

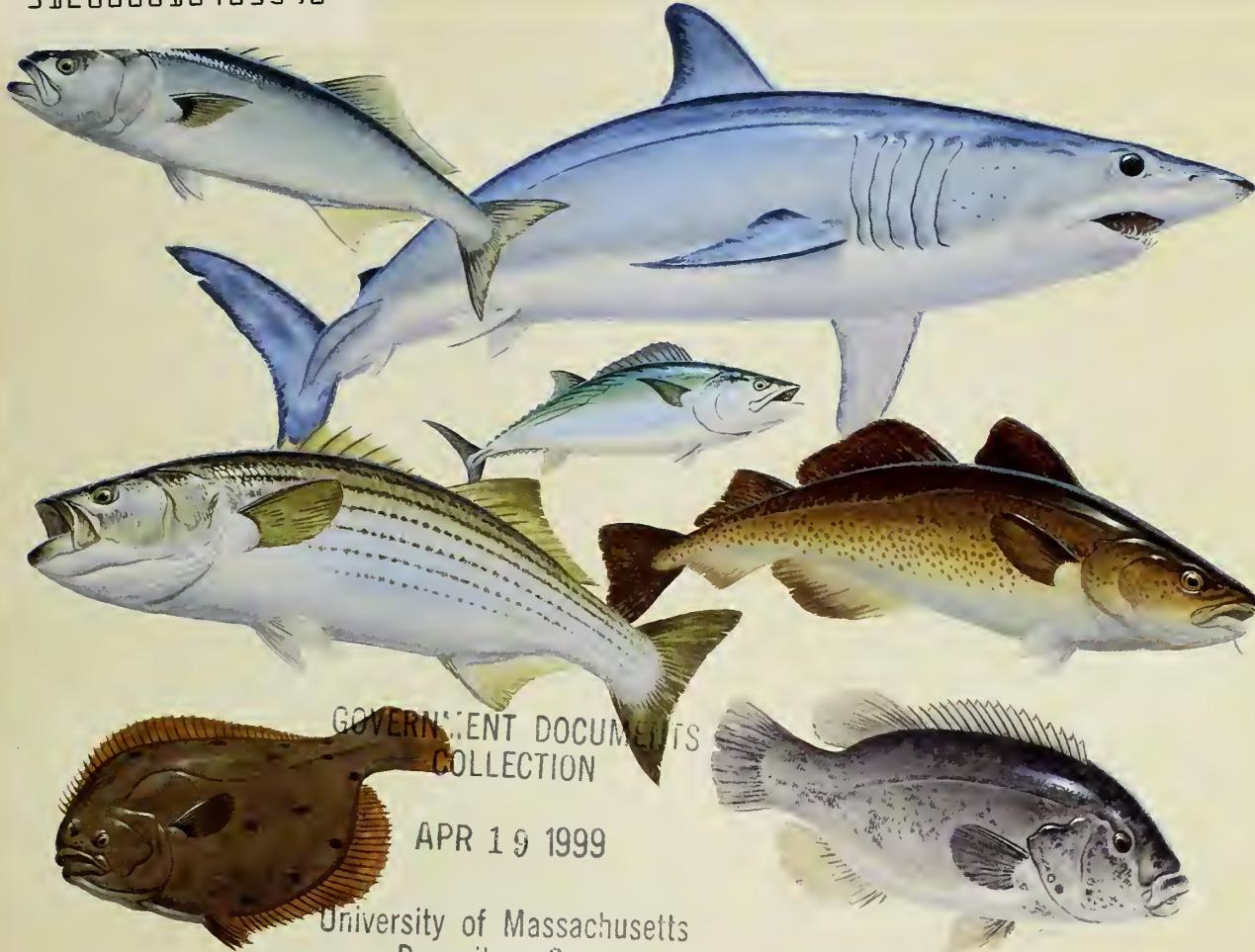
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Massachusetts Division of Marine Fisheries Sport Fish Program Guide

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Photo by Karen Rypka

As stated in our country's *Recreational Fishery Resources Conservation Plan*, "Recreational fisheries are an integral component of our national heritage and continue to play an important role in the social, cultural, and economic well-being of our nation." This could not be more true in Massachusetts where sport fishing comprises our state's most popular and valued outdoor activity.

Our state's fishery leaders recognize that a greater commitment to protection, restoration and conservation efforts of our marine resources is needed to achieve higher levels of quality, quantity and diversity of recreational fishing opportunities. The Commonwealth's Salt Water Sport Fish Program is dedicated to improving fishery restoration efforts and responding to the needs and values of current and potential recreational fishery users.

— Paul Diodati, Sport Fish Program Director

Sport Fish Program Guide



Atlantic Cod (*Gadus morhua*)

Sport Fish Program

Paul Diodati, Program Director

Division of Marine Fisheries

Philip G. Coates, Director

Department of Fisheries, Wildlife & Environmental Law Enforcement

John C. Phillips, Commissioner

Executive Office of Environmental Affairs

Trudy Coxe, Secretary

Commonwealth of Massachusetts

Argeo Paul Cellucci, Governor



Bluefin Tuna (*Thunnus thynnus*)

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Information for the MASSACHUSETTS SPORT FISH PROGRAM GUIDE was collected by Sport Fish Program personnel and edited by Karen B. Rypka and Daniel McKiernan. Layout support was provided by David DesTangents Gabriel. The fish illustrations were created by Victor Young.

Introduction

The Massachusetts Division of Marine Fisheries is proud to present its first Sport Fish Program Guide. This Guide has been specially designed to give you concise descriptions about the variety of projects and unique jobs we are accomplishing through the Federal Aid in Sport Fish Restoration Act.

Federal Aid in Sport Fish Restoration is one of our country's most valuable and most efficient mechanisms for administering your tax dollars to restore and enhance sport fish populations and to develop and improve sport fishing opportunities. In the following pages, we will explain how this important "user pay – user benefit" approach operates and show how we use it to conduct the Massachusetts Salt Water Sport Fish Program.

With nearly 2,000 miles of coastline, the Commonwealth of Massachusetts has some of the most diverse aquatic habitats in the country. Our coastal waters provide recreation to as many as 700,000 anglers each year. They generate up to one billion dollars annually for the state's economy. The Sport Fish Program's agenda is structured to protect, restore and conserve our marine and anadromous fishery resources. This leads to an increase in the quality, quantity, and diversity of recreational fishing opportunities.

Lengthy discussion about policies for managing fisheries, fishery regulations or long-term planning objectives have been deliberately left out of this publication. Our aim in producing this guide is much more to the point. We want to demonstrate what is being accomplished by real-time projects — working to achieve pertinent and specific objectives within vigorously set time-frames.

Please don't hesitate to contact us to find out more information about any of our work that interests you.

Federal Aid in Sport Fish Restoration Program Overview



Through the Sport Fish Restoration Act, anglers and boaters provide vital financial support for state fisheries management, fisheries research, boating access, outreach and education programs. Originally passed in 1950 and strongly supported by anglers throughout the nation, the Sport Fish Restoration Act (SFR) created a "user-pay, user-benefit" system by placing a 10% excise tax on fishing rods, reels, lures, fishing line, and related fishing equipment. The small amount of tax adds up; in 1996, the peak funding year, \$350 million was apportioned to the states.

In 1984 Congress passed the Wallop-Breaux Amendment to the Act, which dramatically increased funds by including import duties on tackle and boats and a motorboat fuel tax. In addition, it expanded the scope of projects to include creation and maintenance of boating access and education programs on fishing skills and aquatic resources. An important provision of the 1984 Amendment is that equitable expenditures be made between fresh water and salt water projects.

Sport Fish Restoration revenues accumulate in the Aquatic Resources Trust Fund. Before funds are divided among the states, a percentage has historically been apportioned to the U.S. Coast Guard for

the Boating Safety Account, to the Land and Water Conservation Fund for coastal wetlands and waterfowl protection, and to the U.S. Fish and Wildlife Service (FWS) to administer the SFR Program.

Each state's allocation of SFR funds depends upon the size of the state and the number of fishing licenses sold; no state receives more than 5% or less than 1% of each year's total funds. The Commonwealth of Massachusetts has never received more than a 1% share in the annual apportionment.

The SFR Program is run on a cost-reimbursement basis, where the state covers the full amount of an approved project then applies for reimbursement through Federal Aid for up to 75 percent of the project expenses. The state must provide at least 25 percent of the project costs from a non-federal source.

Other amendments to Sport Fish Restoration that significantly altered the Program include the Coastal Wetlands Restoration Act in 1990 and the Clean Vessel Act in 1992. These competitive grant programs have allowed states to clean up and conserve important near shore environments.

Sport Fish Restoration Cycle



The Sport Fish Restoration story is one of successful partnerships among state and federal governments, the fishing and boating industries, and anglers and boaters. Across the country, wherever children and adults gather to learn how to fish, wherever fishing piers are built, wherever boating access facilities are constructed, wherever fishing streams are preserved, and when new research shows us how to enhance or maintain our fisheries, an SFR program can often be shown to play a key role.

The stable funding provided to the Commonwealth of Massachusetts through the “user-pay, user-benefit” system of Federal Aid in Sport Fish Restoration is essential. For almost 50 years, this program has enabled Massachusetts to conserve and manage our sport fisheries for the future and to provide access for anglers and boaters to enjoy those fisheries.

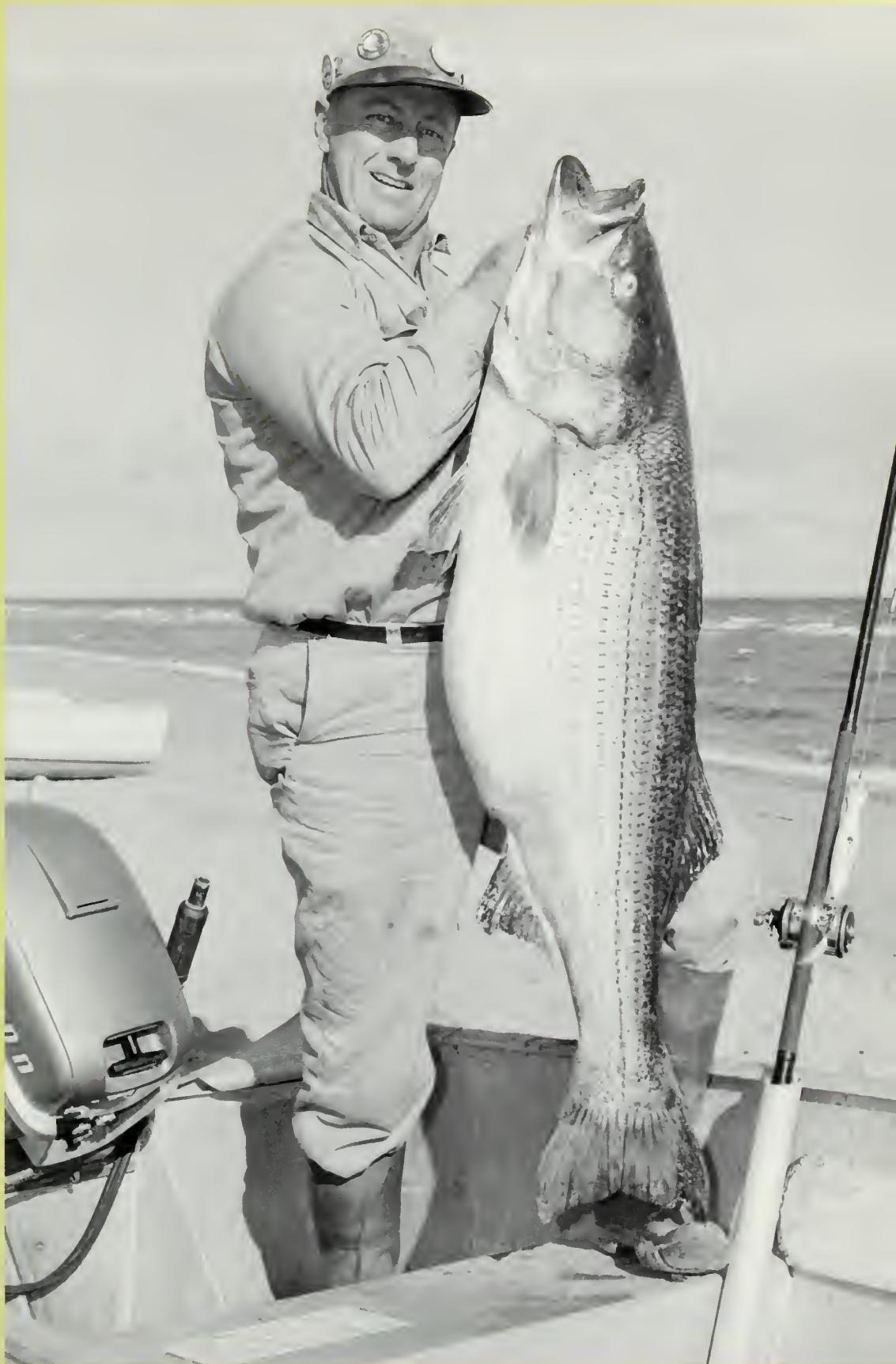


Photo courtesy of Nelson's Bait & Tackle Shop, Provincetown

Massachusetts Sport Fish Program

The Massachusetts Division of Marine Fisheries Sport Fish Program (SFP) is designed to maximize the benefits available from Federal Aid in Sport Fish Restoration (SFR). The Program currently has eight major projects and operates nearly 30 individual jobs. Past and present activities encompass a wide spectrum that include fisheries research, resource assessment, technical assistance, fisheries statistics, artificial reefs, fisheries engineering, public access, aquatic education and outreach. Much of our work will be highlighted in the following pages, but first a word about finance.

Massachusetts is eligible to receive 1% of the national apportionment made to the states from the Aquatic Resources Trust Fund. Annually, this amount has averaged about \$2 million over the past five years. The apportionment is divided evenly between our inland and marine fishery agencies after the amount allocated for boating access is transferred to the Massachusetts Public Access Board. The Public Access Board uses these funds to construct boat launching ramps.

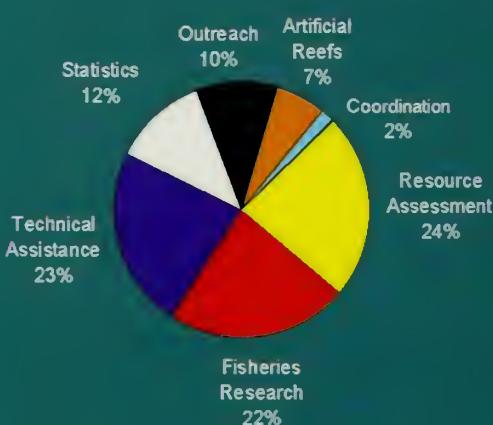
Since the SFR is administered on a cost-reimbursement basis, responsive state Legislative appropriations that authorize expenditures are vital to the overall success of the Program. Expenditures on approved projects can then be applied for reimbursement. Returning federal funds are deposited to a special "Marine Fisheries Fund," dedicated to the operation of the Division of Marine Fisheries. These funds can then be used repeatedly as fuel for this country's most important sport fish restoration funding cycle.

Fiscal year 1998, July 1, 1997 through June 30, 1998, was our most prosperous in terms of state appropriations. The total FY1998 state appropriation for the Division's SFP was nearly \$1.6 million, qualifying for a federal reimbursement of \$1.2 million. In contrast, the annual state appropriation to the SFP over the past five years has averaged closer to \$1 million.



Massachusetts Sport Fish Program

1998 Spending Plan - \$1.54 Million



Federal Share - \$1,151,000

State Share - \$384,000

This Program Guide will highlight most but not all of what the Program is accomplishing. We will also highlight some aspects of our Sport fish Program work which is not directly supported by Federal Aid in Sport Fish Restoration.

Photo by Jeff Plouff



The Habitat



Photo by Colin Canham

Massachusetts has a wide variety of marine fishery habitats. Shallow, protected, and fertile bays and tidal rivers riddle our coastline, which connect with the expansive and deep ocean waters. It is because of these many different habitats that Massachusetts is home to a diversity of marine species not found in any other Atlantic coastal state.

The geographic layout and location of Massachusetts are unique, with the peninsula of Cape Cod representing the boundary between the warmer waters of the Mid-Atlantic Bight and the colder waters of the Gulf of Maine. Accordingly, our fisheries reflect the assortment of fish species associated with both these areas of the Atlantic coast. Warmer water species such as scup, tautog, black sea bass, bonito and false albacore as well as the colder water species typically cod, pollock, and smelt can all be found somewhere in Massachusetts waters, dependent on the time of year and the particular habitat.

Along with the wide range of water temperatures, are the unique habitat features needed for the survival of many of these species. For example, the North and South Shores of Boston down to the shorelines of Buzzards Bay and Vineyard Sound contain extensive rocky habitat; sandy shoals surround Cape Cod and Nantucket; and muddy bottoms are found in Massachusetts Bay, Buzzards Bay and Cape Cod Bay. This variety of habitats supports the breeding and/or feeding needs of the important mix of marine fish species and the prey they depend on.



Photo by Karen Rypka

Recreational and commercial fisheries have flourished throughout the history of the Commonwealth due to this diversity of habitats and marine resources. Native cultures living along our coast fed extensively on the anadromous and catadromous species that run up our rivers and brooks, such as alewives and American eels. The many varieties of shellfish found in our estuaries were also a staple. Early European settlers came to our shores largely

in the pursuit of cod, the species that also allowed Boston to become a trading port of worldwide significance. The ports of Gloucester and New Bedford became two of the largest fishing ports in the United States. In more recent times, our striped bass, bluefish and tuna fisheries have supported, and continue to support, large-scale recreational fisheries, which in turn maintain a large vacation and recreation economy.

These various demands on both the marine habitat and the local fish and invertebrates present unique challenges to the government and people of Massachusetts. The Division of Marine Fisheries has been actively involved in the balancing act between the demands for food and recreational opportunities, and other needs of society that place environmental burdens on our coastal lands and waters through the development and implementation of policy and regulations.



Photo by Brad Chase

Technical Assistance

The Program's most extensive project was established to provide technical assistance to fishery management agencies, to evaluate all coastal construction and land development projects, to protect public health, to maintain public access and to provide technical assistance to private sector organizations and the general public.

Management of interjurisdictional fishery resources requires a sound technical basis if it is to perpetuate important fish stocks and fairly allocate harvestable surpluses between users and geographic areas. The preferred approach to managing shared fishery resources is a cooperative endeavor by state, federal and other agencies/organizations where each management entity commits time and personnel necessary to develop a technically sound management regime. This approach generates technical assistance of the highest quality since it draws upon existing programs and the most experienced personnel from throughout the geographic range of the species under consideration. It also reduces duplication of effort and maximizes cost-savings.

A technical assistance capability also helps in the thorough and timely evaluation of all coastal construction and development projects, thereby helping to assure marine resources, fisheries habitat and sport fishing interests are amply recognized and protected.

Technical assistance provided to sport fishing organizations and the private sector in general contributes to an involved and informed public. An informed public can be expected to better appreciate marine fisheries, their habitat requirements, their use and to play a more active and supportive role in their management. Lastly, we can identify and respond to user conflicts in a timely fashion, promote harmony between users and enhance quality of the sport fishing experience.

Photo by Karen Rypka



Support to Fishery Management Agencies

Many species of ocean fish tend to have wide geographic distributions. A single fish stock can span the boundaries of many states, and in some cases nations. Spawning off the coast of one state in spring, then migrating hundreds or thousands of miles to feed off the coast of another state during summer. Developing competent and effective management and research plans requires a high level of cooperation and coordination from state and federal fishery agencies. Sport Fish Program staff are currently involved in over a dozen management plans for Atlantic fish stocks and participate on more than 30 research or management committees.



Photo by David Pierce

Habitat and Resource Protection



Photo by Brad Chase

A clean, productive marine environment with adequate public access is of paramount concern to fishery management agencies. Although DMF does not exercise regulatory control over coastal alteration and water use projects that may impact adversely on marine resources and sport fisheries, it is afforded substantial opportunity to review and comment through a project referral process. The Sport Fish Program receives notices on up to 500 coastal projects to review each year. Since they can range in magnitude from small "home improvement" to immense industrial construction, time commitments to review these projects vary considerably. Some review periods can span many months.



Photo by Karen Rypka

Merrimack River Fisheries Restoration

The Merrimack River is the fourth largest river system in New England. Its headwaters are in Franconia, New Hampshire and it runs 187 miles downstream to the Atlantic ocean in Newburyport, Massachusetts. Damming the river's mainstem to provide water power for milling operations during the industrial revolution delivered a crushing blow to anadromous fish populations, primarily by blocking access to suitable spawning areas. The "Great Stone Dam" in Lawrence, Massachusetts was built in 1846. Despite vast fish restoration efforts, the ineffective fish passageways and serious water pollution problems prevented successful spawning by returning fish. This situation persisted through the mid-1960s.

In 1969 DMF joined forces with other state and federal fishery resource agencies to develop a Merrimack River fish restoration program. The goals of this joint effort include rebuilding the anadromous and residential fishery resources to provide the public with quality sport fishing op-

portunities and to realize the long term needs for food through the development and management of the commercial fisheries.

Activities during the first decade of restoration focused on identifying and quantifying habitat, estimating fish production levels from available habitat, describing fish passage requirements necessary to provide fish spawning ground access and identifying and obtaining suitable fish for restocking purposes. In 1982, a new upstream fish passage and trapping facility constructed by the Essex Hydroelectric Associates at the Essex Dam became operational. It provides opportunities to trap Atlantic salmon for broodstock and to count other anadromous fish that pass through the facility. DMF's technical and policy related contributions to this restoration effort have continued to this day through our Sport Fish Program. Progress toward complete restoration has been slow but steady. To date, the Merrimack supports one of our most successful recreational fisheries for American shad.

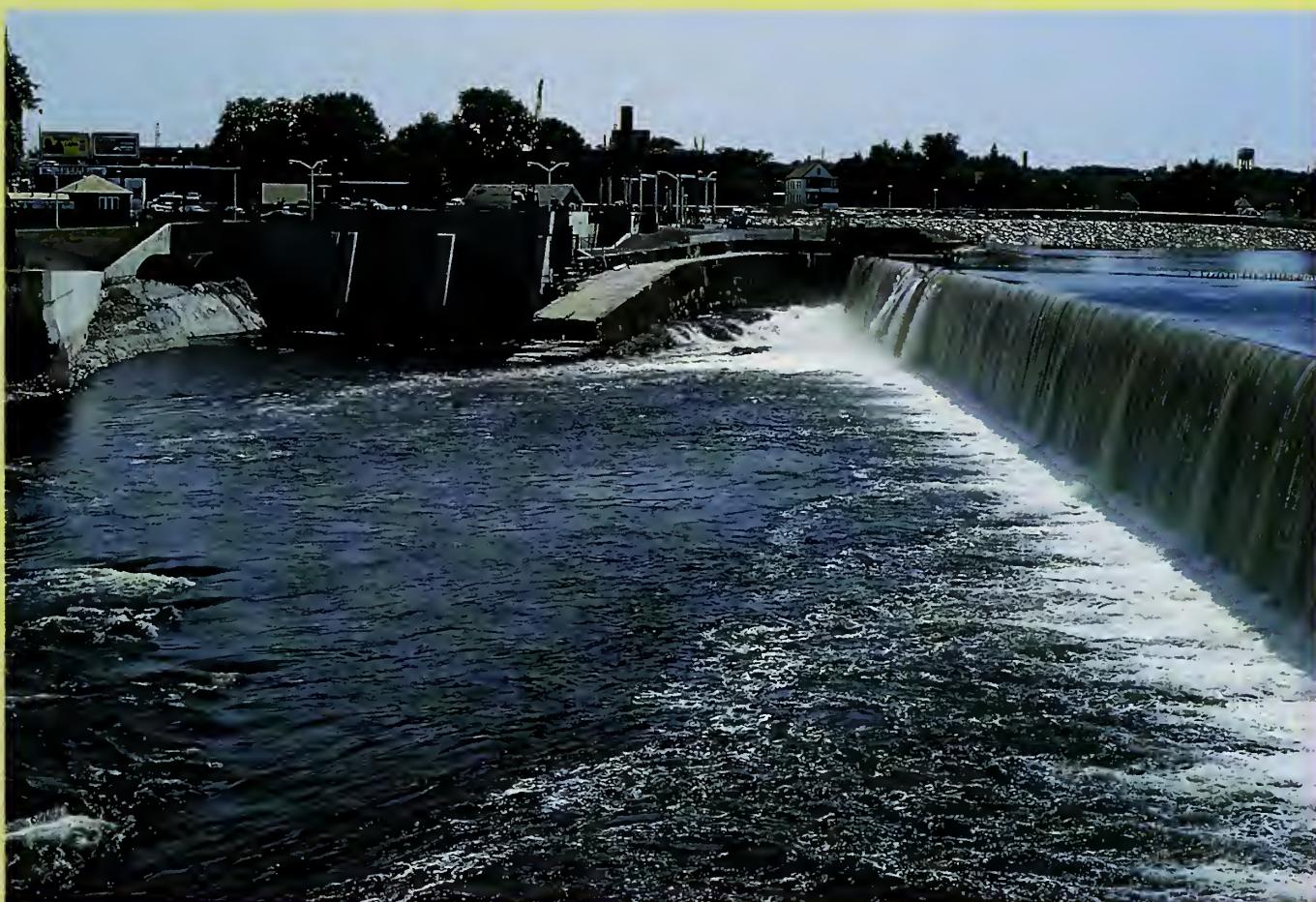


Photo by Rusty Iwanowicz

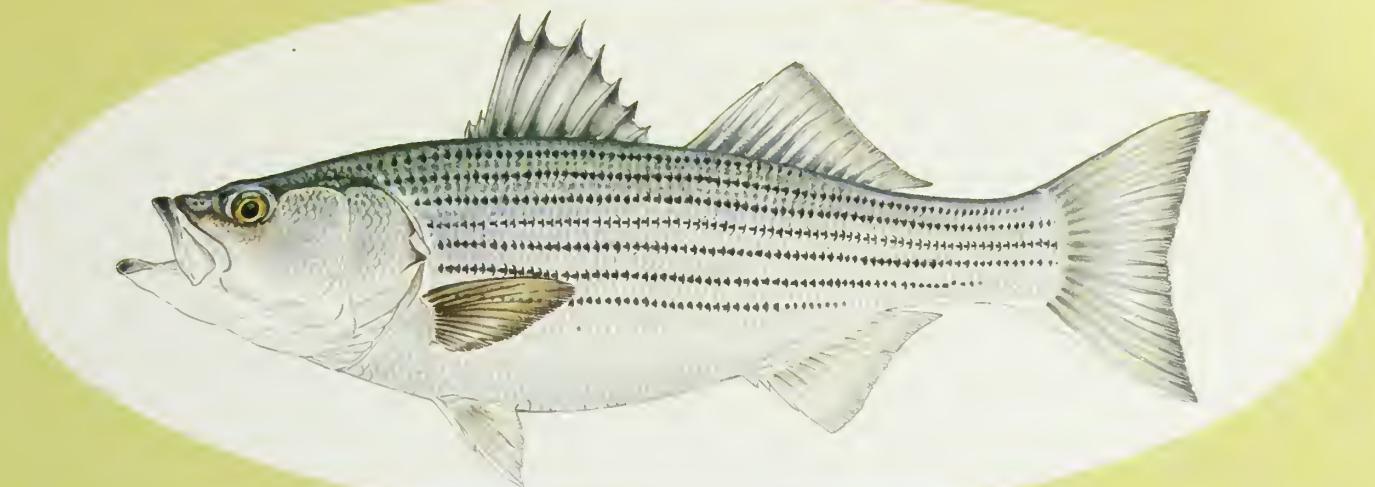
Fisheries Research



Photo by Brad Chase

Responsibility for sustaining fish stocks and upholding high levels of angling opportunity rests with the coastal states both individually and in conjunction through the Atlantic States Marine Fisheries Commission, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and the Fishery Management Councils. We most effectively fulfill this responsibility through the development of Fishery Management Plans (FMP's) that guide the processes of regulating and allocating fishery resources within and among the various management jurisdictions. Development of FMPs almost invariably leads to identification of data and informational needs that we must address if plans are to be completed quickly and effectively. In addition, the new generation FMPs are incorporating substantial monitoring regimes as the basis for evaluating status of the stocks and plan performance overall. Many FMPs currently in place also identify research needed to refine and improve effectiveness of the planning document.

The objective of this project is to provide information needed for formulating and implementing FMPs with a sound technical basis. We accomplish this by conducting short-term surveys, research projects, special investigations, biological monitoring projects, and other related activities in cooperation with participating state, regional and federal management authorities.



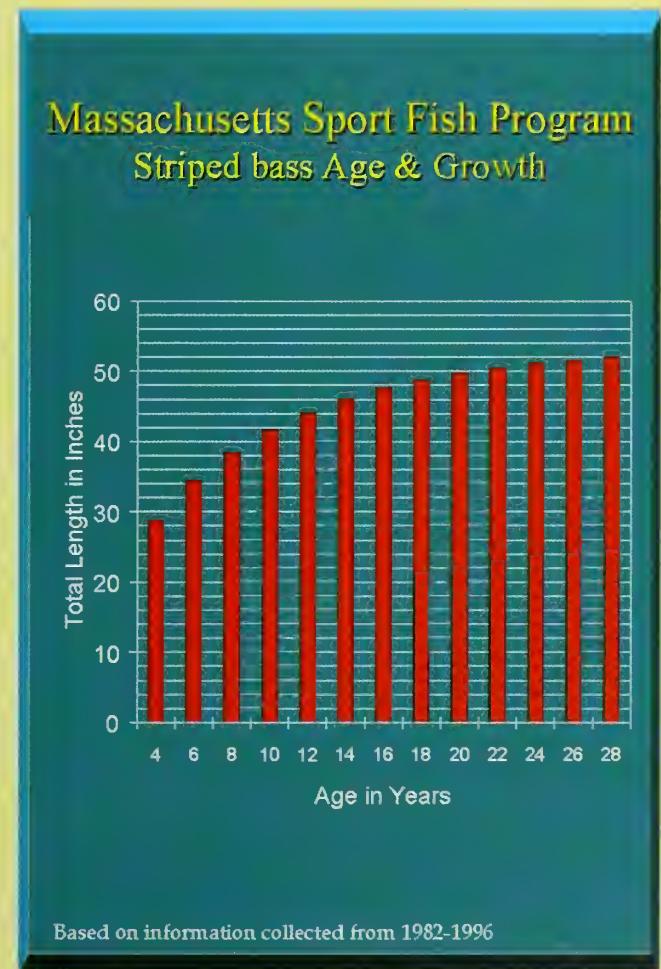
Striped Bass (*Morone saxatilis*)

Striped Bass Research

Massachusetts is currently home to the largest recreational striped bass fishery in the country. Our total catch of stripers in 1997 alone approached six million fish. High population abundance of striped bass, the diversity of the Commonwealth's nearshore habitat and many sources of food for stripers are major factors contributing to the success of this fishery. Without a doubt, striped bass are the backbone of our recreational industry and provide enjoyment to hundreds of thousands of recreational anglers each year. Accordingly, we give this important resource a high level of attention by conducting many special investigations and monitoring programs designed to support the regional planning process.

Age and Growth Sampling

Atlantic coast states that harvest striped bass are required, as part of the interstate management process, to characterize their landings. Monitoring of age, size and sex composition of both commercial and recreational catch and landings of striped bass is indispensable for identifying the need for constructive revisions to management strategies and for confirming estimates of population parameters. In Massachusetts we conduct annual sampling of the commercial harvest at seafood dealerships. Information collected from more than 7,000 striped bass beginning in 1982 include length, weight, sex and scales from each fish examined. We can observe annual "growth rings" on fish scales and use them to estimate age and rate of growth.



Tagging Studies

Tagging and long-term monitoring of tag recoveries improves understanding of distribution and movement of Atlantic striped bass stocks and generates vital information about annual survival rates. A state-federal cooperative study, now the largest of its kind, has applied tags to more than 400,000 wild and hatchery striped bass since 1986. Massachusetts began a striped bass tagging study in 1991 as part of this ongoing state-federal cooperative effort. We employ skilled charterboat captains to guide and collect fish for this study from shoal feeding grounds around Cape Cod. Our study furnishes the largest proportion of legal-size fish to this overall effort.

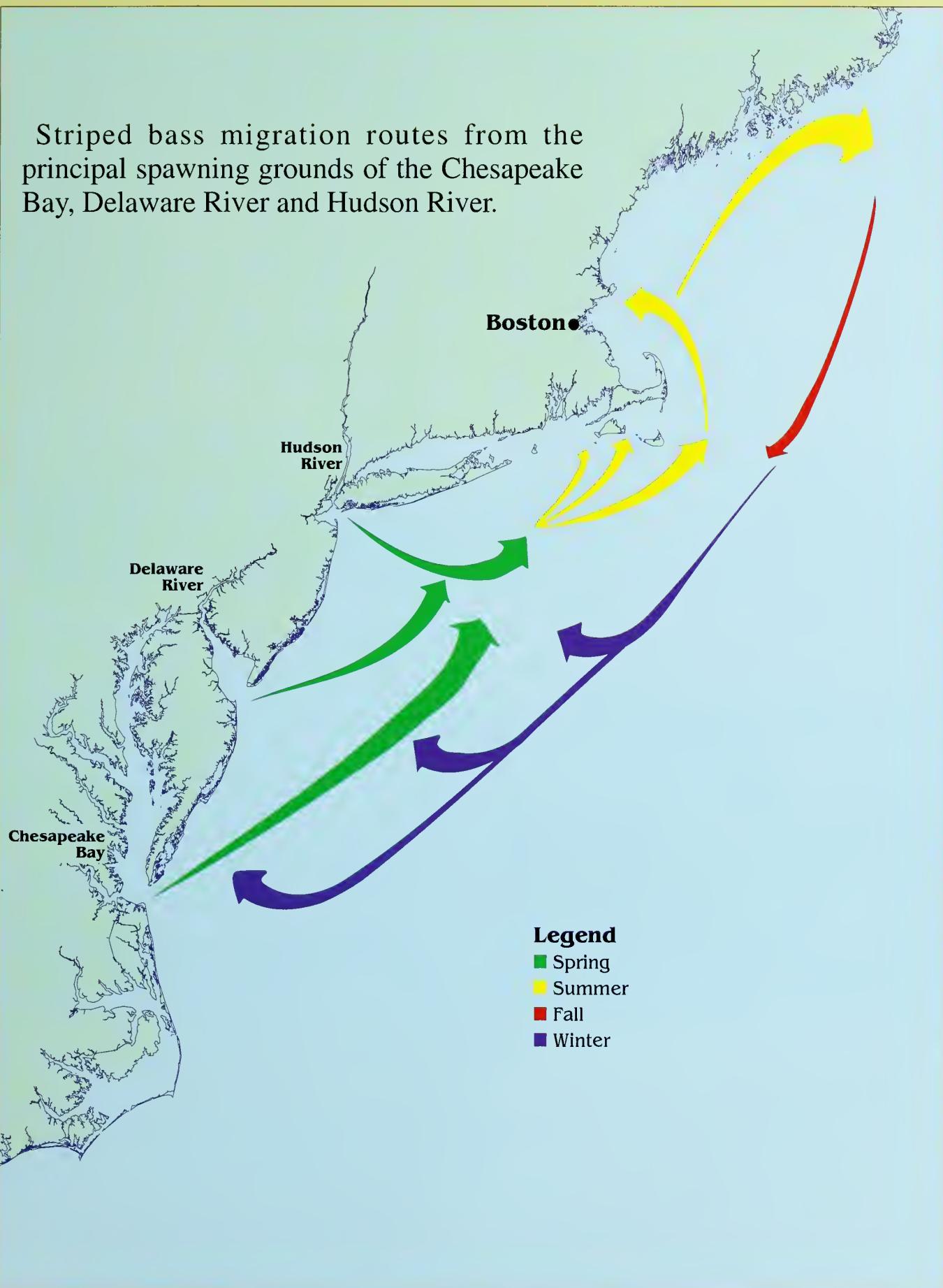


Photo by Ken Reback



Photo by Dan McKiernan

Striped bass migration routes from the principal spawning grounds of the Chesapeake Bay, Delaware River and Hudson River.



Striped Bass Diet and Bioenergetics

For the past 15 years, our biologists have studied striped bass growth among fish caught along Massachusetts and have noted an apparent decline in average weight at age. Likewise, stripper fishermen have repeatedly reported the appearance of 'thin' fish in their catches in recent years. As a result, the Sport Fish Program began a long-term study in 1997 to address the issue of striped bass forage needs and the impacts of striped bass consumption on forage species. The project will require strong collaborations with the federal fishery agencies and the fishery agencies of other states.

Striped bass are "opportunistic" predators that migrate northward from as far south as North Carolina. Their trek brings them to summer feeding grounds which extend up into the Canadian maritime.

"Opportunistic" implies that stripers will consume whatever prey they encounter, but undoubtedly they have preferences. A list of species found in the stomachs of striped bass would be a "who's who" of fish and invertebrates. There being enough food for this burgeoning population may be a legitimate concern for fishery managers.

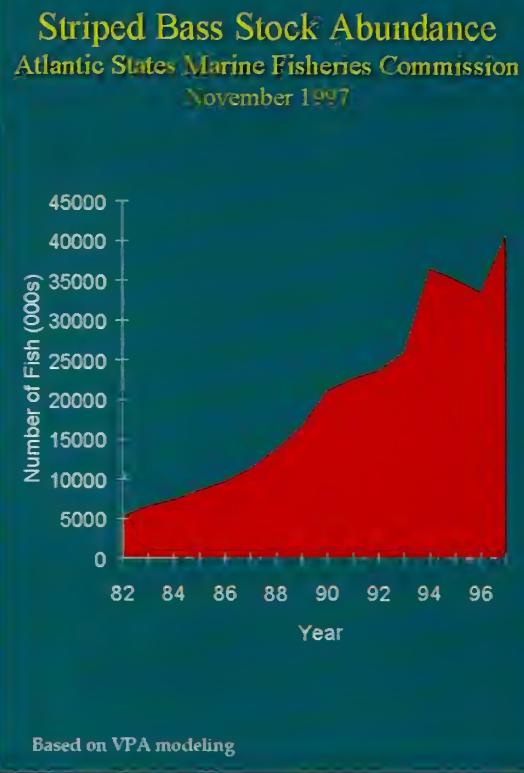
We will use information collected about striped bass diet and predator-prey relationships to develop



Photo by Brad Chase

a computer-based model that will help determine the current food needs of striped bass stocks. This field of study is commonly called bioenergetics modeling.

Bioenergetics models, widely used in fisheries management and studies of fish ecology, are mathematical representations of energy balance: energy consumed by fish should equal energy spent on growth, respiration, and waste elimination. Since



we can estimate growth rates from measuring fish, and we can estimate respiration and waste elimination from laboratory work, we can then calculate consumption requirements.

A rudimentary bioenergetics model for striped bass, including respiration and waste parameters, was developed by University of Maryland scientists a few years ago. However, no application of such models has been developed for the Atlantic coast migratory striped bass population, mainly due to lack of diet data on striped bass. This DMF research project is designed to: (1) consolidate information derived by field samples with available data from published literature, and (2) build a bioenergetics model for the entire striped bass population. The model will allow us to estimate consumption rates of striped bass for any particular food item, such as river herring, menhaden, and even the commercially important lobster. In 1997, diet samples from over 700 fish were collected along the Massachusetts coast. More samples will be collected over the next several years, and sampling locations will also cover some inner river systems. The inner river work is being conducted by the Massachusetts Cooperative Fish and Wildlife Research Unit at the University of Massachusetts, Amherst and is supported by a grant through our Sport Fish Program.



Rainbow Smelt (*Osmerus mordax*)

Smelt Research

Populations of rainbow smelt, a popular fine-tasting anadromous fish, have continued to decline throughout the region over the past two decades. Dwindling population size has led to fewer recreational fishing opportunities for what once was a popular winter pastime. The Sport Fish Program initiated a monitoring project in 1988 to address this decline in population abundance. The objective of the project was to document all smelt spawning habitat in Massachusetts Bay and develop recommendations for reestablishing habitat and for resource restoration.

Monitoring components are completed and efforts are now underway to report our findings and offer our management recommendations. We surveyed over 100 fresh water tributaries to Massachusetts Bay and monitored 80 individual locations for 1-3 springtime spawning seasons. Upon completion of seasonal monitoring, we mapped the habitat where smelt eggs were found in a given river system and noted the seasonality of egg deposition.

The following impact sources are known to alter smelt populations and the habitats they use: stream obstructions, stream alterations, water withdrawals, acute pollution discharges, sedimentation of substrates, and over fishing. These impacts continue today along with less understood sources, such as: watershed nutrient and toxic inputs, atmospheric nutrient and toxic inputs, and human induced shifts in natural mortality.

The second stage of the project was a resource restoration experiment to transfer eggs from a donor population to a stream without a smelt run. This was done at the Crane River in Danvers. We designed this experiment to evaluate the benefits of the egg-transfer restoration approach. Although some success was found, it may not be the best approach for us to use given the poor status of donor runs in Massachusetts Bay.



Photo by Brad Chase

Estuarine Research



Photo by Karen Rypka

The Commonwealth of Massachusetts has a great variety of embayments, harbors, estuaries and islands. These coastal features provide habitats for many marine resources that support commercial activities and are the source of delightful recreational benefits to the public. Given the value of these resources and the proximity to centers of commerce and coastal development, resource managers must be familiar with existing resource conditions to avoid population impacts and habitat degradation.

The Massachusetts Division of Marine Fisheries developed the Massachusetts Estuarine Research Program, which studied the marine resources of 17 embayments and estuaries from 1963 to 1971. The Division monitored most systems for a calendar year. Finfish populations were targeted, but valuable information on shellfish, marine invertebrates, marine algae, habitats, water chemistry, physical characteristics, and historical and present uses of marine resources were also recorded. Over 70 species of finfish were documented during these

studies. Collectively, the 17 reports produced from 1965 to 1975 represent an exceptional achievement and remain valuable as references today.

The public demands on these coastal features and resources have not diminished since the Massachusetts Estuarine Research Program conducted these landmark studies. Interest has grown in the 1990s to revisit some study areas. The Sport Fish Program's Fisheries Research Project has recently examined the Salem Sound area and Palmer River with the objective of updating the status of marine resources and evaluating the potential of returning to a large scale effort of monitoring these vital ecological systems.

Fishery Resources of the Palmer River

The Palmer River originates in northern Rehoboth, Massachusetts. It flows southerly through swamp, farmland, and marsh for 11 miles until it reaches the coastal community of Swansea. It is one of the few remaining rivers in Massachusetts with a relatively undeveloped shoreline and one of only three coastal streams that supports a significant American shad population and fishery. There are also popular fisheries for alewives, white perch, winter flounder, and blue crabs.

The Sport Fish Program conducted a study of the Palmer River to establish baseline data on its resources and fisheries, especially that for American shad.

The findings included an active shad fishery, good water quality during the shad spawning season, an unmanaged alewife fishery, obstructions to fish passage, a threat of water diversion from a local water company, a healthy blue crab fishery and a reduced white perch and winter flounder resource.

The study recommendations resulted in a regulation to close winter flounder fishing in the Palmer River, improvements to anadromous fish passage, establishing sound management practices and regulations for the alewife fishery, and starting a dialog with the water company over the need for adequate water flow during fish migration periods.



Photo by MCFWRU

Salem Sound Study

Salem Sound was last surveyed in 1965 as part of the Division's Estuarine Research Program. Monthly seine and trawl net samples were collected at specific locations in Salem Sound to document the status of the fishery resources. This report remains as an important reference for natural resource managers.

During 1997, our Sport Fish biologists teamed up with Salem Sound 2000, a local coalition of citizens interested in natural resource conservation, to conduct another inventory of the Salem Sound marine resources. This cooperative project included assistance from Massachusetts Audubon, Salem State College and local volunteers organized through Salem Sound 2000. A grant from the Massachusetts Department of Environmental Protection partially funded the analysis of nutrient samples. The sampling design was very similar to the previous study, with the addition of gillnet use and scuba surveys and extensive water chemistry analysis.

Why Salem Sound 30 years later? Salem Sound provides many commercial and recreational opportunities in a highly populated region. The harbors of Marblehead, Salem, Beverly, Manchester and the Danvers River have an illustrious maritime tradition and continue to support important fishing and boating industries. The economies of these communities rely on healthy marine resources. This cooperative effort put valuable information into the hands of local, state and federal resource managers and increased environmental awareness amongst North Shore citizens to protect these valuable fishery resources.



Photo by Brad Chase

Massachusetts Cooperative Fish and Wildlife Research Unit Juvenile Herring Investigations

Anadromous fish are increasingly threatened by water removal from their habitat. Agricultural, municipal, and industrial water diversion and consequent reductions in instream flow are becoming extremely common in Massachusetts.



Photo by MCFWRU

DMF contracted a research team headed by Dr. Martha E. Mather of the Massachusetts Cooperative Fish and Wildlife Research Unit (MCFWRU) at the University of Massachusetts, Amherst. This team has worked to address the following issues: (1) assess how variations in discharge affect the relative abundance and outmigration timing of juvenile river herring, (2) relate other critical abiotic and biotic factors (i.e., temperature, habitat,

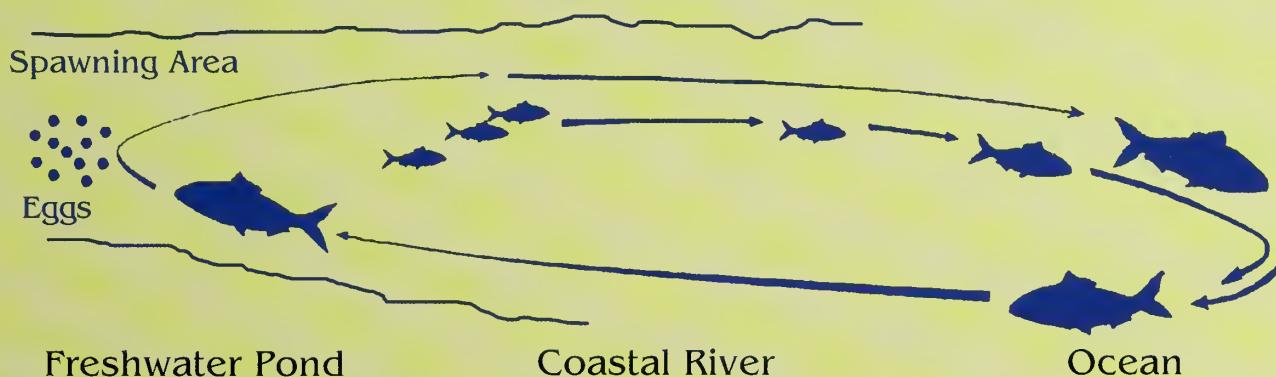
pH, water transparency, lunar phase, rainfall, adult spawning stock, zooplankton food, predation) to patterns of juvenile herring abundance across and within systems, (3) offer some insights into why juvenile herring leave fresh water when they do, and (4) provide biological data on which to make sound management decisions that help conserve these stocks. These questions were addressed in two related studies. Both investigations focused on juvenile river herring because the population depends to a large degree on what happens in the first year of life.

First, eleven small to medium coastal Massachusetts streams on and adjacent to Cape Cod were sampled to define the pattern of juvenile relative abundance and outmigration. In the second study, two stream/pond systems on Cape Cod were examined for potential mechanisms that trigger juvenile herring outmigration. Together these two studies provide information about the role of discharge and other abiotic and biotic variables at two spatial scales and managers can concentrate sampling during periods of peak migration and optimize sampling effort.

Allocation of water resources must be done in a way that ensures successful herring migration and provides most of the water needs for human usage.

River Herring Life Cycle

A. Habitats

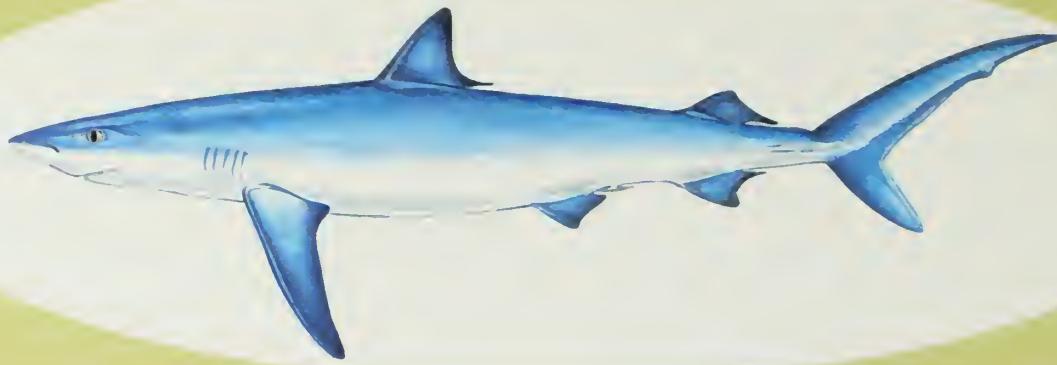


B. Timing Summer

Spring
Adults migrate upstream
Spawning

Juveniles remain in pond
Juveniles migrate downstream

Fall
Juveniles migrate



Blue Shark (*Prionace glauca*)

The Massachusetts Shark Research Project

As the coastal and open ocean waters of New England warm in spring, many species of fish migrate north from their southern wintering grounds - among them the sharks. While most people don't think of Massachusetts when they think of sharks, no fewer than a dozen shark species migrate in and out of our waters annually. Oceanic sharks such as the blue, mako, thresher, and basker swim onto the continental shelf from offshore capitalizing on the productive northeast waters rich in food, and reproductive opportunity. Coastal species like the sandbar shark, dogfish, dusky, and sand tiger invade near shore waters. Tropical species, like the tiger and the hammerhead, will make an occasional

appearance during our warmest months. The porbeagle shark is the only shark found year-round in Massachusetts waters, because of its preference for colder temperate waters. Although rare, the most notorious of all sharks, the great white shark, is known to visit New England waters, keeping to itself despite its heinous reputation. In fact, Massachusetts represents the northernmost range for several species of these sharks. Therefore, it is an important area for monitoring the health and distribution of shark populations.

No single life history characteristic (i.e., growth rate, food habits, distribution) can be applied to all shark species. Unfortunately, much of the basic life history research remains to be done. Historically, shark populations have plummeted in the face of intense fishing activities because they cannot replace themselves fast enough to sustain the fishery.

In Massachusetts, there are no directed commercial fisheries for sharks except trawl and gillnet fisheries for spiny dogfish, a small schooling fish weighing less than 10 pounds. Of the 27 million pounds of shark landed in the Commonwealth in 1996, 99.7% were dogfish with a commercial value of \$4.9 million. The remaining 0.3% were primarily makos, thresher, and porbeagles taken incidental to offshore trawl, longline, and gillnet fisheries based in this state. On the other hand, a substantial recreational fishery for sharks occurs in Massachusetts from June through September each year. Although many Massachusetts recreational fishermen target sharks, most of those caught are released. Not only is the shark an important component of the Massachusetts recreational fishery, but it is currently fished as a sustainable resource.



The National Marine Fisheries Service (NMFS) Fishery Management Plan for sharks of the Atlantic Ocean recommends that states "actively par-

ticipate in acquiring pertinent information and data" on sharks. We began the Massachusetts Shark Research Project (MSRP) in 1990 to study the ecology, distribution, and relative abundance of sharks targeted by recreational fisheries in the Commonwealth. The project also provides public education and technical information on the biology, management, and use of sharks. Our shark researchers collaborate with other world renowned researchers to provide local expertise and biological samples for these cosmopolitan, highly migratory predators. The major activities of the project are summarized as follows:

Fieldwork

Inshore: From late June through August of each year, MSRP personnel set longlines to sample those species of sharks that enter coastal waters. The inshore areas east and south of Martha's Vineyard are consistently sampled. Sharks are taken on longlines and either tagged with standard NMFS tags and released, or sacrificed for life history research. MSRP Biologists examine biological parameters including age structure, feeding ecology, local movements, and reproductive status through dissection and tagging of shark specimens. They generate annual catch indices from longline data to monitor trends in the relative abundance of coastal shark species. During this period, surf fishermen that routinely target sharks on the Cape and Islands are surveyed for important information on the species, size, sex, and other details for each shark they land. The compiled data from these efforts help explain the ecology of these species in our waters.



Photo by Paul Schultz

Offshore: Anglers participating in offshore sport fishing tournaments make large pelagic sharks including the blue, mako, and thresher available to the project. In addition, we routinely make offshore trips with cooperative fishing vessels and our research vessel to sample offshore sharks. The collective information that we gather contributes to our understanding of these elusive predators.

Public Education

One of the most important aspects of the MSRP is the educational component. Throughout the year, program personnel present extensive slide shows to schools, clubs, and conservation groups throughout the Commonwealth on New England sharks, their biology, fisheries, and our study. Also, we provide information about sharks throughout the year to a variety of media interests that include magazines, television, and documentary producers. These efforts educate the public about a remarkable animal that is an integral component of the marine ecosystem.

Photos by Greg Skomal



Catch and Release Survivorship Studies on Big Game Fish

With the growing interest in "catch and release", especially for large pelagic species like tunas and marlins, work is ongoing to determine the effect of "the fight". These highly energetic species may suffer terminal fatigue and die after being released.



Yellowfin Tuna (*Thunnus albacares*)



Mako Shark (*Isurus oxyrinchus*)

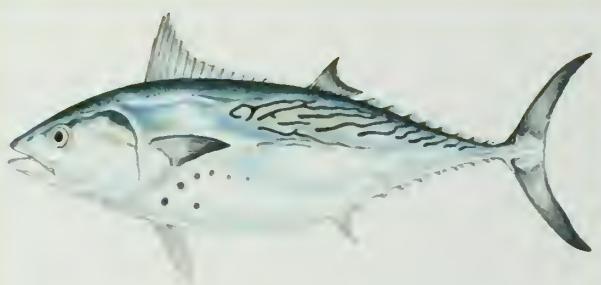
The answer may lie in the fishes' blood chemistry. We are using blood samples taken from fish to determine the effects of increased anaerobic activity, muscular fatigue, and time-out-of-water caused by angling. The study includes captive fish as well as the use of ultrasonic tags to judge release mortality estimates. Catch data generated by our Sport Fish Tournament Monitoring Program since 1987, show that a high percentage of these big game fish are released. For bluefin tuna, the number of fish released has increased greatly since the federal regulations imposed a commercial minimum size and decreased the recreational bag limit in 1992.

Sport Fish Program biologists use a 2-pronged approach. First, the "relative" health of a hooked fish is determined by taking a blood sample after the fight. High muscular activity and stress induced by angling causes changes and disturbances in fish tissues and organs. These changes, manifested in the blood, may be severe enough to alter normal physiology and behavior, and ultimately reduce

survival. In some cases, fish may die, either on the line, or more likely after release. For each species, we link changes in blood chemistry to several variables associated with the fight such as tackle type, fight time, water temperature, and fish size. Fish studied include: bluefin, yellowfin, bigeye, albacore, and skipjack tunas; blue, mako, tiger, dusky, and sandbar sharks; white marlin; Atlantic bonito; little tunny; and dolphin (mahi-mahi).

Our preliminary findings show that these fish exhibit significant fluctuations in blood pH and blood levels of some hormones, electrolytes, and metabolites due to the fight associated with rod and reel angling. Each species shows a different physiological response to angling.

The second part of our study tracks released fish with radio tags to monitor movement and survival. We have outfitted sharks and tunas that fought for extended periods with acoustic "pingers" which allow us to follow the fish, tracing its location and depth over several hours. This provides direct evidence of short term post-release survival. In addition, since most of the fish sampled to date have been tagged and released, tag-recaptured fish provide direct evidence of long term survival. We will determine the levels of exhaustion that tunas and sharks can withstand from the correlation of blood chemistry data, fight data, and survival information.



False Albacore (*Euthunnus alleterus*)



Bonito (*Sarda sarda*)



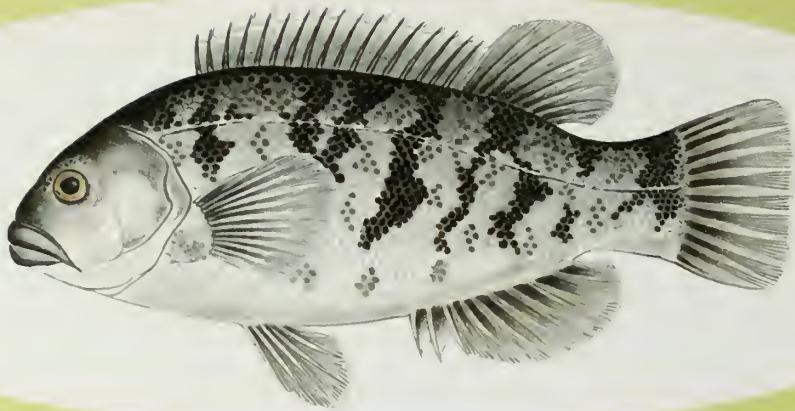
Photo by Terry Tessein

During the second phase of the study, our biologists have tracked bluefin tuna, blue sharks, and yellowfin tuna for periods ranging from 2 to 48 hours after release. The bluefin tuna were tracked in cooperation with researchers from the New England Aquarium, the University of Hawaii, and professional tuna fishermen. These fish were not taken on rod and reel; the acoustic tag was applied with a modified harpoon. The behavior of "non-stressed" fish is also being studied.

Photo by Greg Skomal

In a related study, our biologists have teamed up with their federal counterparts to evaluate hook design in offshore tuna "chunk" fisheries. This research will compare the efficiency and hook site of standard shank hooks to circle hooks. The study will concentrate on bluefin and yellowfin tunas taken during bait fisheries where hooks are more likely to be swallowed, causing considerable damage to a fish that is to be released. The results of this study may lead to recommendations for using specific gear or practices to minimize mortality in our valued catch and release fisheries.





Tautog (*Tautoga onitis*)

Tautog Age and Growth

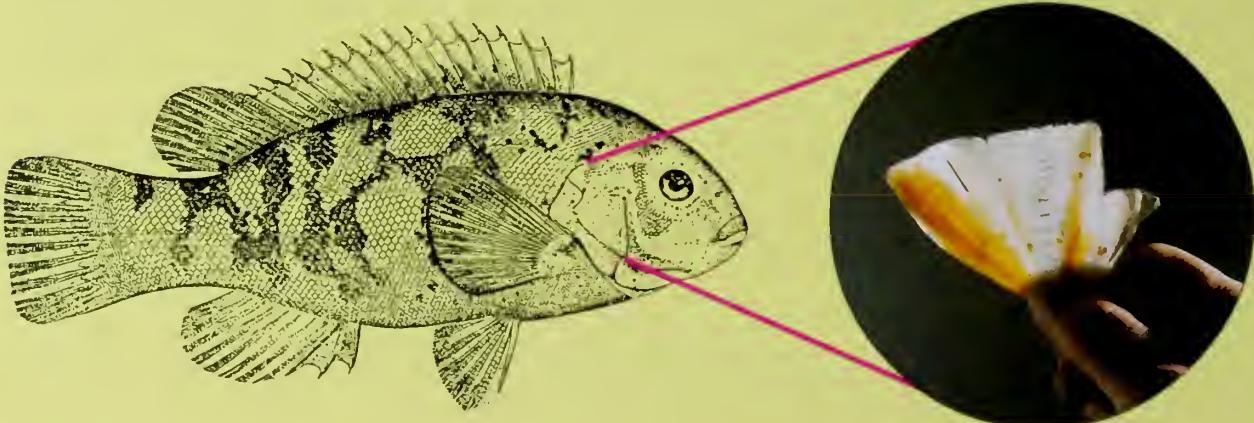
The management of the Commonwealth's tautog fisheries is an important priority for the Division and our Marine Fisheries Commission. In addition to the recent application of numerous regulatory changes aimed at the conservation of this valuable fisheries resource, Massachusetts has been instrumental in the creation of the 1996 Atlantic States Marine Fisheries Commission Interstate Fisheries Management Plan for Tautog (FMP).

Early in the FMP development process it became apparent that basic biological information needed for managing tautog, specifically age and growth information, was lacking for most of its habitat range (Maine to Georgia). In fact, no information at all was available for Massachusetts stocks. Accordingly, a regional age-length key was created by using existing information from Rhode Island and Connecticut. While this approach was adequate for the first-ever FMP for this species, it will be inadequate for subsequent stock assessments.

In order to gather Massachusetts age and growth information, Sport Fish Program biologists have been gathering a limited number of age samples, along with length, weight, sex and spawning condition data from local commercial and recreational

catches over the past two years. Additionally, samples of tautog smaller than our minimum size (16"), which are not available in landed catches, have been obtained while conducting other program work using otter trawls and fish pots.

Unlike many fish that can be aged from readily obtainable scales from either live or dead specimens, tautog possess few readable scales and are therefore aged by reading annual marks found on their cheek bones (see inset figure). Each cheek bone must be cut from a dead fish and carefully cleaned of flesh before reading. Having to use dead fish for samples compounds the difficulty in obtaining an adequate sample size. This is no small task in the commercial fisheries because much of the landed catch consists of highly valued live fish. It's also difficult to obtain enough samples in the recreational fishery, where numbers landed per trip are small, geographically restricted and occur primarily during the months of May and October. Despite sampling constraints, the Massachusetts Sport Fish Program will continue to play a significant role in the interstate management process for tautog.



Resource Assessment



Photo by Jack Fiske

Resource conservation laws require that the best scientific information be used as the basis for management actions. The Resource Assessment Project's mission is to collect and analyze data to contribute to this process. Coastal and estuarine species found in Massachusetts territorial waters vary widely in abundance and diversity. Many are highly-prized sport fish. The Resource Assessment Project samples these fish using standardized spring and autumn bottom trawl surveys of Massachusetts territorial waters designed to coincide with seasons when either adults or juveniles are available inshore.

The Division contracts the 65 foot NOAA research vessel, Gloria Michelle, for these surveys. The objective of this project, the east coast's longest ongoing inshore survey, is to obtain fishery independent data on the distribution, abundance and size and age composition of finfish as well as some crustaceans and mollusks. The project's staff prepares scientific reports and gives technical presentations to fishery managers for use in developing policies governing the use and protection of fishery resources.

Stock assessment analyses rely on various sources of information other than surveys to estimate resource abundance and trends. The principal information comes from recreational and commercial fisheries. Fishery-independent surveys operate differently from other types of fishing. While other fishing operations seek out the greatest aggregations of fish to maximize catch rates, trawl surveys fish in a standardized manner over a wide area to annually provide an unbiased population abundance index. Our survey is based on a stratified random design that uses five bio-geographic regions. We divide each region into depth zones called strata. About 100 stations for each survey are allocated based on the approximate proportion of each stratum's area. Survey tow location is randomly selected within each stratum and based on presence of "good" bottom and absence of fixed gear.



Photos by Karen Rypka

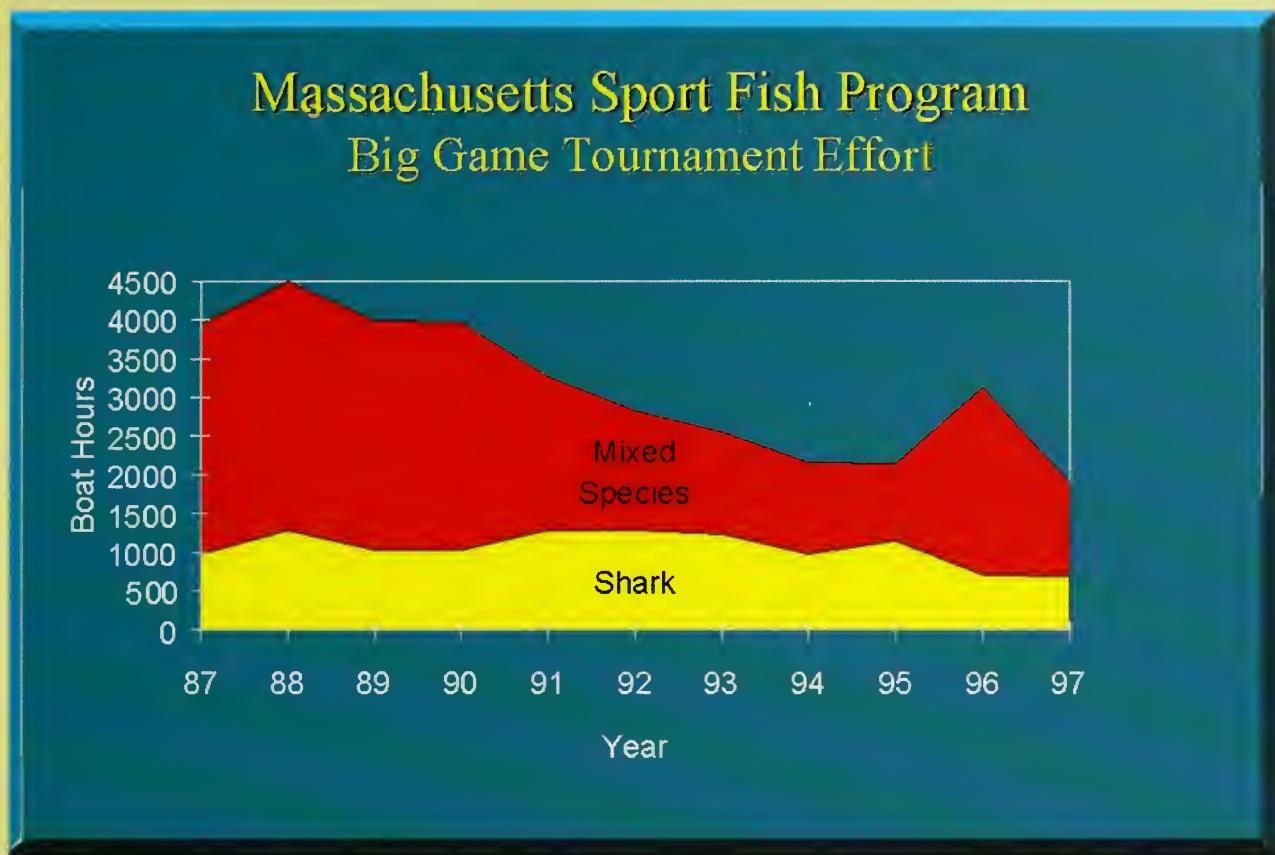


Most of the important recreational fish caught within state waters belong to stocks with wide geographic distributions. With this perspective, project data have supplemented the National Marine Fisheries Service / Northeast Fishery Science Center (NMFS/NEFSC) and Atlantic States Marine Fisheries Commission (ASMFC) stock assessments in various ways and results have been used by ASMFC and regional management councils in managing interjurisdictional fishery resources. Project personnel have published peer reviewed scientific papers, serve on and chair many interstate scientific committees and working groups investigating both single and multi-species assemblages.

Although the trawl survey captures about 90 different species each year, project emphasis has been directed toward sampling some of the state's most important finfish resources. These include winter flounder, summer flounder, Atlantic cod, scup and black sea bass.

The Resource Assessment Project also conducts an annual estuarine seine survey to monitor spawning success of winter flounder in six estuaries on southern Cape Cod. We sample estuaries with a small mesh haul seine on the top half of the tide when winter flounder young-of-the-year are feeding in the intertidal and shallow subtidal zones.

Fisheries Statistics



Fishery scientists face the difficult task of assessing marine resources without the ability to directly see, count, or measure fish or fishermen. Instead, they must rely on a more indirect approach to gathering information, such as data provided by fishermen regarding the type, quantity and size of the fish in their catch, how many trips they take, how long their fishing trips last and what type of gear they use.

Current assessments and management strategies are hindered by a lack of data and inconsistencies in data collection programs. The resulting uncertainties in the data and the assessments upon which they are based make it difficult for managers and fishermen to balance the needs of the fisheries with the conservation requirements of the resource.

Reliable fisheries statistics allow the management process to work successfully. They are needed to evaluate impacts of fishing mortality on fish stocks, to provide a basis for allocating catch among users and geographical areas and to monitor the effectiveness of fishery management plans overall.

For the past several years, Atlantic coast fishery managers and fishermen have realized that coordinating statistics programs is essential for the conservation and management of coastal resources. On November 2, 1995, the 23 Atlantic state, regional, and federal fishery management agencies committed to such a coordinated approach through the design and implementation of the Atlantic Coastal Cooperative Statistics Program (ACCSP). The over-riding goal of ACCSP is to develop coastwide standards and protocols for the way in which all Atlantic coastal agencies collect, manage and disseminate both commercial and recreational fisheries statistics.

Our Sport Fish Program's Fisheries Statistics Project is designed to increase the amount of information collected from Massachusetts recreational fisheries. The project conducts surveys and monitoring efforts to collect a variety of biological, catch and economic data. As a cooperator and supporter of the ACCSP, we are prepared to modify and adapt our state's data collection projects to meet the major recommendations of the coordinated coastwide program.

Marine Recreational Fisheries Statistics Survey

Most recreational catch and effort statistics important to fishery managers and stock assessment scientists are estimated from data collected by the Marine Recreational Fishery Statistics Survey (MRFSS). The MRFSS is a nationwide program started in 1979 by the National Marine Fisheries Service (NMFS). Federal and state fishery agencies, interstate fishery commissions and fishery management councils use this information to assess the impacts of recreational fisheries on marine resources and to help guide the fisheries management process. This information is also available and widely distributed to the public. Private consultants often use it to show relevance of recreational fisheries when developing environmental impact reports.

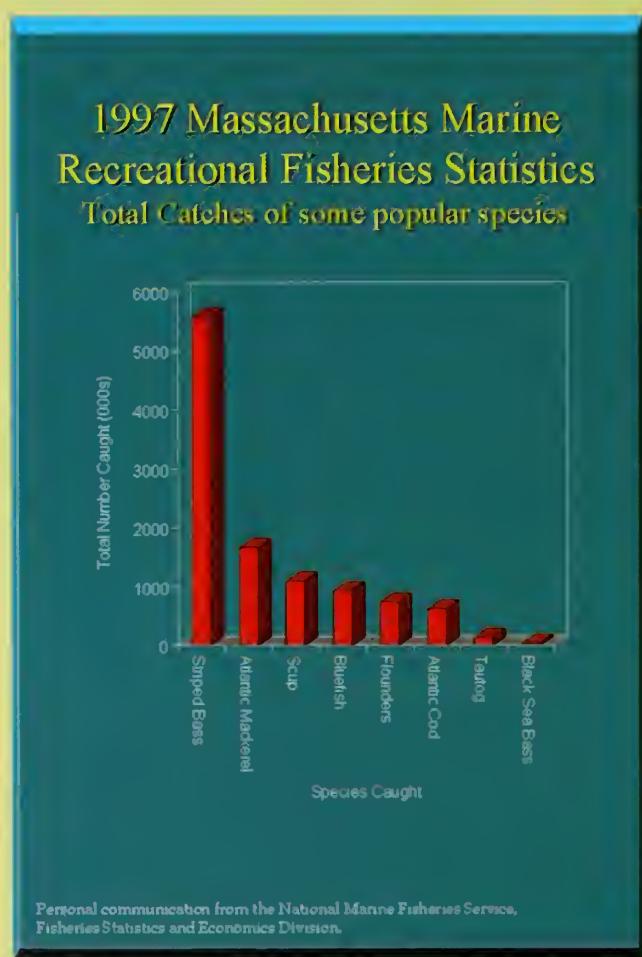
Currently a NMFS Virginia-based contractor conducts the MRFSS. However, in some states the fishery agencies commit to conducting components of the survey.

The MRFSS consists of two separate but complementary surveys: a telephone survey of households in coastal counties to estimate the number of fishing trips made, and a field intercept survey of anglers at access sites to estimate catch rates and species composition.

The most basic use of the survey is to estimate total number of fish caught, the amount released alive, and the amount harvested; weight of harvest; total number of trips; and number of people participating in marine recreational fishing.

NMFS divides the survey into regions: North Atlantic, Mid-Atlantic, South Atlantic, and the Gulf of Mexico. The North Atlantic includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut. MRFSS inspects three separate modes of marine recreational fishing: shore, party and charter boats, and private and rental boats. Intercept interviews and telephone interviews are conducted in six bimonthly "waves" from January/February to November/December. In Massachusetts, NMFS has a target of about 10,000 telephone interviews each year and about 2,000 field interviews of anglers completing their fishing trips. Our Sport Fish Program pays additional money to the NMFS contractor to triple the Massachusetts number of field interviews, thereby bringing the total to 6,000. Increasing the sample size serves to improve precision of state-level estimates for many species.

Massachusetts recreational fisheries dominate landings in the North Atlantic region by a large margin. Over 40% of the average annual total of all recreationally caught fish in this region from 1993-1997 were caught in Massachusetts. While the Massachusetts recreational catch typically consists of over 30 different types of fish, most fishing activity in recent years has focused on striped bass.



Sport Fishing Tournament Monitoring

Extensive offshore fisheries for tunas, sharks, and marlin occur off our coast from June through October each year. Recreational anglers in private and chartered vessels travel miles offshore to catch bluefin, yellowfin, albacore, and bigeye tunas, blue, mako, and thresher sharks, and blue and white marlin. The highly migratory nature, large size, and long life span of these species render data acquisition and biological studies expensive and difficult to execute.

Since 1987, DMF Sport Fish biologists have harnessed the efforts of tournament fishermen to learn about the species and size composition, basic biology, and relative abundance of big game species off our coast. Offshore fishing tournaments not only provide catch data and biological samples but estimates of effort which are often lacking for offshore recreational fisheries. The number of tournaments held in Massachusetts fluctuates from year to year depending on the economic climate and nature of the fisheries. There are generally about five to nine offshore tournaments annually, with most located on the Cape and Islands. The traditional tournaments have also evolved over the years providing valuable time series data for our Tournament Monitoring Project.

Although several states and the federal government have used tournament data to monitor landings in offshore recreational fisheries, the Massachusetts monitoring project is unique. While most other entities collect data on landed fish, the DMF program attempts to collect total catch data including fish that are boated, tagged, released, or lost. By working closely with tournament sponsors and tournament participants, our biologists not only help in the development of the event but also facilitate complete data collection.

The comprehensive catch and effort data collected are forwarded annually to the National Marine Fisheries Service for inclusion in their national statistics. Well-founded fishery management decisions must be based on a thorough understanding of the fisheries themselves. The Massachusetts Sport Fishing Tournament Monitoring Project provides valuable information about our fisheries that contributes to such a foundation.



Photo by Sharks Unlimited

Anadromous Fisheries Restoration



Photo by Steve Heaslip

Anadromous fish are fish that live in the sea but enter fresh water rivers and streams to spawn. Anadromous fish species such as the rainbow smelt, American shad and river herring play an important role in the sport and commercial fisheries of Massachusetts. They are not only targeted by fisheries but also serve as an important food source for high ranking predator species such as striped bass.

River herring are actually two closely-related migratory species, the alewife (*Alosa pseudoharengus*) and the blueback herring (*Alosa aestivalis*). The alewife is the most abundant anadromous fish in the Commonwealth. The blueback herring is often confused with alewives by the untrained observer. Because their life cycles are very similar and their spawning migrations into coastal systems overlap, we have traditionally managed the alewife and blueback as a single fishery.

The Division of Marine Fisheries has broad legal authority within the Commonwealth to provide suitable passage for anadromous fish coming into fresh water to spawn. Our authority includes seizing and removing at the expense of the owner all illegal obstructions to fish passage. We also have authority to examine all dams and other obstructions to passage in brooks, rivers and streams which flow into coastal water to decide if fishways are needed and determining whether existing fishways are suitable and sufficient for the passage of fish.

The Division maintains its own fishway construction crew, fish stocking equipment and a highly trained staff of anadromous fish biologists. After over 50 years of effort, Massachusetts has nearly 150 fish passageways. More than any other coastal state in the nation. Although our Anadromous Fish Restoration Project is currently not fully supported by Federal Aid in Sport Fish Restoration, it is an integral part of the Sport Fish Program.

The emphasis of our work today is on fishway maintenance, reconstruction and replacement of fishway passage facilities with more advanced designs. Stocking fish is also an important component of our work. When we have gained access to a spawning area either through ladder construction or some other means, we stock the new site with adult herring collected from a well-established population. The offspring of these fish will imprint on the new spawning grounds and return as mature adults in three to five years. To maintain a continuity of year classes, we typically carry on stocking in a single system for four or five years. This process of creating and enhancing Massachusetts river herring populations has had a long history of success and has been used as a model for restoration programs in several other states.

In 1984, the Division established a new feature to the Anadromous Fish Restoration Project to help in the assessment and evaluation of anadromous fish populations. Since then, we have sampled many systems to detect the approximate numbers of alewives and bluebacks, their size composition, age and sex ratios. Such estimates are a basic part of the development of fish stock assessment policies. Of the approximate 100 herring runs in Massachusetts, population may vary in size from a few thousand to over a million individuals.

While DMF has addressed passage obstructions and poor water quality to a large degree in Massachusetts, new problems have arisen which we must deal with to insure the continuation of our existing anadromous fish populations. One such problem occurs primarily on Cape Cod where sandy soils combined with shoreline development and beach nourishment have contributed to a deposition of

Photo by Ken Reback

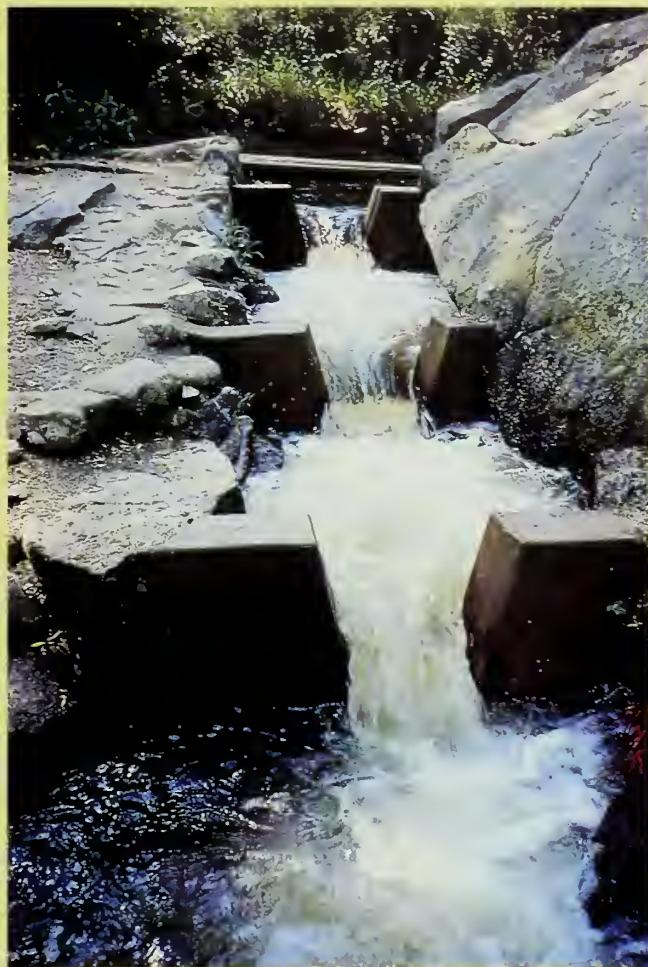
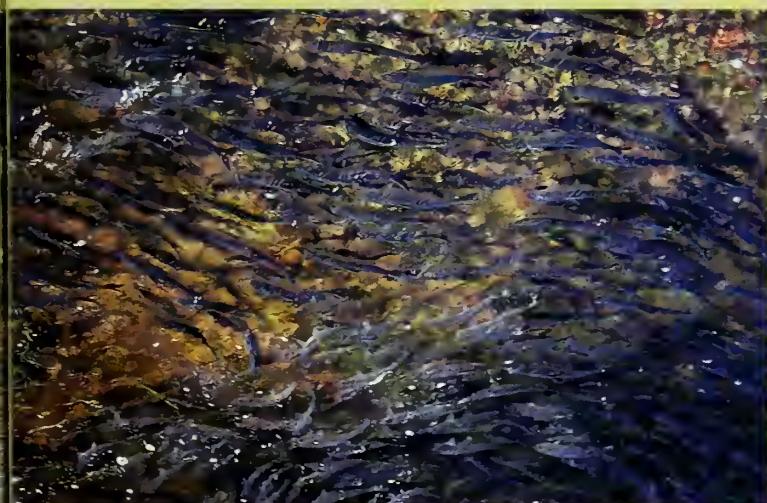


Photo by MCFWRU

sand in the outlets of many spawning area ponds. During low water years, pond levels may drop below the outlet elevation trapping juvenile herring in the pond and delaying or preventing downstream migration.

A second concern is the increasing number of requests for water withdrawal permits either from surface water bodies or from wells close to anadromous fish habitats. Stream withdrawals may create migration barriers within the stream by lowering water levels and may also draw in and trap fish at the intake. Withdrawals from spawning areas can also reduce productivity by decreasing the spawning area available.

Conflicts between anadromous fish and agricultural operations have occurred historically and persist today. Agricultural impacts include blockage of passage, diversion of stream flow, entrainment and stranding of juveniles. Solutions to these problems should be attainable with the cooperation of the industry. DMF is currently working with farming associations to develop management practices which will eliminate many of these problems.

Artificial Reefs



Unplanned artificial reefs, namely shipwrecks, have a long history in Massachusetts waters. Today, many of these wrecks have deteriorated to the point where they have little value as fish and invertebrate habitat. Natural deterioration of shipwrecks and lack of naturally occurring reefs has prompted the intentional placement of additional materials to serve as reefs on the ocean floor in other parts of the country.

A successful reef project requires proper site identification, public backing and regulatory oversight, as well as long-term monitoring and maintenance. The state marine resource agency is in the best position to provide this level of support. A properly administered project will maximize potential attraction - production benefits commonly associated with reefs, will minimize user group conflicts and will avoid creating hazards to the marine environment and boaters. Most importantly, information gathered from existing reefs will be used to construct better future projects.

In 1997, DMF in partnership with the University of Massachusetts at Dartmouth (UMASS), planned and developed a sophisticated artificial reef project, which was supported solely by state funds and implemented at the urging of local state officials. The three-acre site is in Buzzards Bay, East of Salters Point, Dartmouth and is composed of prefabricated concrete units. DMF is the project permit holder and is required to maintain and periodically monitor the site. The monitoring schedule coincides with additional research of the reef conducted jointly between DMF and UMASS.



Photo by Vin Malkoski

Photos by TheNewBedford Standard Times

Interest concerning artificial reef development has increased to new levels, producing more efforts by outside user groups and political forces to create reefs. Total effort in salt water recreational fishing has grown immensely in Massachusetts waters over the past decade primarily as a result of improved fishing conditions for striped bass. It is likely that fishing interests will become more diverse in coming years and will lead to fierce competition for good fishing sites. All these factors will increase public demand for more artificial reef development.

The Sport Fish Program has recently unfolded a project to responsibly address further reef development in Massachusetts. As many as six new sites in the coastal waters of the Commonwealth will eventually be proposed. Each site will be developed through the town, state and federal permitting process and held at the ready for choice reef projects. Once the sites are established, the materials for each site will be pre-selected to streamline the development process and to avoid unwanted materials. Project proponents will also be required to have sufficient funds to acquire the materials, safely deploy the materials to the site and to maintain the reef according to permit conditions.



Outreach



Photo by Karen Rypka

During winter of 1997, the Division of Marine Fisheries Sport Fish Program conducted 21 meetings with various Massachusetts-based sport fishing organizations. The meetings were constructed to describe program efforts, ideas for future program development and the federal-aid system. It was confirmed by these meetings that most groups appreciate marine resources, but they have minimal awareness of state marine resource agency programs, fisheries management efforts and agency funding sources. It was often noted that most individuals could not distinguish the differing roles between the state's inland and marine agencies, nor between the states and the federal agencies. Likewise, the proper identity of important state and federal management commissions, boards and councils could not be discerned.

These same findings were also reported in the Connecticut Responsive Management Survey (Responsive Management 1997). What's particularly troubling about these findings is that the audience in attendance at sporting and conservation organization meetings, the club membership, is generally much more familiar with the agencies and programs that govern and affect their sport than other members of the general public. If our programs are going to have any impact at all on the general public, than it is clear that we must do more and we must do it better than we have in the past to explain our programs to a wider audience.

Sport Fishing Guide

In addition to the Sport Fish Program Guide, we produce a "Massachusetts Saltwater Sport Fishing Guide." It contains current information on launching sites, tackle shops, charter and party boats, fish profiles, fishing clubs, and fishing tournaments to assist recreational anglers in enjoying our spectacular array of fishing opportunities from shore or by boat. The guide is arranged geographically starting from the New Hampshire border following the coastline south to Rhode Island then swinging east to Cape Cod and the Islands. To assist with orientation, there is a map centerfold of the coastline. The guide is updated annually and is available at most bait and tackle shops, or from one of our three offices.



Photo by Alan Bazer

Saltwater Sport Fishing Derby

The Massachusetts Saltwater Fishing Derby is held each year from March 1 to November 30. It is free and no preregistration is required to enter. All qualifying entries receive a derby poster. At the end of the derby year, trophies and special artist prints are awarded to the anglers who landed the heaviest fish in each species category. Winners are chosen in three divisions: men, women, and junior (age fifteen and younger). The Sport Fish Program also maintains a list of state gamefish records. Spe-

cial recognition awards are given to anglers who set a new record.

The goal of the program is to promote an interest in fishing and thereby build support for the recreational fishing industry. Through this we also hope to make people aware of the need for good water quality, habitat protection, and effective fisheries management.



Photo by David Pierce

Internet Homepage

In this day and age we need to take full advantage of the technology available to us. Our homepage: <HTTP://www.state.ma.us/DFWELE> will soon be renovated to allow timely and interactive communications.

Public Access



Photo by Dan McKiernan

The Commonwealth of Massachusetts plays an important role in supporting sport fishing activity in the northeast region of the United States. In fact, about half of all regional participation occurs here. Nearly 700,000 men, women and children are estimated to participate in saltwater fishing in our tidal waters each year. We project the annual number of fishing trips they make will exceed 10 million by the year 2000.

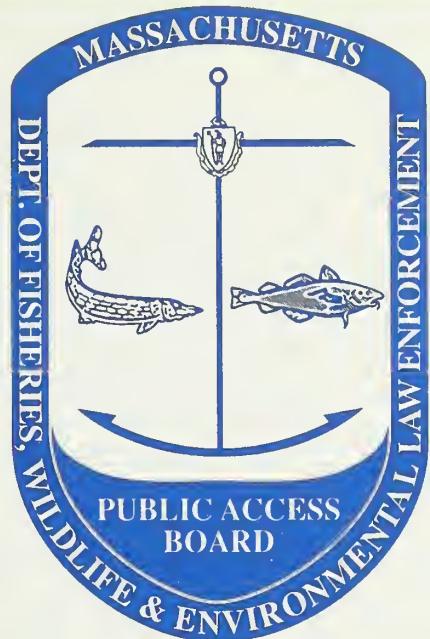
While the type of fishing and species sought often will determine the fishing mode, may it be from boat or shore, boating accounts for the most significant share of the overall recreational catch. This is understandable given the mobility of the boating fleet and its ability to use technology to find fish. Boating, however, although it provides the platform for recreational activities other than fishing, is an expensive proposition for most of the Commonwealth's anglers. Consequently, about half of all salt water recreational fishing trips take place from shore.

The Division's Sport Fish Program has identified a need for the Commonwealth to acquire lands, build infrastructure and develop management plans to further enhance public access to our tidal waters for shore-based sport fishermen.

Massachusetts has a respectable history in providing public access to our boating community. Much of this work has been accomplished through our Department's Public Access Board (PAB) by building boat launching facilities. The PAB takes full advantage of Federal Aid in Sport Fish Restoration funds to develop these boating facilities. Today there are over 200 public launching sites in the Commonwealth and nearly 50 of those provide access to tidal waters making us one of the nation's leaders in this public service area.

We began the effort of developing better shore-based public access with our purchase of over 100 acres of beachfront on, Martha's Vineyard in 1993. The land on Chappaquiddick Island, commonly known as the Leland Beach property, protects 1.5 miles of ocean shore frontage. The beach links the 200-acre Wasque Reservation and the 500-acre Cape Poge Wildlife Refuge, both owned by The Trustees of Reservations (The Trustees), a state-wide private land conservation organization. We manage the property with the assistance of The Trustees so that a coordinated ecological management effort is applied to the entire barrier beach ecosystem.

The Sport Fish Program is now developing a new public access project dedicated to financing land



acquisitions and infrastructure needs that will further enhance public access in the tidal waters of the Commonwealth for sport fish anglers. Types of shore-based access needs vary throughout the state from fishing piers, small beachfronts or simply helping beach managers design more favorable plans for sport anglers.

Photo by Karen Rypka



Clean Vessel Act Program

The Massachusetts Clean Vessel Act (CVA) program, operating on a five-year grant from the U.S. Fish and Wildlife Service, has been underway now since 1994. In this time, 49 pumpout boats have been placed into service, and 46 shoreside pumpout stations and 17 dump stations have been installed. The program has greatly increased the boating public's awareness and use of pumpout facilities and has contributed substantially to coastal water quality by safely disposing of boating sewage.

In 1993 when CVA pumpout funds (derived from the USFWS's Sport Fish Restoration monies) were first announced, the Commonwealth's meticulous two year coastal shellfish bed study had just been completed. An essential part of the study (conducted by Division of Marine Fisheries biologists and bacteriologists) located and counted all moorings, marinas and anchorages in state waters and noted their proximity to shellfish beds. This clearly defined Massachusetts's pumpout needs.

It was this study, plus a desire to encourage boaters to follow through on their good intentions of properly using their holding tank and to encourage collaboration between the public and private sec-

tors, that resulted in a first year (Segment 1) grant of over \$1.5 million - the highest CVA award in the nation. The ease of using pumpout boats and the elimination of pumpout fees whenever possible has been an outstanding success. This was confirmed by the great increase in compliance with pumpout regulations. Marina owners and harbor masters all along the coast have given anecdotal accounts of this change in attitude.

Another use for pumpout boats became apparent only after they were put in service: the occasional dewatering of a sinking boat, thus diverting oily bilgewater from the marine environment. This occurs more often than was imagined when the program was first put together.

One unarguable measure of the program's success is that the state now has 9 Federal No Discharge Area (NDA) applications either approved or on the way to approval - due to CVA sponsored pumpout equipment. The NDA goal is statewide coverage, a status only achievable with CVA sponsored pumpout stations, conveniently and easily available to boaters.

Photo by Buell Hollister



Fisheries Management

The Commonwealth's recreational and commercial fisheries are subject to a host of regulations developed by DMF to carry out management measures for conservation of the Commonwealth's marine fishery resources. These decisions frequently involve resource allocation between fishermen to disperse allowable harvest according to established and evolving policies and to ease user group conflicts, such as competition for the same fishing grounds and fish.

Many decisions stem from petitions heard at Marine Fisheries Commission public hearings or from proposals suggested by DMF or the Commission itself. Management measures and accompanying regulations can be obligatory because they are requirements of interstate fisheries management plans developed with DMF participation for coordinated management of fishery resources, such as striped bass and bluefish. Some regulations are needed to support Fishery Management Council management plans, e.g., multispecies (cod, haddock, flounders...) and sea scallops.

This is quite a complex management environment under which the Commonwealth's fishing public must operate. General administration and guidance for managing our fisheries comes from three principal organizations. These are the Massachusetts Marine Fisheries Commission, The Atlantic States Marine Fisheries Commission and the New England Fisheries Management Council.

Marine Fisheries Commission

In Massachusetts we have our Marine Fisheries Commission, a 9-member board established by the Legislature in 1961. These unpaid members are appointed by the Governor for a period of three years. They must be qualified in the field of marine fisheries by training and experience.

Current and past Commissioners have been recreational fishermen, commercial fishermen, seafood dealers, restaurateurs, marine scientists, environmentalists, and leaders of recreational and commercial fishing organizations. Monthly business meetings and quarterly public hearings make up the Commission's agenda as it works with DMF through an effective fisheries management partnership.

Atlantic States Marine Fisheries Commission

The next level of complexity in the network of fisheries management is the Atlantic States Marine Fisheries Commission (ASMFC). DMF is a voting member of ASMFC which consists of Atlantic states from Maine through Florida. Established in 1942, ASMFC has 45 voting members with three from each state. Its purpose being to "promote the better utilization of the fisheries, marine, shell and anadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries."

One of the Commission's core programs is the Interstate Fisheries Management Program (IFMP). The IFMP has many Advisory Panels of representatives from the charterboat, recreational, and commercial fishing industries, plus conservation interests, from coastal states. ASMFC has the charge of carrying out fishery management requirements for all Atlantic coast interjurisdictional fisheries under the 1994 Atlantic Coastal Fisheries Cooperative Management Act. This Act, building upon the success of the Atlantic Striped Bass Conservation Act, provides the means to ensure states' compliance with mandated conservation measures in ASMFC-approved fishery management plans.

Fishery Management Councils

DMF is a voting member of the New England Fisheries Management Council - a creation of the Fishery Conservation and Management Act (FCMA) of 1976. FCMA was amended in 1996 and renamed the Magnuson-Stevens FCMA. This Act is a national program for "conservation and management of U.S. fishery resources to prevent overfishing, rebuild overfished stocks, insure conservation, facilitate long-term protection of essential fish habitats, and realize the full potential of the Nation's fishery resources."

DMF participates in the development and amendment of Council fishery management plans that must comply with 10 National Standards dealing with such issues as fairness and equity to all fishermen and the need to reduce bycatch and bycatch mortality.

Massachusetts
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