

Reported commercial landings of red drum in Florida and estimated annual length and age composition.

Michael D. Murphy  
Florida Fish and Wildlife Conservation Commission  
Fish and Wildlife Research Institute  
St. Petersburg, Florida

### *Reported Landings*

Commercial harvest information was obtained from the FWC's Marine Fisheries Information System data and from the Fisheries Statistics Division of the National Marine Fisheries Service (NMFS) for the years 1950-1988. Earlier records came from various publication of Fisheries Statistics of the United States. No commercial landings have been reported for Florida since 1988 when the sale of native-caught red drum was prohibited. These data include annual landings tallied from monthly dealer reports collected by the NMFS during the period 1950-85<sup>1</sup> and trip-specific commercial landings reported within the FWC trip ticket program during the period 1986-1988. Florida trip tickets examined included edited batches 1 – 981.

Prior to 1986, landings of red drum were reported to the NMFS through monthly dealer reports made by major fish wholesalers in Florida. Since 1986, information on what is landed and by who in Florida's commercial fisheries comes from the FWC's Marine Resources Information System, commonly known as the trip-ticket program. Wholesale dealers are required to use trip tickets to report their purchase of saltwater products from commercial fishers. Conversely, commercial fishers must have Saltwater Products Licenses to sell saltwater products to licensed wholesale dealers. In addition, red drum became a "restricted species" in late 1987 so only fishers who had Restricted Species Endorsements on their Saltwater Products License qualified to sell red drum (though commercial fishing effectively ended beginning in 1988). Each trip ticket includes the Saltwater Products License number, the wholesale dealer license number, the date of the sale, the gear used, trip duration (time away from the dock), area fished, depth fished, number of traps or number of sets where applicable, species landed, quantity landed, and price paid per pound. During the early years of the program some data field were deleted from the records, e.g. Saltwater Products License number for much of 1986, or were not collected, e.g., gear used was not a data field until about 1991.

Annual commercial harvest of red drum in Florida was sporadically available between 1889 and the late 1920's and during the 1940's but consistently since 1950. There was a clear increase in landings between the historic period and the early 1980's; landings averaged 0.07 million pounds during 1927-1940 and 0.13 million pounds during 1975-1984 (Table 1, Fig. 1). During the mid-1980's the commercial fisheries faced tightening restrictions resulting in declining landings prior to being prohibited after 1987.

The dominant commercial fishing gear used to capture red drum had consistently been gill nets since at least the 1960's on both coasts. After the early 1960's gill-net-caught red drum have generally made up more than 70% of the landings on the Atlantic coast (Table 2).

---

<sup>1</sup> See <http://www.st.nmfs.gov/st1/commercial/index.html>.

### *Biostatistics*

No formal biostatistical sampling occurred for red drum landed in Florida's commercial fishery. The weights, lengths and ages of red drum comprising the commercial landings were not routinely collected by the NMFS-developed Trip Interview Program (TIP). Only nineteen records of red drum appear in the NMFS Trip Interview Program files for Florida, during the period 1991-2002 when the commercial fishery was closed. These were likely from recreational tournaments that are occasionally sampled within the TIP (S. Brown, FWC-FWRI, pers. comm.). Biostatistics data were opportunistically collected during a red drum life history study conducted during the period 1981-1983 (Murphy and Taylor 1990) and during supplemental sampling of commercial gears in 1987 and 1988 while conducting tagging operations (Table 3). Generally, individual fish lengths, gear type and date were recorded at the very least, with more indepth sample processing for sex, weight, and aging parts for the life history research and for mortalities observed during tagging operations.

Biostatistical sampling intensity for commercially landed or caught red drum was highest during the early 1980's when catches made using gill nets, trammel nets, and hook-and-line gear were sampled each year (Table 2). For samples obtained during tagging programs, where commercial fishermen were utilized to obtain large numbers of red drum, some fish would not have been landed due to size-limit restrictions. In this analysis, it was assumed that all red drum outside the minimum/maximum size limit at the time would have been released alive and these were not tallied in Table 1. The regulatory battles over red drum during the mid-1980's heightened awareness of changing fishing rules so this assumption is probably valid.

Mean weight estimates were not available for landings made during 1950-1980. This missing information was filled by calculating and applying the mean gear-specific weights for 1981-1982 to the annual gear-specific landings prior to 1981. Several year-gear combinations during 1981-1988 were also missing, requiring varying degrees of interpolation or extrapolation from years with these data (Table 3).

Lengths samples of landed red drum were derived from the same length data used to determine the mean weights for the landings, although length frequency estimates were restricted to the period 1981-1988. All extrapolations and interpolations required for the estimation of mean weights were carried forward in the allocation of the landings into inch-specific total length classes within each gear category (Table 4).

Age-length keys could not be adequately developed from the commercial gear-specific samples each year so a composite age length key comprised of all commercially-caught, aged and measured red drum during 1981-1988 was applied to the annual length frequencies to estimate the age composition of the commercial landings each year (Table 5). In addition, age-length data from angler catches was included to fill in missing information in the key: age 10 and age 12 fish. Red drum ages were determined from well-established protocol for thin-sectioning and reading red drum sagittae. Ages were, by convention, incremented on January 1 each year after completion of their first year to align ages with other calendar-based statistics. For fall-spawned red drum, this meant that their assignment to age 1 occurred at about 15 months of true chronological age.

Biases in the biostatistical sampling are likely but difficult to determine. The fortuitous nature of sampling and the low number of trips sampled for fish could have imparted an unknown bias to the recorded lengths and weights attributed to the

commercial landings. The smoothing effect of the combined-samples age-length key could also obscure fluctuations in recruitment not strongly apparent in the estimated length frequencies. A potentially serious flaw in these data are the lack of any measure of the red drum mortalities attributed to regulatory discards. However, it seems likely that there were few discards before 1985 because of the liberal regulations (12 inch fork length minimum size) and good market price. After 1985 the commercial fishery had a greater likelihood for discards due to regulations.

#### *Estimated catch at age*

The estimated annual numbers of red drum represented by the reported landings from Florida's Atlantic coast declined more rapidly during the 1980's than the landings by weight due to a general increase in mean size in response to increasing minimum size limits (Table 6). The estimated number of red drum landed each year prior to 1981 was related to landings by a scalar (average 1981-83 mean weight) since there was no mean weight information during this time (Table 7).

The length distribution of the commercial landings of red drum also became more restricted with the increase in minimum size limit during the mid 1980's. During the early 1980's red drum down to 10 inches total length were seen in the commercial landings but this changed to larger sizes as minimum size limits increased and reduced fishing pressure allowed for expansion of the length structure in the stock (Table 8). Commercial landings length frequencies showed a bimodal pattern, reflecting the rapid growth of red drum and seasonal changes in their availability. With availability greatest during the fall and winter, model-age-0 and 1 red drum 12-18 inches long and age-2 red drum 22-25 inches long made up a large portion of the overall landings on each coast each year. As the minimum size limit was raised toward the end of the commercial fishery, age-0 red drum declined in the landings.

The number of red drum landed from each age group during 1981-1988 was estimated by applying age-length keys to estimated length frequencies to generate year-specific landings age frequencies (Table 9).

#### *Possible refinements*

The Florida-specific commercial catch-at-age for red drum is based on a limited amount of biostatistics data within each of the four recognized gear categories. If there are similarities in landings lengths with other southern region commercial fisheries, it may be wise to combine the Florida data with these before estimating regional commercial catch at age.

Table 1. Commercial landings (lbs) for red drum on the Atlantic coast of Florida during 1950-1988 by collapsed gear categories. Landings for various types of similar gears were combined into these four categories, though cast-net-caught fish were included with gill-net gear and spear-caught fish were included in hook-and-line gear.

Atlantic					
Year	Gill Net	Hook&Line	Seine	Trammel Net	Totals
1950	98,500	67,900	22,800	0	189,200
1951	32,300	52,600	50,100	500	135,500
1952	42,200	47,500	35,200	5,200	130,100
1953	68,200	29,000	29,200	1,000	127,400
1954	78,500	48,900	11,400	0	138,800
1955	55,900	27,900	9,800	2,600	96,200
1956	59,500	34,800	9,600	2,800	106,700
1957	38,300	53,100	14,600	2,000	108,000
1958	21,600	54,800	25,900	0	102,300
1959	44,700	76,100	10,300	100	131,200
1960	47,500	67,200	14,300	0	129,000
1961	71,700	20,200	21,400	1,200	114,500
1962	94,500	38,400	14,300	2,100	149,300
1963	89,500	32,200	11,500	1,000	134,200
1964	65,100	29,700	19,500	4,700	119,000
1965	83,400	38,800	24,100	0	146,300
1966	82,600	35,400	33,500	1,500	153,000
1967	91,100	30,400	22,100	3,500	147,100
1968	107,600	27,900	28,500	3,000	167,000
1969	82,800	25,300	8,900	2,000	119,000
1970	111,800	24,400	9,600	1,000	146,800
1971	67,600	11,100	4,300	2,200	85,200
1972	95,800	28,700	3,900	0	128,400
1973	133,000	25,900	6,100	1,500	166,500
1974	89,900	33,100	11,700	2,600	137,300
1975	57,100	19,400	5,900	900	83,300
1976	76,400	22,300	6,700	600	106,000
1977	72,600	20,300	8,700	1,900	103,500
1978	87,100	16,900	600	100	104,700
1979	62,200	27,100	500	2,900	92,700
1980	159,896	29,324	257	1,223	190,700
1981	215,132	41,088	519	1,635	258,374
1982	110,028	27,704	479	959	139,170
1983	79,084	24,817	516	747	105,164
1984	93,788	28,797	2,717	5,583	130,885
1985	63,651	21,214	614	3,450	88,929
1986	59,323	17,308	439	0	77,070
1987	31,618	9,387	1,988	0	42,993
1988	131	153	0	0	284

Table 2. Number of commercial trips sampled for biostatistical information on landed red drum and the numbers of fish sampled for length (N), whole weight (Wt), or age structure (Age) each year on the Atlantic coast of Florida during the period 1981-1988. The general gear categories were gill net, hook and line, seine, and trammel net.

Atlantic

	Gill Net				Hook and Line				Seine				Trammel Net			
	Trips	N	Wt	Age	Trips	N	Wt	Age	Trips	N	Wt	Age	Trips	N	Wt	Age
1981	19	649	32	82	2	8	4	4	0	0	0	0	4	90	15	15
1982	36	1,149	38	233	11	80	34	44	2	51	0	0	12	377	19	60
1983	6	108	11	21	0	0	0	0	2	15	0	1	8	276	6	65
1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	5	14	31	40
1988	0	0	0	0	0	0	0	0	0	0	0	0	4	10	28	28

Table 3. Estimated observed mean weights (lbs) from all red drum measured for length (and converted to weight) or directly weighed for whole weight. The ‘Used’ mean weights were those actually applied to the estimated gear-specific landings to calculate the numbers of landed red drum by gear. Differences between the observed and ‘Used’ were due to inadequate sampling or sampling that was known or judged to be biased relative to the commercial landings.

Atlantic

	Gill Net			Hook and Line			Seine			Trammel Net		
	N	Obs	Used	N	Obs	Used	N	Obs	Used	N	Obs	Used
1981	649	2.808	2.808	8	19.148	3.98	0		4.759	90	7.154	7.154
1982	1,149	3.731	3.731	80	11.898	6.55	51	4.277	4.277	377	9.416	9.416
1983	108	2.448	2.448	0		5.265	15	6.397	4.277	276	7.213	7.213
1984	0		2.996	0		5.265	0		4.277	0		5.483
1985	0		2.996	0		5.265	0		4.277	0		5.483
1986	0		2.996	0		5.265	0		4.277	0		5.483
1987	0		2.996	0		5.265	0		4.277	14	3.754	3.754
1988	0		2.996	0		5.265	0		4.277	10	4.645	4.645

Table 4. Observed and estimated length frequencies, total length in inches, for red drum sampled from the commercial landings made along the Atlantic coast of Florida during 1981-1988. Estimated length frequencies were made for time periods when inadequate samples were taken from the landings.

Gill Net									Hook and Line								
TL"	81	82	83	84	85	86	87	88	TL"	81	82	83	84	85	86	87	88
8	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	9	0	2	1	1	0	0	0	0
10	0	9	0	3	0	0	0	0	10	0	14	7	7	0	0	0	0
11	0	51	0	17	0	0	0	0	11	0	22	11	11	0	0	0	0
12	9	59	0	23	0	0	0	0	12	4	21	13	13	0	0	0	0
13	17	89	1	36	36	0	0	0	13	14	1	8	8	8	0	0	0
14	50	119	1	57	57	0	0	0	14	19	0	10	10	10	0	0	0
15	72	136	7	72	72	0	0	0	15	19	0	10	10	10	0	0	0
16	86	108	28	74	74	0	0	0	16	12	0	6	6	6	0	0	0
17	101	71	21	64	64	0	0	0	17	4	4	4	4	4	0	0	0
18	92	66	19	59	59	59	59	59	18	2	1	2	2	2	2	2	2
19	50	33	16	33	33	33	33	33	19	0	4	2	2	2	2	2	2
20	31	19	5	18	18	18	18	18	20	0	2	1	1	1	1	1	1
21	16	19	0	12	12	12	12	12	21	0	2	1	1	1	1	1	1
22	17	22	0	13	13	13	13	13	22	0	5	3	3	3	3	3	3
23	16	15	3	11	11	11	11	11	23	0	4	2	2	2	2	2	2
24	14	39	0	18	18	18	18	18	24	4	2	3	3	3	3	3	3
25	25	35	1	20	20	20	20	20	25	1	4	3	3	3	3	3	3
26	12	43	2	19	19	19	19	19	26	1	10	6	6	6	6	6	6
27	13	50	0	21	21	21	21	21	27	0	8	4	4	4	4	4	4
28	4	37	2	14	14	14	14	0	28	0	10	5	5	5	5	5	0
29	10	48	1	20	20	20	20	0	29	0	12	6	6	6	6	6	0
30	10	22	1	11	11	11	11	0	30	1	5	3	3	3	3	3	0
31	1	12	0	4	4	4	4	0	31	1	8	5	5	5	5	5	0
32	0	11	0	4	4	4	4	0	32	0	2	1	1	1	1	1	0
33	0	11	0	4	4	4	4	0	33	0	0	0	0	0	0	0	0
34	0	5	0	2	2	2	2	0	34	0	4	2	2	2	2	2	0
35	0	2	0	1	1	1	1	0	35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	36	0	6	3	3	3	3	3	0
37	3	0	0	1	1	1	1	0	37	3	1	2	2	2	2	2	0
38	0	0	0	0	0	0	0	0	38	3	8	6	6	6	6	6	0
39	0	1	0	0	0	0	0	0	39	3	3	3	3	3	3	3	0
40	0	5	0	2	2	2	2	0	40	1	2	2	2	2	2	2	0
41	0	3	0	1	1	1	1	0	41	1	2	2	2	2	2	2	0
42	0	3	0	1	1	1	1	0	42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	43	0	0	0	0	0	0	0	0
44	0	3	0	1	1	1	1	0	44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0
46	0	3	0	1	1	1	1	0	46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0
Totals	649	1,149	108	635	593	290	290	225	Totals	93	169	131	131	100	63	63	25

Table 4 (con't). Observed and estimated length frequencies, total length in inches, for red drum sampled from the commercial landings made along the Atlantic coast of Florida during 1981-1988. Estimated length frequencies were made for time periods when inadequate samples were taken from the landings

Seine									Trammel Net								
TL"	81	82	83	84	85	86	87	88	TL"	81	82	83	84	85	86	87	88
8	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	13	0	0	1	1	1	0	0	0
14	0	0	0	0	0	0	0	0	14	0	1	2	1	1	0	0	0
15	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0
16	2	2	2	2	2	0	0	0	16	0	0	3	2	2	0	0	0
17	3	3	3	3	3	0	0	0	17	0	3	8	5	5	0	0	0
18	6	6	6	6	6	6	6	6	18	0	0	5	4	4	4	2	3
19	3	3	3	3	3	3	3	3	19	1	7	33	17	17	17	0	8
20	2	2	2	2	2	2	2	2	20	3	10	22	11	11	11	0	6
21	1	1	1	1	1	1	1	1	21	1	11	12	7	7	7	2	5
22	1	1	1	1	1	1	1	1	22	1	10	12	9	9	9	6	8
23	1	1	1	1	1	1	1	1	23	10	10	11	6	6	6	0	3
24	4	4	4	4	4	4	4	4	24	11	6	4	2	2	2	0	1
25	3	3	3	3	3	3	3	3	25	9	15	9	5	5	5	0	2
26	3	3	3	3	3	3	3	3	26	13	23	16	9	9	9	2	6
27	2	2	2	2	2	2	2	2	27	10	50	15	8	8	8	4	4
28	2	2	2	2	2	2	2	0	28	4	43	22	11	11	11	0	0
29	4	4	4	4	4	4	4	0	29	7	46	11	6	6	6	0	0
30	1	1	1	1	1	1	1	0	30	4	28	23	12	12	12	2	0
31	0	0	0	0	0	0	0	0	31	10	16	12	6	6	6	2	0
32	0	0	0	0	0	0	0	0	32	6	23	13	7	7	7	2	0
33	0	0	0	0	0	0	0	0	33	0	18	24	12	12	12	2	0
34	0	0	0	0	0	0	0	0	34	0	20	10	5	5	5	0	0
35	0	0	0	0	0	0	0	0	35	0	5	8	4	4	4	0	0
36	0	0	0	0	0	0	0	0	36	0	14	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	37	0	3	0	0	0	0	2	0
38	0	0	0	0	0	0	0	0	38	0	1	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	39	0	2	0	0	0	0	6	0
40	0	0	0	0	0	0	0	0	40	0	6	0	0	0	0	6	0
41	0	0	0	0	0	0	0	0	41	0	3	0	0	0	0	4	0
42	0	0	0	0	0	0	0	0	42	0	1	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	43	0	2	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	2	0
Totals	33	33	33	33	33	29	29	22	Totals	90	377	276	145	145	137	44	44

Table 5. Composite (across years and gears) age-length key for commercially landed red drum along the Atlantic coast of Florida during 1981-1988. Ages (0-14<sup>+</sup>) are modeled ages, incremented on January 1 beginning after the first full year of life, and lengths are total length (TL) inch classes.

TL\Age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 <sup>+</sup>
6	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.8400	0.1600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.8750	0.1250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.3448	0.6552	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.2667	0.7333	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	0.2692	0.7308	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	0.2083	0.7917	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	0.1177	0.8235	0.0588	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22	0.0455	0.6818	0.2273	0.0455	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	0.0000	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	0.0000	0.4783	0.4348	0.0870	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.3000	0.6500	0.0500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	0.0000	0.3182	0.5909	0.0455	0.0000	0.0000	0.0455	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	0.0000	0.1563	0.7500	0.0625	0.0000	0.0000	0.0313	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	0.0000	0.2105	0.6842	0.0526	0.0526	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	0.0000	0.0882	0.7059	0.1765	0.0294	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.1600	0.4400	0.3600	0.0000	0.0000	0.0000	0.0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	0.0000	0.0000	0.3889	0.5556	0.0556	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	0.0000	0.0000	0.1765	0.7647	0.0000	0.0000	0.0588	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33	0.0000	0.0000	0.1875	0.5625	0.0000	0.1875	0.0625	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34	0.0000	0.0000	0.0000	0.8182	0.1818	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	0.0000	0.0000	0.0000	0.7000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	0.0000	0.0000	0.0000	0.0000	0.3000	0.4000	0.0000	0.0000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.3000	0.3000	0.0000	0.2000	0.0000	0.0000
38	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.0000	0.1000	0.2000	0.4000	0.0000	0.0000	0.0000	0.0000
39	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.2000	0.0000	0.2000	0.0000	0.1000	0.1000
40	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.0000	0.1000	0.1000	0.2000	0.1000	0.0000	0.0000	0.3000
41	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.1000	0.0000	0.0000	0.1000	0.0000	0.2000	0.1000	0.0000	0.4000
42	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.3000	0.2000	0.0000	0.0000	0.4000
43	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.2000	0.0000	0.3000	0.0000	0.1000	0.0000	0.3000
44	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.0000	0.5000
45	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.0000	0.0000	0.0000	0.7000
46	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.0000	0.0000	0.0000	0.7000
47	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5000
48	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7000	0.0000	0.3000



Table 6. Reported landed weight (lbs), estimated observed mean weights (lbs) from all red drum measured for length (and converted to weight) or directly weighed for whole weight, and calculated numbers of red drum represented in the landings made on the Atlantic coast of Florida during 1981-1988.

## Atlantic

	Gill Net			Hook and Line			Seine			Trammel Net		
	Land wt	Mean wt	Est num	Land wt	Mean wt	Est num	Land wt	Mean wt	Est num	Land wt	Mean wt	Est num
1981	215,132	2.808	76,614	41,088	3.98	10,323	519	4.759	109	1,635	7.154	229
1982	110,028	3.731	29,488	27,704	6.55	4,230	479	4.277	112	959	9.416	102
1983	79,084	2.448	32,310	24,817	5.265	4,714	516	4.277	121	747	7.213	104
1984	93,788	2.996	31,308	28,797	5.265	5,469	2,717	4.277	635	5,583	5.483	1,018
1985	63,651	2.996	21,248	21,214	5.265	4,029	614	4.277	144	3,450	5.483	629
1986	59,323	2.996	19,304	17,308	5.265	3,205	439	4.277	100	0	--	0
1987	31,618	2.996	10,547	9,387	5.265	1,782	1,988	4.277	464	0	--	0
1988	131	2.996	44	153	5.265	29	0	--	0	0	--	0

Table 7. Estimated commercial landings (numbers) of red drum made on the Atlantic coasts of Florida during 1950-1988 by collapsed gear categories. During the period 1950-1980, when no mean weight estimates were available the average of the 1981-1983 mean weights were used for each gear category.

Atlantic						
Year	Gill Net	Hook&Line	Seine	Trammel Net	Totals	
1950	32,881	12,896	5,138	0	50,915	
1951	10,782	9,990	11,290	63	32,126	
1952	14,087	9,022	7,932	656	31,697	
1953	22,766	5,508	6,580	126	34,981	
1954	26,205	9,288	2,569	0	38,061	
1955	18,660	5,299	2,208	328	26,496	
1956	19,862	6,610	2,163	353	28,988	
1957	12,785	10,085	3,290	252	26,413	
1958	7,210	10,408	5,837	0	23,455	
1959	14,922	14,454	2,321	13	31,709	
1960	15,856	12,763	3,222	0	31,842	
1961	23,935	3,837	4,822	151	32,745	
1962	31,546	7,293	3,222	265	42,327	
1963	29,877	6,116	2,592	126	38,710	
1964	21,732	5,641	4,394	593	32,360	
1965	27,840	7,369	5,431	0	40,641	
1966	27,573	6,724	7,549	189	42,035	
1967	30,411	5,774	4,980	442	41,606	
1968	35,919	5,299	6,422	378	48,019	
1969	27,640	4,805	2,006	252	34,703	
1970	37,321	4,634	2,163	126	44,245	
1971	22,566	2,108	969	278	25,921	
1972	31,980	5,451	879	0	38,310	
1973	44,398	4,919	1,375	189	50,881	
1974	30,010	6,287	2,637	328	39,261	
1975	19,061	3,685	1,330	114	24,189	
1976	25,504	4,235	1,510	76	31,325	
1977	24,235	3,856	1,961	240	30,291	
1978	29,075	3,210	135	13	32,433	
1979	20,763	5,147	113	366	26,389	
1980	53,376	5,570	58	154	59,158	
1981	76,614	10,323	109	229	87,276	
1982	29,488	4,230	112	102	33,931	
1983	32,310	4,714	121	104	37,248	
1984	31,308	5,469	635	1,018	38,431	
1985	21,248	4,029	144	629	26,050	
1986	19,304	3,205	100	0	22,609	
1987	10,547	1,782	464	0	12,793	
1988	44	29	0	0	73	

Table 8. Estimated length frequencies, total length in inches, for commercial red drum landings made along the Atlantic coast of Florida during 1981-1988.

Gill Net									Hook and Line								
TL"	81	82	83	84	85	86	87	88	TL"	81	82	83	84	85	86	87	88
8	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	9	0	50	36	42	0	0	0	0
10	0	231	0	148	0	0	0	0	10	0	350	252	292	0	0	0	0
11	0	1,309	0	838	0	0	0	0	11	0	551	396	459	0	0	0	0
12	1,062	1,514	0	1,117	0	0	0	0	12	444	526	450	522	0	0	0	0
13	2,007	2,284	299	1,758	1,279	0	0	0	13	1554	25	270	313	304	0	0	0
14	5,903	3,054	299	2,792	2,032	0	0	0	14	2109	0	342	397	385	0	0	0
15	8,500	3,490	2,094	3,532	2,569	0	0	0	15	2109	0	342	397	385	0	0	0
16	10,152	2,772	8,377	3,647	2,653	0	0	0	16	1332	0	216	251	243	0	0	0
17	11,923	1,822	6,283	3,170	2,306	0	0	0	17	444	100	144	167	162	0	0	0
18	10,861	1,694	5,684	2,907	2,115	3,923	2,143	12	18	222	25	54	63	61	76	42	2
19	5,903	847	4,787	1,626	1,183	2,194	1,199	6	19	0	100	72	84	81	102	57	2
20	3,660	488	1,496	903	657	1,219	666	4	20	0	50	36	42	40	51	28	1
21	1,889	488	0	575	418	776	424	2	21	0	50	36	42	40	51	28	1
22	2,007	565	0	641	466	864	472	3	22	0	125	90	104	101	127	71	3
23	1,889	385	898	558	406	754	412	2	23	0	100	72	84	81	102	57	2
24	1,653	1,001	0	871	633	1,175	642	3	24	444	50	108	125	121	153	85	3
25	2,951	898	299	1,002	729	1,352	739	4	25	111	100	90	104	101	127	71	3
26	1,417	1,104	598	936	681	1,263	690	4	26	111	250	198	230	223	280	156	6
27	1,535	1,283	0	1,035	753	1,396	763	4	27	0	200	144	167	162	203	113	5
28	472	950	598	706	514	953	521	0	28	0	250	180	209	202	254	141	0
29	1,181	1,232	299	969	705	1,308	714	0	29	0	300	216	251	243	305	170	0
30	1,181	565	299	542	394	731	400	0	30	111	125	108	125	121	153	85	0
31	118	308	0	214	155	288	157	0	31	111	200	162	188	182	229	127	0
32	0	282	0	181	131	244	133	0	32	0	50	36	42	40	51	28	0
33	0	282	0	181	131	244	133	0	33	0	0	0	0	0	0	0	0
34	0	128	0	82	60	111	61	0	34	0	100	72	84	81	102	57	0
35	0	51	0	33	24	44	24	0	35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	36	0	150	108	125	121	153	85	0
37	354	0	0	49	36	66	36	0	37	333	25	72	84	81	102	57	0
38	0	0	0	0	0	0	0	0	38	333	200	198	230	223	280	156	0
39	0	26	0	16	12	22	12	0	39	333	75	108	125	121	153	85	0
40	0	128	0	82	60	111	61	0	40	111	50	54	63	61	76	42	0
41	0	77	0	49	36	66	36	0	41	111	50	54	63	61	76	42	0
42	0	77	0	49	36	66	36	0	42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	43	0	0	0	0	0	0	0	0
44	0	77	0	49	36	66	36	0	44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0
46	0	77	0	49	36	66	36	0	46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0
Totals	76,614	29,488	32,310	31,308	21,248	19,304	10,547	44	Totals	10,323	4,230	4,714	5,469	4,029	3,205	1,782	29

Table 8 (con't.). Estimated length frequencies, total length in inches, for commercial red drum landings made along the Atlantic coast of Florida during 1981-1988.

Seine									Trammel Net								
TL"	81	82	83	84	85	86	87	88	TL"	81	82	83	84	85	86	87	88
8	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	13	0	0	0	4	2	0	0	0
14	0	0	0	0	0	0	0	0	14	0	0	1	7	4	0	0	0
15	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0
16	7	7	7	39	9	0	0	0	16	0	0	1	11	7	0	0	0
17	8	8	9	48	11	0	0	0	17	0	1	3	35	22	0	0	0
18	18	19	20	106	24	19	90	0	18	0	0	2	25	15	0	0	0
19	10	10	11	58	13	11	49	0	19	3	2	12	116	72	0	0	0
20	5	5	5	29	7	5	24	0	20	8	3	8	77	48	0	0	0
21	3	3	4	19	4	4	16	0	21	3	3	5	49	30	0	0	0
22	2	2	2	10	2	2	8	0	22	3	3	5	63	39	0	0	0
23	2	2	2	10	2	2	8	0	23	25	3	4	39	24	0	0	0
24	12	12	13	67	15	12	57	0	24	28	2	2	14	9	0	0	0
25	8	8	9	48	11	9	41	0	25	23	4	3	32	20	0	0	0
26	8	8	9	48	11	9	41	0	26	33	6	6	63	39	0	0	0
27	5	5	5	29	7	5	24	0	27	25	14	6	53	33	0	0	0
28	7	7	7	39	9	7	33	0	28	10	12	8	77	48	0	0	0
29	13	14	15	77	17	14	65	0	29	18	12	4	39	24	0	0	0
30	2	2	2	10	2	2	8	0	30	10	8	9	81	50	0	0	0
31	0	0	0	0	0	0	0	0	31	25	4	5	42	26	0	0	0
32	0	0	0	0	0	0	0	0	32	15	6	5	46	28	0	0	0
33	0	0	0	0	0	0	0	0	33	0	5	9	84	52	0	0	0
34	0	0	0	0	0	0	0	0	34	0	5	4	35	22	0	0	0
35	0	0	0	0	0	0	0	0	35	0	1	3	28	17	0	0	0
36	0	0	0	0	0	0	0	0	36	0	4	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	37	0	1	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	39	0	1	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	40	0	2	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	41	0	1	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	43	0	1	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	47	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	0
Totals	109	112	121	635	144	100	464	0	Totals	229	102	104	1,018	629	0	0	0

Table 9. Estimated age frequencies (January 1 anniversary) of red drum caught with gill nets, hook and line, seines, or trammel nets deployed in the commercial fishery on the Atlantic coasts of Florida during 1981-1988.

**Gill N**

Age	1981	1982	1983	1984	1985	1986	1987	1988
0	30,213	13,836	11,854	13,711	8,445	2,021	1,104	6
1	36,697	8,429	18,394	11,511	8,375	9,071	4,956	25
2	7,858	4,973	1,749	4,373	3,181	5,900	3,223	11
3	1,267	1,445	234	1,114	811	1,503	821	1
4	66	152	40	109	79	147	80	0
5	71	68	0	54	39	72	40	0
6	112	148	27	112	81	151	82	0
7	47	23	12	22	16	29	16	0
8	0	15	0	10	7	13	7	0
9	106	33	0	36	26	49	27	0
10	106	95	0	76	55	102	56	0
11	0	64	0	41	30	55	30	0
12	71	8	0	15	11	20	11	0
13	0	3	0	2	1	2	1	0
14+	0	195	0	125	91	168	92	0
Totals	76,614	29,488	32,310	31,308	21,248	19,304	10,547	44

**H&Line**

Age	1981	1982	1983	1984	1985	1986	1987	1988
0	6,494	1,592	2,197	2,549	1,197	70	39	2
1	2,020	637	786	911	884	687	382	13
2	423	991	781	906	879	1,104	614	13
3	151	382	299	347	336	422	235	1
4	51	109	86	100	97	122	68	0
5	144	98	94	109	105	132	74	0
6	127	78	77	89	86	109	60	0
7	4	5	4	5	5	6	3	0
8	78	78	68	79	77	97	54	0
9	255	73	94	109	105	132	74	0
10	255	98	112	129	126	158	88	0
11	100	30	38	44	43	53	30	0
12	78	10	20	23	22	28	16	0
13	33	8	11	13	12	15	8	0
14+	111	43	49	56	55	69	38	0
Totals	10,323	4,230	4,714	5,469	4,029	3,205	1,782	29

Table 9 (con't.). Estimated age frequencies (January 1 anniversary) of red drum caught with gill nets, hook and line, seines, or trammel nets deployed in the commercial fishery on the Atlantic coasts of Florida during 1981-1988

### Seine

Age	1981	1982	1983	1984	1985	1986	1987	1988
0	15	16	17	88	20	10	44	0
1	52	54	58	304	69	46	214	0
2	35	36	39	204	46	37	172	0
3	5	6	6	32	7	6	27	0
4	1	1	1	4	1	1	4	0
5	0	0	0	0	0	0	0	0
6	1	1	1	3	1	1	3	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14+	0	0	0	0	0	0	0	0
Totals	109	112	121	635	144	100	464	0

### Tram'l

Age	1981	1982	1983	1984	1985	1986	1987	1988
0	3	2	9	89	55	0	0	0
1	64	21	36	373	231	0	0	0
2	116	43	31	296	183	0	0	0
3	40	22	22	206	127	0	0	0
4	2	4	2	22	14	0	0	0
5	0	3	2	16	10	0	0	0
6	3	2	1	12	8	0	0	0
7	0	0	0	3	2	0	0	0
8	0	1	0	0	0	0	0	0
9	0	1	0	0	0	0	0	0
10	0	1	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14+	0	1	0	0	0	0	0	0
Totals	229	102	104	1,018	629	0	0	0

Table 9 (con't.). Estimated age frequencies (January 1 anniversary) of red drum caught with gill nets, hook and line, seines, or trammel nets deployed in the commercial fishery on the Atlantic coasts of Florida during 1981-1988

<b>All gear</b>								
Age	1981	1982	1983	1984	1985	1986	1987	1988
0	36,725	15,445	14,076	16,437	9,717	2,101	1,188	8
1	38,833	9,141	19,274	13,100	9,558	9,804	5,552	39
2	8,432	6,043	2,599	5,779	4,289	7,041	4,010	24
3	1,463	1,855	561	1,698	1,281	1,931	1,083	2
4	120	266	130	236	191	270	152	0
5	215	169	95	178	154	205	113	0
6	243	228	106	216	176	260	145	1
7	52	28	17	30	23	35	20	0
8	78	94	68	89	84	110	61	0
9	362	107	94	145	132	181	100	0
10	362	193	112	205	181	260	143	0
11	100	95	38	85	72	109	60	0
12	149	18	20	38	33	48	26	0
13	33	10	11	14	13	17	10	0
14+	111	239	49	181	145	237	130	0
Totals	87,276	33,931	37,248	38,431	26,050	22,609	12,793	73

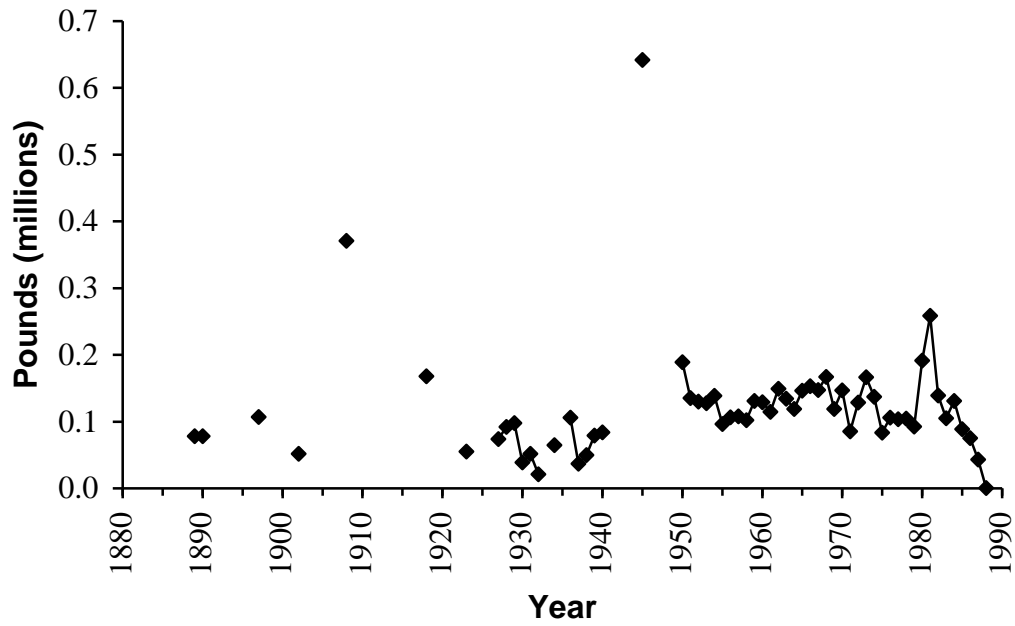


Figure 1. Available annual commercial landings reports for red drum landed on the Atlantic coast of Florida during the period 1888-1988.