,576	788,392	895,027
Saltwater	58,621	80,602	95,837	113,694	167,499	164,040	171,055
Hunting	169,423	192,539	185,819	203,689	401,476	348,543	350,393
Small game	118,630	138,192	128,448	124,041	269,653	225,793	214,544
Big game	30,834	39,190	43,845	54,536	100,800	117,406	135,447
Waterfowl	19,959	15,158	13,526	25,113	31,223	26,179	25,933

Table 3: Summary of estimates produced using the updated FHWAR method for SEDAR 100 Gulf of America Gray Triggerfish. The mean CPUE was calculated using combined MRIP, SRHS, and TPWD landing and effort estimates from 1981-1989.

Year	U.S. Saltwater Days	Adjusted Saltwater Days	Standardized Saltwater Days	Mean CPUE	Historic Catch (n)	CV
1955	58,621,000	8,283,480	7,157,419	0.033	235,977	0.576
1960	80,602,000	12,738,514	11,006,833	0.033	362,891	0.576
1965	95,837,000	14,557,561	12,578,599	0.033	414,712	0.576
1970	113,694,000	16,980,180	14,671,885	0.033	483,726	0.576
1975	167,499,000	24,808,032	21,435,615	0.033	706,724	0.576
1980	164,040,000	25,223,893	21,794,944	0.033	718,571	0.576

Table 4: Historic recreational landings (n) for SEDAR 100 Gulf of America Gray Triggerfish for the entire Gulf and delineated into West (Texas and Louisiana) and East (Mississippi to west Florida) stock regions.

Year	Gulf	CV	West	East
1955	235,977	0.576	45,072	190,906
1956	261,360	0.576	49,920	211,440
1957	286,743	0.576	54,768	231,975
1958	312,126	0.576	59,616	252,510
1959	337,508	0.576	64,464	273,044
1960	362,891	0.576	69,312	293,579
1961	373,255	0.576	71,292	301,963
1962	383,619	0.576	73,271	310,348
1963	393,983	0.576	75,251	318,733
1964	404,348	0.576	77,230	327,117
1965	414,712	0.576	79,210	335,502
1966	428,515	0.576	81,846	346,668
1967	442,318	0.576	84,483	357,835
1968	456,121	0.576	87,119	369,002
1969	469,924	0.576	89,755	380,168
1970	483,726	0.576	92,392	391,335
1971	528,326	0.576	100,910	427,416
1972	572,926	0.576	109,429	463,497
1973	617,525	0.576	117,947	499,578
1974	662,125	0.576	126,466	535,659
1975	706,724	0.576	134,984	571,740
1976	709,093	0.576	135,437	573,657
1977	711,463	0.576	135,889	575,573
1978	713,832	0.576	136,342	577,490
1979	716,202	0.576	136,795	579,407
1980	718,571	0.576	137,247	581,324

Figures

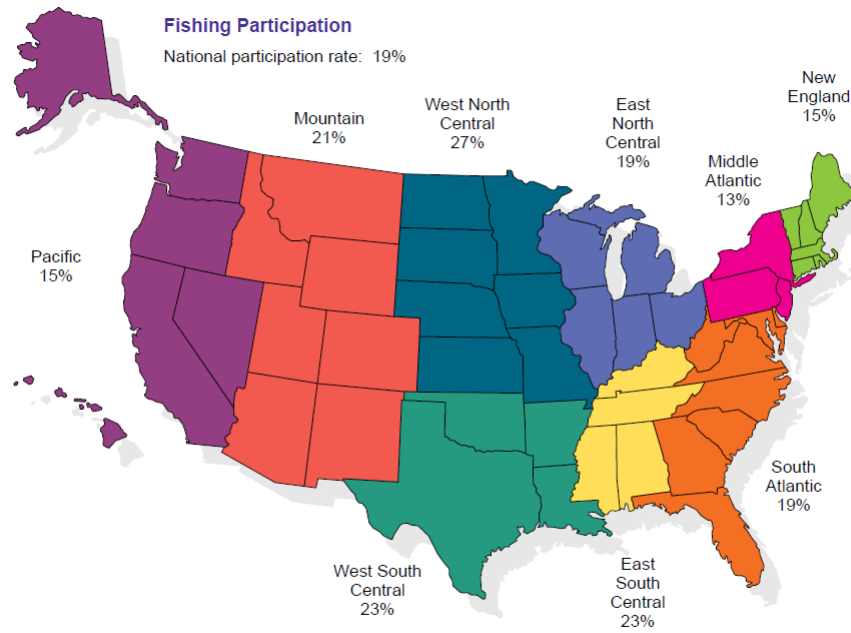


Figure 1. Map of regions defined in the FHWAR survey. Figure is from FHWAR 1991. The numbers show the percentage of anglers by region in the 1991 survey.

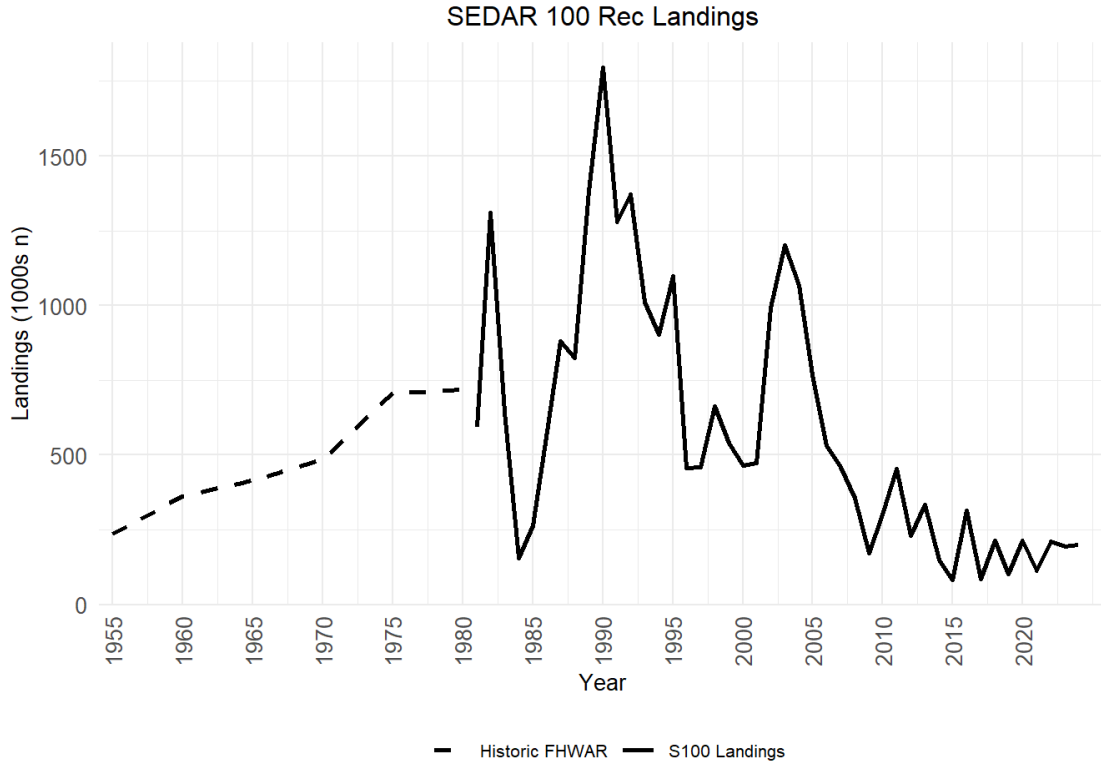


Figure 2. Recreational landings (n) from 1955-2024 for SEDAR 100 Gulf of America Gray Triggerfish. Landings from 1955-1980 were estimated using the FHWAR Census Method.

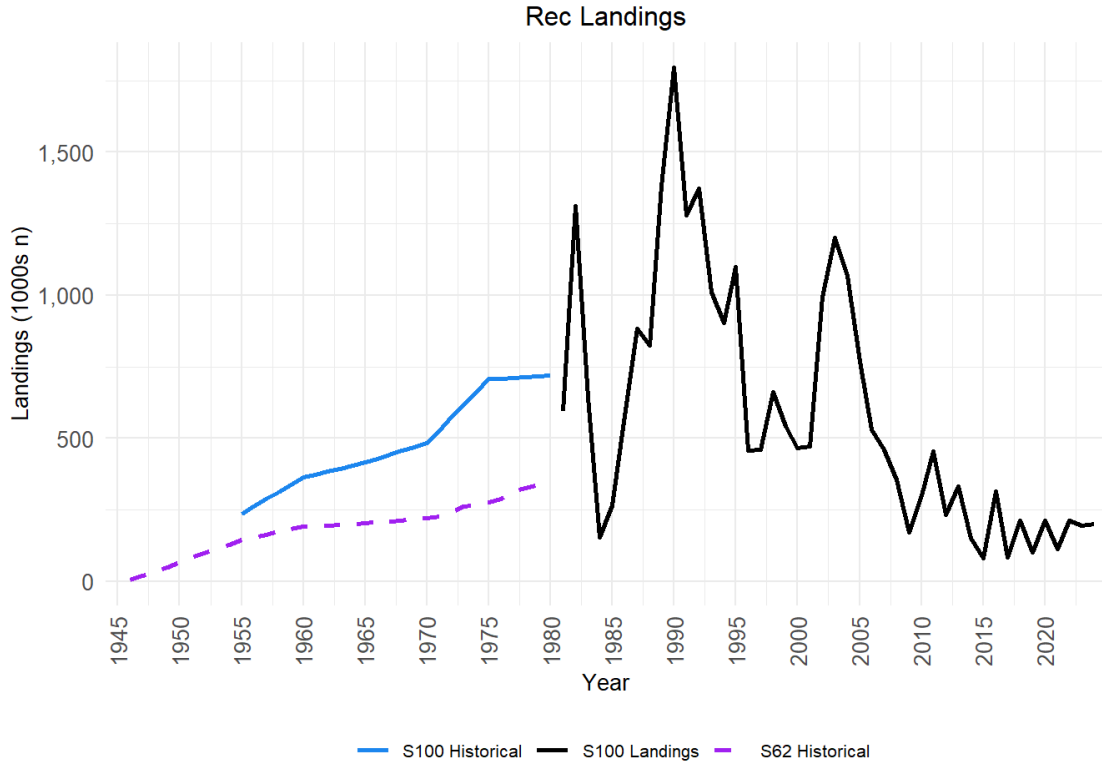


Figure 3. Comparison of historical (1955-1980) recreational landings (n) for SEDAR 62 and SEDAR 100 Gulf of America Gray Triggerfish. Historical landings in SEDAR 62 were not updated from SEDAR 43 and are in MRIP CHTS units while SEDAR 100 is in MRIP FES units.

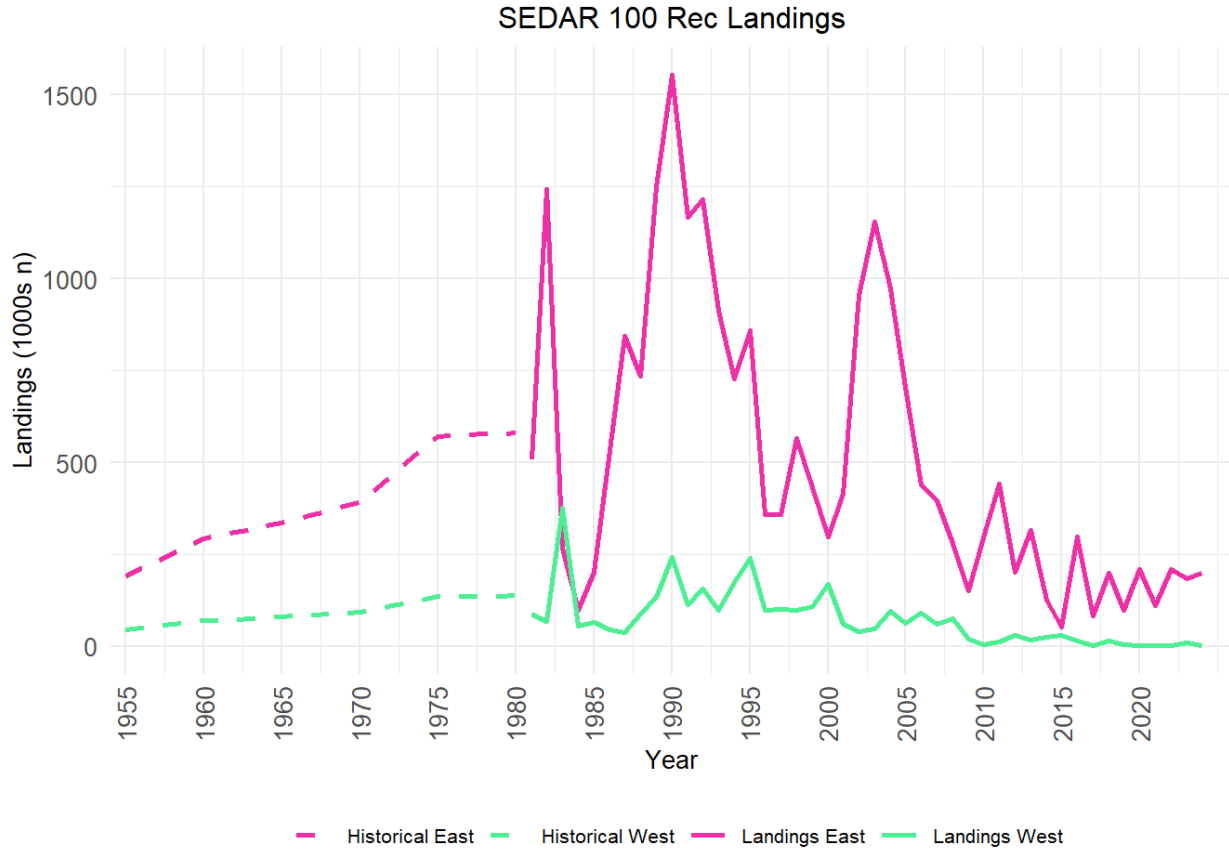


Figure 4. Recreational landings (n) from 1955-2024 for SEDAR 100 Gulf of America Gray Triggerfish apportioned into West (Texas and Louisiana) and East (Mississippi to west Florida) stock regions. Landings from 1955-1980 were estimated using the FHWAR Census Method.