

Development of historical annual recreational landings of red drum from 1950 through 1980 for the Atlantic coast states from Florida through New Jersey.

Mike Murphy
Fish and Wildlife Research Institute
Florida Fish and Wildlife Conservation Commission
St Petersburg, FL 33701

June 20, 2015

The last benchmark assessment used available data from 1989 through 2007 (SEDAR 18). The lack of age composition to characterize the catch prior to 1989 led to shortening of the original assessment period from 1981-2007 to 1989-2007 in the final reviewed assessment runs. The assessment model used for SEDAR 18 required external processing of the available data to develop a complete age composition of the catch for all fishing fleets used in the model (retained and released fisheries) and this required a large amount of data pooling and major assumptions about similar compositions over time. A disadvantage to the truncation of the data period is high uncertainty in the initial estimated state of the stock (level of depletion). There was also little contrast in exploitation rates through this period (especially in the south) by which to understand the stock response to removals. Given the move to use a new model platform (Stock Synthesis 3) that utilized the input data at a much less processed level, ideally retaining a truer level of uncertainty, the assessment time period was expanded to include exploitation back through 1950. Though the red drum commercial fishery was still fairly well developed by 1950 it was known that the additional years of data would add some contrast in the levels of exploitation.

In order to implement this change, estimates of the recreational harvest and releases are needed through the complete time frame. The Marine Resources Information Program (and predecessor Marine Recreational Fisheries Statistics Survey) began providing estimates of recreational catch in 1981. The following follows the procedure used in estimating recreational harvest of black drum (ASMFC 2014). Previous estimates of historic recreational catch have been based on human population from the U.S. Census (e.g. Florida Spotted Seatrout, Murphy *et al.* 2011) or coastwide estimates of saltwater anglers and days spent saltwater fishing from the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR) (South Atlantic Spanish mackerel, Brennan and Fitzpatrick 2012). The human population method assumes that the number of anglers is proportional to the total coastal population and does not account for periods when recreational fishing expanded faster (or slower) than human population. The FHWAR method applied to Spanish mackerel uses coastwide estimates of saltwater fishing effort and assumes that the rate of expansion in saltwater angling was the same across the entire region. Here, we combined information from the FHWAR survey with historical fishing license data to estimate historical recreational catch in each year and state from 1950-1980.

Historic fishing license data were available in the USFWS National Fishing License Reports (<http://wsfrprograms.fws.gov/Subpages/LicenseInfo/Fishing.htm>) from 1958-2013 for each state. No data were available in 1960 and only Georgia was available in 1959. These reports provide values for the number of certified paid fishing license holders (participants) in each state, where

a license holder is one individual regardless of the number of licenses purchased. The reports do not differentiate between saltwater and freshwater anglers. The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR) provides data about the state in which these activities occurred, the number of trips taken, days of participation, type of trip, and expenditures. The survey was conducted 1991, 1996, 2001, 2006, and 2011 by the Census Bureau for the U.S. Fish and Wildlife Service. An estimate of the percentage of anglers in each state that fish in saltwater is provided in these reports (%saltwater). This percentage was extrapolated linearly between years when the survey was not conducted. Prior to 1991, the %saltwater was only available nationally and only every five years from 1955-1985. These national percentages were used to extrapolate back the statewide estimates. The total number of license holders from the USFWS Historic Fishing License data was then adjusted by the percent estimates from the FHWAR surveys to get the total number of saltwater participants by year and state (Table 1). Lastly, CPUE was calculated for each year and state from 1981-2012 by dividing the MRFSS/MRIP harvest estimates by the total number of saltwater participants. The number of saltwater participants in each state each year from 1950-1980 was then multiplied by the 1981-1985 average CPUE (or available years in sparse-catch states like NJ, DE, MD) to estimate historical harvest since 1950 (Table 2). The same procedure was applied to live-release estimates (Table 3)

Literature

ASMFC. 2015. Black drum stock assessment for peer review. Atlantic States Marine Fisheries Commission Stock Assessment Report No. , Washington, D.C.

Brennan, K., and K. Fitzpatrick. 2012. Estimates of recreational landings of Spanish mackerel in the South Atlantic using the FHWAR census method. SEDAR 31-RD25. SEDAR, North Charleston, SC.

Murphy, M. D., Chagaris, D., and D. Addis. 2011. An assessment of the status of spotted seatrout in Florida waters through 2009. Florida Fish and Wildlife Conservation Commission. Fish and Wildlife Research Institute. IHR 2011-002. Available online at: <http://myfwc.com/research/saltwater/stock-assessments/finfish/>

Table 1 Estimated number of saltwater angler participants each year based on National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR) data.

Year	DE	FL	GA	MD	NJ	NC	SC	VA
1950	5,926	265,900	58,689	45,387	80,422	95,637	44,789	130,062
1951	6,110	274,187	60,518	46,801	82,928	98,618	46,185	134,116
1952	6,295	282,475	62,347	48,216	85,435	101,598	47,581	138,169
1953	6,480	290,762	64,176	49,630	87,941	104,579	48,977	142,223
1954	6,665	299,049	66,006	51,045	90,448	107,560	50,373	146,277
1955	6,849	307,337	67,835	52,459	92,954	110,541	51,769	150,330
1956	7,034	315,624	69,664	53,874	95,461	113,521	53,165	154,384
1957	7,219	323,911	71,493	55,289	97,968	116,502	54,561	158,438
1958	7,403	332,199	73,322	56,703	100,474	119,483	55,957	162,491
1959	7,895	365,676	83,528	56,631	179,199	77,808	58,865	150,237
1960	8,087	374,577	84,808	58,010	183,561	79,702	60,298	153,894
1961	8,702	414,720	87,064	58,511	104,646	113,602	64,063	142,102
1962	8,196	391,199	89,882	73,867	103,705	112,338	69,651	148,620
1963	7,332	399,699	99,412	69,019	107,664	112,518	77,411	152,512
1964	8,372	418,956	104,567	74,949	113,146	129,586	79,839	161,955
1965	8,120	442,416	117,125	82,622	116,827	143,987	86,452	172,459
1966	7,952	453,819	131,537	88,934	119,166	149,296	79,277	182,655
1967	8,911	493,510	120,220	90,285	121,613	160,514	103,793	191,333
1968	8,650	496,090	114,606	100,562	141,187	167,869	105,401	206,204
1969	9,776	521,289	114,150	86,776	149,627	175,485	118,824	217,011
1970	6,699	562,752	118,638	85,161	145,519	176,272	88,347	232,996
1971	8,196	705,592	126,846	92,728	158,116	176,823	94,301	233,635
1972	6,456	731,204	130,360	97,156	158,416	181,544	101,932	252,805
1973	10,093	772,865	134,834	101,476	173,348	199,445	107,716	272,907
1974	11,735	834,392	144,253	112,040	174,222	217,449	117,847	295,247
1975	11,581	870,670	149,037	104,120	191,718	220,220	123,102	248,908
1976	11,199	821,995	144,075	97,919	172,519	207,841	128,982	233,888
1977	11,160	739,438	133,881	113,261	154,994	190,099	121,552	242,880
1978	11,236	667,847	128,013	96,774	132,414	183,570	116,870	226,124
1979	11,414	716,261	132,393	101,510	150,084	183,452	116,626	242,359
1980	11,935	588,882	129,388	99,517	145,920	175,120	116,110	247,867
1981	12,909	581,532	142,225	87,394	150,357	179,784	122,976	279,302
1982	13,155	563,339	124,649	88,698	160,509	179,074	113,596	287,828
1983	13,819	607,404	130,869	88,414	158,133	182,963	115,678	266,607
1984	14,143	649,083	138,965	92,488	166,822	125,261	108,849	259,888
1985	14,497	684,301	142,115	168,257	170,086	170,115	115,252	277,734
1986	15,568	687,402	142,018	267,153	174,162	170,657	113,209	292,186
1987	14,895	645,483	137,284	261,254	181,873	164,443	97,684	292,464
1988	15,991	644,860	131,507	271,691	185,196	152,247	104,500	293,088
1989	15,980	632,557	125,219	195,314	183,184	161,918	108,359	233,749
1990	16,372	693,183	117,966	416,966	190,422	165,753	108,705	235,724
1991	18,370	731,261	117,930	459,474	185,774	170,443	106,321	237,249
1992	18,431	775,458	125,913	340,235	179,001	184,647	117,195	249,572
1993	17,753	745,297	129,800	334,743	181,118	202,442	123,896	273,545
1994	20,004	777,864	136,200	351,490	174,618	209,046	149,579	290,893
1995	19,991	791,477	142,395	374,674	176,954	243,362	160,257	298,034
1996	21,154	770,610	151,340	359,309	169,755	251,122	170,785	290,376
1997	19,114	782,742	127,550	232,858	167,124	253,050	182,696	296,726
1998	17,233	806,434	108,233	234,467	159,826	257,454	192,441	278,159
1999	16,137	935,546	96,422	223,613	126,737	315,623	199,857	264,757
2000	14,652	925,380	79,597	211,863	123,355	323,887	200,097	256,100
2001	13,487	871,024	59,975	204,808	128,548	351,919	217,396	246,155
2002	13,772	846,377	66,677	215,623	123,193	341,942	217,542	241,153
2003	12,834	796,720	68,861	207,467	121,697	310,993	196,827	230,220
2004	15,019	815,838	77,563	223,609	126,615	314,028	211,385	248,650
2005	13,947	767,444	79,255	215,011	125,031	284,526	191,176	237,267
2006	14,997	933,356	86,736	210,065	128,758	283,825	199,235	254,140
2007	15,579	1,008,471	92,073	177,450	123,494	290,660	196,328	266,515
2008	16,269	1,057,003	90,769	158,516	122,676	302,977	198,856	283,067
2009	17,856	1,085,113	93,441	158,725	123,630	388,134	205,280	328,299
2010	18,198	1,079,780	96,030	139,472	132,777	450,868	202,744	289,357
2011	70,484	1,059,224	95,167	136,889	136,530	470,477	208,585	305,352
2012	72,078	1,140,376	96,648	141,931	144,352	478,201	250,580	306,960
2013	67,736	1,066,988	105,798	134,786	140,387	491,486	223,108	303,023

Table 2. Estimated historical recreational annual harvest of red drum (in numbers, equivalent to Type A+B1 catch from MRIP/MRFSS) during 1950-80 for Atlantic states from NJ through FL.

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
1950	562	87	508	9,483	32,261	60,597	42,126	120,050	265,675
1951	580	90	524	9,779	33,267	62,485	43,439	123,792	273,955
1952	597	92	540	10,074	34,272	64,374	44,751	127,534	282,235
1953	615	95	556	10,370	35,278	66,263	46,064	131,275	290,516
1954	632	98	572	10,665	36,283	68,151	47,377	135,017	298,796
1955	650	101	587	10,961	37,289	70,040	48,690	138,759	307,077
1956	668	103	603	11,257	38,294	71,928	50,003	142,500	315,357
1957	685	106	619	11,552	39,300	73,817	51,316	146,242	323,637
1958	703	109	635	11,848	40,305	75,706	52,629	149,984	331,918
1959	1,253	116	634	10,954	26,247	79,641	59,955	165,098	343,899
1960	1,284	119	650	11,221	26,886	81,579	60,873	169,117	351,728
1961	732	128	655	10,361	38,322	86,673	62,493	187,241	386,604
1962	725	120	827	10,836	37,895	94,234	64,515	176,621	385,774
1963	753	108	773	11,120	37,956	104,732	71,356	180,459	407,256
1964	791	123	839	11,809	43,713	108,017	75,056	189,153	429,502
1965	817	119	925	12,574	48,571	116,964	84,070	199,745	463,786
1966	833	117	996	13,318	50,362	107,257	94,415	204,894	472,191
1967	850	131	1,011	13,951	54,146	140,425	86,291	222,814	519,619
1968	987	127	1,126	15,035	56,628	142,600	82,262	223,978	522,743
1969	1,046	143	972	15,823	59,197	160,761	81,935	235,355	555,232
1970	1,018	98	954	16,988	59,462	119,528	85,156	254,076	537,280
1971	1,106	120	1,038	17,035	59,648	127,584	91,047	318,566	616,144
1972	1,108	95	1,088	18,433	61,240	137,907	93,570	330,130	643,571
1973	1,212	148	1,136	19,898	67,279	145,732	96,781	348,939	681,126
1974	1,218	172	1,255	21,527	73,352	159,440	103,542	376,718	737,224
1975	1,341	170	1,166	18,149	74,287	166,548	106,975	393,097	761,733
1976	1,206	164	1,097	17,053	70,111	174,504	103,414	371,120	738,670
1977	1,084	164	1,268	17,709	64,126	164,452	96,097	333,847	678,747
1978	926	165	1,084	16,487	61,924	158,118	91,885	301,525	632,114
1979	1,050	168	1,137	17,671	61,884	157,788	95,029	323,383	658,109
1980	1,020	175	1,114	18,073	59,073	157,089	92,872	265,873	595,290

Table 3. Estimated historical recreational annual live-releases of red drum (in numbers, equivalent to Type B2 catch from MRIP/MRFSS) during 1950-80 for Atlantic states from NJ through FL.

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
1950	135	374	742	131	2,343	3,289	1,457	13,643	22,114
1951	139	386	766	135	2,416	3,391	1,503	14,068	22,804
1952	144	398	789	139	2,489	3,494	1,548	14,493	23,493
1953	148	409	812	143	2,562	3,596	1,593	14,918	24,182
1954	152	421	835	147	2,635	3,699	1,639	15,344	24,871
1955	156	433	858	151	2,708	3,801	1,684	15,769	25,561
1956	160	444	881	155	2,781	3,904	1,730	16,194	26,250
1957	165	456	904	159	2,854	4,006	1,775	16,619	26,939
1958	169	468	928	163	2,927	4,109	1,821	17,044	27,628
1959	301	499	926	151	1,906	4,322	2,074	18,762	28,942
1960	308	511	949	155	1,953	4,427	2,106	19,219	29,628
1961	176	550	957	143	2,783	4,704	2,162	21,278	32,753
1962	174	518	1,208	149	2,752	5,114	2,232	20,072	32,219
1963	181	463	1,129	153	2,757	5,684	2,468	20,508	33,343
1964	190	529	1,226	163	3,175	5,862	2,596	21,496	35,237
1965	196	513	1,352	173	3,527	6,348	2,908	22,699	37,717
1966	200	502	1,455	184	3,658	5,821	3,266	23,284	38,370
1967	204	563	1,477	192	3,932	7,621	2,985	25,321	42,296
1968	237	547	1,645	207	4,113	7,739	2,846	25,453	42,787
1969	251	618	1,420	218	4,299	8,725	2,834	26,746	45,111
1970	244	423	1,393	234	4,318	6,487	2,946	28,874	44,920
1971	266	518	1,517	235	4,332	6,924	3,150	36,202	53,143
1972	266	408	1,589	254	4,448	7,484	3,237	37,516	55,203
1973	291	638	1,660	274	4,886	7,909	3,348	39,654	58,660
1974	293	741	1,833	297	5,327	8,653	3,582	42,811	63,537
1975	322	732	1,703	250	5,395	9,039	3,701	44,672	65,814
1976	290	708	1,602	235	5,092	9,471	3,577	42,175	63,149
1977	260	705	1,853	244	4,657	8,925	3,324	37,939	57,908
1978	222	710	1,583	227	4,497	8,581	3,179	34,266	53,266
1979	252	721	1,661	244	4,494	8,563	3,287	36,750	55,972
1980	245	754	1,628	249	4,290	8,525	3,213	30,214	49,119