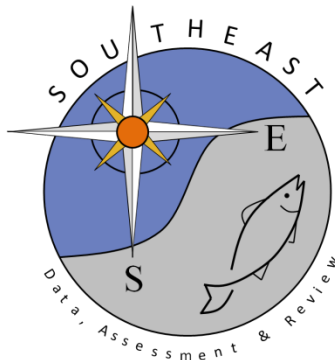


Estimates of Historical Private/Charterboat and Headboat Fishery Red Grouper Angler Catch in the Gulf of Mexico 19xx-1980

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Introduction

Marine recreational catch and effort data in the Gulf of Mexico have been collected and reported by the National Marine Fisheries Service (NMFS) since 1981. Documenting historic (pre-1981) landings in the recreational sector has been problematic because comprehensive surveys were not conducted consistently prior to 1980. Brennan and Fitzpatrick (2012) developed a method of estimating historic catch and effort based on the National Survey of Fishing, Hunting and Wildlife Associated Recreation (FHWAR 2001). This method has been accepted in recent SEDARs (SEDAR28; SEDAR33) and has been applied to a several recently assessed species. However, Brennan and Fitzpatrick (2012) did not develop estimates by separate modes. Rios (2013) partitioned recreational catch and effort into private, charterboat and headboat modes. However, the method relied on assumptions related to the development of the historic headboat and charterboat modes that are not well supported. In this paper, we provide data on the development of the headboat mode in the Atlantic, and provide estimates of historical recreational angler catch for the SEDAR42 assessment of red grouper Gulf of Mexico for the private/charterboat and headboat sectors using a modification of method proposed by Rios (2013) and Brennan and Fitzpatrick (2012).

Data Sources

1. *Marine Recreational Fisheries Statistics Survey and Marine Recreational Information Program, National Marine Fisheries Service*

The NMFS has estimated catch and effort throughout the Gulf (except Texas) using the Marine Recreational Fisheries Statistics Survey (MRFSS), between 1981 and 2003, and the Marine Recreational Information Program (MRIP) since 2004. MRFSS and MRIP provide estimates in two-month periods (waves) by fishing mode (shore, private/rental boat, charterboat, or headboat/charterboat combined) and area of fishing (inshore, state Territorial Seas, U.S. Exclusive Economic Zone). Together, MRFSS and MRIP provide a time-series of estimated catch per unit effort, total effort, landings, and discards between 1981 and 2013. The exclusion of the shore mode and the combination of the private and charterboat modes is detailed in SEDAR38-DW Report (2014).

2. Southeast Region Headboat Survey

Starting in 1986, the NMFS, Southeast Fisheries Science Center (SEFSC), Beaufort (NC) laboratory initiated the Southeast Regional Headboat Survey (SERHS) to collect catch and effort data on headboats in the Atlantic and Gulf of Mexico (Brennan 2012). Therefore, estimates of headboat angler trips from MRFSS and MRIP are not available after 1985. The survey first began as a local (North Carolina, South Carolina) survey in 1972 and was expanded to include vessels throughout the Atlantic (Georgia, Florida East Coast) in the late 1980's and finally into the Gulf of Mexico in 1986. In this study we use numbers (i.e., counts of registered vessels) of headboats in specific ports through time as a proxy for headboat effort between 1972 and 1986.

3. The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, U.S. Fish and Wildlife Service and U.S. Census Bureau

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR) is one of the oldest continuous recreational surveys in the U.S. (U.S. Fish and Wildlife Service and U.S. Census Bureau, 2001). Among other things, the FHWAR survey gathers information about the number of anglers in the U.S., including the frequency of angler participation and time spent fishing. The FHWAR Surveys published in 1991, 1996, 2001 and 2006 provide summary tables (Comparison of Major Findings of the National Surveys: 1955 to 1985) of U.S. population estimates, along with estimates of fishing participation and effort from surveys conducted by the USFWS every five years from 1955 to 1985.

Methods

We used FHWAR survey regional estimates of anglers, saltwater anglers, and saltwater days combined with MRFSS/MRIP effort and catch per unit effort (CPUE) to estimate regional saltwater angler effort, and recreational catch as described by Brennan and Fitzpatrick (2012). Briefly, ratios of U.S. saltwater anglers to total U.S. anglers were applied to the number of anglers by region to obtain saltwater anglers by region. Ratios of saltwater anglers by region to U.S. saltwater anglers were applied to total U.S. saltwater days to yield saltwater days by region. Because the survey only provides a combined estimate of effort for the state of Florida, MRIP estimates of effort from 1981-1985 for west Florida and East Florida were used to partition Florida total effort from the FHWAR survey. Red grouper are geographically restricted to the eastern Gulf of Mexico. Therefore, only FHWAR effort estimates from Florida, Alabama and Mississippi were used to estimate red grouper harvest. Estimates of angler participation from the FHWAR surveys conducted every five years between 1955 and 1985 are

reproduced in Table 1. Linear interpolation was used to estimate effort in non-survey years. Because methods were not comparable between the FHWAR and MRFSS surveys, the mean of the 80 and 85 effort estimates from the FHWAR survey were scaled to the mean of the 1981-1985 MRFSS values. To obtain landings, adjusted effort was multiplied by average catch rates calculated from early (1981-1985) MRFSS/MRIP estimates. Historical effort was estimated by fishing mode (private/charterboat and headboat). Encounters of red grouper from shore are rare; therefore, historical effort from the shore mode was not estimated. Red grouper are also geographically restricted to the eastern Gulf of Mexico. We, therefore, provide estimates for the total Gulf of Mexico as well as the eastern Gulf of Mexico (Louisiana/Alabama and Florida). FHWAR saltwater angler trends (1955-1985) were used to estimate historical landings for the private/charterboat fishing modes (Table 2).

Scant information exists on the development of the charterboat fishery in the Gulf of Mexico. For the purpose of estimating historic catch and effort, the relative contribution of charterboat to the total of private and charterboat was assumed constant. This assumption differs from the method developed by Rios (2013), which assumed historic charterboat effort was constant. Linear interpolation was used to estimate effort and landings for years when FHWAR surveys were not conducted. Since historical effort was only lacking prior to 1981, the FHWAR effort estimates from 1981 to 1985 were excluded. In recent red grouper assessments, catches from private and charterboat modes were combined. Therefore, the combination of catch across these fleets is consistent with current stock assessment procedures.

The development of the headboat fishery mode survey was described earlier. Headboat fleet effort in the Southeast US Atlantic Ocean is presented in Table 2. For estimation purposes, we assumed the development of the headboat fleet in the Gulf of Mexico mirrored the development in North and South Carolina. This is in contrast to Rios (2013), who assumed constant headboat angler effort between 1950 and 1980. Estimation of headboat landings prior to 1972 is even more problematic. Although anecdotal and published reports of historic point estimates of headboat effort in the Gulf of Mexico are available, repeated surveys in the same regions were insufficient to develop proxies for effort based on vessel numbers through time (see Rios 2013 for additional documentation). Using information developed by Hudson (2013) in combination with information derived from the SERHS, an effort time series was constructed for the Atlantic (Table 3). Overlapping years within the time series (among regions) were used to estimate a continuous region-specific effort trend in the Atlantic. We then assumed the development of the headboat mode in the Gulf of Mexico was similar to the development in the Atlantic, and used Atlantic values as proxies for the Gulf of Mexico.

Results

Estimates of historical private/charterboat recreational angler effort in the eastern Gulf of Mexico between 1950 and 1980 are provided in Table 4. Red grouper historic catch in relation to recent catch and estimates from SEDAR12 (Walter 2006), rescaled to SEDAR42 catch estimates are plotted in Figure 1. Estimates of historical private/charterboat recreational angler effort in the eastern Gulf of Mexico between 1950 and 1980 are provided in Table 5. Historic red grouper catch estimated using the historic headboat fleet size as an effort proxy are provided in Table 6. Historic red grouper headboat catch in the Gulf of Mexico estimated using an historic series of the number of Headboats from 1946-1972 (Hudson

2014) and 1973-1980 (Dixon and Huntsmen 1986; Brennan 2010) as an estimate of effort for years prior to 1981 are plotted with current estimates from the Marine Recreational Intercept Program (MRIP) from 1981-1985 and the Southeast Regional Headboat Survey (SRHS) from 1986-present in Figure 2.

Conclusions

The time-series of historical effort estimated here can be used to inform the Gulf of Mexico red grouper assessment models. The adjusted FHWAR and Historic Headboat Effort Proxy method may be used to estimate historical recreational effort for other species, and when appropriate, the method could be modified to include estimates for shore effort, Western Gulf of Mexico effort, or to the Atlantic. The outlined method presents an improved method for estimating historical recreational catch and effort inputs needed for stock evaluations of other species in the Gulf of Mexico.

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Table 1.—Combined private and charter fleet effort in angler trips in the Eastern and Total Gulf of Mexico (Alabama, Mississippi and West Florida) estimated from the National Survey of Fishing, Hunting and Wildlife Associated Recreation (FHWAR). Gray values are survey estimates. Other estimates are interpolated.

Year	Total Gulf	Eastern Gulf
1945	0	0
1946	475,373	688,400
1947	1,918,066	1,376,797
1948	3,360,758	2,065,194
1949	4,803,451	2,753,591
1950	6,246,144	3,441,988
1951	7,688,836	4,130,385
1952	9,131,529	4,818,782
1953	10,574,222	5,507,179
1954	12,016,914	6,195,576
1955	13,459,607	6,883,973
1956	14,902,300	7,320,641
1957	16,344,992	7,757,308
1958	17,787,685	8,193,976
1959	19,230,378	8,630,643
1960	20,673,070	9,067,311
1961	21,311,174	9,090,933
1962	21,949,277	9,114,556
1963	22,587,380	9,138,179
1964	23,225,484	9,161,801
1965	23,863,587	9,185,424
1966	24,627,200	9,406,594
1967	25,390,813	9,627,764
1968	26,154,427	9,848,935
1969	26,918,040	10,070,105
1970	27,681,653	10,291,275
1971	30,241,527	10,653,220
1972	32,801,400	11,015,165
1973	35,361,274	11,377,111
1974	37,921,148	11,739,056
1975	40,481,022	12,101,001
1976	40,630,369	12,789,369
1977	40,779,717	13,477,737
1978	40,929,065	14,166,105
1979	41,078,412	14,854,473
1980	41,227,760	15,542,841

Table 2.—Continued,

1981	41,681,152	15,689,018
1982	42,134,545	15,835,196
1983	42,587,937	15,981,373
1984	43,041,330	16,127,551
1985	43,494,723	16,273,728

Table 2.—Historic count of the number of Headboats in North and South Carolina modified from Brennan (2010). Numbers were uses as a proxy for historic Headboat effort in the Gulf of Mexico.

Year	Number
1974	21
1975	29
1976	28
1977	26
1978	25
1979	28
1980	28
1981	25
1982	26
1983	23
1984	25
1985	26

Table 3.—Historic count of the number of Headboats in the Ponce Inlet area of Florida (Hudson 2014).
Numbers were uses as a proxy for historic Headboat effort in the Gulf of Mexico.

Year	Headboat Number
1935	0
1945	0
1955	3
1965	13
1970	19
1985	11

Table 4.—Historic private/charter landings (numbers of fish) of Red Grouper in the Gulf of Mexico using FHWAR effort estimates referenced to the average of 1981-1985 MRFSS Gulf of Mexico estimates.

Year	Private/Charter Landings (numbers)
1945	0
1946	11,908
1947	23,816
1948	35,724
1949	47,632
1950	59,540
1951	71,448
1952	83,356
1953	95,264
1954	107,172
1955	119,080
1956	126,634
1957	134,187
1958	141,741
1959	149,294
1960	156,848
1961	157,257
1962	157,665
1963	158,074
1964	158,483
1965	158,891
1966	162,717
1967	166,543
1968	170,369
1969	174,195
1970	178,020
1971	184,281
1972	190,542
1973	196,803
1974	203,064
1975	209,325
1976	221,233
1977	233,140
1978	245,048
1979	256,955
1980	268,863
1981	110,626

Table 5.—Historic red grouper catch (numbers of fish) estimated using the historic Ponce Inlet headboat fleet size (Hudson 2014) as an effort proxy.

Year	Headboat Catch
1945	0
1946	0
1947	1,911
1948	1,911
1949	3,822
1950	3,822
1951	5,732
1952	5,732
1953	5,732
1954	7,325
1955	8,917
1956	10,509
1957	12,102
1958	13,694
1959	15,286
1960	16,879
1961	18,471
1962	20,063
1963	21,656
1964	23,248
1965	24,840
1966	27,133
1967	29,426
1968	31,719
1969	34,012
1970	36,305
1971	35,213

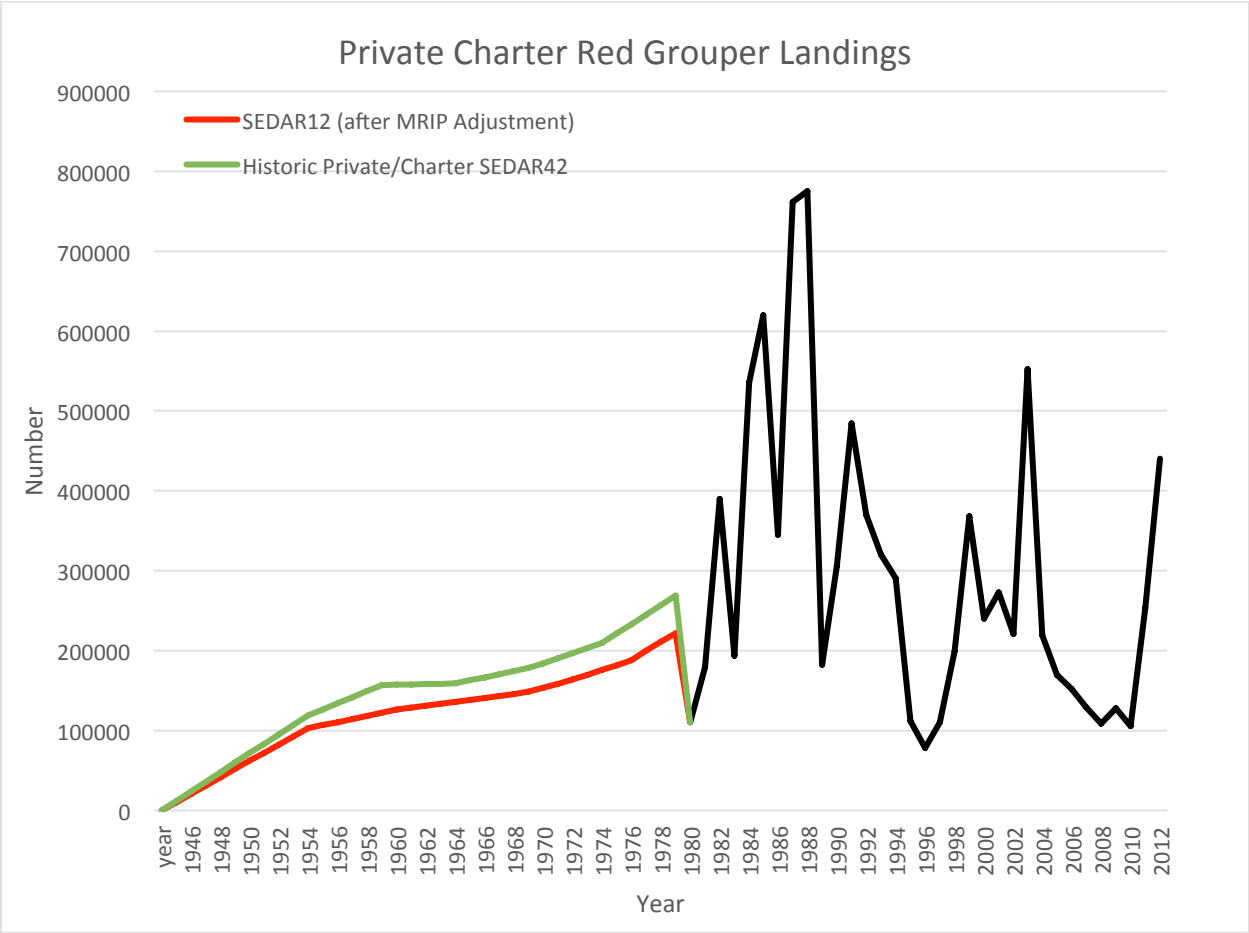


Figure 1.—Historic Private/Charter recreational Red Grouper catch (number) in the Gulf of Mexico compared to SEDAR12 estimates.

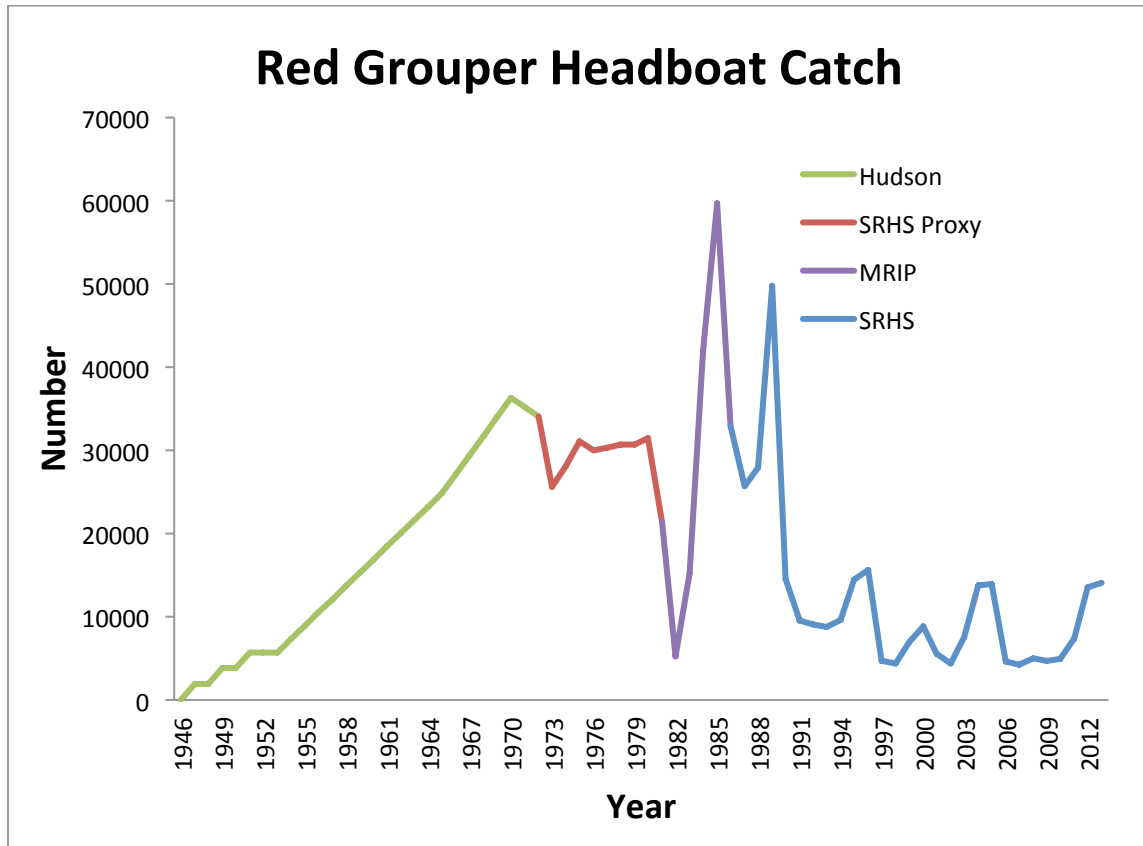


Figure 2.—Historic Headboat Red Grouper catch (numbers) in the Gulf of Mexico estimated using an historic series of the number of Headboats from 1946-1972 (Hudson 2014) and 1973-1980 (Brennan 2010) as an estimate of effort for years prior to 1981. Estimates are plotted with current estimates from the Marine Recreational Intercept Program (MRIP) from 1981-1985 and the Southeast Regional Headboat Survey (SRHS) from 1986-present.