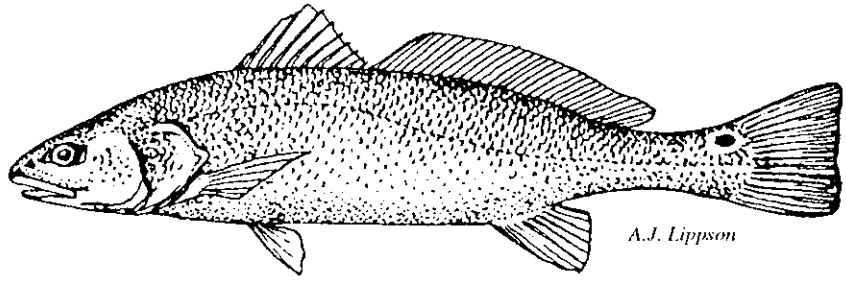
CBP/TRS 111/94
April 1994

Chesapeake Bay Red Drum Fishery Management Plan



Agreement Commitment Report 1993

Chesapeake Bay Program

Printed on Recycled Paper

Chesapeake Bay Red Drum Fishery Management Plan

Agreement Commitment Report

September 1993

Printed by the U.S. Environmental Protection Agency for the Chesapeake Bay Program

ADOPTION STATEMENT

We, the undersigned, adopt the Chesapeake Bay Red Drum Management Plan, in partial fulfillment of Living Resources Commitment Number 4 of the 1987 Chesapeake Bay Agreement:

> *"...by July 1989 to develop, adopt, and begin to implement a Bay-wide management plan for oysters, blue crabs and American shad. Plans for other major commercially, recreationally and ecologically valuable species should be initiated by 1990."*

We recognize the need to commit long-term, stable financial support and human resources to the task of enhancing and perpetuating the red drum stock.

Date **September 15, 1993**

For the Commonwealth of Virginia

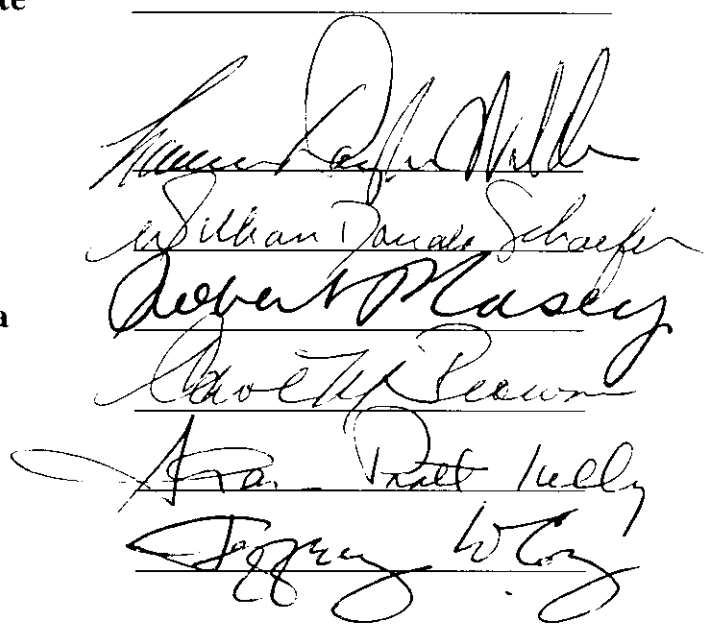
For the State of Maryland

For the Commonwealth of Pennsylvania

For the United States of America

For the District of Columbia

For the Chesapeake Bay Commission



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ACKNOWLEDGEMENTS

The Chesapeake Bay Red Drum Management Plan was developed under the direction of the Fisheries Management Workgroup. Staff from the Virginia Marine Resources Commission (VMRC), Plans and Statistics Department, Fisheries Management Division were responsible for writing the plan and addressing comments on the draft versions. Support was provided by staff from the Maryland Department of Natural Resources (MDNR), Tidewater Administration, Fisheries Division. Contributing VMRC staff included David Boyd, Roy Insley, Lewis Gillingham and Sonya Knur. MDNR staff included Nancy Butowski and Harley Speir. Thanks are due to Verna Harrison and Ed Christoffers for guiding the plan through the development and adoption process. Carin Bisland, from the EPA's Chesapeake Bay Liason Office, assisted with production of title pages and fact sheets, and with printing and distribution. Finally, we express gratitude to members of the various Chesapeake Bay Committees and Workgroups and to the public who commented on the plan.

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Mr. Larry Simns, Maryland Watermen's Association
Mr. Jack Travelstead, Virginia Marine Resources Commission
Ms. Mary Roe Walkup, Citizen's Advisory Committee

EXECUTIVE SUMMARY

Introduction

One of the strategies for implementing the Living Resources Commitments of the 1987 Chesapeake Bay Agreement is to develop and adopt a series of baywide fishery management plans (FMPs) for commercially, recreationally, and selected ecologically valuable species. The FMPs are to be implemented by the Commonwealth of Pennsylvania, Commonwealth of Virginia, District of Columbia, Potomac River Fisheries Commission, and State of Maryland as appropriate. Under a timetable adopted for completing management plans for several important species, the red drum FMP was scheduled for completion in December 1992.

A comprehensive approach to managing Chesapeake Bay fisheries is needed because biological, physical, economic, and social aspects of the fisheries are shared among the Bay's jurisdictions. The Chesapeake Bay Program's Living Resources Subcommittee formed a Fisheries Management Workgroup to address the commitment in the Bay Agreement for comprehensive, bay-wide fishery management plans. The workgroup is composed of members from government agencies, the academic community, the fishing industry, and public interest groups representing Pennsylvania, Maryland, Virginia, the District of Columbia, and the federal government.

Development of Fishery Management Plans

An FMP prepared under the 1987 Chesapeake Bay Agreement serves as a framework for conserving and wisely using a fishery resource of the Bay. Each management plan contains a summary of the fishery under consideration, a discussion of problems and issues that have arisen, and recommended management actions. An implementation plan is included at the end of the FMP to provide additional details on the actions that participating jurisdictions will take and the mechanisms for taking these actions.

Development of a fishery management plan is a dynamic, ongoing process. The process starts with initial input by the Fishery Management Workgroup, is followed by public and scientific review of the management proposals, and then by endorsement by the appropriate Chesapeake Bay Program committees. A management plan is adopted when it is signed by the Chesapeake Bay Program's Executive Committee. In some cases, regulatory and legislative action will have to be initiated, while in others, additional funding and staffing may be required to fully implement a management action. A periodic review of each FMP will be conducted under the auspices of the Bay Program's Living Resources Subcommittee, to incorporate new information and to update management strategies as needed.

Goal Statement

The goal of the Chesapeake Bay Red Drum Management Plan is to enhance and perpetuate red drum stocks in the Chesapeake Bay and its tributaries, and throughout their Atlantic coast range, so as to generate optimum long-term ecological, social and economic benefits from their commercial and recreational harvest and utilization over time.

In order to meet this goal, a number of objectives must be met. They include following the guidelines established by the Atlantic States Marine Fisheries Commission (ASMFC), the South-Atlantic Fishery Management Council (SAFMC) and the Mid- Atlantic Fishery Management Council (MAFMC) for coastwide management of the red drum fishery, providing for fair allocation of the resource, promoting efficient harvesting practices, promoting biological and economic research and pursuing standards of environmental quality and habitat protection. These objectives are incorporated into the problems and management strategies discussed below.

Problem Areas and Management Strategies

Problem 1: Overfishing. The red drum is an important fishery resource along the Atlantic coast, particularly between Florida and Virginia. Recreational catches have contributed 80 to 90% to the total landings in recent years, with commercial harvest making up the remaining 10 to 20%. While trends in commercial landings of red drum are not discernable due to changes in regulation, recreational catches, especially of large mature fish, have shown signs of decline. The spawning stock biomass per recruit of the Atlantic coast red drum stock has declined to about 2% of the unfished level, dispite minimum size and bag limits implemented by the states since 1984. Virginia Saltwater Fishing Tournament citation data indicates that catches of red drum over 40 pounds have declined from over 150 per year between 1966 and 1977, to 23 per year 1988-1991. Since the commercial fishery exploits primarily small fish and red drum can live to 55-60 years old, there is concern that trends evidenced in the recreational fishery would not be apparent in the commercial fishery until a stock collapse had already occurred.

Strategy 1: Bay jurisdictions will evaluate a number of alternatives to control directed fishing mortality and improve protection of the spawning stock. Management options include minimum and maximum size limits, daily trip limits, gear restrictions and quotas.

Problem 2 : Stock Assessment and Research Needs: Fisheries managers lack some of the biological and fisheries data necessary for effective management of the red drum resource. In particular, there

are no estimates of fecundity or delineation of spawning grounds for Atlantic coast red drum and there is no information on migration of Chesapeake Bay stocks.

Strategy 2 : Stock Assessment and Research Needs: Fishery independent measures of spawning stock size and recruitment to red drum stocks are needed to project the size of incoming year-classes. Data collection in both recreational and commercial fisheries should be improved and focused directly on red drum. Specific research to address these deficiencies will be persued.

Problem 3 - Habitat Issues: Estuarine areas are utilized by red drum stocks for nursery and feeding grounds. Increasing urbanization and industrial development of the Atlantic coastal plain has resulted in a decrease in the environmental quality of many estuarine communities. Estuarine habitat loss and degradation in Chesapeake Bay may contribute to declines in red drum stocks.

Strategy 3 - Habitat Issues: The jurisdictions will continue their efforts to improve water quality and define habitat requirements for the living resources in the Chesapeake Bay.

INTRODUCTION

MANAGEMENT PLAN BACKGROUND

As part of the 1987 Chesapeake Bay Agreement's commitment to protect and manage the natural resources of the Chesapeake Bay, the Bay jurisdictions are developing a series of fishery management plans covering commercially, recreationally, and selected ecologically valuable species. Under the agreement's Schedule for Developing Baywide Resource Management Strategies, a list of the priority species was formulated, with a timetable for completing fishery management plans as follows:

- oysters, blue crabs and American shad by July 1989;
- striped bass, bluefish, weakfish and spotted seatrout by 1990;
- croaker, spot, summer flounder and American eel by 1991;
- red and black drum by 1992; and
- Spanish mackerel, king mackerel, tautog, black sea bass and freshwater catfish by 1993

A comprehensive and coordinated approach by the various local, state and federal groups in the Chesapeake Bay watershed is central to successful fishery management. Bay fisheries are traditionally managed separately by Pennsylvania, Maryland, Virginia, the District of Columbia, and the Potomac River Fisheries Commission (PRFC). There is also a federal Mid-Atlantic Fishery Management Council, which has management jurisdiction for offshore fisheries (3-200 miles), a coast-wide organization, the Atlantic States Marine Fisheries Commission (ASMFC), which coordinates the management of migratory species in state waters (internal waters to 3 miles offshore) from Maine to Florida and regional coast-wide organizations, such as the South-Atlantic Fishery Management Council (SAFMC), which coordinates management of migratory species within their jurisdiction, from North Carolina to Florida. The state/federal Chesapeake Bay Stock Assessment Committee (CBSAC) was responsible for developing a Baywide Stock Assessment Plan, which included collection and analysis of fisheries information, but does not include the development of fishery management plans.

Consequently, a Fisheries Management Workgroup, under the auspices of the Chesapeake Bay Program's Living Resources Subcommittee, was formed to address the commitment in the Bay Agreement for baywide fishery management plans. The Fisheries Management Workgroup is responsible for developing fishery management plans with a broad-based view. The workgroup's members represent fishery management agencies from Maryland, Pennsylvania,

Virginia, the District of Columbia, and the federal government; the Potomac River Fisheries Commission; the Bay area academic community; the fishing industry; conservation groups; and interested citizens. Establishing Chesapeake Bay FMP's, in addition to coastal FMP's, creates a format to specifically address problems that are unique to the Chesapeake Bay. They also serve as the basis for implementing regulations in the Bay jurisdictions.

WHAT IS A FISHERY MANAGEMENT PLAN?

A Chesapeake Bay fishery management plan provides a framework for the Bay jurisdictions to undertake compatible, coordinated management measures to conserve and utilize a fishery resource. A management plan includes pertinent background information, lists management actions that need to be taken, the jurisdictions responsible for implementation, and an implementation timetable.

A fishery management plan is not an endpoint in the management of a fishery; rather, it is part of a dynamic, ongoing process consisting of several steps. The first step consists of analyzing the complex biological, economic and social aspects of a particular finfish or shellfish fishery. The second step includes defining a fishery's problems, identifying potential solutions, and choosing appropriate management strategies. Next, the chosen management strategies are put into action or implemented. Finally, a plan must be regularly reviewed and updated in order to respond to the most current information on the fishery; this requires that a management plan be adaptive and flexible.

GOALS AND OBJECTIVES FOR FISHERY MANAGEMENT PLANS

The goal of fisheries management is to protect the reproductive capability of the resource while providing for its optimal use by man. Fisheries management must include biological, economic and sociological considerations in order to be effective. Three simply stated objectives to protect the reproductive capabilities of the resource while allowing its optimal use include:

- quantify biologically appropriate levels of harvest;

- monitor current and future resource status to ensure harvest levels are conserving the species while maintaining an economically viable fishery; and

- adjust resource status if necessary, through management efforts.

MANAGEMENT PLAN FORMAT

The background section of this management plan summarizes:

° natural history and biological profile of red drum;

° FMP status and management unit;

° fishery parameters;

° habitat issues;

° historical fishery trends;

° current resource status;

° current laws and regulations in the Chesapeake Bay; and

° data and analytical needs.

The background information is partially derived from the document entitled, Chesapeake Bay Fisheries: Status, Trends, Priorities and Data Needs and is supplemented with additional data. Inclusion of this section as part of the management plan provides historical background and basic biological information for the species.

The management section of the plan, which follows the background, defines:

° the management goal and objectives for the species;

° problem areas for the species;

° management strategies to address each problem area; and

° action items with a schedule for implementation.

THE CHESAPEAKE BAY PROGRAM'S FISHERY MANAGEMENT PLANNING PROCESS

The planning process starts with initial input by the Fisheries Management Workgroup and development of a draft plan. This is followed by a review of the management proposals by Bay program committees, other scientists and resource managers, and the public. After a revised draft management plan is prepared, it must be endorsed by the Chesapeake Bay Program's Living Resources Subcommittee and Implementation and Principal Staff committees. The plan is then sent to the Executive Committee for adoption.

Upon adoption by the Executive Committee, the appropriate management agencies implement the plan. In 1990, the Maryland legislature approved S^{S} 4-215 of the Natural Resources Article

giving the Maryland Department of Natural Resources authority to regulate a fishery once an FMP has been adopted by regulation. In Virginia, FMP recommendations are pursued either by legislative changes or through a public regulatory process conducted by the Commission. A periodic review of each FMP is conducted by the Fisheries Management Workgroup to update management strategies as needed.

SECTION 1. BACKGROUND

Red Drum - Life History

The red drum, Sciaenops ocellatus, is a member of the drum family, Sciaenidae. It is known by a number of common names, including puppy drum (small fish), channel bass and redfish. It is one of 13 species of sciaenids that occur in the Chesapeake Bay region. The family includes the commercially and recreationally important seatrouts, spot, croaker, kingfishes, silver perch and black drum (USFWS, 1978). Red drum are not often confused with other sciaenids, since they grow to a much larger size than all other species except the black drum and their reddish-bronze coloration and characteristic spot on the caudal peduncle are distinctive.

Occurrence of red drum was once common as far north as New Jersey, where they supported both a commercial pound net fishery and a recreational surf fishery (ASMFC, 1991). Since the 1950's, the Chesapeake Bay has marked the northern extent of commercially harvestable numbers of fish (NMFS commercial landings reports). However, 1991 marked a year of exceptional abundance for young red drum, the result of a very successful 1990 spawn, and fish were caught farther north than in most years.

Historically, red drum ranged from the Gulf of Maine to Key West, Florida on the Atlantic Coast and from southwest Florida to Mexico on the Gulf Coast. Atlantic Coast red drum are rare north of New Jersey and are most abundant along the east coast of Florida.

Young-of-the-year (YOY) and subadults tend to remain within estuaries except in areas where the lower temperature threshold is reached (e.g. Chesapeake Bay). Movements of young-of-the-year and subadults are poorly known once they leave Chesapeake Bay and the effects of emigration on fishing mortality and population estimates are a matter of concern to fisheries biologists. In the Chesapeake Bay region, occurrence of red drum has historically been restricted to young of the year to yearling fish and mature red drum at least 6 years of age (>35 inches total length). In late February and March 1992, red drum to over 20 inches were caught in Virginia's Chesapeake Bay and ocean waters. Water temperatures during this time period were substantially higher than normal, which may account for the winter presence of red drum and the occurrence of 2 year old fish. Additionally, earlier attempts to define the distribution of YOY fish have relied on trawl surveys, but the habitat of early juveniles is generally restricted to shallow marsh areas where trawling is ineffective (Daniel, pers. comm., 1992; Peters and McMichael, 1987; Mansueti, 1960).

Fish 2-6 years old are thought to migrate south along the coast, probably inhabiting estuaries and surf zones from North

Carolina southward. Although large red drum traditionally frequent barrier islands along Virginia's Eastern Shore, it is not known whether these fish were originally spawned in Virginia waters.

Preferred prey items of red drum change as the fish grow. Late-stage larvae and early juveniles (to 2 inches) consume first copepods, then mysids, then amphipods as the primary component of their diet in sequential growth stages. Fish from 2- 12 inches in length feed primarily on decapod crustaceans (xanthid crabs and penaid shrimp), with fish becoming an increasingly important part of the juvenile drum's diet as it grows (SAFMC, 1990; Daniel, MS thesis). The digestive tracts of fish between 11.8 and 23.6 inches (300-600mm), contained 72% arthropods, 17% fish and 11% plant material, with fiddler crabs (16%) and white shrimp (11%) predominating (Musick and Pafford, 1984 as cited in SAFMC, 1990). Dietary composition exhibited a seasonal variation in Louisiana, with menhaden and blue crab comprising the bulk of winter-spring samples and shrimp replacing menhaden as a primary food item in summer-fall (Boothby and Avault, 1971).

Growth is rapid in juvenile red drum sampled in South Carolina, averaging 0.31-0.82 mm/day during various months of the year. Red drum usually turn one year old in September, by which time they average 8.7 inches (220mm) in length (Daniel, MS thesis). Limited sampling in Virginia waters has indicated similar growth rates for juvenile red drum from the Chesapeake Bay (Daniel, pers. comm., Mansueti, 1960).

Adults are best categorized as marine littoral, feeding on or off the bottom. The diet of red drum between 23.6 and 43.3 inches (600-1,100mm) in length was found to consist largely of arthropods (59%) and fish (36%). Fiddler and mud crabs constituted the most predominant food items (Musick and Pafford, 1984 in SAFMC, 1990). Adults normally stay close to shore, typically cruising the sloughs and troughs of the surf zone, but schools have been sighted in the Gulf as far as 14 miles offshore (USFWS, 1978). After reaching sexual maturity, adults spend more time at sea and less time within estuaries. Adults entering the Chesapeake Bay are following a seasonal pattern of northward movement in the spring followed by southward movement in the fall. Red drum occurring in the Chesapeake region apparently overwinter in waters just south of Cape Hatteras, North Carolina.

Spawning occurs in the ocean near channels and passes (Yokel, 1978) and distribution of larvae is affected by tidal currents. The location of spawning grounds is not well defined, but red drum are known to spawn nocturnally with a synchronous, short-duration pattern (Shaw et al., 1988). Red drum are batch spawners and are extremely prolific. During a Texas study on reproduction, two pairs of fish (22-33 lb. each) were held in captivity and photoperiod and temperature were adjusted to induce spawning. These four fish spawned 360 times in 71 months, producing 250 million fertilized

eggs (Arnold, 1988). When laboratory conditions were adjusted to match natural conditions, red drum spawned an average of once every 3.5 days. Very little spawning occurred below 73 degrees F. and spawning ceased when water temperatures dropped rapidly.

Preliminary sampling for the occurrence of juvenile red drum along Virginia's Eastern Shore demonstrated about one tenth the number of fish (0-0.1/sq. meter) found in South Carolina nursery areas (Daniel, pers. comm.).

FMP Status and Management Unit

The Atlantic States Marine Fisheries Commission (ASMFC) interstate FMP for red drum was finalized in 1984. The Atlantic Coast FMP was prepared by the South Atlantic Fishery Management Council (SAFMC) in conjunction with the Mid-Atlantic Fishery Management Council (MAFMC) in 1990. The ASMFC adopted Amendment # 1 to its Red Drum Plan in 1991 to update the information contained therein and bring that plan in conformance with the South Atlantic plan. The ASMFC FMP and the Atlantic Coast FMP are the source documents and the basis for the Chesapeake Bay Red Drum Management Plan. The Chesapeake Bay Red Drum Plan is scheduled for completion in December 1992.

The management unit is defined as a single Atlantic coast stock of red drum (Sciaenops ocellatus).

Fishery Parameters

Status of exploitation:	Overfished- commercial landings have generally declined along the Middle Atlantic Coast. Spawning stock is believed to be 2-3 % of the unfished level. No commercial landings have been reported north of Chesapeake Bay since 1950.
Long term potential catch:	Unknown.
Importance of recreational fishery:	Currently, of moderate importance. Recreational catches of red drum over 40 pounds have declined substantially over the last decade in Virginia, but 1991 was a very good year for small red drum. Since 1960, Virginia landings of small fish appear to follow a 8-10 year cycle, with no discernable relationship to landings of large fish (VMRC data). MRFSS surveys estimate 0-95% of the Atlantic coast harvest was caught by

the recreational fishery in recent years (Vaughan, 1992).

Importance of commercial fishery: No directed commercial fishery at this time. Bycatch in directed fisheries for other species has averaged 300,000 pounds in recent years. North Carolina, which has accounted for 95% of commercial landings since 1988, has enacted a 250,000 lb. cap and an 18" size limit for its commercial fishery. Florida, also a major historical entity in commercial landings, declared the sale of red drum illegal in 1988. South Carolina designated red drum a gamefish in 1987.

Fishing mortality rate: Fishing mortality (F) is estimated to be 1.01 for fish 1-5 years old and 1.3 for fish aged 1-3.

Natural mortality rate: Natural mortality (M) is estimated at 0.51, ages 1-5 and 0.17, ages > 5 (based on life history information).

Total mortality rate: Total mortality (Z) estimated at 1.52, ages 1-5, for 1990 (based on catch curve analysis).

Biological Profile

Fecundity: Estimates range from 2.5 million eggs for 29"- 33" fish collected off Texas to 3.5 million eggs per fish at a size of 36". There are no fecundity estimates for Atlantic coast fish.

Age\Size at maturity: The size at which 50 % of the female fish are mature is between 29" (Vaughan, 1992) and 36.3" (SAFMC, 1990) and 3-6 years of age. Males mature at 20.9" and 2 years old.

Longevity: Red drum have been aged to 55 years.

Spawning and Larval Development

Spawning season: Red drum spawn in late summer and fall. Spawning begins in July and continues through December with a

peak in late September or October.

Spawning area: From Virginia, southward to at least St. Lucie Inlet, FL. There is no evidence of spawning north of the Chesapeake Bay.

Location: Primarily on the outer coast near passes and channels, but there is also evidence of spawning in the Chesapeake Bay.

Salinity: Larvae are carried from Atlantic Ocean spawning areas into estuaries where salinity ranges from near fresh water to 35 ppt.

Temperature: 65 to 80°F. (18.3-26.7°C.)

Young-of-year

Location: Larval red drum assume a demersal life-style at a length of 0.3 inches (8mm) and about 17 days old (Peters and McMichael, 1987). Early juveniles prefer clumps of grass or oyster shell over slightly muddy bottoms in quiet, protected waters, generally less than 6 feet. YOY first appear in the Chesapeake Bay in mid-September. YOY are restricted to a shoal estuarine habitat, primarily in tidal creeks, during fall months, then rapidly descend to deeper Bay or ocean waters in early winter.

Salinity: Collected from freshwater to 45 ppt. Reported in Chesapeake Bay from 14-22 ppt.

Temperature: 50-91°F. (10-32.2°C.)

Subadults and Adults

Location: Immature red drum inhabit estuaries year-round in their southern ranges. In the northern portion of their range, immature red drum appear to migrate south to estuarine waters during winter. Adult red drum

	apparently leave low salinity waters at the onset of sexual maturity and migrate north along the coast in the spring, and south in the fall. Red drum spend the first three to four years of their life within estuaries throughout most of their range.
Salinity:	Collected from 0-50 ppt.
Temperature:	36-91°F.(2.2-32.8°C.) Older individuals are apparently more sensitive to cold, but more tolerant of high salinities.

Habitat Issues

The future condition of red drum populations along the Atlantic Coast is in part dependent on larval recruitment, survival and growth in estuarine habitat. Submerged aquatic vegetation (SAV) areas are used as temporary habitat by larval red drum. Degradation of estuarine habitat will lead to declines in subadult populations. Estuaries and inshore oceanic waters are critically important to the life cycle of red drum. These areas are utilized as feeding grounds by the adults and nursery grounds by juveniles. Continuing alteration of these habitats through pollution, dredging and urban development could disrupt the life cycle of red drum.

The Fisheries

The Atlantic coast commercial catch of red drum was formally split between North Carolina and Florida. Since Florida declared the sale of red drum illegal in 1988, over 95% of the commercial catch has been landed in North Carolina. Despite the magnitude of the North Carolina landings, there is no directed fishery for the species in that state. Landings from North Carolina are predominately bycatch from the gillnet and haul seine fisheries.

Red drum are not an important commercial species in the Chesapeake Bay region. Maryland has had no commercial catch of red drum in 27 of the past 40 years. In years when landings were reported (1950-1990), the catch did not exceeded 4,500 pounds. In 1991, Maryland recorded its largest harvest of red drum in over 40 years, with 6,000 pounds of red drum caught. (Figure 1).

Virginia's red drum harvest has historically been as high as 180,000 pounds, but annual commercial catches have normally been under 20,000 pounds since the late 1950s. While the majority of years since 1965 have generated landings under 5,000 pounds, catches in the 20,000 to 40,000 pound range occur briefly every 8-10 years (Figure 2). These peaks in landings appear to be

associated with recruitment of yearling red drum cohorts which do not return to Virginia waters as 2-5 year old fish, but may return as mature fish greater than five years old. In the 1980's, the price per pound of red drum landed in Virginia fluctuated between $0.13 and $0.55, so the annual commercial dockside value has ranged from under $100 to $4,645 (Figure 3).

In terms of numbers, red drum support a modest recreational fishery in Chesapeake Bay. Data collected by NMFS indicate that the recreational harvest in Maryland and Virginia was less than 60,000 pounds for the two states combined during the early 1980s. Data collected during 1991 form Maryland's Charter boat logbooks indicated a small number (66) of red drum (average wt.= 3.4 lbs) were caught between July and October. Preliminary 1991 data from MRFSS indicates less than 30,000 red drum were caught by recreational fishermen from Maryland and Virginia. However, MRFSS data on red drum in this part of their range is very unreliable and anecdotal evidence from Virginia indicates 1991 was an exceptional year for small red drum.

Virginia and Maryland have two distinct fisheries for red drum. The fishery for small red drum is highly variable with insignificant landings during most years, but a fairly large influx of fish occurring every 6-8 years, caught primarily as a byproduct of bottom fishing for other more abundant species. Peaks in landings of small fish normally last only 1-2 years. A separate fishery for mature red drum is far more consistent in terms of the annual availability of fish.

In contrast to the fishery for small red drum, mature red drum or channel bass attract a different breed of fisherman. Virginia's Eastern Shore receives an substantial annual migration of these fish and they are considered the big-game of surf casters. These channel bass (large red drum) often weigh 30-50 pounds and, with the exception of striped bass, are the only gamefish presenting such a target to the surfcaster. Serious specialists will spend several nights waiting for their chance at one and will often release the prize once landed.

Resource Status

Data collected in the Middle Atlantic region (New York to Virginia) and in the Chesapeake Bay indicate that red drum are less abundant than they once were. The most recent Atlantic coast stock assessment indicates the stock is overfished. The spawning stock biomass per recruit (SSBR) has fallen to 2% of the unfished level, in spite of management measures enacted by the states. A SSBR of 30% is deemed necessary for a healthy stock. The low level of the spawning stock, along with a 70% annual fishing mortality on fish 1-3 years old, is cause for concern over a collapse in the fishery. The Atlantic coast recreational red drum catch has grown from 679,000 pounds in 1980 to 3,800,000 pounds in 1988. However, the

NMFS Recreational Survey estimated that of the 3,800,072 pounds of red drum caught, 2,129,882 pounds were released. Recreational catch estimates for the Mid-Atlantic states are highly variable due both to the sporadic occurrence of fish and the difficulty in accurately surveying this fishery. In Virginia, catches of citation-sized fish (> 40 lbs.) have declined sharply since the mid-1970s (Figure 4). Maryland's citation program records indicate no large red drum (> 40 lbs.) were caught between 1965 and 1988. Beginning in 1989, small numbers of large red drum have been reported from Maryland's portion of the Bay.

Figure 1. Commercial red drum landings from Maryland, 1950-1991

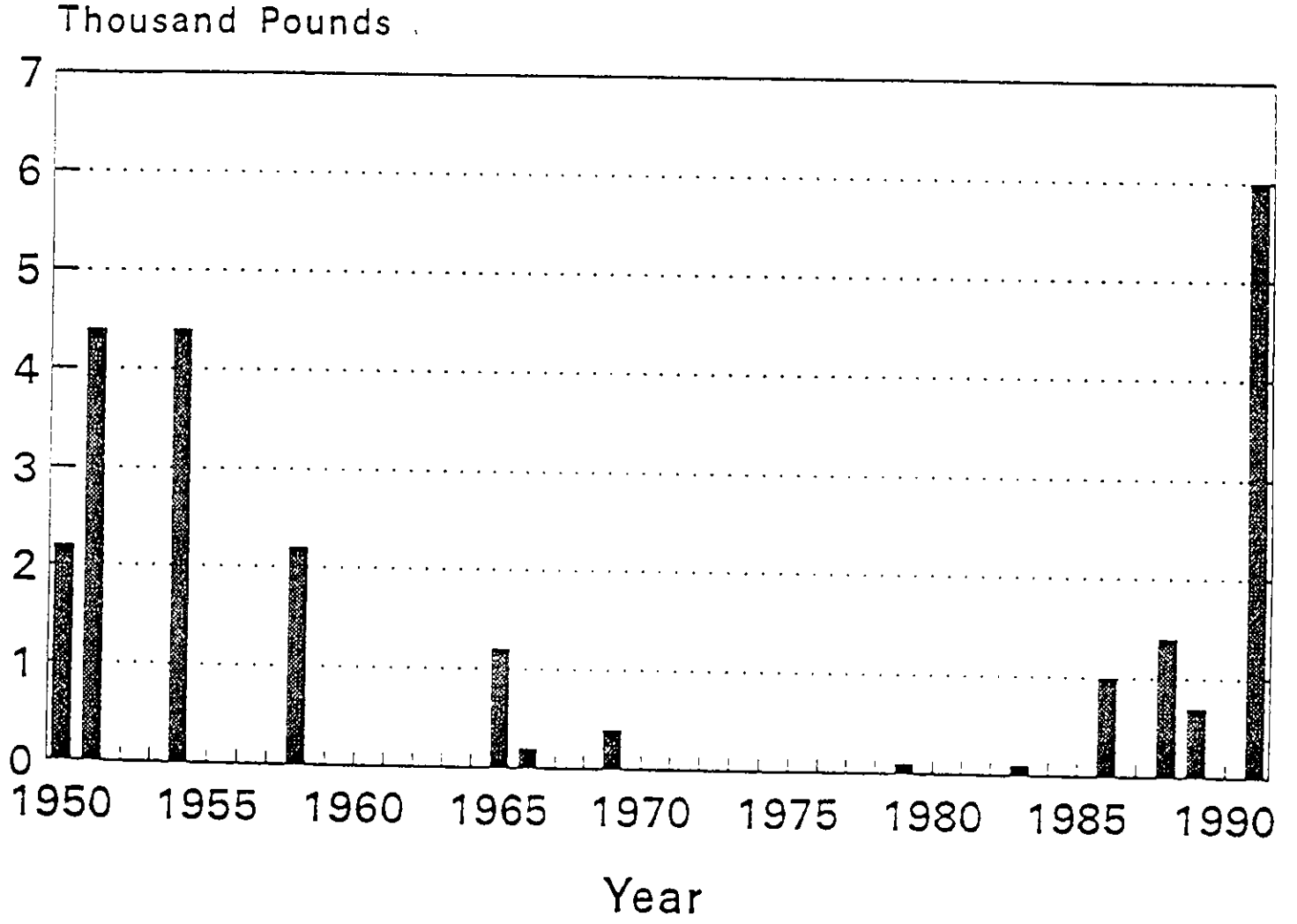


Figure 2. Commercial Red Drum Landings from Virginia, 1950-1991

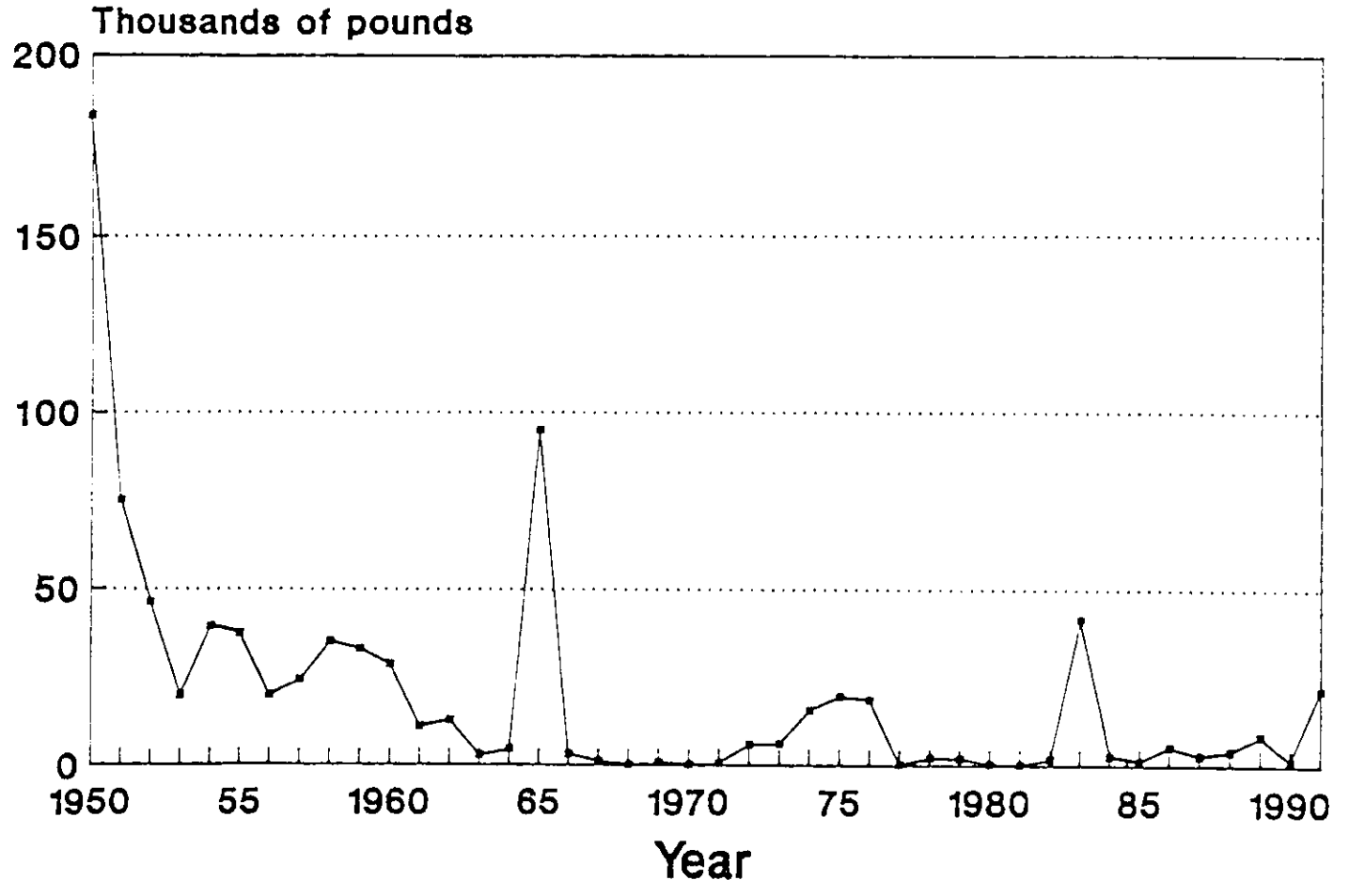


Figure 3. Dockside Value
Virginia Red Drum

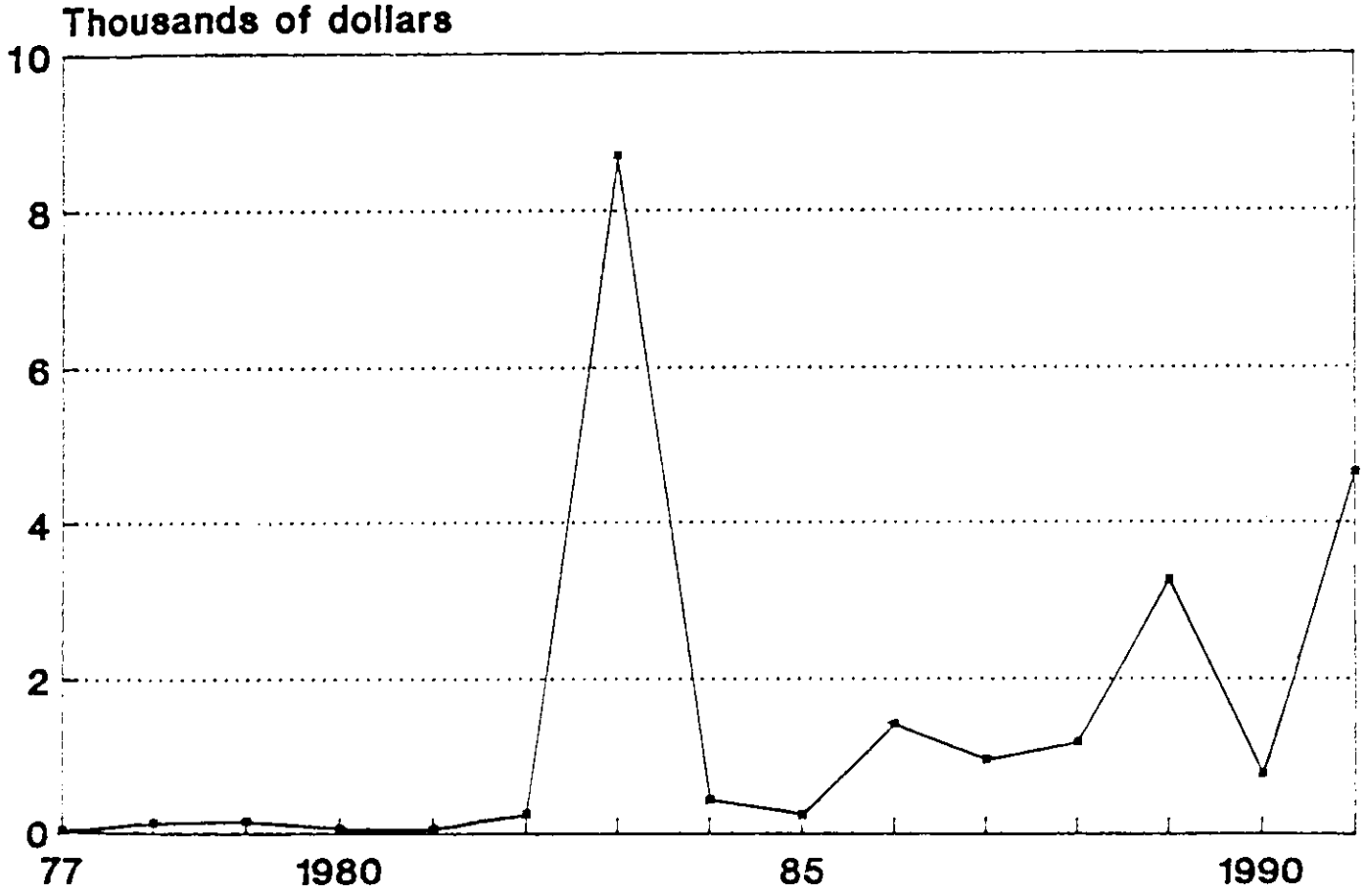
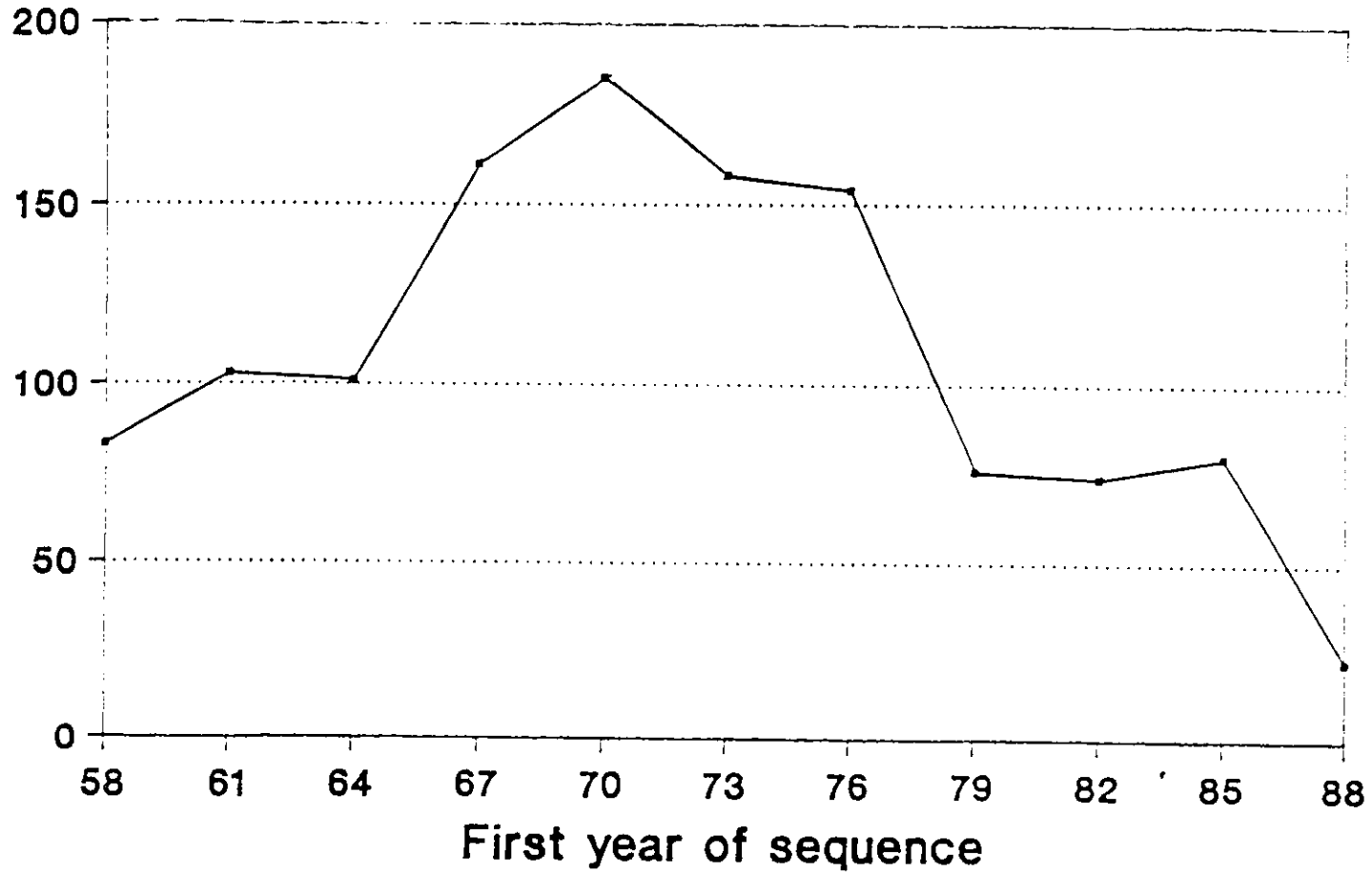


Figure 4. Va. Red Drum Citations
3 year averages - fish > 40 lbs.



Adjustments made for releases 1988-1990

Laws and Regulations

Limited Entry:	Maryland's Delay of Application Process, which went into effect September 1, 1988, requires previously unlicensed applicants to wait two years after registering with MDNR before a license to harvest finfish with commercial fishing gears will be issued. Delayed entry is scheduled to go into effect by January 1, 1993 in Virginia.
Minimum size:	14 inches TL in Maryland and the Potomac River and 18 inches TL in Virginia.
Creel limit:	2 fish per day over 32 inches in Maryland and the Potomac River. 5 fish per day in Virginia, with a minimum size of 18" and only 1 of the 5 fish over 27".
Harvest quotas:	None. However, Virginia's 5 fish per person per day and size restrictions apply to both commercial and recreational fisheries.
By-catch restrictions:	Maryland and Potomac River - None. Virginia - 5 fish per day, all must be over 18" and only one allowed over 27".
Season:	No closed season for Maryland, Virginia or Potomac River.
Gear - Area restrictions:	Maryland: Purse seines, otter trawls, beam trawls, troll nets, drag nets, trammel nets, monofilament gill nets and gigs are prohibited (otter and beam trawls are legal on the Atlantic Coast at distances of one mile or more offshore). Minimum stretch mesh size restrictions: pound net, 1.5"; fyke and hoop net, 1.5"; haul seine, 2.5". Virginia: Trawling prohibited. It is unlawful to set, place or fish a fixed fishing device of any type within three hundred yards in either

direction from the Chesapeake Bay Bridge Tunnel. From April 1 through 31 May the spawning areas of the James, Pamunkey, Mattaponi, and Rappahannock Rivers are closed to stake and anchor gill nets. No trot lines may be set on the seaside of Eastern Shore. There is a 1200 foot maximum size for each gill net and a maximum of 8400 feet of gill net allowed per licensee. Any gill net, whether floating or submerged, that is not assigned a fixed location shall be set in a straight line, have no greater depth than 330" and shall be fished no closer than 200' to any other such gill net. No gillnets or trotlines are allowed from 7 A.M. to 8:30 P.M. between May 1 and June 7 in the area bounded by a line drawn from the Cape Charles Jetty to the C-12 Buoy to the RN-28 Buoy, then along the Baltimore Channel to the Fourth Island of the Chesapeake Bay Bridge-Tunnel and north along the coast, back to the Cape Charles Jetty. Minimum stretch mesh size restrictions: pound net, 2"; gill net, 2.875"; haul seine 3", if over 200 yards long, 2" if under 200 yards.

Status of Traditional Fishery Management Approaches

The following definitions have been adapted from the documents, "Status of the Fishery Resources Off the Northeastern United States" for 1989 and 1990 (NOAA Technical Memoranda NMFS-F/NEC-72 and 81), "Amendment 2 to the Fishery Management Plan for the Summer Flounder Fishery" (MAFMC, 1991) and "The Atlantic Coast Red Drum Fishery Management Plan" (SAFMC, 1990). For a more through review of fisheries terminology, refer to these documents under the "definitions" section.

Catch per unit Effort or CPUE: Defined as the number or weight of fish caught during a specific unit of fishing time and considered a basic measure of abundance or stock density.

Estimates of mortality: A mortality rate is the rate at which fish die from natural causes or fishing. Mortality rates can be expressed in terms of instantaneous or annual mortality. Instantaneous rates are used extensively in fisheries management for ease of comparing the relative importance of different sources

of mortality. Annual mortality rates can be easily converted to percentages, while instantaneous rates cannot. The instantaneous total mortality rate (Z) is the natural logarithm of the ratio of the number of fish alive at the end of a period of time to the number of fish alive at the beginning of the same period of time. Fishing mortality is usually expressed in terms of an instantaneous rate (F), as is natural mortality (M). For example, an instantaneous total mortality rate (Z) of 1.5 equals an annual mortality rate of 0.78 or 78% annual total mortality. Instantaneous mortality rates are additive, but annual rates are not.

Yield-per-recruit (YPR): The theoretical yield that would be obtained from a group of fish of one year-class if harvested according to a certain exploitation rate over the lifespan of the fish.

Spawning Stock Biomass (SSB) and Spawning Stock Biomass per Recruit (SSBR): SSB is the weight of all adult females in the population, calculated as the remaining number of individual females in each year-class, times the percent that are mature, times their average weight. SSBR is the total contribution of a cohort (year-class) to the SSB over its lifetime, determined by summing its contribution at each age.

Maximum Sustainable Yield (MSY): The largest average catch or yield that can be continuously taken from a stock under existing environmental conditions, while maintaining stock size.

Virtual Population Analysis (VPA): an analysis of the catches from a given year-class over its life in the fishery.

Catch per unit Effort:	Catch per unit effort estimates in the South Atlantic recreational fishery average slightly under 1 fish per trip with an average weight of 2 pounds (MRFSS Survey, 1980-1987). Estimates for Virginia and Maryland recreational fisheries are highly variable and unreliable. Commercial CPUE not available due to lack of a directed commercial fishery.
Estimates of mortality:	Estimated fishing mortality rates for 1986-1990 ranged from F = 0.98 to 1.46, with an average F of 1.3. Natural mortality rates (M) are estimated to be 0.51 (ages 1-5), 0.17 (ages > 5) and 0.075 (all ages). Total mortality (Z) is estimated at 1.52-2.57 between 1987 and 1990.
Yield-per-recruit:	Yield per recruit (YPR) in the

	recreational fishery averaged 2.6 pounds from 1979-1990, and 2.44 pounds over the period 1984-1988. YPR estimate from 1985-1988 data for the combined commercial/recreational fishery was 1.02 pounds.
Stock-recruitment:	No YOY indices exist for red drum along the East Coast.
Spawning stock/biomass ratio:	SSBR estimated at 2-3 % of the level which would exist in an unexploited stock.
MSY:	Unknown.
VPA Analysis:	Age F at age 0 0.15 1-3 1.26 4 0.25 5 0.005

Note: The two most recent stock assessments (Vaughan and Helser, 1990; Vaughan, 1992) for red drum are limited to the subadult phase of the stock because insufficient samples are available to estimate status of the adult stock (Vaughan, 1992). Therefore, no estimates of mortality for fish greater than 5 years old have been made.

Data and Information Needs

1. Tagging studies to help determine rates of migration and generate complimentary information on fishing mortality rates.

2. Fishery independent indices of spawning stock size and relative abundance.

3. Estimates of fecundity for the Atlantic coast stock.

4. Sampling of sub-adults to develop long term indices of recruitment.

5. Improved estimates of migration, recruitment and mortality rates to better develop yield models.

6. Improved catch and effort data for the commercial and recreational fisheries, including modification of MRFSS collection procedures to more accurately survey red drum.

7. Develop more reliable estimates of natural mortality through directed sampling of the adult population.

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SECTION 2. RED DRUM MANAGEMENT

The source documents for this plan, the Atlantic States Marine Fisheries Commission inter-state FMP (1984), Amendment # 1 to the ASMFC FMP (1991) and the Atlantic Coast Red Drum FMP (SAFMC, 1990) contain current knowledge and discuss management priorities for red drum stocks. Information from these documents has been supplemented and updated with recent stock assessments published by NOAA/NMFS (1990 and 1992). Problems and management strategies have been defined and grouped into specific categories and serve as the basis for identifying the goals and objectives of the plan. The management strategies and actions will be implemented by the jurisdictions to protect and enhance the stocks of red drum utilizing the Chesapeake Bay. Existing regulations regarding the harvest of this species will continue to be enforced except where otherwise indicated by the plan.

A. GOAL AND OBJECTIVES

The goal of this plan is to:

Enhance and perpetuate red drum stocks in the Chesapeake Bay and its tributaries, and throughout their Atlantic coast range, so as to generate optimum long-term ecological, social and economic benefits from their commercial and recreational harvest and utilization over time.

In order to meet this goal, the following objectives must be met:

1) Follow guidelines established by the Atlantic States Marine Fisheries Commission, the South-Atlantic Fishery Management Council and the Mid-Atlantic Fishery Management Council for coastwide management of red drum stocks and make Bay regulatory actions compatible where possible.

2) Promote protection of the resource by maintaining a clear distinction between conservation goals and allocation issues.

3) Maintain red drum spawning stocks at a size which provides a 30% spawning stock biomass per recruit by allowing a 30% escapement rate of juveniles to the adult stock.

4) Determine the effects of environmental factors on year-class strength.

5) Promote the cooperative interstate collection of economic, social and biological data required to effectively monitor and assess management efforts relative to the overall goal.

6) Improve collection of catch and standardized effort statistics

in the red drum fisheries.

7) Promote fair allocation of allowable harvest among various components of the fishery.

8) Continue to provide guidance for the development of water quality goals and habitat protection necessary to protect the red drum population within the Bay and state coastal waters.

B. PROBLEM AREAS AND MANAGEMENT STRATEGIES

Problem 1: Overfishing. Recent stock assessments indicate that red drum spawning stocks are overfished and continuing to decline despite the adoption of regulations governing harvest of the species as set forth in the 1984 ASMFC plan. Spawning stocks have fallen to a 2% SSBR level estimated in 1990 and 1991. Therefore, the ASMFC has rejected management schemes based on size and harvest limits set forth in the 1984 plan and requested the states adopt regulations in a stepwise format sufficient to provide 30% escapement of juveniles to the adult stock, as recommended in Amendment # 1 (1991) to the ASMFC plan. It is recommended that the states initially adopt management measures sufficient to provide a rate of escapement greater than 10%. The need for further reductions in the fishery will be determined by future annual stock assessments.

Strategy 1: Provide escapement of juvenile red drum to the spawning stock and control fishing mortality to achieve a target spawning stock biomass per recruit level of 30%.

PROBLEM 1.1
The recreational and commercial fisheries have been harvesting immature red drum at a rate which exceeds the ability of the stock to replenish itself. This has contributed to the decline in the spawning stock.

STRATEGY 1.1
In order to reduce fishing mortality, increase juvenile escapement and reach the 30% target spawning stock biomass per recruit level, the states will implement specific management measures in a series of steps. Initially, the states will adopt regulations to provide a 10% escapement of juveniles to the adult stock. Annual stock assessments will be conducted by the ASMFC during the first step of management that may result in more stringent regulations.

ACTION 1.1.1: Virginia will continue to enforce its 18 inch total length mimimum size limit and 5 fish per person per day bag limit, with one fish over 27 inches, for red drum.

ACTION 1.1.2: Maryland and the PRFC will implement an 18 inch total length minimum size limit and 5 fish per person per day bag limit, with one fish over 27 inches, for red drum.

PROBLEM 1.2
The incidental bycatch of immature red drum in non-directed fisheries continues to hinder efforts to rebuild the stock. Over 95% of the Atlantic coast commercial harvest of red drum is considered by-catch in fisheries targeting other species. Nondirected fisheries include the Chesapeake Bay's pound net, haul seine and gillnet fisheries and North Carolina's gillnet, haul seine, pound net and trawl fisheries for finfish and shrimp.

STRATEGY 1.2a
Management agencies will promote the use of escape panels, trawl efficiency devices, selective mesh sizes, culling devices and other methods to promote gear efficiency and reduce bycatch.

ACTION 1.2a
Virginia, Maryland and the PRFC will investigate the potential for innovative devices designed to reduce the by-catch of juvenile finfish in non-selective fisheries. Virginia is conducting a one year study of escape panels in pound nets to reduce the catch of undersize fish.

IMPLEMENTATION 1.2a
1) 1993; Continue

STRATEGY 1.2b
The management agencies will continue to participate in coastal deliberations and field trials to encourage the use of gear efficiency and bycatch reduction devices. Research underway in Virginia's pound net fishery and North Carolina's pound net, haul seine and trawl fisheries may provide guidance on the design of more selective gear.

ACTION 1.2b
Virginia and Maryland will work with the Mid-Atlantic Fisheries Management Council and the Atlantic States Marine Fisheries Commission to develop and require the use of more efficient gear consistent with policies designed to reduce bycatch and/or discards. Virginia has initiated a cooperative program of field trials and data exchange with North Carolina on the use of escape panels in pound nets in an effort to reduce the

catch of small fish by that gear type.

IMPLEMENTATION 1.2b
1) 1992; Continue

Problem 2 - Stock Assessment and Research Needs: Fisheries managers lack some of the biological and fisheries data necessary for effective management of the red drum resource. In particular, there are no estimates of fecundity or delineation of spawning grounds for Atlantic coast red drum and there is no information on migration of Chesapeake Bay stocks.

Strategy 2 - Stock Assessment and Research Needs: Fishery independent measures of spawning and recruitment to red drum stocks are needed to project the size of incoming year-classes. Data collection in both recreational and commercial fisheries should be improved and focused directly on red drum. Specific research to address these deficiencies will be persued.

PROBLEM 2.1
Fecundity of Atlantic coast red drum spawning stock and the extent of population mixing are poorly understood. Estimates of the Chesapeake Bay red drum population's contribution to recruitment of the Atlantic coast stock are not available. There is a need for a survey designed specifically to sample young-of-the-year (YOY) red drum since trawl surveys are not reliable indicators of juvenile red drum abundance. Information on the stock-recruitment relationship of red drum within the Chesapeake Bay is lacking, as is information on movements of red drum to and from the Chesapeake Bay system.

STRATEGY 2.1
Research on Atlantic coast stock fecundity, the contribution of the Chesapeake Bay population to recruitment and mixing of recruits from various Atlantic coast nursery areas will be encouraged.

ACTION 2.1
1) The jurisdictions will support fecundity research, tagging studies to determine movements of juvenile red drum once they leave the Chesapeake Bay and the development of juvenile indices to estimate spawning success of red drum within the Chesapeake Bay. Tagging studies should be coordinated to take advantage of the episodic occurrence of large year-classes of juvenile red drum.
2) Maryland and Virginia will continue the Baywide trawl survey of estuarine finfish species and crabs

to measure size, age, sex, distribution, abundance and CPUE. Use of channel block nets or alternative methods of efficiently sampling the small estuarine creeks frequented by YOY red drum will be encouraged as a preferable method for developing a juvenile index.

IMPLEMENTATION 2.1
1) Continue; 2) Continue

PROBLEM 2.2
Data on mortality rates and movement of adult red drum, particularly at the extremities of their range (i.e. the Chesapeake Bay), are lacking. No direct estimates of the current status of the red drum spawning stock are available.

STRATEGY 2.2
The jurisdictions will promote research to better estimate movements and mortality of adult red drum stocks within state waters.

ACTION 2.2
VMRC's Stock Assessment Program will continue to collect biological data (age, size, sex) from commercial catches of red drum.

IMPLEMENTATION 2.2
1) Continue

PROBLEM 2.3
Catch and effort statistics for red drum recreational and commercial fisheries need to be improved for fisheries stock assessment. The intermittent nature of the fisheries for juvenile red drum and the inaccessability of the recreational fishery for adult fish create difficulties in using traditional stock assessment and survey techniques. Specific surveys designed around these limitations should be utilized to better monitor the status of the Chesapeake Bay red drum population.

STRATEGY 2.3
Maryland, Virginia and the Potomac River Fisheries Commission will continue to support inter-jurisdictional efforts to maintain a comprehensive data base on coastwide level.

ACTION 2.3
1) Maryland, Virginia and the PRFC will continue to collect fisheries landings data on red drum as part of ongoing commercial fisheries statistics programs.
2) Virginia will implement a limited and/or delayed entry program and a mandatory reporting system for

commercial licensees.
3) Maryland and Virginia will continue to supplement the Marine Recreational Fisheries Statistics Survey to obtain more detailed catch statistics at the state level.
4) From FISHMAP data, Maryland will design a trawl and pound net sampling program to collect biological information on finfish including red drum.

IMPLEMENTATION 2.3
1993

Problem 3 - Habitat and Water Quality: In 1987, Virginia, Maryland, Pennsylvania, the District of Colombia, the Chesapeake Bay Commission and the U.S. Environmental Protection Agency formally agreed to reduce and control point and nonpoint source pollution to improve water quality in the Bay. During 1991, The strategies to achieve the goals of the agreement were reevaluated. Based upon the 1991 nutrient reduction reevaluation, the following conclusions were made: 1) Significant improvements in water quality and living resources habitat conditions have occurredin the mainstem of the Chesapeake Bay; 2) There is a need to expand program efforts to include the tributaries since most of the spawning grounds and essential habitat are in the tributaries; 3) In order to meet the 40% nutrient goal, intensified efforts to control nonpoint sources of pollution from agriculture and developed areas will be necessary; 4) There is a demonstrable linf between water quality conditions and the survival and health of submerged aquatic vegetation (SAV); 5) Implementation of the Clean Air Act Amendments will provide additional opportunities to achieve nitrogen reductions; 6) Achieving a 40% nutrient reduction goal challenges the limits of current point and nonpoint source control technologies.

In order to further efforts in restoring and protecting the ecological integrity, productivity and beneficial uses of the Chesapeake Bay system and further the commitments made in the 1987 Cheaspeake Bay Agreement, the 1992 Amendments were developed and signed by the Executive Council and are included in the following strategy and actions.

STRATEGY 3
The District of Colombia, Environmental Protection Agency, Maryland, Pennsylvania, the Potomac River Fisheries Commission and Virginia will continue the commitment to achieve an overall 40% reduction of nitrogen and phosphorus entering the mainstem Chesapeake Bay by the year 2000 and maintain this level of reduction thereafter. The jurisdictions recognize the importance of the tributaries in restoration efforts.

ACTION 3

The District of Colombia, Environmental Protection Agency, Maryland, Pennsylvania, Potomac River Fisheries Commission and Virginia will continue to set specific objectives for water quality goals and review management programs established under the 1987 Chesapeake Bay Agreement. The 1992 Amendments call for the following:

1) Amend the water quality goal of the 1987 Chesapeake Bay Agreement to reflect the importance of the tributaries in restoring the Bay.

2) Develop and implement tributary-specific strategies to reduce nutrients, achieve water quality requirements for living resources, incorporate public participation and involvement and advance both cost-effectiveness and equity.

3) Use the distribution of SAVs in the Bay and its tidal tributaries as an initial measure of progress in the restoration of living resources and water quality.

4) Incoporate into the nutrient reduction strategies an air deposition component which builds upon the 1990 Amendments to the Federal Clean Air Act and explores additional implementation opportunitites to further reduce airborne sources of nitrogen entering the Chesapeake Bay and its tributaries.

5) Continue to explore cost-effective and improved technologies to attain further nutrient reductions.

6) Explore cooperative working relationships with the three other basin states, New York, West Virginia and Delaware, in the development of tributary-specific strategies for nutrient reduction.

IMPLEMENTATION 3
1993

CHESAPEAKE BAY RED DRUM
MANAGEMENT PLAN IMPLEMENTATION

PROBLEM AREA	ACTION	DATE	RESPONSIBLE AGENCY & METHOD	ADD. STAFF OR $$	COMMENTS/NOTES
1. Overfishing	1.1.1 MD and the PRFC will implement an 18 inch recreational minimum size limit and 5 fish beg limit, with one fish over 27 inches.	1993	MDNR - A PRFC - A		
	1.1.2 VA will enforce its 18 inch size limit and five fish beg limit, with one fish over 27 inches, in compliance with ASMFC recommendations.	1992; Continue	VMRC - A		
	1.2a VA, MD and the PRFC will investigate the potential for using devices designed to reduce bycatch in commercial gears.	1992; Continue	MDNR - A,R VMRC - A,R,L PRFC - A,R	Additional funding to facilitate Va.'s escape panel study may be available from fees collected through the new commercial registration license.	Virginia is presently conducting a one year study of escape panels in pound nets to reduce the catch of undersized fish.
	1.2b VA and MD will promote, through the MAFMC and the ASMFC, implementation of more efficient gear designed to reduce bycatch and/or discards. Virginia will continue its cooperative pound net escape panel study.	1992; Continue	MDNR - A VMRC - A		

2. Stock Assessment and Research Needs	2.1 The jurisdictions will support fecundity research and migration studies to determine the contribution of the Chesapeake Bay's red drum population to the Atlantic coast stock.	1993; Continue	VMRC - A MDNR - A PRFC - A		
	2.2 Continue collection of data from commercial catches and begin collection of recreational data to better estmiate movements and mortality of adult red drum stocks within state waters.	1993; Continue	VMRC - A MDNR - A PRFC - A		Virginia's recreational saltwater fishing license program, becoming effective January 1, 1993, may enable better collection of data on recreational catch of red drum, the only source of significant catches of adult fish.
	2.3 Continue on-going commercial fisheries statistics programs; VA will implement its mandatory reporting system; VA and MD will continue to supplement the Marine Recreational Statistics Program. Continue the Baywide Trawl Survey to measure size, age, sex, distribution, abundance and CPUE	1993; Continue	VMRC - A MDNR - A		
3. Habitat Issues	3.1 Promote the objectives of the Chesapeake Bay Agreement to improve water quality	1993; Continue	VMRC - A MDNR - A		

Legend:
VMRC = Virginia Marine Resources Commission
MDNR = Maryland Department of Natural Resources
PRFC = Potomac River Fisheries Commission
DCFM = District of Colombia, Fisheries Management
FMAC = Fisheries Management Advisory Committee
TFAC = Tidal Fisheries Advisory Committee
PFC = Pennsylvania Fish Commission
SFAC = Sports Fisheries Advisory Commission

A = Administrative action
R = Regulation
L = Legislation