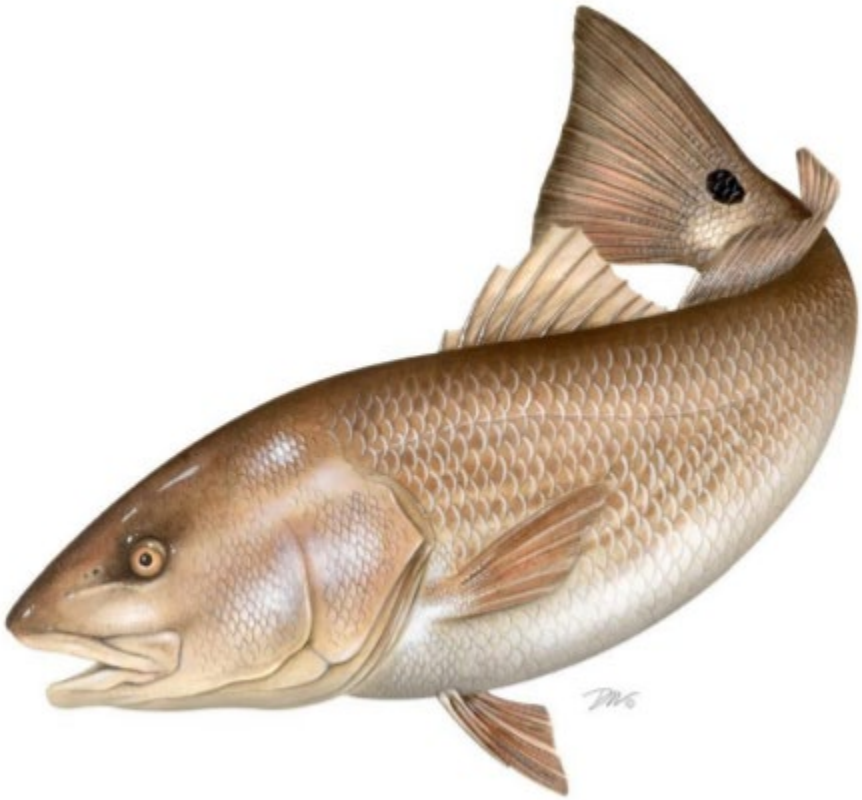
ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR RED DRUM
(Sciaenops ocellatus)

2006 FISHING YEAR



Prepared by the Plan Review Team

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Table of Contents

I. Status of the Fishery Management Plan 3
II. Status of the Stocks 4
III. Status of the Fishery 5
IV. Status of Research and Monitoring 6
V. Status of Management Measures and Issues 7
VI. Implementation of FMP Compliance Requirements for 2006 9
VII. Status of Assessment Advice 5
VIII. Recommendations of the Plan Review Team 9
IX. References 10
X. Figures 12
XI. Tables 13

I. Status of the Fishery Management Plan

Date of FMP Approval:	Original FMP – October 1984, revised 1988
Amendments:	Amendment 1 – October 1991 Amendment 2 – June 2002
Management Areas:	The Atlantic coast distribution of the resource from New Jersey through Florida Northern: New Jersey through North Carolina Southern: South Carolina through the east coast of Florida
Active Boards/Committees:	South Atlantic State/Federal Fisheries Management Board; Red Drum Technical Committee, Stock Assessment Subcommittee, Plan Development Team, Plan Review Team, and Advisory Panel

The Atlantic States Marine Fisheries Commission (ASMFC) adopted a Fishery Management Plan (FMP) for Red Drum in 1984. The original management unit included the states from Florida to Maryland. In 1988, the Interstate Fisheries Management Program (ISFMP) Policy Board requested that all states from Florida to Maine implement plan requirements to prevent development of northern markets for southern fish. All Atlantic coastal states Florida through New Jersey are now required to implement the provisions of the FMP, while New York through Maine (including Pennsylvania) are encouraged to implement consistent provisions to protect the red drum spawning stock.

In 1990, the South Atlantic Fishery Management Council (Council) adopted an FMP for red drum that defined overfishing and optimum yield (OY) consistent with the Magnuson Fishery Conservation and Management Act of 1976. Adoption of this plan prohibited the harvest of red drum in the exclusive economic zone (EEZ), a moratorium that remains in effect today. Recognizing that all harvest would take place in state waters, the Council FMP recommended that states implement measures necessary to provide the target level of at least 30% escapement.

Consequently, the ASMFC updated its FMP in 1991 with Amendment 1, which included the goal to attain optimum yield from the fishery over time. Optimum yield was defined as the amount of harvest that could be taken while maintaining the spawning stock biomass per recruit (SSBR) level at or above 30% of the level that would result if fishing mortality were zero. However, the lack of adequate information on the status of the adult stock resulted in the use of a 30% escapement rate of sub-adult red drum to the off-shore adult spawning stock.

Substantial reductions in fishing mortality were necessary to achieve the escapement rate; however, because of a lack of data on the status of adult red drum along the Atlantic coast, a "phase-in" approach was adopted that required all states to implement or maintain harvest controls necessary to attain at least 10% SSBR. All states in the management unit north of Florida modified regulations and/or commercial quotas to reach this goal. Florida maintained its strict regulations that were thought to exceed the target escapement rate. The harvest regulations

remained unchanged from 1992-1998, except in Florida where regulations were relaxed somewhat by opening the previously closed March-May period.

As hoped, these management measures led to increased escapement rates of juvenile red drum. However, the overall exploitation estimates indicated that overfishing was still occurring with SPR values less than 30% for both the northern (North Carolina through New Jersey) and southern regions (South Carolina through the east coast of Florida). These regions were based on stock identity, mark-recapture experiments, life history, habitat preferences, human dimensions of the fisheries, and management goals.

The Council adopted new definitions of OY and overfishing for red drum in 1998. Optimum yield was redefined as the harvest associated with a 40% static spawning potential ratio (SPR), overfishing as an SPR less than 30%, and threshold overfishing as 10% SPR. North Carolina, South Carolina, and Georgia implemented substantive changes to their regulations from 1998-2001 that restricted the harvest of red drum and increased the escapement rate.

In 1999, the Council recommended that management authority for red drum be transferred to the states through the Commission's Interstate Fishery Management Program (ISFMP) process. One reason the Council recommended this transfer to the ASMFC was the inability to accurately determine an overfished status and therefore stock rebuilding targets and schedules as required under the revised Sustainable Fisheries Act of 1996. See Section V for an update on this issue.

The ASFMC adopted Amendment 2 to the Red Drum FMP in June 2002 (ASMFC 2002). The amendment's primary objective is to achieve and maintain SPR at or above 40 percent. The states from Florida through New Jersey were required to implement appropriate recreational bag and size limit combinations needed to attain the objective. Amendment 2 also required all states to maintain their current, or implement more restrictive, commercial fishery regulations. The states implemented the provisions of Amendment 2 by January 1, 2003. See Table 1 for the states' commercial and recreational regulations in 2006.

II. Status of the Stocks

The most recent assessment uses data through 1998 for estimating yield per recruit, escapement to age 4, and static (equilibrium) spawning potential ratio (SPR) for the two regions of the red drum distribution (Vaughan and Carmichael 2000).

For the northern region (North Carolina and north), the 2000 assessment estimated escapement at 18%. Estimates of static SPR increased from about 1.3% for the period 1987-1991 to approximately 18% for the period 1992-1998. However, the assessment report cautioned that these estimates may be overestimated due to the lack of discard data from both the commercial fishery and recreational netting practices. A 2007 assessment by NC DMF using a similar assessment methodology estimated escapement rates ranging from 40.6% to 41.0% and static SPR from 40.4% to 40.8% (Takade and Paramore 2007). As in the past, these results may be overestimated due to the continued lack of information on commercial discards.

For the southern region (South Carolina through Florida), the 2000 assessment estimated escapement at 17%. Estimates of static SPR increased from about 0.5% for the period 1987-1991

to approximately 15% for the period 1992-1998. The assessment report cautioned that these estimates may not be reflective of the resource throughout the region, as there appears to be significant differences between Florida and Georgia/South Carolina. Estimates of escapement on Florida's Atlantic coast have been much larger: 94% in 1988 (following two years of near-complete moratoria on fishing), 51-69% during 1992-1994 (declining with the reopening of the fishery in 1989), and 32-43% during 2001-2003 (Murphy 2005). This may mean that rates in Georgia and South Carolina are lower than the regional estimate.

III. Status of the Fishery

Few commercial landings of red drum have been recorded in states north of Maryland (Table 2). Coastwide commercial landings show no particular temporal trends, ranging from approximately 55,000 to 422,000 pounds annually over the last 47 years (Figure 1). The greatest harvest was reached in 1980, while the lowest was reached in 2004. In 2006, coastwide commercial harvest increased to 171,823 pounds, the majority (98.5%) from North Carolina (Table 2). Landings in Virginia (2,607 lbs), Georgia (<500 lbs), Maryland (8 lbs), and the Potomac River (2 lbs) comprise the remaining 1.5% of the commercial landings for red drum in 2006.

Historically, the major commercial harvesters were North Carolina and Florida. However, commercial harvest has been prohibited in Florida under state regulation since January 1988. (South Carolina has also banned the commercial harvest or sale of native caught red drum since 1987.) In North Carolina, daily commercial trip limits (currently seven fish) and an annual cap of 250,000 pounds limit the commercial harvest of red drum.

Recreational harvest of red drum peaked in the 1984 at 1,047,360 fish (or 2,616,660 pounds; Tables 3 and 4). Since 1988, the number has been in the 250,000-530,000 fish range (or 0.9 to 1.7 million pound range; Figures 1 and 2). Recreational harvest in 2006 is estimated as 380,636 fish (~1.3 million pounds). Florida anglers took 39% of the coastwide harvest by number of fish, but over 50% by weight. North Carolina, South Carolina, Georgia, and Florida are responsible for nearly 94% of the harvest by number of fish (Tables 4). The number of red drum released by recreational anglers shows an increasing trend (Figure 2), as does the total catch. In 2006, recreational releases numbered approximately 2.3 million fish, the second highest for the time series (Table 5).

IV. Status of Assessment Advice

Red drum stock status information comes from two sources: regional assessments conducted by the NOAA Center for Coastal Fisheries and Habitat Research (Vaughan and Helser 1990; Vaughan 1992, 1993, 1996; Vaughan and Carmichael 2000) and state-specific assessments conducted by state fisheries departments (e.g., Murphy 2005; Takade and Paramore 2007). The regional assessments evaluate stock status for two regions: the northern region from New Jersey through North Carolina, and the southern region from South Carolina through the east coast of Florida. Future regional assessments will be conducted by the AMSFC Red Drum Stock Assessment Subcommittee and Technical Committee.

The last red drum assessment was conducted in 1999 and peer reviewed by both the Red Drum Technical Committee and the South Atlantic Fishery Management Council's Scientific and

Statistical Committee in 2000 (Vaughan and Carmichael 2000). Recreational and commercial catches were converted to catch in numbers at age using available length-frequency distributions and age-length keys. Separable and tuned virtual population analyses were conducted on the catch in numbers at age to obtain estimates of fishing mortality rates (F). These estimates of F combined with estimates of growth, sex ratios, sexual maturity, and fecundity are used to estimate yield per recruit, escapement to age-4, and static (or equilibrium) spawning potential ratio (static SPR, based on both female biomass and egg production). The Technical Committee chose the FADAPT Virtual Population Analysis methodology as the population modeling approach to determine the status of the stock. A revised bag and size limit analysis was developed for each region using the new overfishing definitions and standards as benchmarks (Vaughan and Carmichael 2001).

Population metrics used in the regional assessment (specifically yield per recruit and static SPR) are based on equilibrium assumptions: because no direct estimates are available as to the current status of the adult stock, model results imply potential longer term, equilibrium effects. Because current status of the adult stock in unknown, a specific rebuilding schedule can not be determined.

A SouthEast Data, Assessment, and Review (SEDAR) benchmark assessment is scheduled for the spring of 2009.

V. Status of Research and Monitoring

The following fishery dependent and independent monitoring programs were reported in the 2006 compliance reports.

Fishery Dependent Monitoring

- Maryland: DNR samples commercial pound nets once per week in the Chesapeake Bay from late spring through summer. In 2006, 16 red drum were sampled. DNR monitors the number of sportfishing citations issued for large red drum releases. In 2006, anglers submitted 32 entries to the program.
- Virginia: MRC samples commercially landed red rum through its biological monitoring program. In 2006, 29 fish were sampled for length, of which 16 were aged from otoliths. The Virginia Game Fish Tagging Program uses volunteer anglers to tag red drum. In 2006, a record number of red drum were tagged (4,105 fish), with 349 recaptures.
- North Carolina: DMF has conducted commercial fishery monitoring since 1982 to characterize the size and age distribution of fish by gear/fishery. In 2006, 1032 red drum caught primarily by gill net were measured.
- South Carolina: DNR has conducted a state finfish survey since 1988 for catch, effort, and length data, charterboat trip reporting since 1992 for catch and effort data, and a cooperative public tagging program since 1974 to study movement patterns, growth rates, and release-mortality rates. DNR also collects data from a carcass collection program and fish tournaments.
- Georgia: CRD runs a Marine Sportfish Carcass Recovery Project, which collects carcasses of filleted fish in designated bins at ports. In 2006, 229 red drum were recovered and measured.

- Florida: FWC conducts a random survey of licensed anglers on the sizes of kept and released fish. In 2006, only six red drum trips were collected. Eighteen otoliths were collected from the recreational fishery.
- NMFS Marine Recreational Fisheries Statistics Survey: recreational catch, harvest, release, and effort data; length measurements.

Fishery Independent Monitoring

- North Carolina: Since 1991, DMF has conducted a seine survey to produce a juvenile (age-0) abundance index. In 2006, the CPUE was 3.43 (n=412), lower than the time series average of 6.4. In 2001, DMF began a gill net survey in Pamlico Sound to characterize size and age distribution, help improve bycatch estimates, evaluate the success of management measures, and study habitat usage. In 2006, the CPUE was 2.95 (n=729).
- South Carolina: DNR conducts an inshore trammel net survey, an electrofishing survey, and an inshore longline survey to obtain biological data and information on trends in abundance. In 2006, the trammel net CPUEs of subadults and recruits were below their time series averages; however, longline results indicate that survival of subadults to maturity has increased and abundance of larger, older fish has not decreased. Fish from all the programs assist in inshore tagging efforts. Tagging data is used, in part, to estimate escapement and stock mixing rates. DNR also participates in stock rearing and enhancement, results of which will be used to estimate recruitment rates and study life history and population dynamics.
- Georgia: CRD runs a Marine Sportfish Population Health Survey to collect information on biology and population dynamics. In the Altamaha, Hampton, and Wassaw rivers and estuaries, trammel nets are deployed for determining relative abundance, size, sex, and age compositions, and maturity, and gill nets are deployed for determining young-of-the-year relative abundance and size composition. In 2006, 209 red drum were caught. After funding delays, bottom longline sampling to produce an adult abundance index began in November. Ten red drum were caught in 2006.
- Florida: FWC-FWRI has monitored juvenile red drum abundance in the northern Indian River Lagoon since 1990, in the southern Indian River Lagoon since 1997, and in the lower reaches of the St. Johns, St. Marys, and Nassau rivers since 2001. Beginning in 1997 in the Indian River Lagoon and in 2001 in the lower reaches of the three major rivers in northeast Florida, the programs expanded to include the use of a 183-m haul seine to monitor the abundance of larger fish. Additionally, age and length data are collected from randomly sampled red drum captured in the surveys. In 2006, a total of 1,378 fish were measured and 127 otoliths were collected.

VI. Status of Management Measures and Issues

Fishery Management Plan

Amendment 2 was fully implemented by January 1, 2003 and provided the management requirements for 2006. No additional amendments or addenda are under development.

De Minimis Requests

New Jersey and Delaware requested *de minimis* status through the annual reporting process. While Amendment 2 does not include a specific method to determine whether a state qualifies for *de minimis* (e.g., a maximum percent contribution to the coastwide harvest over a certain time

period), the PRT chose to evaluate the two state's contribution to the fishery by comparing each state's two-year average of combined commercial and recreational landings to that of the management unit. New Jersey and Delaware harvested 0.02% and 0.05% of the two-year average total landings, respectively.

However, the PRT also notes that Amendment 2 authorizes the Board to grant a state *de minimis* status if the Board determines that action by the state with respect to a particular management measure—implemented through addenda prepared subsequent to Amendment 2—would not contribute significantly to the overall management program. Therefore, *de minimis* status does not exempt a state from any requirement, nor did either of the two states ask for exemption from any requirement, meaning that *de minimis* requests and Board approval of such requests will not provide any benefit to the states until any new management measures have been implemented.

Changes to State Regulations

In 2007, the South Carolina legislature approved a change to the state's recreational red drum regulations. The slot limit was modified from 15-24" to 15-23" with a concurrent increase in the bag limit from two fish to three fish. According to Appendix A of Amendment 2, these changes should result in a net increase in the static SPR ratio for red drum in South Carolina from 44.5% to 45.5%.

Florida is currently considering more restrictive management of red drum, although it is unclear if additional management actions will occur before the completion of the next scheduled state stock assessment (November 2008). Citing a downward trend in escapement rate estimates, a series of workshops, public hearings, and web surveys were conducted to determine if anglers would agree to more restrictive regulations. A general consensus was formed to develop and adopt regulations that would help increase escapement to 40%. Management changes under consideration include an increase in the minimum size limit, a reduction in the maximum size limit, and a temporal closure.

Management Authority Transfer

Discussions between the Council's Red Drum Management Committee and the South Atlantic Board led the Council to recommend, in December of 2000, a transferal of management authority to the states. This necessitated the development of Amendment 2 to the Interstate FMP, which was planned to commence after the update and review of the stock assessment in 2000-2001. Following the approval of Amendment 2 in 2002, a process was begun to transfer management authority.

As part of that process, the National Environmental Policy Act required the completion of an Environmental Assessment (EA). The EA, completed by staff at the NMFS Southeast Regional Office in 2005, is currently under review by the Secretary of Commerce's Office of General Counsel.

Law Enforcement

The ASMFC Law Enforcement Committee surveyed its members for any issues concerning the Red Drum FMP during the 2006 calendar year. There were no enforcement related issues involving red drum or its fishery management plan. The plan is enforceable as written.

VII. Implementation of FMP Compliance Requirements for 2006

Amendment 2 provides the basis for determining state compliance with the FMP for 2006. The amendment includes four compliance criteria: 1) implement harvest controls to achieve a minimum 40% SPR; 2) set a maximum size limit of 27 inches or less; 3) maintain current or more restrictive commercial fishery regulations for red drum; and 4) submit an annual compliance report by July 1. The PRT finds that all states have implemented the requirements of Amendment 2.

VIII. Recommendations of the Plan Review Team

Management and Regulatory Recommendations

- Support a continued moratorium of red drum fishing in the exclusive economic zone.

Prioritized Research and Monitoring Recommendations (H)=High, (M)=Medium, (L)=Low

Stock Assessment and Population Dynamics

- Design an appropriate state fishery-independent survey of sub-adult and adult red drum to be implemented in Virginia, North Carolina, South Carolina, Georgia, and Florida. (H; in progress for sub-adult and adult surveys)
- Each state should develop an on-going red drum tagging program that can be used to estimate both fishing and natural mortality and movements. This should include concurrent evaluations of tag retention, tagging mortality, and angler tag reporting rates. (M)
- Improve catch/effort estimates and biological sampling from recreational and commercial fisheries for red drum, including increased effort to intercept night fisheries for red drum. This should include significant efforts to determine the size and age structure of regulatory discards of live red drum. (H)
- States should maintain annual age-length keys. (H)
- Determine the chronic mortality rate of red drum following regulatory and voluntary discard from commercial and recreational fishing gear, including recreational net fisheries. Evaluate effects of water temperature and depth of capture. (M)
- Evaluate alternatives to VPA for red drum stock assessment. (M)

Biological

- Fully evaluate the effects and effectiveness of using cultured red drum to restore native stocks along the Atlantic coast. (H)
- Explore methods to effectively sample the adult population in estuarine, nearshore, and open ocean waters. (H)
- Continue tagging studies to determine stock identity, inshore/offshore migration patterns of all life stages (i.e. basic life history info gathering). Specific effort should be given to developing a large-scale program for tagging adult red drum (M)
- Determine habitat preferences, environmental conditions, growth rates, and food habits of larval and juvenile red drum throughout the species range along the Atlantic coast. Assess the effects of environmental factors on stock density/yearclass strength. (M)
- Refine maturity schedules on a geographic basis. Thoroughly examine the influence of size and age on reproductive function. Investigate the possibility of senescence in female red drum. (L)

Social

- Examine the effectiveness of controlling fishing mortality and minimum size in managing red drum fisheries.
- Encourage the NMFS to fund socioeconomic add-on questions to the recreational fisheries survey that are specifically oriented to red drum recreational fishing.

Economic

- Encourage the NMFS to continue funding socioeconomic add-on questions to the recreational fisheries survey that include data elements germane to red drum recreational fisheries management.
- Where appropriate, encourage member states to conduct studies to evaluate the economic costs and benefits associated with current and future regulatory regimes impacting recreational anglers including anglers oriented toward catch and release fishing trips.
- Fully evaluate the efficacy of using cultured red drum to restore native stocks along the Atlantic Coast including risk adjusted cost-benefit analyses.
- Conduct a special survey and related data analysis to determine the economic and operational characteristics of the "for-hire sector" targeting red drum especially fishing guide oriented businesses in the South Atlantic states.
- Estimate the economic impacts (e.g. sales, jobs, income, etc.) of recreational red drum fisheries at the state and regional level including the "for-hire sector" (e.g. fishing guides).
- Encourage the NMFS to continue funding research on projecting future participation in marine recreational fishing in the Atlantic states with an emphasis on forecasts for major fisheries such as red drum.
- States with significant fisheries (over 5,000 pounds) should collect socioeconomic data on red drum fisheries through add-ons to the recreational fisheries survey or by other means.

Habitat

- Identify spawning areas of red drum in each state from North Carolina to Florida so these areas may be protected from degradation and/or destruction. (H; in progress at NC State University)
- Identify changes in freshwater inflow on red drum nursery habitats. Quantify the relationship between freshwater inflows and red drum nursery/sub-adult habitats. (H)
- Determine the impacts of dredging and beach re-nourishment on red drum spawning and early life history stages. (M)
- Investigate the concept of estuarine reserves to increase the escapement rate of red drum along the Atlantic coast. (M)
- Identify the effects of water quality degradation (changes in salinity, DO, turbidity, etc.) on the survival of red drum eggs, larvae, post-larvae, and juveniles. (M)
- Quantify relationships between red drum production and habitat. (L)
- Determine methods for restoring red drum habitat and/or improving existing environmental conditions that adversely affect red drum production. (L)

IX. References

Atlantic States Marine Fisheries Commission (ASMFC). 2002. Amendment 2 to the Interstate Fishery Management Plan for Red Drum. ASMFC, Washington, DC, Fishery Management Report No. 38, 141 p.

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X. Figures

Figure 1. Commercial and recreational harvest (pounds) of red drum
(Recreational data not available until 1981; see Tables 2 and 4 for values and data sources)

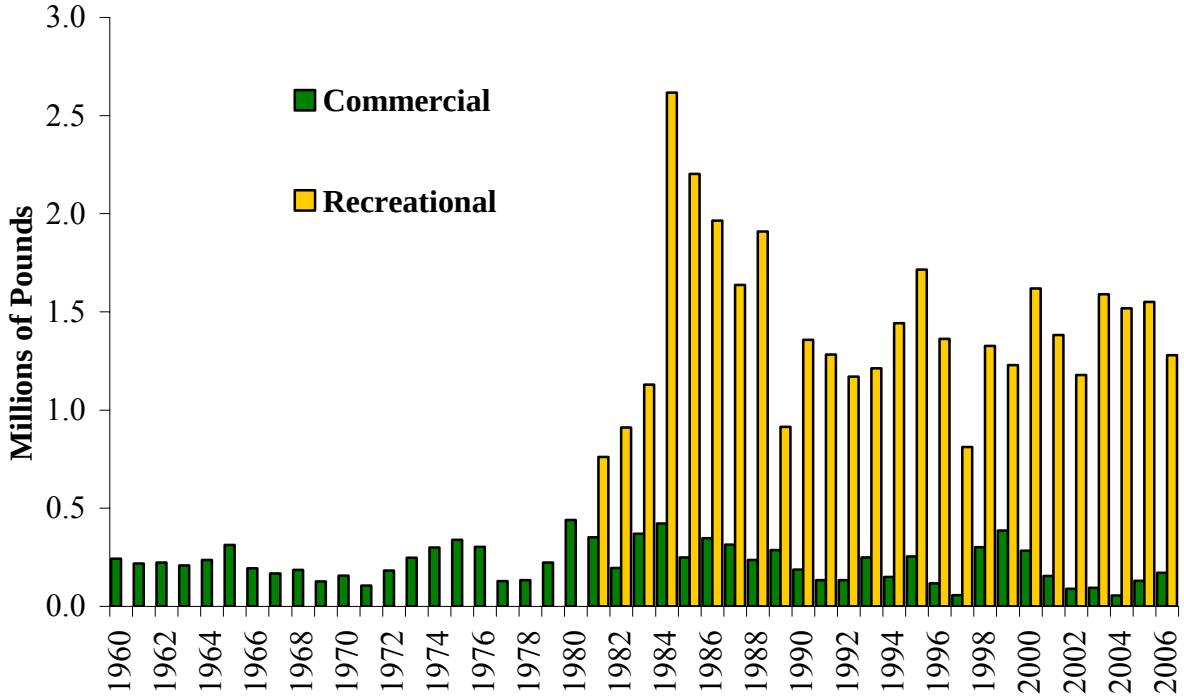
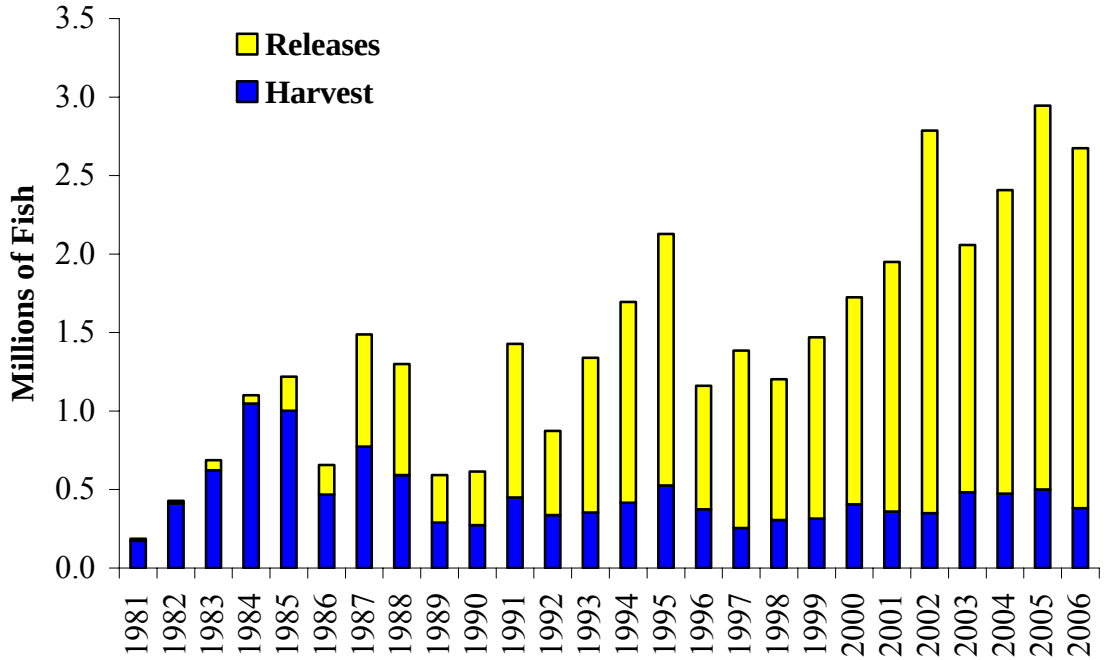


Figure 2. Recreational harvest (number of A + B1 fish) and releases (number of B2 fish)
(See Tables 4 and 5 for values and data sources)



XI. Tables

Table 1. Red drum regulations for 2006
Note that the states of New Jersey through Florida are required to meet the requirements in the FMP; states north of New Jersey are encouraged but not required to follow these regulations.

State	Recreational	Commercial
ME	None	None
NH	14" - 27", 5 fish	14" - 27", 5 fish
MA	14" min	14" min
RI	None	None
CT	≤ 27"	≤ 27"
NY	≤ 27"	≤ 27"
PA	None	None
NJ	18" - 27", 1 fish	18" - 27", 1 fish
DE	20" - 27", 5 fish	20" - 27", 5 fish
MD	18" - 27", 1 fish	18" - 25", 5 fish
PRFC	18" - 25", 5 fish	18" - 25", 5 fish
VA	18" - 26", 3 fish	18" - 26", 3 fish
NC	18" - 27", 1 fish	18" - 27", 7 fish daily trip limit (1 fish for hook and line), 250,000 lb. harvest cap, red drum must be less than 50% of catch (lbs)
SC	15" - 24", 2 fish, gigging allowed November - March.	Gamefish Only
GA	14" - 23", 5 fish	14" - 23", 5 fish
FL	18" - 27", 1 fish	Sale of native fish prohibited

Table 2. Commercial landings (lb.) of red drum by state, 1981-2006 (Source: NMFS Fishery Statistics Division, except where noted*)

Year	NJ	DE	MD	PRFC	VA	NC	SC	GA	FLEC	Total
1981					200	93,420		261	258,374	352,255
1982					1,700	52,561	2,228	251	139,170	195,910
1983			100		41,700	219,871	2,274	1,126	105,164	370,235
1984					2,600	283,020	3,950	1,961	130,885	422,416
1985					1,100	152,676	3,512	3,541	88,929	249,758
1986			1,000		5,400	249,076	12,429	2,939	77,070	347,914
1987					2,600	249,657	14,689	4,565	42,993	314,504
1988			8,100		4,000	220,271		3,281	284	235,936
1989			1,000	86	8,200	274,356	165	3,963		287,770
1990			29	86	1,481	183,216		2,763		187,575
1991			7,533	3,808	24,771	96,045		1,637		133,794
1992			1,087	196	2,352	128,497		1,759		133,891
1993			55		8,637	238,099		2,533		249,324
1994			859		4,080	142,119		2,141		149,199
1995			6		2,992	248,122		2,578		253,698
1996			215		2,006	113,338		2,271		117,830
1997			22	4	3,820	52,502		1,395		57,743
1998	311		336		6,456	294,366		672		302,141
1999	241	6	504	186	10,856	372,942		1,115		385,850
2000			843	10	11,512	270,953		707		284,025
2001	14		727	191	4,905	149,616				155,453
2002			1,161	310	7,361	81,370				90,202
2003			631	47	2,716	90,525				93,919
2004	12		12		638	54,086				54,748
2005	517		37	51	527	128,770				129,902
2006			8	2	2,607	169,206				171,823

* Notes: NJ landings from SAFIS, 2004-present; MD landings from state reporting program, 1991-present; PRFC landings from state reporting program, 1988-present; VA landings from state reporting program, 1996-present; NC landings from state reporting program, 1994-present; GA landings from state reporting program in 2006 (<500 lb.) are not reported because less than three dealers reported.

Table 3. Recreational harvest (pounds of A + B1 fish) of red drum by state, 1981-2006
(NMFS Office of Science & Technology, Queried 7/30/07)

Year	DE	MD	VA	NC	SC	GA	FLEC	Total
1981		4,370	347,939	31,519	50,230	9,442	317,963	761,463
1982				37,511	340,686	52,150	480,676	911,023
1983		3,018	51,299	109,540	222,691	67,298	675,924	1,129,770
1984			1,285	1,160,539	183,282	294,583	976,971	2,616,660
1985				70,677	1,532,316	185,887	414,176	2,203,056
1986		754,161	145,517	31,594	498,586	173,837	360,725	1,964,420
1987			44,332	200,729	913,639	250,795	227,222	1,636,717
1988			9,030	451,974	1,050,049	385,860	12,507	1,909,420
1989		2,348	27,236	214,849	396,771	127,245	146,064	914,513
1990		2,679		302,994	631,819	161,712	258,569	1,357,773
1991		5,635	30,582	108,268	284,290	337,207	516,999	1,282,981
1992			55,324	109,134	411,484	198,751	396,555	1,171,248
1993			45,505	266,459	282,614	328,245	290,930	1,213,753
1994			3,684	192,060	314,632	353,616	578,412	1,442,404
1995			66,270	405,620	417,595	300,337	525,231	1,715,053
1996			1,512	204,556	396,394	164,756	596,483	1,363,701
1997			1,810	39,077	296,155	129,836	345,390	812,268
1998			34,861	591,428	129,619	84,348	487,091	1,327,347
1999			92,794	326,303	103,777	166,630	540,310	1,229,814
2000			95,596	316,029	93,043	228,965	885,447	1,619,080
2001	860		51,890	132,578	188,198	155,854	853,714	1,383,094
2002	*860	15,154	155,213	182,226	103,830	170,572	551,128	1,178,983
2003			57,214	118,808	449,399	234,865	729,445	1,589,731
2004			33,106	115,056	402,725	288,708	677,736	1,517,331
2005			7,231	242,078	314,184	194,556	791,709	1,549,758
2006	1,466		18,027	219,362	231,450	163,967	644,920	1,279,192

* Weight estimated from same number of fish (275) caught in previous year

Table 4. Recreational harvest (numbers of A + B1 fish) of red drum by state, 1981-2006
(NMFS Office of Science & Technology, Queried 7/30/07)

Year	DE	MD	VA	NC	SC	GA	FLEC	Total
1981		601	49,630	15,054	27,319	6,323	75,244	174,171
1982				16,445	160,760	30,757	204,401	412,363
1983		2,413	32,940	81,528	104,806	56,854	344,513	623,054
1984			1,457	108,787	129,547	258,188	549,381	1,047,360
1985			0	22,077	530,110	183,837	265,185	1,001,209
1986		12,804	28,139	17,501	193,188	102,279	113,440	467,351
1987			2,186	61,100	522,420	138,062	51,225	774,993
1988			4,311	142,626	287,916	147,042	9,542	591,437
1989		1,014	12,007	62,359	127,492	51,557	34,748	289,177
1990		1,279	0	33,149	118,666	76,304	44,280	273,678
1991		2,745	17,119	38,658	125,833	162,802	102,727	449,884
1992			13,275	23,593	112,534	83,861	104,265	337,528
1993			14,005	49,493	119,189	105,710	65,140	353,537
1994			1,378	28,953	129,515	134,214	120,938	414,998
1995			3,665	88,593	202,430	134,915	96,927	526,530
1996			572	36,746	130,649	60,251	146,823	375,041
1997			1,920	8,749	129,022	39,041	75,235	253,967
1998			13,070	114,638	46,509	24,929	107,982	307,128
1999			12,425	64,739	44,069	67,283	126,180	314,696
2000			22,603	61,618	37,217	94,144	191,070	406,652
2001	275		6,967	23,142	61,420	90,376	177,633	359,813
2002	275	5,521	49,795	42,541	41,190	90,993	119,010	349,325
2003			13,607	25,481	162,484	122,259	159,331	483,162
2004			5,190	30,315	134,001	140,075	164,170	473,751
2005			2,624	53,268	141,023	107,970	196,235	501,120
2006	901	7,118	15,058	52,383	72,557	82,863	149,756	380,636

Table 5. Recreational releases (numbers of B2 fish) of red drum by state, 1981-2006
(NMFS Office of Science & Technology, Queried 7/30/07)

Year	NJ	DE	MD	VA	NC	SC	GA	FLEC	Total
1981					2,230	417		9,042	11,689
1982						2,496	3,377	10,172	16,045
1983					1,866	6,751	1,417	54,723	64,757
1984					2,931	0	4,232	47,196	54,359
1985				1,115		16,688	6,315	193,399	217,517
1986				7,595		24,018	56,045	100,095	187,753
1987					18,499	82,595	234,676	377,959	713,729
1988				3,958	24,874	269,176	177,319	233,988	709,315
1989			2,918	7,038	7,566	42,824	71,162	172,303	303,811
1990			0	934	12,452	102,611	156,263	68,667	340,927
1991			4,432	14,461	121,178	99,968	92,803	645,773	978,615
1992	301			15,383	60,230	46,269	128,066	284,893	535,142
1993				50,434	182,301	146,324	140,386	465,656	985,101
1994				10,684	107,662	324,706	146,039	691,261	1,280,352
1995				33,560	164,520	362,844	356,618	683,706	1,601,248
1996				2,424	35,752	176,517	71,983	500,374	787,050
1997		2,571		109,754	259,570	175,772	22,736	560,559	1,130,962
1998			2,768	93,660	199,701	84,274	33,882	481,009	895,294
1999			2,148	232,893	247,146	87,776	18,586	565,981	1,154,530
2000			1,458	196,541	203,967	94,050	129,190	693,152	1,318,358
2001				30,365	238,552	221,045	249,892	850,044	1,589,898
2002		1,388	18,412	801,239	640,857	142,931	168,902	663,879	2,437,608
2003		731	2,935	43,379	75,561	430,052	272,897	748,765	1,574,320
2004		86		33,594	194,627	401,234	165,802	1,137,541	1,932,884
2005				30,968	319,322	491,526	330,581	1,271,041	2,443,438
2006		1,007	11,282	159,178	463,565	616,458	148,785	893,781	2,294,056