Shrimp trawl index of abundance for Gulf of Mexico red snapper, 1967-1989

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Introduction

Historically, commercial size red snapper were taken as bycatch in shrimp trawls. These red snapper were sold commercially prior to Amendment 1 to the Reef Fish Fishery Management Plan taking effect in 1990 (GFMFC 1989). The catch rates of these commercial size red snapper in shrimp trawls should reflect the relative abundance of red snapper, because red snapper are not targeted by the shrimp fishery. Goodyear (1995) constructed a shrimp trawl index of abundance, which was included in the 1995 Gulf of Mexico red snapper assessment.

The shrimp trawl index was not included in the SEDAR 7 assessment of red snapper (SEDAR 2005), because the Accumulated Landings System (ALS) had been edited in the intervening years since the 1995 assessment, and the shrimp trawl bycatch series used by Goodyear to build the index could not be reconstructed.

An attempt was made to reconstruct Goodyear's shrimp trawl bycatch series for the SEDAR 31 assessment. The shrimp trawl bycatch series was successfully reconstructed once Texas landings assigned to unclassified gear from 1978-1983 were proportioned to missing trawl and handline gears (see Methods for details). This allowed the shrimp trawl index to be constructed for possible inclusion in the SEDAR 31 assessment.

Methods

Shrimp trawl landings were compiled from ALS for 1967 through 1989. Commercial landings in Texas from 1978 to 1983 were classified as either gear code 0 or 215 (i.e., unclassified gear or shrimp trawl, respectively). No vertical (hand or electric) or longline gear was present for TX landings. To account for the missing gears, apportioning of Texas landings by gear for 1979 through 1983 was performed using proportions presented in Parrack and McClellan (1986). The proportions used were an annual accumulation of proportions by age and gear for the western Gulf of Mexico. Proportions for 1978 were not available, and as a best estimate the proportions from 1979 were used for 1978. Once the Texas landings for 1967 through 1989 were reclassified, the shrimp trawl bycatch series produced from ALS was similar to the shrimp trawl bycatch series used in the 1995 assessment (Table 1, Figure 1). The majority of the trawl landings (i.e., 97% on average) come from shrimp trawls, but low levels of landings are reported for crab and fish trawls. It is unknown whether or not the shrimp trawl bycatch series from the 1995 assessment included these other trawl gears.

Estimates of shrimp effort were generated by the NMFS Galveston Lab using their SN-pooled model (Nance 2004). The SEDAR 31 Data Workshop panel concluded that bycatch of red snapper in the shrimp fishery occurs primarily in depths greater than 10 fm (SEDAR 2012). Therefore, only shrimp effort estimates for depths greater than 10 fm were used in this analysis (Table 2, Figure 2). As expected, the majority of shrimp effort (i.e., 71% on average) is concentrated in the western Gulf.

No additional information was available from ALS with which to standardize the shrimp trawl index. Therefore, only a nominal index of abundance was constructed, as was done in the 1995 assessment (Goodyear 1995). Two indices were constructed for this analysis: 1) using all of the commercial trawl landings, and 2) using only the shrimp trawl landings.

Results

The shrimp trawl indices of abundance are reported in Tables 3 and 4 and in Figure 3. Relative trends in the index based on all trawl landings and the index based on shrimp trawl landings were nearly identical. Both of these indices show similar trends to the index used in the 1995 assessment. All of the indices show red snapper abundance to vary without trend from 1967 to 1973. After 1973, red snapper abundance declines, with a brief stable period between 1980 and 1983.

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Tables

Table 1. Gulf of Mexico red snapper landings in commercial trawls, 1967-1989. Landings are reported in pounds whole weight.

	Gear			
Year	Crab Trawl	Fish Trawl	Shrimp Trawl	Total
1967			481,700	481,700
1968		2,500	601,300	603,800
1969		5,000	457,100	462,100
1970	1,100	5,900	621,800	628,800
1971		10,100	484,000	494,100
1972		2,500	631,756	634,256
1973		2,850	694,312	697,162
1974		4,600	559,461	564,061
1975		3,500	320,219	323,719
1976		1,100	294,117	295,217
1977		12,350	275,127	287,477
1978		9,040	174,487	183,527
1979		3,520	141,957	145,477
1980		1,830	184,866	186,696
1981		1,718	210,945	212,663
1982		1,856	173,481	175,337
1983		3,812	245,771	249,583
1984		3,052	144,290	147,342
1985		1,686	74,174	75,860
1986		1,633	66,587	68,220
1987		4,632	51,445	56,077
1988		14,346	73,241	87,587
1989		2,266	33,081	35,347

Table 2. Gulf of Mexico shrimp effort for depths greater than 10 fm by year and area, 1967-1989. Effort is reported in vessel days fished.

	Statistical Grid			
Year	1-9	10-12	13-17	18-21
1967	16,663	6,470	13,270	47,314
1968	17,617	9,637	13,526	39,088
1969	18,227	8,353	17,538	52,727
1970	18,482	7,710	19,231	44,232
1971	15,167	7,400	16,811	49,448
1972	15,588	8,750	20,683	51,667
1973	19,799	7,029	16,799	40,890
1974	19,707	6,243	15,074	41,844
1975	19,622	6,257	12,356	41,503
1976	16,754	7,251	26,863	35,798
1977	21,523	6,921	22,908	30,764
1978	17,035	4,949	32,798	30,011
1979	18,093	4,532	31,430	34,054
1980	11,119	2,733	12,097	27,591
1981	18,601	3,145	17,582	43,731
1982	16,680	4,989	20,856	41,765
1983	18,336	5,400	17,287	33,280
1984	20,256	7,593	19,530	44,874
1985	19,139	7,737	20,784	41,808
1986	22,075	5,784	32,518	53,592
1987	19,403	3,171	29,878	58,328
1988	15,817	5,466	28,869	56,582
1989	16,008	9,790	22,614	54,362

Table 3. Shrimp trawl index of abundance for Gulf of Mexico red snapper, 1967-1989. Index constructed using all commercial trawl landings.

Year	Catch 1000 lbs	Catch MT	Effort Days	Effort 1000 Days	CPUE Nominal	CPUE Relative
1967	482	218	83717	83.7	2.609915	1.589464
1968	604	274	79868	79.9	3.429137	2.088379
1969	462	210	96845	96.8	2.164336	1.318102
1970	629	285	89655	89.7	3.181291	1.937438
1971	494	224	88827	88.8	2.523119	1.536605
1972	634	288	96688	96.7	2.975491	1.812104
1973	697	316	84518	84.5	3.74156	2.278647
1974	564	256	82869	82.9	3.087454	1.88029
1975	324	147	79737	79.7	1.841504	1.121494
1976	295	134	86667	86.7	1.545097	0.94098
1977	287	130	82116	82.1	1.587964	0.967086
1978	184	83	84793	84.8	0.981768	0.597906
1979	145	66	88110	88.1	0.748922	0.456101
1980	187	85	53539	53.5	1.581715	0.96328
1981	213	96	83058	83.1	1.161384	0.707295
1982	175	80	84290	84.3	0.943542	0.574627
1983	250	113	74303	74.3	1.523606	0.927891
1984	147	67	92253	92.3	0.724458	0.441202
1985	76	34	89468	89.5	0.384601	0.234226
1986	68	31	113968	114.0	0.271515	0.165355
1987	56	25	110780	110.8	0.229609	0.139834
1988	88	40	106734	106.7	0.372221	0.226686
1989	35	16	102774	102.8	0.156003	0.095007

Table 4. Shrimp trawl index of abundance for Gulf of Mexico red snapper, 1967-1989. Index constructed using shrimp trawl landings only.

Year	Catch 1000 lbs	Catch MT	Effort Days	Effort 1000 Days	CPUE Nominal	CPUE Relative
1967	482	218	83717	83.7	2.609915	1.589464
1968	601	273	79868	79.9	3.414939	2.079732
1969	457	207	96845	96.8	2.140918	1.30384
1970	622	282	89655	89.7	3.145876	1.91587
1971	484	220	88827	88.8	2.471543	1.505195
1972	632	287	96688	96.7	2.963763	1.804961
1973	694	315	84518	84.5	3.726264	2.269332
1974	559	254	82869	82.9	3.062275	1.864956
1975	320	145	79737	79.7	1.821594	1.109369
1976	294	133	86667	86.7	1.53934	0.937474
1977	275	125	82116	82.1	1.519745	0.92554
1978	174	79	84793	84.8	0.933409	0.568455
1979	142	64	88110	88.1	0.730801	0.445065
1980	185	84	53539	53.5	1.566211	0.953838
1981	211	96	83058	83.1	1.152002	0.701581
1982	173	79	84290	84.3	0.933554	0.568544
1983	246	111	74303	74.3	1.500335	0.913719
1984	144	65	92253	92.3	0.709451	0.432063
1985	74	34	89468	89.5	0.376053	0.22902
1986	67	30	113968	114.0	0.265016	0.161397
1987	51	23	110780	110.8	0.210643	0.128284
1988	73	33	106734	106.7	0.311255	0.189557
1989	33	15	102774	102.8	0.146002	0.088917

Figures

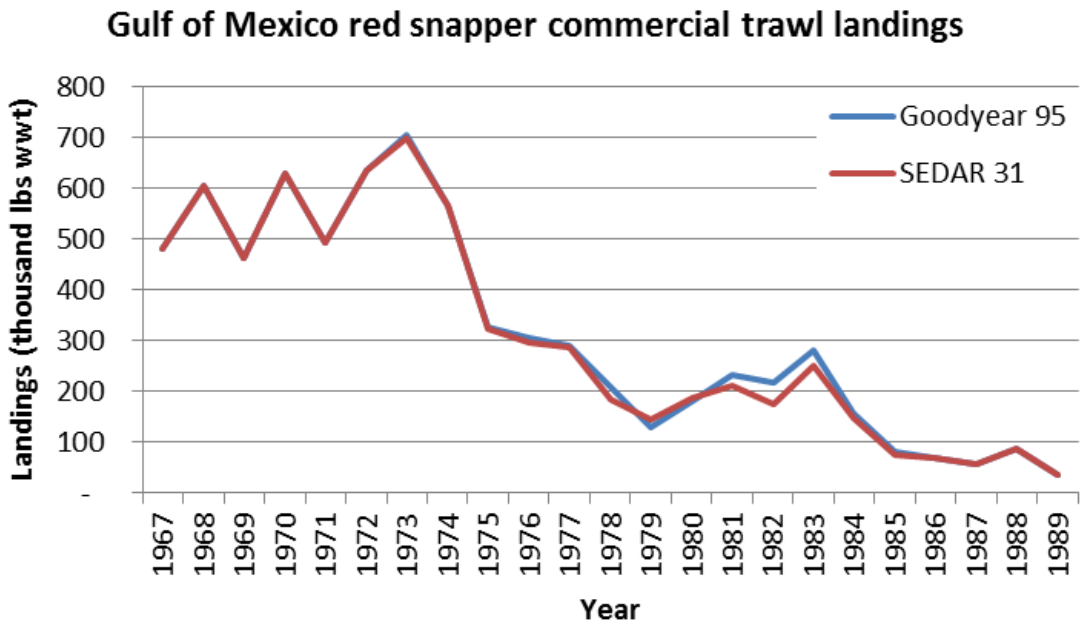

Figure 1. Gulf of Mexico red snapper commercial trawl landings, 1967-1989. Landings are reported in thousand pounds whole weight.

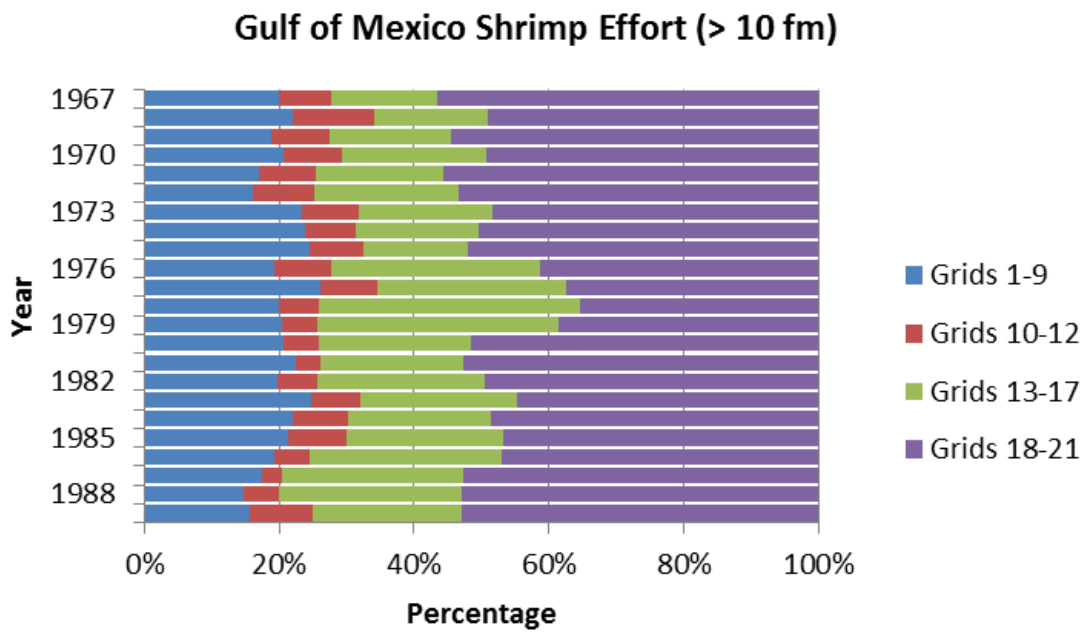

Figure 2. Percentage of Gulf of Mexico shrimp effort by area, 1967-1989. Effort is for depths greater than 10 fm.

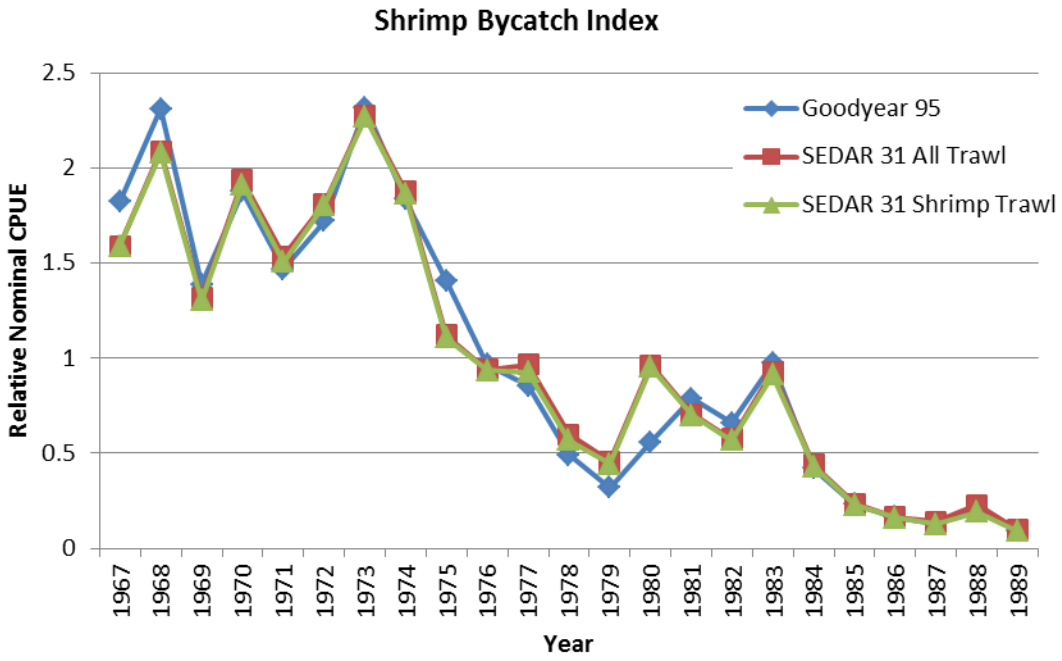

Figure 3. Shrimp trawl indices of abundance for Gulf of Mexico red snapper, 1967-1989.