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The Rhode Island Marine Fisheries Council: Stewardship in Need of Goals and Objectives

Robert Censabella
University of Rhode Island

THE RHODE ISLAND MARINE FISHERIES COUNCIL: STEWARDSHIP IN NEED OF GOALS AND OBJECTIVES

BY

ROBERT CENSABELLA

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ROBERT CENSABELLA

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Major Professor ______________________

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ABSTRACT

In the State of Rhode Island, marine fisheries are managed through the Marine Fisheries Council, a citizen-based regulatory body of nine members from either the commercial or recreational fishing industries or experienced with the conservation and management of fisheries resources. To ostensibly help this group make informed decisions, biological data and scientific advice are provided by the State Division of Fish and Wildlife. This thesis examines the decision-making process of this Council. More specifically, it provides a case study of how this body has attempted to manage the State's winter flounder stocks — an economically-valuable species which confines its life cycle mostly within state jurisdictional waters. Specific attention is paid to the manner in which scientific recommendations are incorporated into the Council's decisions. Through carefully examining the minutes of monthly council meetings and annual stock assessments of the past ten years, a detailed chronology is presented of the stewardship of this species. Upon an analysis of this information, it is concluded that the Council has generally failed to take timely action to prevent the collapse of this fishery despite being forewarned of its demise, and even worse, has occasionally acted in direct contradiction to the Division's findings and recommendations.

Any attempt to revamp the Council's decision-making process must provide a framework to better incorporate scientific advice. In recognition of this, this thesis starts with the premise that the fundamental purpose of any management system — public or private — is to work towards the realization and accomplishment of an organization's goals (as specified through objectives). Through a careful review of the State's environmental laws, it has been determined that a critical omission in Rhode Island's marine fisheries management program is the failure to clearly define its stewardship goals. As things currently stand, it is uncertain as to whether or not the Council is even supposed to prevent overfishing. Consequently, to the detriment of the State's fishery resources, important decisions are routinely delayed or postponed indefinitely as various factions within the

Council work towards dissimilar or diametrically opposite goals. Given this state of affairs, it is therefore not surprising that the Council has been largely ineffective in preventing the devastating collapse of the State's winter flounder stocks despite an abundance of data forewarning of such an occurrence.

To remedy this situation, it is recommended that the State unequivocally recognize that conservation, not allocation, is the foremost goal of its management program. Additionally, to help meet this goal, strategies should be developed to more consistently incorporate scientific data into the decision-making process. This study further recommends that the system of adaptive management, as specified under the Atlantic States Marine Fisheries Commission Striped Bass Management Plan, serve as a model to better include biological data in the decision-making process. An underlying precept of such a program is the need to constantly monitor stock conditions and make adjustments when necessary. In specific reference to the State's winter flounder fishery, year class abundance as determined through the Division of Fish and Wildlife's inshore trawl survey can survey as an early indicator to help reach more timely and effective management decisions. By adopting these recommendations the State can take a giant step towards ensuring that its marine fisheries remain a viable and sustainable resource for future generations to enjoy.

ACKNOWLEDGEMENTS

It is hard to believe that I have finally finished my thesis. Subconsciously, I seem to be having a difficult time accepting this. I have lived with my thesis hanging over my head for so long, that I have forgotten how to relax. For the past several years, whenever I did something other than my thesis, an annoying little voice kept nagging me to continue writing. Even at this late date, I still feel a sense of guilt that I should be constantly working on my thesis.

I can say in all honesty, that without the undying support of my fiancee Theresa and my parents, it is doubtful that I would have ever finished this project. I wish I was one of those people who seemingly have little problem writing their ideas on paper. Unfortunately for me (and all those around me), writing is a tortuous process full of pain and suffering. I often felt nauseous just thinking about have to do battle with my word processor to complete another part of my thesis. Yet, throughout my fits of rage and depression, Theresa always tried to help keep things in perspective and occasionally even cheered me up. Additionally, my parents remained supportive even during the darkest hours when it seemed like my thesis was never going to get done. I would especially like to thank my dad for always backing me and offering whatever assistance he could. Furthermore, I would also like to thank my major professor, Dennis Nixon, the other member of my thesis committee, Richard Burroughs and Timothy Hennessey, and my thesis defense chairperson, Joseph DeAlteris, for their suggestions and input. And in conclusion, thank God it's finally over!

PREFACE

As a young boy growing up in New York City, I was fortunate to have a dad who truly appreciated being outdoors and away from the noise and congestion of the city. He spent countless hours taking me fishing for flounder, fluke, blackfish, bluefish, and striped bass in Long Island Sound and around Fire Island Inlet. As I got a little older, whenever they had time, both my mom and dad took turns dropping me off on a town dock in Port Washington, where I spent my time trying to figure out (mostly unsuccessfully) what would make a fish bite my lure or bait. Little did I realize at the time, that while many of my friends were turning on to drugs, my parents had turned me on to fishing and a love for the ocean. They helped to inspire in me an insatiable desire to be by the ocean and to learn as much as possible about it.

With this background, it should not be surprising that I jumped at the opportunity to get out of New York City and study for a master's degree in marine affairs at the University of Rhode Island. At the time, the only thing I knew about Rhode Island was that it was the smallest state in the country. However, I quickly learned what a great place it is for those people who like to be by the ocean. While studying for my degree, I was fortunate to land a job with the National Marine Fisheries Service in Galilee (and eventually in Woods Hole). Sue Murphy, my supervisor, made it a point to show me around and introduce me to as many of the fishermen as possible. I also managed to earn a couple of extra dollars occasionally working as a "lumper" unloading fish from one of the vessels. At about this time, winter flounder became one of the most contentious issues in the port. The Council was struggling to find a way to satisfy small-vessel fishermen who wanted to keep landing flounder while somehow still conserving the stocks. To make a long story shore, from this controversy my thesis was born.

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INTRODUCTION

STATEMENT OF THE PROBLEM

Meeting the competing demands of conservation and allocation of marine fisheries can be one of the most intractable environmental problems. Ideally, managers are expected to maintain a balance, where user groups such as commercial and recreational fishermen are restricted to harvesting only a portion of the resource while maintaining sufficient mature fish to ensure sustainable catches into the future. This may seem like a readily achievable aim, however in practice it has proven to be elusive. In addition to the technical challenge of generating accurate stock assessments, a management system must contend with a diversity of participants, each with their own value judgements that are often dissimilar or even mutually exclusive about what is perceived to be a good or desirable outcome in a fishery. As a result, the decision-making process is commonly marred by infighting between different factions arguing for their own parochial interests. During which, necessary protective measures are commonly postponed indefinitely while each group seeks to protect or enhance its "share" of the resource. As a result of this intense lobbying, managers, many of whom are from the fishing industry themselves, will usually look to foremost accommodate the short-term economic needs of fishermen instead of the biological needs of the resource. Consequently, conservation and long-term sustainability are seldom a priority.

Unfortunately, the scenario described above is endemic to the management of marine fisheries throughout much of the United States. While on the national level this situation has received substantial media coverage, especially with the collapse of the New England groundfishery and the partial shutdown of Georges Banks, less noticeable is the similar manner in which fish stocks are administered in the coastal waters of the state of

Rhode Island. Regulatory jurisdiction over all marine finfish and shellfish found within the state's internal and territorial waters is entrusted to the Rhode Island Marine Fisheries Council.[1] The RIMFC is composed of the Director of the Department of Environmental Management (or a designee) and eight private citizens with "skill, knowledge and experience in the commercial fishing industry, the sport fishing industry, and in the conservation and management of fisheries resources."[2] Its powers and duties, which include regulating the manner, size, season, quantity, and geographic location for harvesting fish and shellfish, are explicitly stated under Title 20, Chapter III of the *General Laws of Rhode Island*. However, conservation standards to be adhered to, as defined through a system of goals and objectives, are conspicuously absent. This omission has greatly hindered the Council's effectiveness to protect some of the state's inshore fisheries. Nowhere has this been more evident than in its inability to make timely and substantive decisions to help conserve the dwindling supply of winter flounder (*Pleuronectes americanus*).

The severe decline of the winter flounder in Narragansett Bay (since the mid 1980s) has been extensively studied by federal, state, and academic sources.[3] These groups have provided invaluable examinations of the biological habits of the local winter flounder stocks and have gathered a critically important continuous time series of abundance data, dating back to 1959, through several independent research surveys. Additionally, the National Marine Fisheries Service (NMFS) has also kept track of commercial and recreational catch and effort data for this species in the coastal waters of Rhode Island. Through annual reports and periodic updates, this information has been presented to the Council by the Rhode Island Division of Fish and Wildlife (RIDFW).

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[1]General Laws of Rhode Island vol. 4, ch. 3, Marine Fisheries Council.
(Hereinafter referred to as "the Council" or the RIMFC)

[2]Ibid. at 20-3-1.

[3]See chapter 3 for specific details. While there are other smaller stocks of winter flounder in most of the coastal salt ponds and south shore estuaries, this paper will mainly concentrate on the fishery in Narragansett Bay. It is this area, because of its tremendous commercial and recreational importance, more so than the salt ponds, which has been the center of attention.

Yet despite being presented with an overwhelming body of evidence illustrating its precipitous decline over the past ten years, the Council has been unable to take timely and substantive action to help conserve this resource and prevent a near total collapse of the fishery.

In all due fairness, it should be noted that there are a host of factors, some of which lie outside of the Council's jurisdiction, that have contributed to the winter flounder's decline. For example, heavy fishing pressure in federal waters, habitat degradation, and above-average winter water temperatures have all taken a toll on this resource. However, it will be demonstrated that, with the exception of the power plant entrainment in Mt. Hope Bay, unsustainable fishing pressure in state waters is the overriding factor responsible for the collapse of this fishery.

A system of concise goals supported by verifiable objectives would be of invaluable assistance in providing an underlying philosophy of conservation to help to bind the variety of decision makers and user groups who often participate in the management of the State's coastal fisheries. The key words here are *concise* and *verifiable*, for all too often in fisheries management, goals and objectives are stated in such a fashion that precludes measurability and fail to provide any substantive guidance. While there is no one definitive definition, in general goals are defined as "ideals, the major accomplishments, ends, or states of affairs to be achieved for which managers plan, develop strategies, and direct their organizations activities."[4] Objectives help facilitate the accomplishment of goals by providing "specific, measurable, and verifiable statements of intermediate tasks that must be accomplished."[5] Their usage would

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[4]Willard E. Barber and John N. Taylor, "The Importance of Goals, Objectives, and Values in the Fisheries Management Process and Organization: A Review." North American Journal of Fisheries Management 10, no.4 (1990):367.

[5]Ibid. at 368.

improve a managerial system by helping to: identify conflicting activities; guide the decision-making process; and insure accountability.[6]

There is a small but growing body of literature stressing the importance of goals and objectives to more effectively manage marine fisheries.[7] While these topics have received great attention in the business community, in fisheries they have remained mostly an afterthought.[8] However, there is increasing recognition that in fisheries management, the decision-making process is often severely impeded not so much by scientific deficiencies but by the failure to accurately specify the goals that are to be achieved.[9] When these goals remain unstated, or ambiguously worded, or even worse, at cross purposes with each other, the management decision-making process is prone to degenerate into a free-for-all where each user group vociferously argues its cause and managers are compelled to make value-laden judgements without guidance or direction. In such a situation, the needs of fishermen routinely take precedent over the needs of the fish stocks, and consequently the resource is rarely harvested at a sustainable level.

This project will demonstrate, through a case study of the Council's handling of the winter flounder fishery, that the system of marine fisheries management in Rhode Island is in serious need of revision if the resource is to be harvested on a sustainable basis. This thesis will address two specific questions:

1. How would the establishment of an explicit set of well-defined goals supported by verifiable objectives improve the Council's ability to adopt substantive conservation measures in a more timely fashion?

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[6]Ibid.

[7]See Alverson and Paulik (1973); Sarnecchia (1988); Barber and Taylor (1990); Hilborn and Walters (1992) "Objectives of Fisheries Management":22-43.

[8]Supra note 4 at 366.

[9]Supra note 4 at 370.

2. What management system(s) currently in use could serve as a model to implement such a strategy?

This study will operate with two major assumptions in its attempt to provide further insight into the problem.

1. The ultimate goal of any fisheries management system is to ensure that stocks do not fall below some critical threshold of abundance which will jeopardize their future viability.[10] To do so, a management regime must be proactive, not reactionary. It should attempt to develop strategies, through careful planning, to rebuild or maintain healthy fisheries that do not periodically collapse due to unsustainable levels of fishing mortality.

2. The validity of the technical and biological information will not be critiqued. This material has already been reviewed and confirmed by several eminent biologists. While misleading or contradictory scientific recommendations will be illustrated, no evaluation will be attempted to prove or discredit the science behind the advice.

SIGNIFICANCE OF THE STUDY

Rhode Island, the Ocean State, has a proud fishing heritage which still continues to play an important (albeit declining) role in the social fabric of the state. Its close proximity to the fishing grounds off of southern New England has helped to promote the

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[10] Ray Hilborn and Carl J. Walters, Quantitative Fisheries Stock Assessment: Choice, Dynamics and Uncertainty (New York: Routledge, Chapman & Hall, Inc.,1992):3.

development and growth of its commercial fishing industry. In 1991, approximately 139.8 million pounds of fish were landed in its ports worth over 85.1 million dollars (ex-vessel).[11] Additionally, its productive inshore waters have fostered the development of a vibrant recreational fishery. In 1991, recreational anglers made approximately 1.1 million fishing trips and caught over 5.5 million fish.[12] Although some important commercial and recreational stocks have dramatically declined from overfishing and the loss of critical habitat, many residents are still directly or indirectly involved in the fishing industry for their livelihoods.

The regulation of this resource within the jurisdictional waters of the state is delegated to the RIMFC, which has full responsibility to promulgate and adopt regulations untethered by binding performance standards and without final approval from a supervisory agency. This level of autonomy for a state fisheries agency is quite unique.[13] Its membership consists of the Director of the Department of Environmental Management (or a designee), three representatives each from the commercial and recreational fishing industries, and two participants from the scientific community.[14] Regulatory actions taken by the Council must be done pursuant to the Administrative Procedures Act, which include, among other things, providing ample prior notice of upcoming public hearings and assessing the economic impact of its regulations.[15] Additionally, members are bound by the States' conflict of interests laws and must therefore exercise caution prior to becoming involved in an issue which might have an

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[11]US. Dept. of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Fisheries of the United States, 1991 (May 1992):4.

[12]US. Dept. of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts 1990-1991 (Sept. 1992): 133, 182.

[13]Jill Bubier and Alison Rieser, "Conflict of Interest and Fishery Management Councils" Territorial Sea (University of Southern Maine) 4, no. 2 (1984):4.

[14]Supra note 2.

[15]General Laws of Rhode Island, vol. 6C, ch. 35, Administrative Procedures.

impact upon their income. However, outside of these restrictions, they are free to make decisions regarding a fishery based solely on their discretion.

The winter flounder is commonly found in the inshore and territorial waters of New England and the Mid-Atlantic states. It was chosen for this study, because in addition to being an important commercial and recreational species, it also tends to remain within state jurisdictional waters throughout most of its life cycle. Except for a separate body of fish located on Georges Bank, it is generally comprised of discrete local subgroups centered around estuarine systems and embayments.[16] Unlike many other sought-after species, which spend the majority of their time offshore and only temporarily venture into the shoal waters off Rhode Island during the warmer months of the spring and summer, the winter flounder is found concentrated inshore during the coldest months of the year, when water temperatures are at a minimum. During the fall, as water temperatures begin to decline, it migrates into bays and estuaries where it will spawn during the winter or early spring. As water temperatures rapidly rise during the late spring, it disperses offshore into deeper, cooler water.

Its relatively small-scale migrations make it an ideal candidate for localized state or regional management. Returns from tagging studies indicate that approximately ninety percent of the winter flounder indigenous to Narragansett Bay are harvested within nearby coastal waters.[17] According to landings reported to the NMFS, in 1990 this species was the most commercially important (in lbs. and dollars) finfish caught in Narragansett Bay; approximately 64,353 lbs. of winter flounder were recorded at a value of 61,161 dollars.[18] These figures substantially exceed the next ranking finfish of

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[16]Ibid. US. Dept. of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Northeast Fisheries Science Center. Status of the Fishery Resources Off the Northeastern United States (Jan. 1991): 68.

[17]Mark R. Gibson, Stock Assessment of Winter Flounder in Rhode Island, 1991: A Report to the RI Marine Fisheries Council Rhode Island Division of Fish and Wildlife, (Nov. 1991):4.

[18]Sue Murphy, National Marine Fisheries Service, Personal Contact, 15 Nov. 1991. This figure most likely under-represents the total catch in the bay since most small trawlers that fish this area generally land

herring, scup, and summer flounder.[19] Its relatively high price, consistently averaging over a dollar a pound, makes it an economically important species for small commercial vessels, which can not safely venture far offshore.[20] Additionally, it is also one of the most highly sought-after species for recreational fishermen. Over 36 percent of the total regional landings of winter flounder since 1978 have been by recreational fishermen.[21] According to the NMFS's Marine Recreational Fisheries Statistical Survey, in the North Atlantic subregion (which includes Rhode Island) the winter flounder was the primary target in 11.37 percent of its total interviews, ranking fourth behind bluefish, none (no one specific primary species), and Atlantic cod.[22]

Various trends indicate that the local population of winter flounder is in a serious state of decline.

1. Since 1982, there has been a 81 percent reduction in commercial catch per unit effort (CPUE) of winter flounder in the NMFS statistical area 539 (which includes Narragansett Bay, Rhode Island Sound, and Block Island Sound).[23] The present stock size is estimated to be less than 10 percent of the stock size of 1982.[24] (The abundance of fish in this region is heavily dependent upon the health of the stocks from the estuaries and salt ponds of Rhode Island.)

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their catch late in the day when reporting agents are not on duty. However, the proportional distribution of the landings is most likely reflective of the fishery.

[19]Ibid.

[20]Ibid.

[21]Supra note 17 at 6.

[22]Supra note 12 at 99. It should be noted that as this species has declined throughout the Northeast and subsequently has become more difficult to catch by rod and reel, its popularity amongst recreational anglers has fallen. For instance, in 1987, when its abundance was relatively high, it ranked third and was the intended species for 13.56 percent of the total interviews (Marine Recreational Fishery Statistic Survey, Atlantic and Gulf Coasts, 1987-1989), whereas in 1991 it ranked seventh and was the intended target 7.25 percent .

[23]Mark R. Gibson, Stock Assessment of Winter Flounder in Rhode Island, 1993 Rhode Island Division of Fish and Wildlife, (Mar. 1994): 16. (For a map of this area, see figure 3.6 in chapter 3.)

[24]Ibid. at 1.

2. The estimated recreational catch in Rhode Island waters declined from a range of 1.3 to 1.7 million fish during the late 1970s and early 1980s to 91,600 fish in 1990 (the last full year before the inshore moratorium).[25]

3. Indices of winter flounder abundance, gathered from survey trawls in and around Narragansett Bay by the University of Rhode Island, Marine Research Incorporated, the RIDFW, and the NMFS are all at or near record low levels.[26]

Evidence, like the information stated above, is presented to the Council by the RIDFW on a regular basis. Additionally, during the late fall, similar data are combined into a comprehensive stock assessment detailing the condition of the fishery. Yet despite these periodic updates, the Council has generally been unable to effectively work together with the RIDFW to adopt timely protective regulations. As a result of this situation, the population of fish in Narragansett Bay has deteriorated to the point of stock collapse and recruitment failure.

Critics of this argument may point to the 1991 inshore winter flounder moratorium, the most substantive measure taken to date, as an indication that the system does eventually work out in the long run. Yet the ban can hardly be called a timely restriction; by the time it was passed, the fishery had deteriorated to the point where biologists with the RIDFW estimate that it may take a decade for the population to recover![27] Additionally, it should also be noted that since its inception a faction within the Council has tried to rescind the ban on several occasions. In early 1994, under

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[25]Supra note 17 at 6.

[26]Mark R. Gibson, Stock Assessment of Winter Flounder in Rhode Island, 1992: A Report to the Rhode Island Marine Fisheries Council Rhode Island Division of Fish and Wildlife (Jan. 1993): 1.

[27]Ibid. at 2.

relentless pressure from bait and tackle store owners, the Council approved a one month (April) open recreational fishery despite a continuance of depressing news about the health of the stocks. Subsequent attempts may yet prove successful in further weakening the ban before the stocks have truly recovered.

The management of the winter flounder fishery will be studied emphasizing a systems approach. That is, all components and participants involved in the decision-making process will be reviewed. The overall purpose of this undertaking is to demonstrate how clearly–stated, verifiable goals and objectives can help promote conservation by providing a decision-making framework to promote the adoption of more timely and effective regulations.

METHODOLOGY

This study will be divided into two major sections. The first half will focus upon the process of fisheries management in Rhode Island. The regulatory powers and administrative procedures of the RIMFC will be reviewed. An assessment will be made of the stock reports provided by the RIDFW and how the Council subsequently responded. The second half of this thesis will review how a system of conservation goals and objectives played a critical role in the restoration of the Atlantic striped bass and how such a program could be adopted to better manage the winter founder fishery in Narragansett Bay.

This project will begin with an overview of marine fisheries management by the Council. Its composition, jurisdictional powers, and administrative guidelines will be examined. An historical review of its establishment in 1976 will be reviewed to assess whether or not it has lived up to the expectations of its originators. A brief comparison to other fishery management programs will illustrate that the independence granted to this regulatory body is not commonplace.

The next chapter will contain a summary of the commercial and recreational importance of the winter flounder and how it is dependent upon responsible localized state management. Commercial and recreational catch and effort data are available from the NMFS and have also been analyzed by the RIDFW. Information about its biological requirements and dependency upon estuarine systems is available from an extensive body of literature published in scientific journals.[28] Specific details about its temporal and spatial distribution as well as its decline in abundance will be gathered from survey trawls, tagging studies, and CPUE data gathered by the NMFS. Much of the information has already been collected in the annual stock assessments by the RIDFW. The following four major natural and anthropogenic causes of mortality will be covered to fully explain the collapse of the fishery:

1. the correlation between above-average water temperatures and low survival rate of juvenile winter flounder;[29]
2. the crash of the Mt. Hope Bay stock of fish due to entrainment in an electrical power plant on Brayton Point;
3. the loss of habitat due to pollution and coastal development; and
4. excessive fishing effort.

Information for this section will be obtained from reports distributed by the RIDFW and the Atlantic States Marine Fisheries Commission, scientific literature, and government documents.

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[28]See William G. Pearcy (1962); Grace Klien-MacPhee (Synopsis No. 117); Alfred Perlmutter (1947); Saul Saila (1961).

[29]Perry H. Jeffries and William C. Johnson, "Seasonal Distribution of Bottom Fishes in the Narragansett Bay Area: Seven-Year Variations in the Abundance of Winter Flounder (*Pseudopleuronectes americanus*)" Journal Fisheries Research Board of Canada 31 (1974): 1057-1066.

The following chapter will contain an assessment of how the Council responded as the winter flounder fishery declined. Through a thorough examination of the Council's minutes from past meetings, a chronological record will be compiled of its accomplishments and failures. This section will focus upon the origins of specific recommendations, how these ideas were introduced to this regulatory body, and how they progressed through the decision-making process before being rejected or accepted. Special attention will be directed towards illustrating how infighting and differences of opinions have impeded the Council from adopting proactive conservation measures. Additionally, the role of the RIDFW in the management process will also be covered. Specific attention will focus on its assessments and advice regarding the winter flounder fishery. By studying the minutes of past meetings and through questioning present and former Council members, a determination will be made of how a system of realistic and verifiable goals and objectives could have facilitated the decision-making process and enhanced the stewardship of the state's winter flounder stocks.

The last chapter of this study will provide an example of an existent management program that can serve as a model to implement goals and objectives into Rhode Island's management system. Under the Atlantic States Marine Fisheries Commission's Interstate Striped Bass Management Plan, a specific goal to rebuild the striped bass population has been carefully outlined through a series of detailed objectives. Through a system known as adaptive management, allowable fishing mortality is adjusted based upon the juvenile abundance index as gathered through Maryland's young-of-the-year beach seine survey. The results of this survey are used to forecast stock abundance and thereby provide an early warning of any upcoming potential problems. Through a trigger mechanism based upon a three year running average of the index, the fishery was rebuilt in a gradual and risk-averse manner. A similar system may provide a practical way to better utilize data from the trawl surveys in Narragansett Bay and thereby develop a proactive strategy to manage the winter flounder fishery.

Based upon the striped bass example, a series of multiple regression analyses will be conducted to determine which data base offers the most significant means to account for the variation in the total catch of winter flounder from the waters off Rhode Island. These analyses will be modeled after Philip Goodyear's study comparing the Maryland young-of-the-year striped bass index to commercial landings along the eastern seaboard.[30] Additional comparisons will be conducted if appropriate. While this study will not derive a specific index value, it will review the necessary procedure required to develop an index as well as assess the potential for such a system considering present knowledge of stock conditions.

[30]Philip C. Goodyear, "Relationship between Reported Commercial Landings Abundance of Young Striped Bass in Chesapeake Bay, Maryland," Transactions of the American Fisheries Society, 114 (1985): 92-96.

CHAPTER II
THE RHODE ISLAND MARINE FISHERIES COUNCIL

Traditionally, most marine fisheries have been considered unrestricted common property resources. As such, they have been harvested on a first-come-first-served basis. While there have always been natural cycles of abundance, where some species flourish while others decline, generally speaking, prior to the advent of modern fishing technology, most stocks were able to sustain themselves by naturally replacing any losses due to fishing mortality. However, in an ever-spiraling race to obtain even greater economic benefits, fishermen have invested — and continue to do so — in a vast array of sophisticated technology to maximize their total catch. The result of this scenario is a *tragedy of the commons* situation, as described by Garret Hardin, whereby stocks are unsustainably exploited, thus jeopardizing their future viability.[31] In an attempt to change this course of events, governments have intervened with the intention to conserve and manage their fishery resources.

In the jurisdictional waters of the United States, marine fisheries management is both a federal and state responsibility.[32] Under the Magnuson Fishery Conservation and Management Act, federal jurisdiction, in what is commonly referred to as the Fishery Conservation Zone, extends from the seaward boundary of the coastal states' territorial sea to approximately 200 miles from shore. Marine resources in this zone are administered under the authority of the Secretary of Commerce through eight regional councils comprised of local officials and private citizens familiar with fisheries issues.[33] Landward of the Fishery Conservation Zone, fisheries management is a state

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[31]Garrett Hardin, "The Tragedy of the Commons," Science 162 (1968): 1243-1248.

[32]It should also be noted that there are several quasi-private organizations - the Atlantic, Gulf, and Pacific States Marine Fisheries Commissions - that until 1994 had nonbinding power, unless otherwise specified by Congress, to help coordinate interstate and federal-state management efforts. This has since changed with the passage of the Atlantic Coastal fisheries Cooperative Management Act, under which their management plans are now binding.

[33]16 United States Code §§1801-1882, 1976 Public Law Number 94-265. (Hereinafter referred to as MFCMA)

prerogative.[34] Unlike in federal waters, where regulations are issued under one uniform system, the process by which this resource is administered often varies considerably from state to state. While a few states have retained this power with their legislative branch, most others have delegated part or all of this responsibility to a natural resource agency or citizen-based council.

MEMBERSHIP

In the state of Rhode Island, coastal inshore fisheries are regulated by the RIMFC. This jurisdiction extends over its entire range of inshore and territorial marine waters up to three miles offshore, and over a fishing industry that landed 139.8 million pounds. of fish with an ex-vessel value of $85.1 million in 1991.[35] The Council is composed of the Director of the Department of Environmental Management (DEM) (or a designee) and eight private citizens "with skill, knowledge, and experience in the commercial fishing industry, the sport fishing industry, and in the conservation and management of fisheries resources."[36] Pursuant to the General Laws of Rhode Island, three members each are from the commercial and recreational fishing industries and two are from the scientific community.[37] Present and previous participants have include: commercial and recreational fishermen, academicians with backgrounds in maritime law and marine biology, a scientist from the NMFS, a former member of the New England Regional Council, and a Director of the Rhode Island Seafood Council. Members are appointed by the Governor, with the consent of the Senate, for terms of fours years which may be

[34]Commerce Clause, United States Constitution Article 1 § 8, clause 3 leaves state police power in this area, absent of any conflict with overriding federal law; Submerged Lands Act of 1953 (43 United States Code §§ 1301-1315 (1976)) granted states ownership of three-mile marginal belt off their shores, subject to pre-emptive power to protect navigation, commerce, national defense, and international affairs.

[35]Supra note 11 at 4.

[36]General Laws Of Rhode Island §20-3-1. Originally, the Council consisted of only six members in addition to the Director. In 1985, under P.L. 1985 ch. 190, two additional positions were added.

[37]Ibid.

successive. Although they are not paid a salary, compensation is provided for travel and other incidental expenses.[38]

JURISDICTION

The Council has "regulating jurisdiction over all marine animal species within the jurisdictional territory of the State."[39] This authority includes establishing rules governing:

1. The manner of taking fish, lobster, and shellfish.

2. The legal size limits of fish, lobster, and shellfish to be taken or possessed.

3. The season and hours during which fish, lobsters, and shellfish may be taken or possessed.

4. The numbers of quantities of fish, lobster, and shellfish which may be taken or possessed.

5. The opening and closing of areas within the coastal waters to the taking of any and all types of fish, lobster and shellfish.[40]

Additionally, in conjunction with the DEM, the Council may also designate special shellfish and marine life management areas for several purposes including "enhancing the cultivation and growth of marine species, managing the harvest of marine species, (and)

[38]Ibid.
[39]Ibid. at §20-3-2.
[40]Ibid. (copied verbatim)

facilitating the planting, cultivating, propagating, managing, and developing any and all kinds of marine life..."[41]

The Council's authority is limited in some circumstances. The legislature still reserves the right to pass any and all laws concerning the state's jurisdictional marine fisheries. However, possibly in an attempt to avoid the controversy and criticism inherent in this field, it has generally been reluctant to exercise this authority, except in issuing licenses.[42] Furthermore, the Council is empowered only to regulate fishing effort; additional factors which can effect a fishery, such as habitat degradation and water pollution, are under the jurisdiction of other state agencies and are therefore beyond the scope of its rule-making capacity. Finally, on a more limited basis, the Director of DEM may take emergency actions to open or close areas to the harvesting of fish and shellfish where a delay would endanger the public health. However, such decisions are still subject to subsequent confirmation by the Council.[43]

The Council is relatively free to decide on fisheries issues as it sees appropriate. Unlike on the federal level, where all management plans must be, among other things, consistent with the seven national standards stipulated in the MFCMA, Council members may pass regulations untethered by binding performance goals and without the subsequent approval of a supervisory agency. The closest thing to an operating directive can be found in the 1981 act that recodified the state's environmental statutes under one law. In *An Act Recodifying Title 20 of the General Laws of Rhode Island*, it is the legislative finding that,

> ... the animal life inhabiting the lands of the state, its lakes, ponds, streams and rivers, and the marine waters within its territorial jurisdiction, are a

[41]Ibid. at §20-3-4.

[42]This was most recently apparent when, in 1992 it deferred voting on a highly contentious bill that would have prohibited the harvest of shellfish by scuba divers, until the Council was given an opportunity to render an opinion on the issue. Upon the Council's recommendation, the ban was never implemented.

[43]Supra note 36 at §20-3-5.7.

> precious, renewable, natural resource of the state which, through the application of enlightened techniques, can be developed, preserved and maintained for the beauty that wild animals bring to our environment.
>
> The General Assembly further finds that the management of fish and wildlife through the establishment of hunting and fishing seasons, the setting of size, catch, possession and bag limits, the regulation of the manner of hunting and fishing, and the establishment of conservation policies should be pursued utilizing modern scientific techniques, having regard for the fluctuations of species populations, the effect of management practices on fish and wildlife, and the conservation and perpetuation of all species of fish and wildlife.[44]

Unfortunately, it is only in these two paragraphs where the legislature attempts to define the overall stewardship goal(s) for the state's fish and wildlife resources. Yet this section falls far short of providing a clear directive. For example, is it realistic to both "develop" and "preserve" a natural resource? In a case where there is a clash between conservation and utilization, which takes priority? This statement is worded in such a way that while it offends no one, it is of little functional value. Yet, it is also states that fish and wildlife resources should be managed having regard for, among other things, the "conservation and perpetuation of all species..." Such a statement would seem to indicate that sustainability is an intended aim, yet whether or not that this is the most important goal remains unclear. As will be demonstrated later in this chapter, it is this failure to be more explicit that has resulted in a fishery management system where matters of conservation are generally overlooked in the free-for-all fight over allocation rights.

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[44]P.L. 1981 ch. 197.

OPERATING PROCEDURE

The Council's origins date back to a period when the future of New England's fishing industry seemed especially promising. Prior to the MFCMA, the United States claimed jurisdictional control over the fisheries only within three miles of its shores. During this period, foreign fishing vessels severely depleted many commercially important stocks off of New England. (It was even permissible for these vessels to fish a strip of international water situated between Block Island and the mainland!) The United States fishing industry, which relied mostly on small inshore trawlers, was unable to compete against these highly efficient fleets. International agreements to limit fishing effort and conserve the stocks were mostly unsuccessful. With the passage of a 200 mile limit under the MFCMA in 1976, many fishermen and entrepreneurs mistakenly believed that the stocks would never again be so depressed and that a great era of economic opportunity would be forthcoming. In 1975, in anticipation of this legislation, then Governor William Noel established a special fisheries advisory task force to review how the state could more fully capitalize on a revitalize fishing industry.

The task force, which was comprised of officials (both state and federal) from natural resource agencies, fishing industry spokesmen, and academicians, recommended, among other things, to revamp the state's management system.[45] Prior to the establishment of the Council, the power to regulate marine fisheries was vested entirely with the then-Director of the Department of Natural Resources (the predecessor of the Department of Environmental Management). The task force noted that such a system placed too much power in the hands of one individual; policy decisions could easily fall

[45] "Task force named to advise fishing industry," Providence Journal Bulletin, 10 October 1975: A21. & Steve Olsen, former task force member (and present Director of the Coastal Resource Center in South Kingston, Rhode Island), Personal Contact.

victim to political pressure and personal favoritism for specific individuals or groups.[46] As a solution, it recommended a council system whereby representatives from the scientific community and the recreational and commercial fishing industries could pool their skills and experiences to more efficiently manage the state's fisheries.[47] The eventual culmination of the task force's recommendations was the *Registration and Reports of Commercial Fisheries* Act, which formally established the Council in 1976.[48]

Despite its shortcomings, the council system has fostered a more reviewable and participatory management process. The Council operates in an open forum where its decisions are subject to public review. All meetings are open to the general public and convene, by tradition, on a regular schedule (usually once a month). An agenda is generally prepared beforehand, yet this does not preclude members from introducing new issues at the beginning of its meetings. Proposals are generally raised by public petitions, member initiatives, or RIDFW staff recommendations. Anyone in attendance may comment on a topic after the members have completed their remarks. The Council operates according to the guidelines specified in *Robert's Rules of Order*. All motions, which must be seconded before being voted upon, are carried by a simple majority. The chairman may only vote in instances to "make or break a tie."[49]

To assist the Council in its decision-making process, technical support is provided by several state agencies. As specified in its enabling legislation, the Chairman of the Coastal Resources Management Council, the Chief of the Division of Enforcement within the DEM, and the Chief of the RIDFW serve in an advisory capacity to the Council.[50]

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[46]"Study asks separate agency for regulation of commercial fishing." Providence Journal 12 December 1975:B1. It should be noted that the task force was not critical of the then present Director, Dennis J. Murphy; it commended his performance. However, the task force warned that such a situation might not persist under a different administrator.

[47]Ibid.

[48]Rhode Island Law 1976 - Chapter 267.

[49]see Henry M. Roberts, Robert's Rules of Order, (New York:Berkley Books, 1989)

[50]Supra note 36 at §20-3-1; in practice, the Chairman of the Coastal Resources Management Council does not regularly attend Council meetings.

Additional support, regarding such matters as operating procedures and potential conflicts of interest, is occasionally provided by the DEM legal counsel. In practice, the Council most commonly interacts with the RIDFW. The RIDFW, which is a division of the DEM, operates with a staff of 57 full-time employees and a budget of approximately 8.2 million dollars.[51] Its biologists study terrestrial and aquatic species indigenous to Rhode Island. It provides a wide assortment of assistance ranging from addressing specific technical questions to conducting research-intensive biological assessments. All data and advice rendered to the Council is nonbinding and therefore, its members are free to accept or ignore it as they feel appropriate.

Further assistance is provided by the finfish and shellfish subcommittees. These groups are chaired by RIDFW biologists and their membership is open to the general public. They serve as an initial forum where participants from the recreational and commercial fishing industries can gather to discuss and formulate nonbinding proposals for the Council to consider. For the most part, these subcommittees are comprised of inshore commercial fishermen, and to a much lesser extent, recreational anglers (on the finfish committee), who regularly attend Council meetings. Since they tend to be dominated by commercial fishermen, it is not surprising that their advice is usually biased towards this user group.

OPERATING GUIDELINES

During the past two decades, legislatures have delegated substantial rule-making responsibility to many non-elected officials, who as a result, have the authority to promulgate regulations that can have profound social and economic consequences. To help ensure that these rules are adopted in an orderly process and remain consistent with

[51] George Welly, Budget Administrator, Rhode Island Department of Environmental Management, Personal Contact 19 July 1994. (Note: Budget includes money allocated for capital projects)

the public trust, there are generally specific operational guidelines that must be adhered to. In Rhode Island, the Council is bound by the guidelines stipulated in the Administrative Procedures and the Conflict of Interest Acts.

In an attempt to ensure against capricious and secretive rule-making, regulatory agencies in Rhode Island must abide by the Administrative Procedures Act.[52] Under this law, all state entities, such as the Council, are compelled to:

1. Provide at least twenty days prior notice of an impending meeting (either by newspaper announcement or through mailings), which shall state "either the terms or substance of the intended action or a description of the subjects and issues involved, and of the time when, the place where, and the manner in which interested persons may present their views thereon."

2. Afford all interested persons reasonable opportunity to submit data, views, or arguments, orally or in writing.

3. Demonstrate the need for the adoption, amendment, or repeal of any rule in the record of the rulemaking procedure.

4. Determine the economic impacts of an action upon small businesses.[53]

These guidelines are intended to ensure that concerned citizens have prior notification of impending regulatory actions, and that there is an opportunity for public input. Noncompliance with these procedures can potentially invalidate a regulation.

Members of rule-making boards and commissions, such as the Council, whose membership qualifications specify individuals with skills and experience in the industry being regulated, may occasional find themselves in a position to benefit from a decision

[52]Supra note 36 at §42-35 et. seq.
[53]Ibid. at §42-35-3.

made in an official capacity. In an attempt to protect the public trust, Rhode Island, like most other states and the federal government, has passed laws concerning this type of situation.[54] The responsibility for adopting guidelines and rulings on this issue has been delegated to an ethics commission of 15 members appointed by the governor.[55] Council members, like all other state officials, must abide by the its decisions. This creates somewhat of a dilemma for those members who, as part of the criteria for their selection, work or own a business in the fishing industry. Since they are responsible for regulating the same field from which they earn an income, they may occasionally benefit, either directly or indirectly, from a Council's decision. Therefore, to avoid being found in a conflict of interest, it is prudent that Council members seek the approval of the Commission prior to participating in the management of a fishery that is a source of revenue.[56]

The criteria for determining conflict of interests is multifaceted. State officials (or those acting in a governmental capacity such as Council members) must exclude themselves from promulgating laws or regulations that may cause a "substantial conflict" with their personal interests.[57] The Commission has found a "substantial conflict" to exist in those cases in which a financial gain or loss exceeds $5000 or 5% or gross income.[58] A "substantial conflict" is further defined to be applicable only when a new rule has the potential of yielding greater benefits to a regulator or lawmaker than to "any other member of... [their] business, profession, occupation or group."[59] Therefore, a Council member could participate in the management of a fishery where the maximum

[54]Supra note 36 at §36-14 et. seq. For a detailed analysis of how the Conflict of Interest law pertains to the Council (especially concerning the Council's attempt to manage the striped bass fishery during the 1980s) see Jill Bubier and Alison Riesor, "Conflict of Interest and Fishery Management Councils" and Charles C. McKinley, "Marine Fisheries Commissions Adrift in the Murky Waters of Conflict of Interest Law."

[55]Ibid. at §36-14-8 (Hereinafter referred to as the Commission).

[56]Ibid. at §36-14-19.

[57]Ibid. at §36-14-5.

[58]Gary Powers, Legal Counsel, Rhode Island Department of Environmental Management as stated in RIMFC Minutes 11 Feb. 1992.

[59]Supra note 36 at §36-14-7.

income limitation will be exceeded, so long as he does not prosper to a greater degree than others in his particular profession. However, since the law does not offer any explicit suggestions for identifying one's "business, profession, occupation, or group" the Commission must make this determination on a case-by-case basis.

One highly publicized incident involving the Council on this matter occurred over the struggle to help conserve striped bass stocks during the early 1980s. Because of the importance of the striped bass fishery to both recreational and commercial fishermen, this issue became highly contentious and not surprisingly polarized both groups against each other. After many strife-ridden meetings, the Council eventually adopted a complete fishing moratorium. Recreational anglers cried foul over the participation of two commercial representatives who were also owners of businesses that derived a substantial portion of income from this fishery.[60] The Commission, which had previously cautioned the two members against participating in the management of this fishery, defined their business as the *commercial fishing industry* and noted that as *commercial fishermen* they would realize greater benefits from a ruling concerning striped bass than other members of their profession. Had the Commission issued a narrower interpretation, and classified their occupation as *striped bass fishermen,* then it may have been permissible for them to have participated in the management of this fishery, for as *striped bass fishermen* it is unlikely that they would have received benefits in excess of other members of the *striped bass fishing industry*.[61]

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[60]This regulation was perceived by recreational fishermen as a spiteful action. This Council was originally considering a 24 inch minimum size limit. This restriction would have severely impacted the economic livelihoods of the two commercial representatives - one owned a fish trap company which mostly captures small school bass less than 24 inches and the other was a wholesale fish dealer who derived a substantial portion of his income from this fishery. According to the recreational argument, the moratorium was a vindictive regulation intending to inflict upon recreational anglers similar hardships that would have been imposed upon commercial fishermen had the 24 inch size limit succeeded. (as noted in Charles C. McKinley, "Marine Fisheries Commissions Adrift in the Murky Waters of Conflict of Interest Law.")

[61]Jill Bubier and Alison Riesor, "Conflict of Interest and Fishery Management Councils," Territorial Sea (University of Southern Maine) 4, no. 2 (1984):2.

UNIQUENESS OF POWER

The RIMFC is somewhat unique in comparison to other citizen-based fishery commissions.[62] Administering a state's marine fisheries through an advisory or rule-making commission is fairly common throughout the United States. Of the twenty-three maritime states, sixteen utilize a commission in one form or another.[63] However, most states have been reluctant to delegate full regulatory power to an independent board dominated by commercial and recreational fishermen. Instead, many commissions are staffed by private citizens who are not representatives of the fishing industry. In practice, because of their lack of expertise or knowledge of fishery issues, these groups usually work closely with a state fisheries agency and seldom act contrary to their recommendations. Other commissions that are dominated by fishermen, generally serve in an advisory capacity and must have a state agency approve their proposals. Consequently, in addition to Rhode Island, there are only two other states, Alaska and North Carolina, with fully independent rule-making commissions that are staffed by fishing industry representatives. Yet, as will be demonstrated, even these two states have safeguards built into their systems to facilitate the decision-making process and thereby avoid or overcome many of the problems that have afflicted the RIMFC.

For the purpose of this undertaking, management programs have been grouped into six broad categories of rule-making systems (see table 2.1). It is important to remember that in each case their respective legislatures still retain the authority to pass laws over their jurisdictional fisheries. Therefore, in those situations where rule-making

[62]The terms *commission* and *council* are used interchangeably from state to state without difference. For the sake of consistency, when referring in generalities, the term *commission* will be used.

[63]The vast majority of information concerning state management systems was gathered by personal communications with Richard Christian , Lawrence Simpson, and David Hanson respectively of the Atlantic, Gulf, and Pacific States Marine Fisheries Commissions. Additional information about certain specific state systems was obtain through personal contacts with agency representatives familiar with marine fisheries issues.

Marine Fishery Management Systems in the United States		
Legislative	**Resource Agency**	**Advisory Commission**
Connecticut	Alabama	Federal
New York	Delaware	Florida
South Carolina	Maryland	Hawaii
	Washington	Maine
		Massachusetts
Blocking Commission	**Independent Multipurpose Commission**	**Independent Fishery Commission**
New Jersey	California	Alaska
	Georgia	North Carolina
	Louisiana	Rhode Island
	Mississippi	Virginia
	New Hampshire	
	Oregon	
	Texas	

Table 2.1

power is delegated to a commission or agency, there exists an alternate statutory route for developing such ordinances. Unfortunately, not every program fits snugly into one particular category. In some states, a commission or agency has jurisdiction only over a limited number of species. Therefore, in these instances there may be several proscribed routes by which to develop fishery rules.[64] Additionally, California's management system is a hybrid of two categories: recreational regulations are established by its Fish and Game Commission, whereas its commercial industry is administered through statutory law.[65] Therefore, it could technically be placed into both the ***Multijurisdictional Natural Resource Commission*** and ***Legislative*** categories, however for the sake of simplicity it is listed under the former. Additional exceptions will be identified as they occur.

Some legislatures have been reluctant to delegate regulatory authority over their jurisdictional marine fisheries. Such is the case in Connecticut, New York, and South Carolina, where this power has been retained, in its entirety, by their respective law-making bodies. Under this system (designated as ***Legislative*** in table 2.1) fishery rules can only be introduced as bills and must therefore undergo the same process as all other proposed legislation before being adopted. Proposals are primarily generated through formal requests sponsored by concerned groups or through recommendations made by a state resource agency experienced with fisheries issues. Public input is gathered through petitioning local representatives and/or public hearings. Most often, a resource agency is responsible for researching and critiquing potential rules. Although such an agency does not have formal rule-making authority, its decisions often play a pivotal role in the acceptance or rejection of a proposal. For example, in New York, a state where fisheries issues are of relatively minor importance on its legislative agenda, the governor relies

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[64] In Maryland this list is quite comprehensive and covers most important commercial or recreational species. Therefore, for the purpose of this study, Maryland is listed as having a resource agency management system. However, New York, whose Department of Environmental Conservation has rule-making authority only over a few species, is categorized as a legislative system.

[65] David Hanson, Pacific States Marine Fisheries Commission, Personal Contact, 28 June 1993.

heavily upon the counsel of the Department of Environmental Conservation, the agency whose responsibilities include keeping tabs over the state's marine fisheries, prior to deciding upon most fishery-related bills. In effect, the Department's endorsement serves as a *Good Housekeeping* seal of approval.

Legislative management systems, due to their cumbersome decision-making process, are not widely practiced. Law-makers are usually confronted with a multitude of problems that need to be addressed. In those states where fisheries are administered through their general assembly, this extra responsibility only adds to their work load. Additionally, representatives from noncoastal districts may only be vaguely familiar with marine fisheries, and have little if any interest in managing this resource. Consequently, some states, such as Alabama, Delaware, Maryland, and Washington have transferred this authority to a natural resource agency experienced with marine fisheries. Under this type of management system (designated as *Resource Agency* in table 2.1), a director of a specified agency holds final decision-making power. In an attempt to guard against secretive and capricious rule making, administrative guidelines generally stipulate mandatory public notification of impending regulations and a procedure to allow public input into the decision-making process. Ad hoc or standing committees may also assist in the decision-making process by contributing nonbinding advice. For example, the Secretary of the Maryland Department of Natural Resources (through the Tidewater Administration), who has regulatory jurisdiction over, among other things, the state's marine fisheries, may seek advice on proposed fishery regulations from its sport fishery and tidal fishery commissions.[66]

In an attempt to establish a more participatory system while still retaining some degree of control, a number of legislatures have created a two-tiered decision-making process involving both a natural resource agency and a citizen-based commission. Under

[66]Steven Early, Maryland Tidewater Administration, Personal Contact, 24 June 1993.

this scheme (designated as *Advisory Commission* in table 2.1), management plans, which are developed through a commission, require the subsequent approval of a designated official before being adopted. The most widely recognized example of this type of system is the federal management program, authorized under the MFCMA, whereby fishery management plans developed by the eight regional councils are subject to review by the Secretary of Commerce (or a designee). The councils are comprised of federal and state officials, and private citizens experienced with fishery matters.[67] Theoretically, to be approved, a plan must be consistent with, among other things, the seven national standards specified in the MFCMA.[68] This arrangement allows for direct involvement of the fishing industry in the management process through the councils, while still retaining final decision-making authority with a federal official. Therefore, a government representative is ultimately accountable for approving or rejecting a proposed management plan.

Similar programs, with some administrative differences, have been adopted in Florida, Hawaii, Maine, and Massachusetts. In Maine, lobster, because of its commercial importance, is administered through a separate council solely devoted this species; all other fisheries are the jurisdiction of the Marine Resources Advisory Council.[69] Unlike the regional councils, whose membership is comprised mostly of industry representatives, in Florida's Marine Fisheries Commission, participants come from various backgrounds, some of which have little, if any connection to this resource. For instance, the 1993 commission consisted of, in addition to the chairman and vice-chairmen (who are not fishermen), a marine biologist, a coastal and inland resorts consultant, a retired United States marshall, an architect, the president of a county farm bureau, a former university president/fisheries professor, and an attorney.[70] Hawaii requires its Division of Aquatic

[67]Supra note 33 at §1852(a) & (b).
[68]Ibid. at §1853(a)(1)(A).
[69]Richard Laltay, Maine Department of Marine Resources, Personal Contact, 24 June 1993.
[70]Sandra Rohrer, Florida Marine Fisheries Commission, Personal Contact, 24 June 1993.

Resources to have initial discretionary power before subsequently forwarding any accepted proposal to the Board of Land and Natural Resources. Any plan approved by the Commission must then be signed by the governor before becoming official.[71] Therefore, in essence, it has a three-tiered decision-making process. In Massachusetts,most proposed fishery regulations are first reviewed by the Division of Marine Fisheries prior to being forwarded to its fishery council.[72]

One substantial variation of the two-tiered management process is found in New Jersey, where its fisheries council not only serves in an advisory capacity, but it also has the power to block proposed regulations. Under this system (designated as ***Blocking Commission*** in table 2.1), fishery rules are introduced and promulgated through the state Commissioner of Environmental Protection. In practice, most regulations originate from the Fish, Game, and Wildlife Division, a branch of the state Environmental Protection Agency. The New Jersey Marine Fisheries Council, an 11 member board comprised of representatives from the recreational and commercial industries as well as two from the general public, has both an advisory and discretionary function in the management process: it serves as a vehicle for gathering public input through its meetings and it has the authority to nullify any rule introduced by the Commissioner. Therefore, to avoid the embarrassments of a last moment veto, the Fish, Game, and Wildlife Division has made it a practice to seek the Council's approval prior to recommending a new rule to the Commissioner. As a result, since 1969 there has been only one incident where the Council has exercised its veto power.[73]

All of the programs mentioned so far include some form of direct state or federal involvement in the rule-making process. While such a situation enables their respective governments a large degree of control over the outcome, it also leaves them vulnerable to

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[71]Randy Honebrink, Hawaii Division of Aquatic Resources, Personal Contact, 7 July 1993.
[72] Dan McKieran, Massachusetts Division of Marine Fisheries, Personal Contact, 3 Mar. 1992.
[73]Thomas McCoy, New Jersey Division of Fish, Game, and Wildlife, Personal Contact, 7 July 1993.

the controversy and criticism inherent in fisheries management. Therefore, some have tacitly side-stepped the problem by delegating this responsibility, in its entirety, to a citizen-based commission. These bodies tend to be of two general types: some, like the RIMFC, are marine fisheries specific, whereas others are multijurisdictional and must therefore steward a broad spectrum of natural resources. Under each type of system, industry representatives and resource agencies play varying roles in the decision-making process.

Under a multijurisdictional system (designated as *Independent Multipurpose Commission* in table 2.1), the likes of which is practiced in California, Georgia, Louisiana, Mississippi, New Hampshire, Oregon, and Texas, marine fisheries are administered under one rule-making body that also has authority over other natural resources. These commissions must deal with a multitude of resource issues, consequently fisheries matters are only occasionally the focus of their attention. For example, in Texas, marine fisheries are managed through the Parks and Wildlife Commission, which also has jurisdictional control over state parklands, terrestrial wildlife and freshwater fisheries.[74] Since multijurisdictional commissions do not specialize in one particular field and must therefore interact with a wide range of constituencies, members usually come from a diversity of backgrounds. As a result, it is often extremely difficult, if not impossible, to ensure that all user groups are directly represented by a specific member. Therefore, spokesmen from the commercial and recreational fishing industries may not always be present on these bodies. Furthermore, the likelihood that they will constitute a majority, and thereby play a consequential role in the rule-making process, is extremely remote.

In general, fisheries representatives are at most, a small and uninfluential component of these multijurisdictional commissions. Without the dominance of

[74]Paul Hamerschmidt, Texas Division of Coastal Fisheries, Personal Contact, 22 June 1993.

commercial and recreational user groups — each with its own parochial convictions concerning the manner in which the resource should be administered — state resource agencies play a more influential role in the decision-making process. Most members who serve on these commissions lack the experience and academic training to feel comfortable making unassisted decisions on fisheries issues. As a result, they almost always abide by the recommendations made by an agency skilled in this field. For example, referring back to the Texas program, the Parks and Wildlife Commission, as an unwritten rule, will seek advice from the Coastal Fisheries Branch of the Fisheries and Wildlife Division whenever deciding upon marine fisheries regulations, and nearly always acts upon its recommendations.[75] Therefore, in a situation that is somewhat similar to the legislatively-exclusive management programs, state resource agencies often play a critical role in the regulatory process.

In addition to Rhode Island there are three other states, Alaska, North Carolina, and Virginia with independent fishery commissions whose sole concern is to regulate their respective marine fisheries. Each of these states has a commission that can promulgate regulations without subsequent approval from a supervisory agency. However, there are some important differences between each commission. Jurisdiction over marine fisheries in Virginia is the responsibility of the Marine Resources Commission. This Commission is composed of a broad base of members of which only one is required to make a living from fishing or a fisheries-related industry. Participants on the 1993 Commission include two lawyers, a physics professor, an administrator for a marine transportation company, and a retired marine resource enforcement officer. In a situation that is similar to the *Legislative Management* and *Independent Multipurpose Commissions*, their lack of expertise or experience with fisheries issues has fostered a close working relationship the state Fisheries Management Division, which is staffed by

[75]Ibid.

biologists trained in fisheries science. Consequently there is generally a harmonious working relationship between these two groups and most issues are decided *unanimously,* in accordance with the advice of the Fisheries Management Division.[76]

In North Carolina, marine fisheries are the jurisdictional responsibility of its Marine Fisheries Commission. This Commission is required to have four representatives each from the commercial and recreational sectors, two fish processors, two scientists, and two at large members. This group would seem susceptible to the same clash in values that has plagued the RIMFC. However, in an step to mitigate this problem, the state Director of Marine Fisheries has been granted proclamation power to promulgate most fishery regulations. In practice, this power has been reserved for those occasions when the Commission has reached an impasse. As a check on this power, the Commission, if it so decides, can subsequently override the Director's decision with a new regulation at its next meeting.[77]

In Alaska, both fresh- and salt-water fisheries are administered by the Alaska Board of Fisheries. This Board is comprised of seven members appointed by the Governor, of which three represent commercial fisheries, three represent recreational fisheries, and one represents subsistence fishermen. It has full power to promulgate regulations without subsequent approval from a supervisory agency. Technical information and stock assessment are provided by the Alaska Department of Fish and Game. In general, there is an excellent working relationship between these two groups. Unlike in Rhode Island, where its Council members are free to make decisions unrestrained by performance goals and objectives, the Alaska Board of Fisheries is

[76]Eric Barth, Virginia Institute of Marine Sciences, Personal Contact, 7 July 1993.

[77]Dennis Spitsburgen, North Carolina Division of Marine Fisheries, Personal Contact, 14 September 1993.

obligated by statute to first works towards the conservation of wild fish stocks prior to deciding upon issues of allocation.[78]

In comparison to most other states, the RIMFC operates in one of the least restrictive environments. It has full power to pass regulations without subsequent approval from a state agency and it is not accountable to meet any predetermined performance goals and objectives. Its members are free to make decisions based solely on their own interpretation of the issue at hand. Therefore, the RIMFC may act independently of the recommendations by the RIDFW. Furthermore, its dominance by commercial and recreational fishermen, each with their own experience and knowledge of fishery issues, has served to foster this sense of independence. In essence then, Rhode Island's management system operates without the safeguards that have been built into or have developed in the management programs of most other states.

CONCLUSIONS

The Rhode Island Marine Fisheries Council was originally established in an attempt to improve the overall stewardship of the state's marine fisheries. Whereas management decisions were formerly vested solely with one individual, the Director of the Department of Natural Resources, the present system is designed to be more inclusive of the major constituencies in the fishing industry in an attempt to better ensure that their interests are represented when promulgating new regulations. As previously discussed, the Council has brought together nine individuals, each experienced with commercial or recreational fisheries, or with a background in marine biology. It is intended to serve as a forum where these representatives, and members of the general public, can work together to develop mutually-agreeable management strategies. However it may have been too

[78] Herman Savikko, Fisheries Information Officer, Alaska Department of Fish and Game, Personal Contact, 18 July 1994.

optimistic to conclude that this arrangement could "conserve and perpetuate" the state's marine fishery resources. For without a more definitive directive making this condition a priority goal, its members are relatively free to champion the parochial interests of their own user groups rather than support what is in the best interest of sustainable production.

One of the side effects of permitting different user groups to become involved in the decisions-making process, is that it brings together a myriad of opinions regarding the overall purpose of fisheries management. Each participant interprets events and makes decisions based on their own personal beliefs and experiences (sometimes more formally referred to as value systems) which may or may not always be technically correct or truly accurate. For example, a fisherman may genuinely believe that pollution is responsible for his poor catch despite conclusive data indicating that overfishing is the real problem. Consequently, it is unlikely that he would be supportive of a stock rebuilding program that heavily depends upon reducing fishing mortality, despite the potential benefits. Or, as another example, consider the fisherman who has mortgaged his home to pay for his vessel; as will be explained later in the chapter, he may rationalize not curtailing overfishing to protect his investment. With this in mind, it is not surprising that the Council, which brings together nine individuals of different backgrounds and values, should have such a difficult time reaching a consensus when deciding how to manage the state's marine fisheries. As previously discussed, its members are relatively free to work towards dissimilar if not diametrically opposite goals. Consequently, its meetings can and often do become free-for-alls, where timely and responsive decisions are delayed indefinitely, resulting in management that is more reactive than proactive.

As noted earlier in this chapter, the scope of the Council's power, and the manner in which it operates, have been carefully proscribed by the state legislature. Its authority to regulate the harvest of finfish and shellfish from state waters is clearly delineated in its enabling legislation. Its decision-making process, which must conform to the guidelines of the Administrative Procedures Act, is reviewable by the general public and allows for public input. Additionally, to help protect the public trust, as specified under the Conflict of Interest Act, under certain situations its members are prohibited from participating in the management of those fisheries in which they have a vested financial interest. It is ironic that such tremendous attention has been given to the framework of its decision-making process while there is only an indirect and somewhat ambiguous mention made of its fundamental purpose. Only in the 1981 recodification of the state's fish and game laws can there be found a brief general statement concerning the management of all wildlife throughout the state, including marine fisheries.[79] Although there are some broad statements about "preserving and maintaining" and "conserving and perpetuating" the state's fish and wildlife resources, this advice falls far short of providing a clear directive for the Council to operate by. Consequently, without this guidance, there is no mechanism by which to focus the Council's decision-making process or effectively resolve internal differences when they occur.

If it is the intended goal of the Council to "conserve and perpetuate" the state's marine fishery resources, it is imperative that this be more definitively and unambiguously stated. Before proceeding any further with this argument, it is important to understand how *goals* and *objectives* are an integral part of any management program. Although the terms are often used interchangeably, for this undertaking they have two distinct but dependent definitions. While definitions often vary somewhat from source to source, *goals* are generally recognized as "ideals, major accomplishments, ends, or states of affairs to be achieved."[80] Most often they are stated in broad terms that help provide direction for organizational activities as well as for the planning and development of strategy. For example, a goal under Amendment Five to the Northeast Multispecies Fishery Management Plan is to reduce fishing mortality on cod, haddock, and yellowtail flounder stocks. However, goals, of and by themselves, are of little functional value

[79]see pages 17 & 18.
[80]Supra note 4 at 365.

without being further clarified by more specific performance objectives. In reference to the previous example, to what extent should fishing mortality be reduced? What criteria will be used to determine if the reduction is effective in rebuilding these stocks? As with goals, there is no one definitive definition of *objectives*, yet they are generally defined as "measurable, verifiable statements of intermediate tasks that must be accomplished for goal attainment."[81] They are of invaluable assistance in refining broad ideas into more specific strategy. For example, in reference to the above-stated fisheries goal, a performance objective may be to increase the percent maximum spawning potential of cod and yellowtail flounder to 20% in five years and to 30% for haddock in ten years. While similar technical objectives are probably best left to be developed by the RIDFW, which has experience and expertise in stock modeling, the General Assembly should legislate that it is the intended goal for the state's jurisdictional fisheries to be administered in such a manner as to prevent overfishing and protect their long term, continuous sustainability.

Incorporating a specific set of realistic goals and developing objectives to meet these goals are central to the success of any management system. To better understand this, it is helpful to conceptualize what is meant by the term *management.* While there is no one definitive definition, generally speaking, *management* can be described as,

> the art and science of determining, coordinating, and utilizing human and material resources to reach the goals and objectives of an organization. It is a process that includes the elements of planning, giving direction, coordinating, organizing, and controlling the organization to reach its goals and objectives.[82]

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[81] Ibid.
[82] Ibid. at 367.

Goals and objectives provide a sense of purpose and direction for a management body. They help specify the state of being or outcome that an organization seeks to achieve. If they are constructed with foresight, they can better enable an organization to develop preemptive strategies to avert future crises, or at least rapidly respond and adjust to new and changing situations. Furthermore, a system of realistic goals supported by clearly-defined performance objectives can help to:

1. make conflicting activities more recognizable;
2. compare choices when there are conflicts;
3. rationally allocate human and physical resources;
4. promote accountability.[83]

Without a clear understanding of an organization's goals and objectives, each participant must therefore determine them individually. While this may be feasible where there are few people involved in the management process or when an organization has a well understood directive, it is not very practical in large organizations or those whose purpose may be somewhat ambiguous.

The omission of specifically defined stewardship goals for the state's marine fisheries incurs the Council to operate at a serious disadvantage in reconciling the disparate management philosophies that it brings together. The initial decision to create a regulatory body like the Council, where commercial and recreational fishermen as well as members from the scientific community can work together, is commendable in its intentions. Such an arrangement serves to better ensure that most interests are at least broadly represented when regulations are being promulgated. In an ideal world, its members would be willing to set aside their differences to work towards some mutually beneficial outcome for the greater good of everyone involved and for the resource.

[83]Ibid. at 368.

However, in reality, this is seldom the case. As noted in one analysis of multi-participatory fisheries management programs,

> the array of objectives proposed by policy makers, scientists, administers, etc., are frequently not reconcilable.... More often than not, they do not agree among themselves on appropriate goals, and if they do they seldom agree in a functional sense on how they can be obtained.[84]

Therefore, for reasons that will be discussed, it should not be surprising that the Council, like its counterparts on the federal level, often has a difficult time reaching a consensus when administering the fisheries within its jurisdiction.

Nowhere are these discrepancies more obvious than in the inherent disparity of management goals and objectives supported by those user groups that are economically dependent upon fishery resources, and those who are not.[85] Despite what they may publicly endorse, those with a vested economic interest in the fishing industry are generally not receptive towards forgoing their present catch for the possibility of greater returns in the future. (While in their defense, this may not hold true where alternative fisheries of similar value are available, in reality, this is seldom the case.) Conservation measures are seldom willingly embraced even in those situations where overfishing has seriously depleted a fishery. This is due in part to the innate inefficiencies of harvesting a common property resource in an open access industry. With such a resource, those willingly to make sacrifices may not necessarily reap any of the potential benefits. For example, the best intentions of an ethical fisherman who purposely avoids fishing in a known nursery area harboring many juvenile fish, may be subsequently thwarted by a less scrupulous captain who is willing to kill many undersized fish to cull out a few keepers. Additionally, even if these fish were allowed to mature unmolested, in an open access

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[84] D. L. Alverson and G.J.Paulik, "Objectives and Problems of Managing Aquatic Living Resources," Journal and Fisheries Research Board of Canada, 30, no. 12 (1973): 1941.

[85] Ibid.

fishery, others would be free to enter the fishery when catch levels improved, and thereby dissipate his benefits. As a result, it is not always monetarily profitable to be future minded in such an industry. Additionally, it should be remembered that forecasting stock size, despite all the recent advancements in modeling and data gathering, must still deal in probabilities and is not always perfectly accurate. It is this imprecision, or at least perception of imprecision, coupled with the above-mentioned conditions, that can often lead fishermen to prioritize their immediate economic demands ahead of the long-term health of the resource. On top of all of this, there are often social factors, such as maintaining certain lifestyles or protecting community structures, which may further dampen support for promoting sustainable yield.[86]

In reality, most fisheries are managed for the benefit of people, not fish. In a critique of modern fishery management regimes, it was noted that,

> a fundamental premise... is that all benefits derivable from fisheries management are accruable solely to man. Given this premise, a simple general theory of fisheries management can be developed in which most of the controversy surrounding fisheries management decisions revolves around which goals and objectives are selected and who selects them. In such a "general theory of fisheries management" biological factors are largely constraints and are only rarely major decision variables.[87]

These goals are almost always primarily concerned with allocation rights, not matters of conservation. Given the inherent inefficiencies of harvesting common property fisheries, coupled with the anthropocentricism referred to above, is it realistic to expect sustainable yield to be the end result if it is not specifically mandated? Therefore, it should be no

[86]Ray Hilborn and Carl J. Walters.,"Differing Goals of Salmon Management on the Skeena River," Journal of Fisheries Research Board of Canada, 34 (1977): 27.

[87]Robert T. Lackey, "Fisheries Management Theory," American Fisheries Society Special Publication, 11 (1978): 417.

great surprise that many members of the Council often support their own parochial interests at the expense of the long-term health of the resource.

It is the selection process, where goals and objectives are contested in the free-for-all atmosphere of public fishery meetings, that conservation principles generally fall by the wayside. In a criticism of salmon management in the Pacific Northwest, which could just as accurately be applied to many other fishery management regimes, including the RIMFC, it was noted that,

> seldom are the long-term values of the public at large sought or recognized explicitly at ad hoc so-called "public" fishery meetings during times of crisis; instead, actions center on appeasing the demands of vociferous, on-site user groups. If no meaningful survey of public values is available and sufficient or adequate policy statements have not been developed for salmon resources, managers may take the intellectual and political shortcut, spare themselves some verbal abuse from special interests, and assume more fish, however produced, in the short run is automatically better management—regardless of the long-term impacts on stocks or ecosystems... [88]

Most public fishery meetings are dominated by user groups who have a vested financial stake in the fishing industry. For reasons previously discussed, these groups do not necessarily act in the best long-term interest of the resource. Others, such as environmentalists or members from the scientific community, who may care most about conservation, are usually so outnumbered that at best, they are only a minor influence in the process. In specific reference to the Council, only three of its nine members are not from the commercial or recreational fishing industries (and as already discussed, one of these members, the chairman, can only vote in instances to make or break a tie). Furthermore, conservation groups, who are the most likely to speak out on behalf of the

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[88] Dennis L. Scarnecchia, "Salmon Management and the Search for Values," Canadian Journal of Fisheries and Aquatic Sciences, 45 (1988): 2044.

resource, seldom if ever are an influential force at Council meetings or public hearings. As a result, the management process usually degenerates into a struggle where each group is in competition for a larger stake of the resource. Unfortunately, this is a cycle that seems to feed upon itself; for as a fishery declines from being over harvested year after year, and managers struggle to find a remedy, each faction only intensifies its lobbying to ensure that its allocation does not diminish.

This is not to say that fishery management regimes never pass any substantive conservative fishing restrictions; it is just that such measures are too often adopted only after the above-mentioned scenario has been played out over a protracted period of time, during which the resource is allowed to precipitously decline. It seems that it is only at the point when public frustration manifests itself into outrage, that something beneficial occasionally gets done. However, by this late stage, implementing stock rebuilding programs while trying to minimize regulatory interference or interruptions in a fishery, is seldom realistically possible.

To help reconcile the vast differences of opinions assembled in most multiparticipatory fisheries management bodies, it is important to recognize the role that values play in the goal selection process. Before proceeding any further with this argument it is beneficial to define the term *values*. While definitions may vary from source to source, *values* are generally recognized as "personal standards as to what is good or bad, fair or unfair, and hence influence decisions."[89] Or, in other words, they are "conceptions of the desirable, influencing selective behavior."[90] For example, commercial fishermen are generally inclined to support those policies that maintain or increase their present catch rather than accept restrictions that offer the potential of greater returns in the future. In simpler terms, to borrow from a familiar children's fable,

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[89]Supra note 4 at 365.

[90]D.L. Sills, ed. International Encyclopedia of of the Social Sciences, New York:Macmillan, 1968: 283.

to a fisherman, a fish in the net is worth more than two in the sea. The importance of values in fisheries management is just starting to be recognized. As noted in one analysis,

> effective managers must be knowledgeable of fishery science and human values. The science in fishery management is the objective, logical, and systematic method of obtaining reliable knowledge about fishery resources. The art in fishery management involves our values, that is what we judge to be good, desirable, and important in the long run. A rational management plan is a selective embodiment of the values of the manager or of the organization or society that the manager represents.[91]

Goal selection is largely shaped by the intrinsic values of those involved in the decision-making process; they help determine what is and is not desirable in a fishery. As can be expected, those values deemed most worthy or desirable often vary from group to group and even between those within a group. In other words, individuals often disagree over what is good or bad for a fishery. Therefore, if an organization or society has not prioritized its values, and there is little or no agreement regarding those values it wishes to endorse, then the goal selection process will often degenerate into a free-for-all where the most vociferous group has a great advantage in getting what it wants. It should therefore be no surprise that in fisheries management, where goals are notoriously left either unstated or ambiguously worded, that small but well-organized user groups often have a disproportionate influence on the decision-making process.

In Rhode Island, the Council often finds itself embroiled in controversy for failing to take the necessary precautions to promote conservation. With no directive other than to pass fishing regulations, its members are free to pursue goals of their own choosing. Since this body is dominated by recreational and commercial fishermen, and since it is often under intense pressure to minimize regulatory interference by these same groups at

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[91] Supra note 88 at 2042.

public hearings, it should therefore come as no surprise that the immediate needs of these constituencies often take precedent over the long-term needs of the resource. Therefore, if the state's marine fish stocks are to be held in trust so that future generations may continue to enjoy the benefits derived from this resource, then the state's management system, as it presently exists, leaves a great deal to be desired.

CHAPTER III
WINTER FLOUNDER: SPECIES PROFILE

From its physical appearance it is difficult to initially discern what makes the winter flounder (*Pleuronectes americanus*), which is also commonly known as blackback, lemon sole, and Georges Bank flounder, so popular with commercial and recreational fishermen.[92] It has a laterally-compressed, ovate-shaped body over twice as long as it is wide (as measured to the base of the caudal fin) (see figure 3.1).[93] It is a demersal flatfish with a small mouth and thick lips. Like other members of the Family Pleuronectide, such as the witch (*Glyptocephalus cynoglossus*) and yellowtail flounders (*Limanda ferruginea*), both its eyes and viscera are located on its right side. To better enhance its survival from predators lurking above, its top–side pigmentation varies in hue (usually reddish brown, olive green, or dark slat) to blend in with its surroundings. Its bottom-facing side is usually white.[94] Its maximum recorded size is 8 pounds (64 cm total length).[95] In comparison to other highly sought-after groundfish of the Northwest Atlantic, such as cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*), which can both grow in excess of thirty pounds, the winter flounder is relatively small.

Except for a stock that permanently resides on Georges Bank, the winter flounder is most abundant in inshore waters from the Gulf of St. Lawrence to the Chesapeake Bay and occasionally is found as far north as Labrador and south to Georgia.[96] Unlike many other species which only temporarily migrate inshore as water temperatures moderate

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[92]Note that winter flounder is often listed separately from lemon sole in the NMFS catch statistics. Commercially, winter flounder weighing more than 3 lbs are categorized as lemon sole.

[93]K.A. Foster, Status of winter flounder (Pseudopleuronectes americanus) stocks in the Gulf of Maine, Southern New England, and Middle Atlantic areas, National Marine Fisheries Service, Northeast Fisheries Center, Woods Hole. Laboratory Reference Document No. 87-06: 5.

[94]Henry B. Bigelow and William C. Schroeder, Fishes of the Gulf of Main, Fishery Bulletin 74 of the Fish and Wildlife Service, vol. 53, Washington: GPO, 1953: 276.

[95]C. Richard Robins, G. Carlton Ray, and John Douglass, A Field Guide to Atlantic Coast Fishes, (The Peterson Field Guide Series). Boston: Houghton Mifflin Company, 1986: 295.

[96]Supra note 94 at 282.

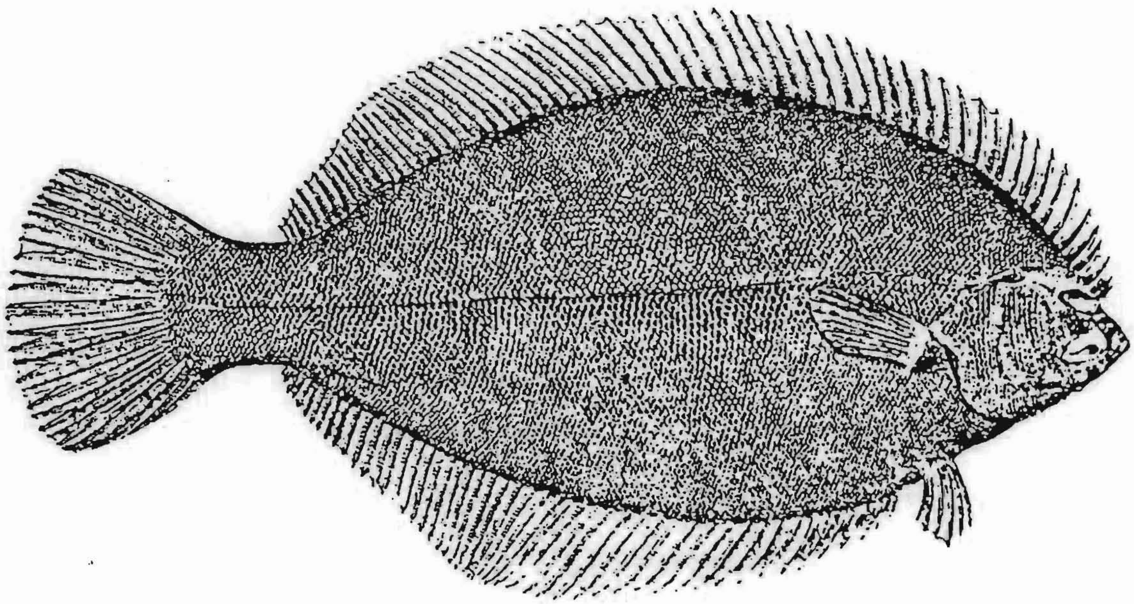

Figure 3.1: Winter Flounder, Pleuronectes americanus[97]

[97] Source: Ibid. at 276.

during the late spring and summer, the winter flounder remains close to its natal estuaries and embayments throughout most of the fall, winter, and spring. During the warmer months, just as many other species are making their initial inshore appearance, it migrates offshore to cooler waters, where it generally does not venture deeper than 20 fathoms, or approximately fifteen miles offshore (excluding the population of fish on Georges Bank).[98]

Throughout New England and the mid-Atlantic states, the winter flounder remains one of the most popular commercial and recreational species despite a marked downturn in total landings over the last decade. In 1992, commercial fishermen landed 13,934,000 lbs. of winter flounder with an ex-vessel value of approximately 15.8 million dollars.[99] Additionally, for the same year, the NMFS estimates that recreational anglers caught nearly 1,674,000 lbs. of winter flounder.[100] Unfortunately, the future of this fishery is uncertain; a combination of unfavorable natural conditions, persistent overfishing, and critical habitat degradation has resulted in annually decreasing stock size and consequently, lower landings.

The winter flounder is an especially important species for small commercial fishing vessels that can not safely venture far offshore, as well as for shore–bound and small–boat recreational fishermen. In recent years, as many inshore stocks have declined, so too has the number of undertonnage (less than 5 gross registered tons) and class 2 (5–50 gross registered tons) fishing vessels, commonly referred to as dayboats.[101] In the Northeast, from Maine to Delaware, there has been a nearly one-quarter reduction in the

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[98]Grace Klein-MacPhee, Synopsis of Biological Data for the Winter Flounder, Pseudopleuronectes americanus (Walbaum). NOAA Technical Report, NMFS Circular 414/FAO Fisheries Synopsis No. 117: 35.

[99]Supra note 11 at 1.

[100]Ibid. at 28.

[101]The name "dayboat" is in reference to the length of a typical fishing trip — usually lasting only a day.

number of class 2 otter trawl vessels since 1982.[102] Many of the fishermen still remaining have generally fallen on hard times. Until very recently, the winter flounder fishery provided a dependable source of much-needed income. Its tendency to be found over unobstructed muddy or sandy bottoms makes it ideally suited for the otter trawl, which accounts for approximately 95% of the commercial landings recorded by the NMFS.[103] Additionally, its ex-vessel price of over a dollar a pound is well above that paid for most other groundfish that are commonly caught in large quantities close to shore (see table 3.1). Its offshore migration during the warmer months ideally coincides with the inshore arrival of other valuable species, such as scup (*Stentotomus chrusops*) and summer flounder (*Paralichthys lethostigma*) in southern New England. During the remainder of the year, when water temperatures are less suitable for most other species, it provides one of the few, if not the only, viable inshore fishery. Consequently, the winter flounder helps to provide small vessel fishermen with both an important and steady source of income.

As previously mentioned, the winter flounder is also a popular recreational species. Its distribution in in close proximity to shore, coupled with its willingness to strike a baited hook, have made it a common target for many fishermen. During the early spring and late fall it is often the first and last fish available for most recreational anglers. It does not require elaborate or expensive equipment to catch; light tackle and a hook baited with a piece of clam, mussel, or sea worm rested on the bottom is often all that is needed. Its flaky texture and mild, delicate flavor are part of the reward for the successful angler. Many bait and tackle stores, small boat liveries, and headboats are dependent upon it as an important source of income. However, in recent years, as its numbers have

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[102]From 538 vessels in 1982 to 403 vessels vessels in 1991. For a discussion of this trend see Anthony, V.C. "The New England Groundfish Fishery after 10 Years of the Magnuson Fishery Conservation and Management Act" North American Journal of Fishery Management 10: 175-184

[103]Atlantic States Marine Fisheries Commission, Interstate Management Plan for Inshore Stocks of Winter Flounder, Oct. 1991: 34.

Price of Commercially Important Finfish & Squid Common to Narragansett Bay & Rhode Island Sound

Species	Price ($/lb)
Summer Flounder	1.45
Winter Flounder	**1.15**
Monkfish	0.82
Cod	0.80
Butterfish	0.59
Windowpain Flounder	0.54
Squid (Loligo)	0.53
Scup	0.52
Silver Hake	0.31
Red Hake	0.22
Ocean Pout	0.10
Atlantic Herring	0.06

Table 3.1: Price/lb of fish commonly caught in Rhode Island waters[104]

[104] United States. Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Northeast Fisheries Center, Woods Hole Massachusetts, Status of the Fishery Resources Off the Northeastern United States for 1992, Technical Memorandum NMFS-F/NEC-95. 1992: 18.

declined, so has its popularity. As estimated with data from the NMFS's Marine Recreational Fishery Statistics Survey (MRFSS), in 1988 and 1989, it ranked second in the North Atlantic subregion, behind bluefish (*Pomatomus saltatrix*), as the most commonly sought-after species; by 1991, it ranked fifth.[105]

Although the total population of winter flounder is comprised of many localized subgroups, for descriptive and management purposes it is divided into four major stocks: Gulf of Maine; Southern New England; Middle Atlantic; and Georges Bank.[106] The individual stocks have similar growth, seasonal movement, and female maturity schedules, allowing each to be modeled as a single unit.[107] To a large degree, the winter flounder is a victim of its own popularity. Continuous overfishing by both commercial and recreational fishermen has significantly reduced total stock size throughout its range. Since around the mid-1980s, all of the stock have generally declined in abundance to a point where there is a great deal of uncertainty over whether or not even the present low landings will be sustainable into the future.

For management purposes, the winter flounder population in Rhode Island is grouped into two separate stocks, one of which comprises all of Narragansett Bay and the other the salt ponds. The total abundance of winter flounder in Narragansett Bay has precipitously declined to a record low level. Since 1980, as measured through several research surveys, there has been a 60–95% reduction in the number of fish in the Bay. Preliminary models by the RIDFW for the salt ponds indicate a similar decline, yet there is some uncertainty due to a paucity of historical abundance data for this population. In Narragansett Bay, there are several factors which have contributed to the stock's decline.

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[105]United States. Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service, Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1987 - 1989. Washington: GPO, 1991: 145 & 215. and Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1990 - 1991. Washington: GPO, 1992: 185.

[106]The NMFS has grouped the population into 3 stocks, combining the Southern New England and Middle Atlantic stocks into one group. The ASMFC feels these stocks should be considered separately.

[107]Supra note 103 at 19.

Many commercial and recreational fishermen argue that while overfishing is partially at fault, there are other natural and man-made problems responsible for this predicament. A closer examination of the status of the winter flounder population reveals there is some validity to their argument. Past catch records and trawl survey data reflect, what appears to be, its natural cyclical pattern of abundance. There is now strong evidence linking poor recruitment with above-average winter water temperatures. Additionally, there is a growing body of data indicating that the collapse of the Mt. Hope Bay subpopulation is due in large part to the high larval entrainment rate by the Brayton Point electrical power plant. And finally, habitat degradation may also be a contributing factor limiting stock production. However, with the possible exception of the Mt. Hope Bay situation, it will be demonstrated in this chapter that the most realistic course of action to help stabilize and rebuild the fishery in the foreseeable future is primarily through curbing overfishing.

SPECIES PROFILE

To survive in the ever-changing nearshore zone, the winter flounder is able to adapt to varying conditions. Unlike deeper ocean waters, which tend to remain relatively stable, shallow coastal areas are greatly affected by seasonal changes and weather conditions. Varying amounts of solar heating and rainfall can lead to wide fluctuations in water temperature and salinity. The winter flounder can tolerate a temperature range of 0°–25°C and a salinity differential of 4–30‰ without any critical impediment of its vital functions.[108] Younger fish are more tolerant of higher temperatures and are therefore able to stay inshore even during the warmer summer months.[109] Mature fish on the other

[108] Supra note 98 at 9.
[109] Ibid. at 5.

hand, tend to seek a comfort zone of 12°–15°C and will therefore migrate inshore and offshore to stay within this range.[110]

This migratory behavior can be observed through data from both tagging studies and research surveys. The results of a RIDFW tagging study in upper Narragansett Bay of legal size fish, indicate that winter flounder migrate out of the Bay, through the deeper cooler waters of the East Passage, when water temperatures reach the critical 15°C threshold, usually in May or June (see figure 3.2).[111] A tagging study of fish from the salt ponds noted a similar dispersal from inshore areas during the warmer summer months.[112] While offshore, these fish generally move into Rhode Island Sound and areas southeast of Narragansett Bay.[113] In the fall, as water temperatures decrease, they generally return, sometime between October and December, to the same location from which they departed.[114] Throughout the coldest months they will remain in a semidormant state buried in the bottom sediment until they are ready to spawn sometime during the late winter or early spring.[115]

This exodus and influx of fish into and out of the Bay during the spring and fall is also reflected in the monthly catch of winter flounder by the URIGSO research survey. This survey intercepts those fish that enter and exit the bay through the West Passage at two sites. The Fox Island station is located in central Narragansett Bay, whereas the Whale Rock station is situated just outside the mouth of the Bay in Rhode Island Sound (see figure 3.3).[116] The bimodal distribution (with peaks occurring during the spring and

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[110]Ibid. at 23. One exception to this pattern occurs near the extreme northern extent of its distribution. In this region, winter flounder migrate inshore during the summer when water temperatures moderate to a more comfortable range and slightly offshore into deeper water during the winter.

[111]Christopher J. Powell, "Winter Flounder Tagging Study, 1986 - 1988 with Comments on Movement," Rhode Island Division of Fish and Wildlife, Jan. 1989. Res. Ref. Doc. 89/3: 3.

[112]Saul B. Saila, "A Study of winter flounder movements," Liminology Oceanography 6.3: 294.

[113]Ibid.

[114]Supra note 111.

[115]Richard Crawford, Winter Flounder in Rhode Island Coastal Ponds, Narragansett, Rhode Island: Rhode Island Sea Grant, Mar. 1990: 6.

[116]This and other research surveys in and around Narragansett Bay will be explained in greater detail further in this chapter.

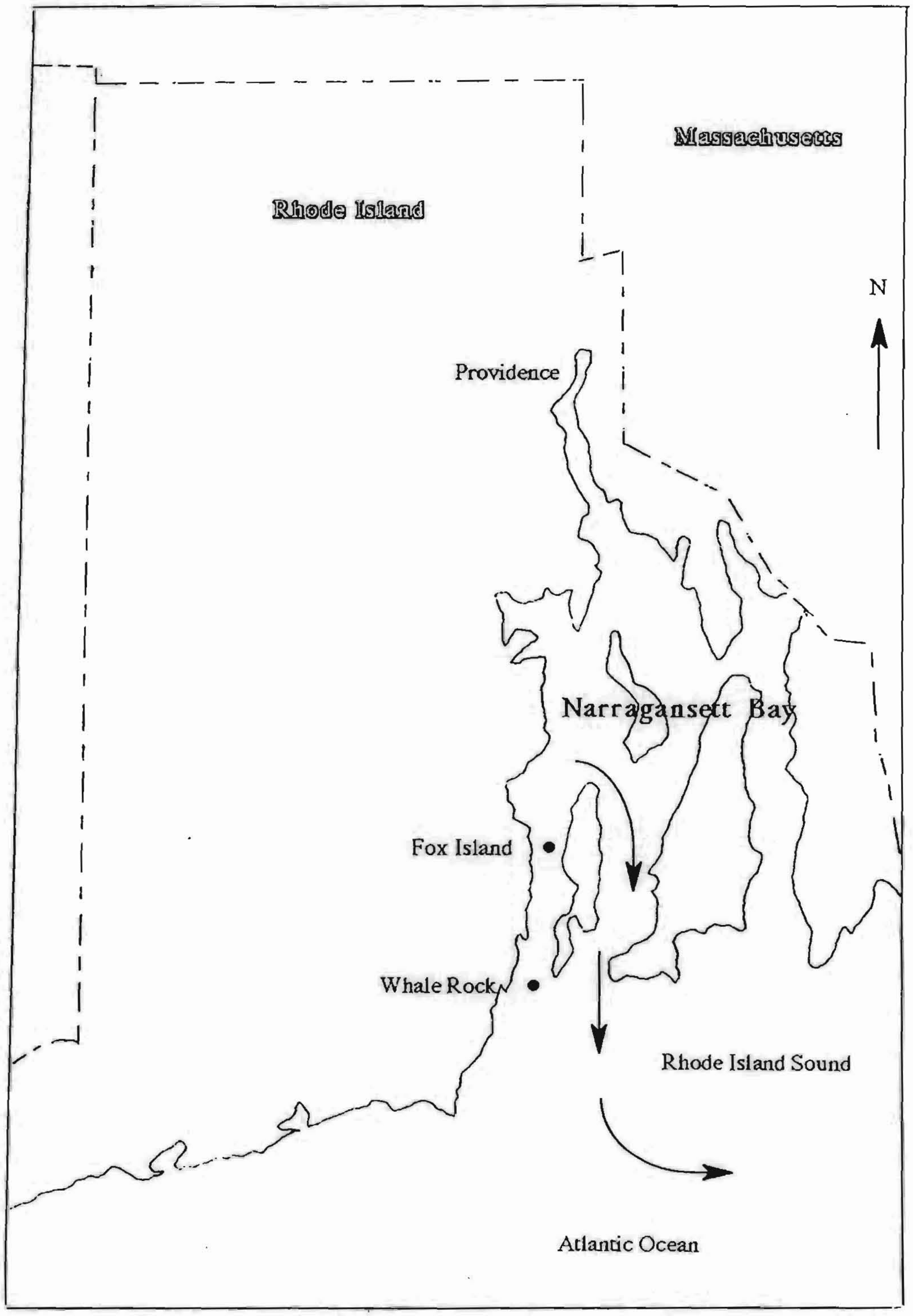

Figure 3.2: Movement of Winter Flounder out of Narragansett Bay in late spring and early summer[117]

[117]Source: Supra note 111.

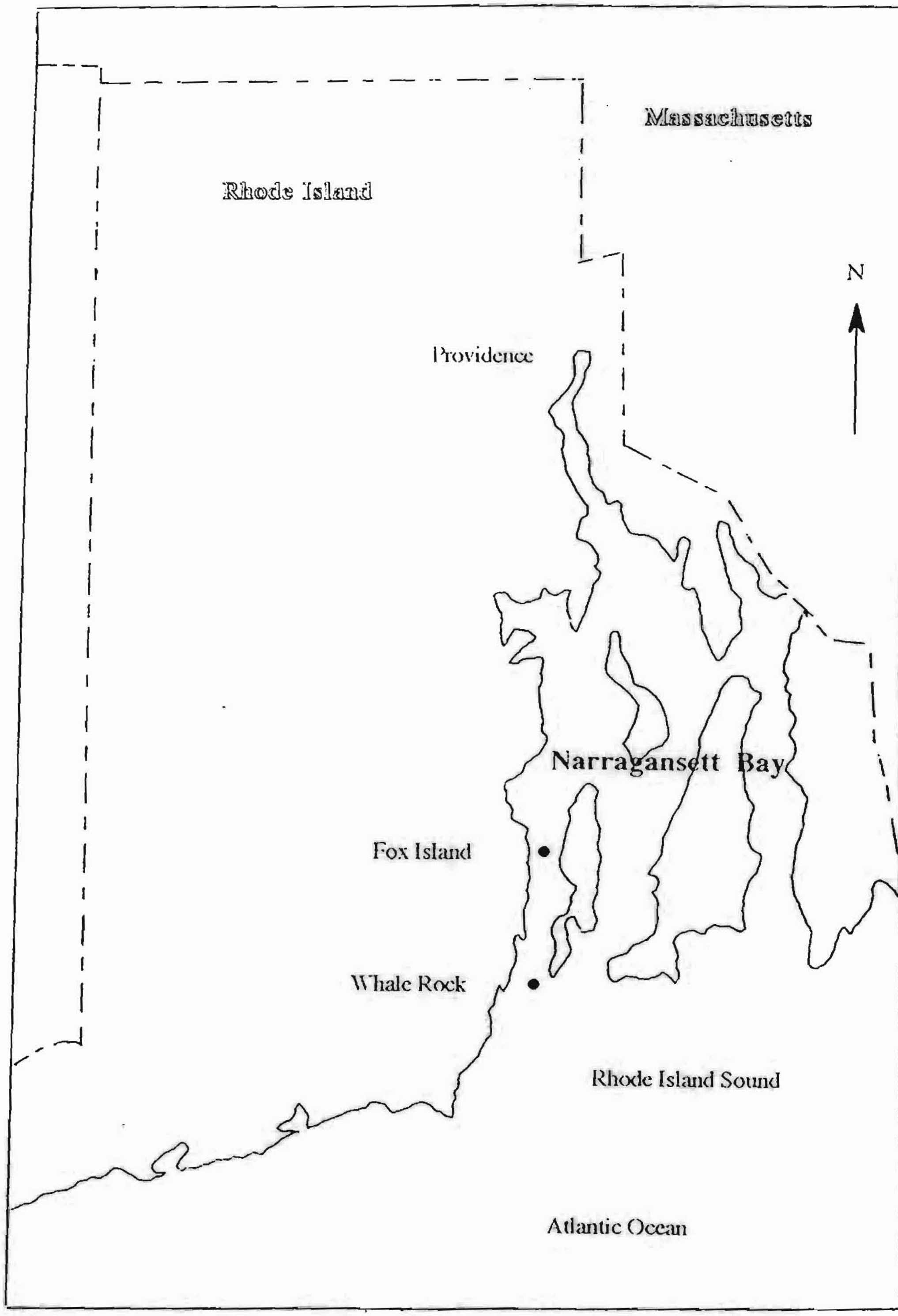

Figure 3.3: Map of URIGSO Fixed Station Research Survey at Fox Island and Whale Rock

fall) of the mean monthly winter flounder catch at the Fox Island station is an indication of when the fish are exiting and entering the Bay, and are therefore more abundant in the West Passage during these periods (see figure 3.4). The January–February trough is the result of the fish having settled in for the winter further up in the Bay, while the July–September dip is the result of most of the fish having left the Bay in search of cooler offshore waters. The summer migration offshore into Rhode Island Sound is apparent in the substantial increase in the mean monthly catch at Whale Rock (see figure 3.4). Yet, it should be remembered, that despite this seasonal movement, in comparison to many other species of finfish, which often migrate great distances from the outer edge of the continental shelf to inshore shoal areas, the winter flounder is a relatively sedentary species.

Studies have demonstrated that most winter flounder return to their natal inshore areas year after year.[118] Therefore, since interspawning amongst different populations is practically negligible, discrete populations have developed with differing growth rates and meristic and morphometric characteristics.[119] Consequently, the winter flounder population "is comprised of many relatively independent, localized stocks inhabiting bays and estuaries along the coast."[120] Regional fisheries are supplied by stocks originating from nearby waters. For example, as determine through tagging studies, the vast majority of winter flounder caught in the NMFS statistical area 539 (see figure 3.5), just off of Rhode Island, originate from Narragansett Bay and to a much lesser degree, Rhode Island's coastal salt ponds.

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[118]See: M.J. Lobell, "A biological survey of the salt waters of Long Island;" Alfred Perlmutter, "The Blackback Flounder and it's Fishery in New England and New York;" and Saul B. Saila, "A Study of winter flounder movements."

[119]Supra note 104 at 92.

[120]Alfred Perlmutter, "The Blackback Flounder and it's Fishery in New England and New York," Bulletin of the Bingham Oceanographic Collection 11.2 (1947): 27.

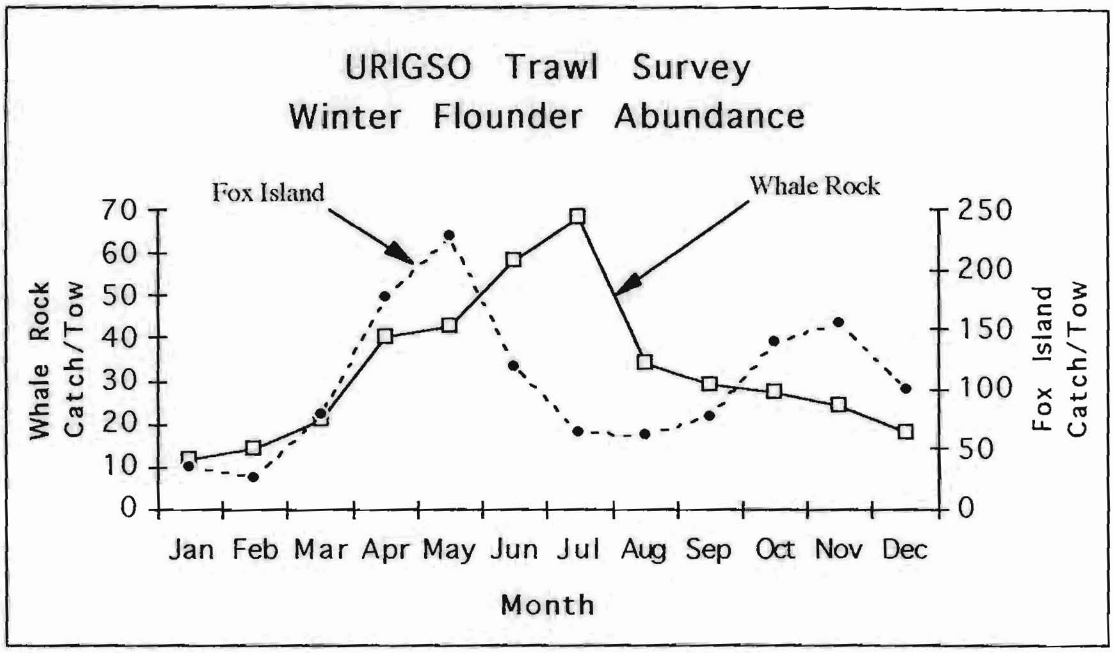

Figure 3.4: Mean Monthly Catch per Tow in Number from the URIGSO Trawl Survey, Whale Rock and Fox Island Stations, 1959–1987[121]

[121]Source: Cynthia L. Gray, Winter Flounder (Pseudopleuronectes americanus) Species Profile, Current Report: The Narragansett Bay Project. NBP-91-56: 14 & 16 (Figures 3 & 5).

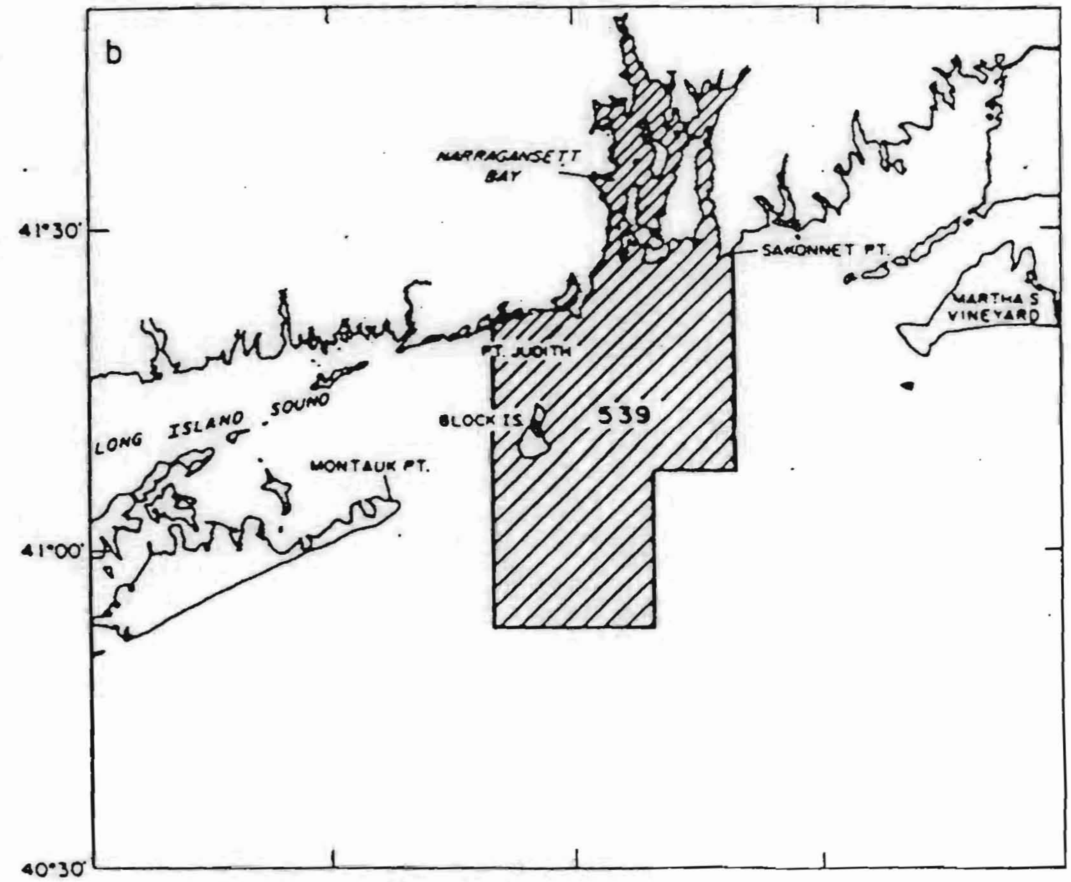

Figure 3.5: NMFS Statistical Area 539[122]

[122]Ibid. at 45.

Winter flounder spawn during the winter and early spring, when water temperatures are close to or at their minimum.[123] As a result of earlier seasonal warming in the southern half of its range, spawning tends to begin first in the Mid-Atlantic and progressively later in the season heading north.[124] Spawning in Narragansett Bay takes place sometime from the end of December through April, with the peak period occurring in March, when water temperatures average between 2° to 5°C.[125] Spawning grounds are generally located along the shallower margins of the Bay over sandy bottoms with depths between 1.8 and 3.6 meters.[126] Within Narragansett Bay, the upper bay north of Prudence Island, Mt. Hope Bay, and the Sakonnet River are all known to be major spawning areas. The same may also hold true for Greenwich Bay and Wickford Cove.[127]

Size and age of first maturity varies throughout its range. In Narragansett Bay, just over half the winter flounder (51.8%) are mature by age 3 (272 mm or 10.71").[128] Most females average approximately 500 thousand eggs, while large individuals may be capable of producing 1.5 million eggs.[129] The eggs are non-buoyant and adhere in clusters to diatom mats along the bottom, thereby reducing the chance that winds or tides will carry them into the open ocean where their survival odds are greatly diminished.[130]

Newly hatched winter flounder initially look like most other non-flatfish, with one eye on each side of their head before they metamorphose into their more recognizable form. Larval development occurs as follows:

> The vertical fin ray begin to appear 5 to 6 weeks after hatching, at a length of about 7 mm., and the left eye has moved upward by then until about half of it is visible above the dorsal outline of the head, while the whole

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[123]Supra note 94 at 280.
[124]Supra note 98 at 6.
[125]Supra note 111.
[126]Supra note 121 at 5.
[127]Ibid. at 9.
[128]Note 87.3% of age 4 fish (322 mm or 12.68") are mature.
[129]Supra note 94 at 280.
[130]Supra note 98 at 4.

> left eye shows from the right side and the fins are fully formed in larvae of 8 mm. Metamorphosis continues rapidly. The left eye moves from this position to the right side of the head; the pigment fades from the blind side; the eyed side becomes uniformly pigmented; and the little fish now lies and swims with the blind side down, its metamorphosis complete when it is only 8 to 9 mm. long.[131] [see figure 3.6]

Larvae and young juveniles generally feed upon diatoms, crustaceans and dinoflagellates.[132] Adult fish switch to a diet of polychaete worms, amphipod and isopod crustaceans, pelecypods, and plant material.[133] In southern New England, most fish are between 4 to 6 inches by the end of their first year (see figure 3.7 for age-length comparison).[134] Immature fish generally tend to remain within the relatively safe confines of their nursery areas year round. As they mature and become less tolerable of warm water, they begin participating in the previously-discussed, annual offshore migration during the late spring and early summer.

The winter flounder's migratory behavior of moving offshore into deeper waters during the warmer months, is opposite that of most other species of finfish, which generally migrate inshore during the spring and summer when water temperatures moderate. This inverse migration may be a survival mechanism, allowing it to spawn and have its larvae develop with a minimum of potential predators. A study of the migratory and resident fish stocks of Narragansett Bay noted,

> the winter flounder's success may result from physiological adaptations that reduce competition during the spawning period. They spawn during winter and spring when potential competitors are in the warmer, and environmentally more stable, offshore depths... Larvae metamorphose by

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[131] Supra note 94 at 280.
[132] Supra note 98 at 13.
[133] Ibid.
[134] Supra note 94 at 281.

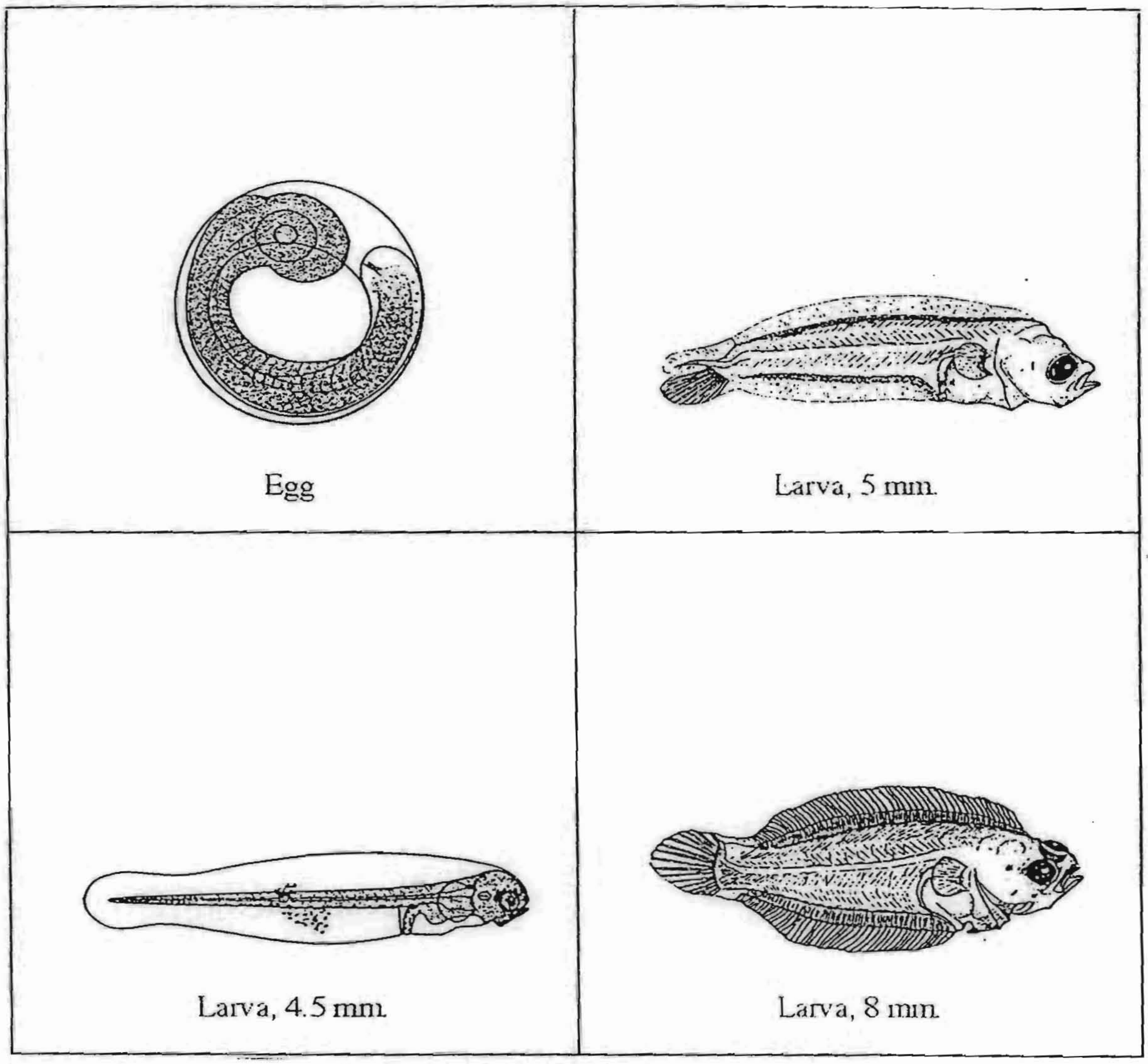

Figure 3.6 Winter Flounder Larval Development[135]

[135]Source: Ibid.

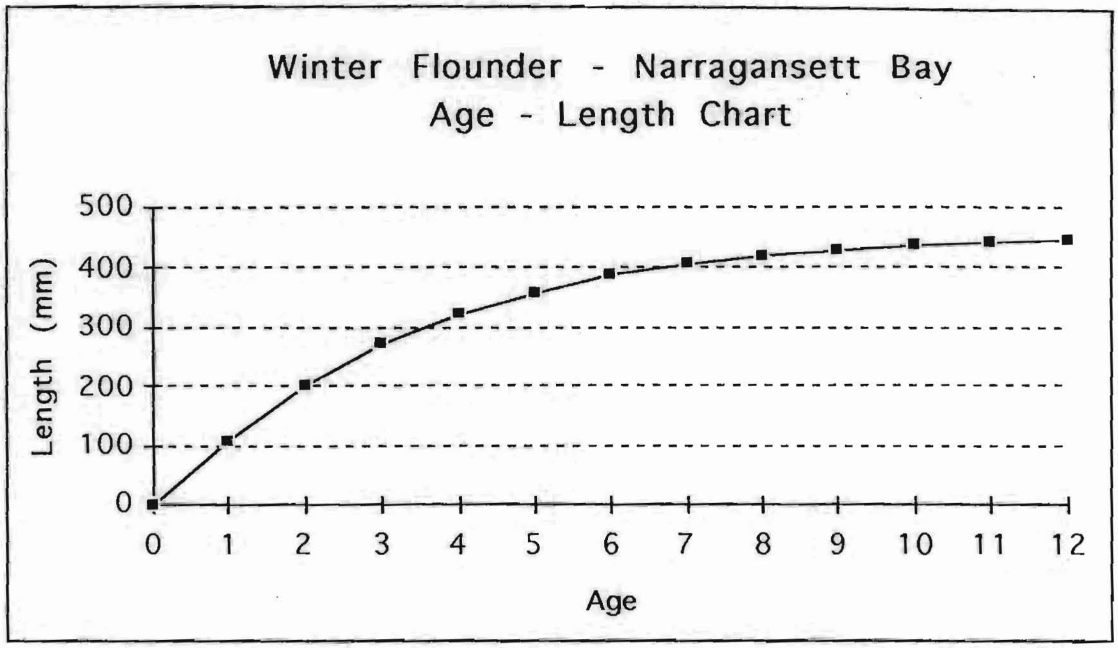

Figure 3.7: von Bertalanffy Estimate of Length at Age for Winter Flounder of the Rhode Island Area[136]

[136]Source: Mark R. Gibson, "Stock Assessment of Winter Flounder in Rhode Island, 1992: A Report to the RI Marine Fisheries Council," Rhode Island Division of Fish and Wildlife. January, 1993. Res. Ref. Doc. 93/7: 42 (Table 5).

June, so the most sensitive phase of the winter flounder's life history is complete by the time potential competitors return to the Bay and begin their spawning and growth periods. Being able to reproduce in brackish water at low temperature, winter flounder utilize space and resources denied more stenotropic species. [137]

Yet despite this strategy to ensure an optimum survival rate, larval and juvenile fish still suffer close to 99.98–99.99% mortality.[138] It is estimated that for fish populations in Rhode Island's salt ponds, only 18 of every 100,000 hatched eggs survive to age one.[139] Part of this can be attributed to the seaward drift of larvae out of their protected inshore estuaries and embayments.[140] While others succumb to predators such as the *Sarsia tubulosa*, a hydromedusa.[141] Juveniles face a host of larger predators including striped bass (*Morone saxatilis*), bluefish (*Pomatomus saltatrix*), cormorants (*Phalacrocoracidae*), and harbor seals (*Phoca vitulina*)[142]

There is strong evidence that larval development is highly sensitive to temperature. Laboratory studies have found larval growth rate to be significantly greater at 8°C than 5°C, with metamorphosis occurring in 49 days as opposed to 80 days at the lower temperature.[143] However, those fish that metamorphosed earlier, do so at a smaller size, which may further diminish their odds of survival.[144] This finding concurs with another study that noted colder water temperature 48–51 days prior to spawning and

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[137]Perry H. Jeffries and William C. Johnson, "Seasonal Distribution of Bottom Fishes in the Narragansett Bay Area: Seven-Year Variations in the Abundance of Winter Flounder (*Pseudopleuronectes americanus*)," Journal Fisheries Research Board of Canada, 31.6 (1974): 1060-1.

[138]William G. Pearcy, "Ecology of an Estuarine Population of Winter Flounder, Pseudopleuronectes americanus (Walbaum)." Bulletin of the Bingham Oceanographic Collection 18.1 (1962): 39.

[139]Saul B. Saila, "The contributions of estuaries to the offshore winter flounder fishery in Rhode Island," Gulf Caribbean Fisheries Institute, University of Miami, Proc. 14th Annual Session 1961: 96.

[140]Supra note 98 at 30.

[141]Supra note 138 at 31.

[142]Supra note 98 at 9.

[143]Ibid. at 17.

[144]As noted in: Mark R. Gibson, "Winter Flounder Recruitment in Narragansett Bay in Relation to Spawning Stock Abundance and Water Temperature," Rhode Island Division of Fish and Wildlife. Aug. 1991. Res. Ref. Doc. 91/5: 3.

throughout the larval development period resulted in more active and healthy larvae.[145] It is hypothesized that the larger and more active larvae are better able to avoid predation, and therefore, colder water temperatures during their development promotes greater recruitment.[146] Based upon this finding it was concluded that "cold winters followed by gradual spring warming produced the largest year classes."[147]

Further supporting this hypothesis is the apparent connection between above-average winter water temperatures with periods of low or declining commercial catch. Historical observations, dating back to the 1920s, have noted cycles of relative abundance and scarcity in the apparent number of winter flounder. According to fyke net records and fishermen log books, winter flounder were less abundant between 1934–1940 than they were from 1925–1933.[148] This decline was originally believed to be associated with a period of above-average winter water temperatures although there was no corroborative temperature data A subsequent study demonstrated that an increasing trend of abundance from 1947–1956 was associated with a period of climatic cooling.[149]

In specific reference to the stock in Narragansett Bay, a comparison of water temperatures and the abundance of winter flounder, as measured by the URIGSO trawl survey, has found there exists a strong relationship between the two variables. Increased water temperature during the spawning period has been found to be a critical variable associated with decreased catch, allowing for a 2 to 3 year time lag during which the fish grow to marketable size.[150] A bivariate linear model that included water temperature at metamorphosis and water temperature during the growth period to catchable size noted that a slight temperature rise accounted for 92% of the URIGSO trawl survey catch

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[145]Ibid.
[146]Ibid.
[147]Ibid.
[148]Supra note 94 at 282 and Supra note 26 at 8-9.
[149]Supra note 144 at 2.
[150]Supra note 137 at 1065. (significant at the 80% confidence level).

variation between 1966–1973.[151] Additional studies since then have noted a continuation of this relationship (see table 3.2).

Narragansett Bay Winter Flounder Abundance & Winter Water Temperature		
Period	Abundance Trend	Winter Water Temperature
1968–72	Declining	Above Average
1975-80	Increasing	Below Average
1981-91	Declining	Above Average

Table 3.2: A brief summary of winter flounder abundance trends, as recorded in the URIGSO trawl survey, and winter water temperatures in Narragansett Bay[152]

There is no definitive, straightforward answer as to why warmer water temperatures appear to be associated with declines in the winter flounder population. In both studies the temperature differential was very slight and well within the species tolerance limit.[153] Instead of temperature having a direct affect, it may involve a host of biotic factors. It was noted that,

> climatic variation during winter and early spring must be a critical factor, imposed not as a physiological limit on reproduction, but possibly by predation during metamorphosis. At this critical stage in the life cycle, the left eye of the planktonic larva moves to the right side, dense pigmentation develops, and the juvenile flounder, now flattened but extremely vulnerable, drops to the bottom.[154]

[151]Perry H. Jeffries and Mark Terceiro, "Cycle of Changing Abundances in the Fishes of Narragansett Bay Area," NOAA/Sea Grant. University of Rhode Island. Marine Report Number 170: 239.

[152]Collected from Mark R. Gibson, "Winter Flounder Recruitment in Narragansett Bay in Relation to Spawning Stock Abundance and Water Temperature;" Perry H. Jeffries and William C. Johnson, "Seasonal Distribution of Bottom Fishes in the Narragansett Bay Area: Seven-Year Variations in the Abundance of Winter Flounder (*Pseudopleuronectes americanus*);" and Perry H. Jeffries and Mark Terceiro, "Cycle of Changing Abundances in the Fishes of Narragansett Bay Area."

[153]Ibid.

[154]Ibid.

It is conjectured that the accelerated metamorphosis may be advantageous for predators such as the sculpin (*Myxocephalus octodecemspinosus*).[155] These fish that have developed earlier, but at a smaller size, may be more vulnerable. And, as previously noted, these warm water offspring are less robust than their cold water counterparts, thus further contributing to their high mortality rate. Another theory hypothesizes that the *Neomysis americana*, an epibenthic mysid that feeds upon larval flounder, is more prolific during warmer winters and may therefore be the cause of its decline during these periods.[156]

IMPORTANT HABITAT ISSUES

In addition to natural climatic conditions, the abundance of winter flounder may be a product of the quality of the coastal environment. There are many studies indicating that anthropogenic modifications of inshore waterways may be partially to blame for the species' near coastwide decline. In its *Fishery Management Plan for Inshore Stocks of Winter Flounder*, the Atlantic States Marine Fisheries Commission (ASMFC) noted:

> Habitat quality is of particular importance to winter flounder because the geographic location of its spawning grounds, and limited seasonal movements, make this species particularly susceptible to habitat degradation. Nursery habitat includes littoral and sublittoral saltwater coves, coastal salt ponds, estuaries, and protected embayments. The proximity of these habitats to many human activities expose winter flounder to the effects of habitat loss and alteration, effects of toxic contaminants, and entrainment and impingement in power plant coolant

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[155] Ibid.

[156] Perry H. Jeffries, Stephen Hale, and Aimee Keller, Historical Data Assessment Finfishes of the Narragansett Bay Area, Current Report: The Narragansett Bay Project. NBP-89-15: 310.

systems. The result can be an insidious loss of reproductive and growth potential.[157]

However, with some exceptions, identifying and quantifying the causes and quantity of mortality attributable to pollution and the modification of critical habitat, are often difficult to discern. As further noted by the ASMFC, "The effects of habitat modification on local fish stocks are often indirect, gradual, and unquantifiable. They are also additive and interactive."[158]

Over the last several decades, many estuarine systems, embayments, and salt ponds have been heavily impacted by the development and pollution resulting from a burgeoning coastal population. It is estimated that 110 million people — nearly 50% of the U.S. population — currently live in coastal counties.[159] The Northeast region, from Maine to Virginia — which happens to coincide with the common range of the winter flounder — accounted for nearly one-third (39 million people) of this total.[160] In its analysis of coastal population growth, the National Oceanic and Atmospheric Administration noted, "Not surprisingly, relatively high concentrations of pollutants have been measured in bottomfish, shellfish, and sediments at sites near highly populated coastal areas." [161] A continuation of this demographic trend, and the subsequent destruction of coastal ecosystems, does not appear as if it will abate in the near future. By the year 2010, the coastal population is expected to increase to 127 million people, thereby placing even further strains upon the coastal environment.[162]

Not surprisingly, larger winter flounder populations appear to be correlated with larger total habitat areas (see table 3.3). With this in mind, it is possible that the building

[157]Supra note 103 at 1.

[158]Ibid.

[159]United States. Department of Commerce. National Oceanic and Atmospheric Administration. National Ocean Service. Strategic Assessment Branch, 50 Years of Population Change along the Nation's Coasts 1960–2010, Second Report of a coastal Trends Series, 1990: 1.

[160]Ibid. at 7.

[161]Ibid. at 1.

[162]Ibid.

Winter Flounder Populations Stock Size versus Available Habitat Area		
Stock Location	Estimated Habitat Area	Estimated Population Size
Georges Bank	11,580,366	11,954,248
St. Marys Bay NS	134,400	1,821,039
Narragansett Bay RI	84,063	6,385,057
Great South Bay NY	81,920	2,458,171
Barnegat Bay NJ	72,593	4,013,937
Peconic Bay NY	14,515	285,300
Moriches Bay NY	8,687	1,513,489
Pt. Judith Pond RI	1,576	38,700
Ninnigret Pond RI	1,560	38,000/137,800
Waquoit Bay MA	1,211	51,845

Table 3.3: Comparison of estimated total population size with estimated habitat area[163]

[163]Source: Supra note 103 at 2. Note: 2 figures for Ninnigret pond are from different tagging studies that were conducted in 1966 and 1982

activity commonly associated with the demands of an increasing population, such as dredging and filling for marinas and shore-front homes, may have permanently reduced the winter flounder's total stock size. It is estimated that between 1954-1968, from Massachusetts to New Jersey (the core area of the winter flounder's abundance) there was a 6 to 15% permanent loss of shallow water habitat, thereby possibly limiting stock size in this region.[164]

In some cases, the loss of habitat may be only temporary. For example, dredging activity during and immediately after the spawning period can adversely affect recruitment. The suspension of sediment particles from dredging operations has been found to reduce hatchability, lessen yolk utilization, and inhibit larval fish from controlling their position in the water column.[165] Additionally, the periodic occurrence of low dissolved oxygen (D.O.) levels, due in part to excessive nutrient loading, can also be detrimental to young winter flounder. Juvenile fish are intolerant of low D.O. levels and consequently are generally never found in areas where the bottom D.O. level is less than 2 mg/l.[166] While it is obvious that anoxic events may result in fish kills, surreptitiously, prolonged conditions of hypoxia (low D.O.) may be responsible for retarding the development of those fish that are unable to flee to more hospitable conditions. Additionally, the extra stress burden of enduring low D.O. levels may make fish more susceptible to disease or predation.[167]

In addition to the above-stated problems, there is a growing body of evidence linking certain pollutants with a higher incidence of stress-related diseases and reproductive failure. Densely populated coastal areas are generally associated with higher levels of toxic contaminants such as DDT (dichloro-diphenyl-trichloroethane), PCBs (polychlorinated biphenyls), PAHs (polycyclic aromatic hydrocarbons), and trace

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[164]Ibid. at 1.
[165]Ibid. at 4-5.
[166]Ibid. at 79.
[167]Ibid.

metals, like cadmium, chromium, copper, lead, mercury, silver, and zinc. These pollutants work their way into nearshore waters through surface runoff, sewage discharges, industrial and refinery wastewater disposal, and accidental spills.[168] This inshore pollution is especially troublesome for estuarine-dependent fish, like the winter flounder. As noted by the ASMFC,

> estuaries in the mid-Atlantic region are most susceptible to pollution retention because of their relatively large volumes, moderate to low freshwater inflow, and low tidal exchange: the very retention characteristics that winter flounder exploit to enhance spawning success.[169]

The winter flounder is "particularly susceptible to the effects of annual or periodic contamination exposure because of... [its] physical contact with polluted sediments, and... ingestion of contaminated sediment and/or benthic organisms."[170] With the assistance of precision measuring tools and computer data analysis, scientists can detect even minute amounts of contaminants in the environment. However, fully understanding their effects upon marine fauna and flora is not always easily recognizable. One barometer used to gage their impact is through detecting and quantifying the presence and frequency of biological diseases or abnormalities in living organisms such as shellfish and finfish. For example, fin rot and liver tumors are but two indicators generally associated with relatively degraded areas where pollutants are more pervasive. While this method is far from full proof, it does provide some means by which to detect if the level of contamination is resulting in chronic or sub-chronic effects that can jeopardize the overall health of a stock.

[168] Ibid. at 8.
[169] Ibid. at 7.
[170] Ibid. at 5.

Liver cancer and fin rot in winter flounder is generally more prevalent in fish endemic to degraded inshore waters. Samples of fish with a greater frequency of heptic neoplasms, a precursor of liver tumors, have been found in areas of high sediment contamination in the Merrimack River (MA), Salem Harbor (MA), Plymouth Harbor (MA), Buzzards Bay (MA), New Bedford Harbor (MA), Narragansett Bay (RI), Western Long Island Sound, and Raritan Bay (NJ).[171] Data from Boston Harbor indicate that between 8 to 23% of the fish studied are afflicted with some form of liver lesions, however the incidence of this occurrence is declining possibly due to a reduction in toxic discharges.[172] Fin rot was found to be most prevalent in winter flounder from degraded areas in the Gulf of Maine and around the general New York City and Boston Harbor vicinity.[173]

In addition to a higher incidence of disease, another indicator that pollution may also be limiting production is inferred by studying the eggs and larvae of fish from relatively contaminated areas. Scientists believe that the additional strain and stress brought on during the spawning period serves to heighten the winter flounder's sensitivity to the toxicity of certain pollutants. A comparison of eggs, embryos, and larvae from relatively contaminated and clean sites in Boston Harbor and Long Island Sound found that fish from the degraded areas produced smaller eggs with higher early embryo mortality, yielding smaller larvae with small yolk-saks.[174] In New Bedford harbor, which is contaminated by PCBs, the incidence of smaller larval fish was greater than a relatively less polluted area in Narragansett Bay.[175] Reduced larval size is linked to higher mortality rates.[176]

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[171] Ibid. at 7.
[172] Ibid.
[173] Ibid.
[174] Ibid. at 11
[175] Ibid.
[176] Ibid.

On site sampling provides a means of monitoring the health and status of a local populations, however because fish are generally exposed to a combination of pollutants and environmental variables, it is often difficult to discern the exact effects of any one particular contaminant. Consequently, laboratory studies, where extraneous variables can be avoided or accounted for, have provided valuable information about the effects of individual pollutants. In general, scientists have found that trace metals can cause kidney and liver disorders, mutations of the gill structure, and elevated gill-tissue respiration rates.[177] Petroleum hydrocarbons and PAHs are associated with the following physiological abnormalities: reduced food consumption, altered swimming behavior, lower juvenile growth rate, excessive mucus secretion from skin and gills, alteration of blood plasma, hematocrit and hemoglobin levels, enlarged gall bladder and altered bile chemistry, reduced testes size, and lowered immune response.[178] For both categories of toxins, it is noted that although these effects may not always be lethal, the stress they create places "added demand... on the animal's energy reserves which greatly impairs its capacity to respond and survive in a naturally changing environment."[179]

In specific reference to Narragansett Bay, there is some mixed evidence about whether or not pollution may be a factor in the decline of this fishery. In a study of the effects of PCBs and trace metals on winter flounder from three areas (Warwick Neck, Whale Rock, and Quonochontaug Pond), liver neoplasms and macrophage were found to be associated with higher levels of PCBs in the more degraded area (Warwick Neck).[180] Based on this finding it was concluded that anthropogenic pollution is adversely affecting the health of the stocks.[181] However, based upon a study of the mortality rate of juvenile fish collected from a beach seine study, the RIDFW concluded that, with the exception of

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[177]Ibid.

[178]Ibid. at 9.

[179]Ibid. at 11.

[180]T.C. Lee, S.B. Saila, and R.E. Wolke, Winter Flounder Contaminant and Pathological Survey: Narragansett Bay and Vicinity, Current Report: The Narragansett Bay Project. NBP-91-51.

[181]Ibid.

the Brayton Point power plant in Mt. Hope Bay, "there is no compelling evidence that elevated mortality rates in pre-recruit winter flounder due to anthropogenic impacts or predators are responsible."[182] However, it is still unclear as to whether overall spawning production may be down due to the loss of shallow water habitat or environmental contamination.

The potential health risk for people consuming winter flounder from polluted areas appears to be minimal. Most of the toxins mentioned above generally accumulate in the fish's liver and not its edible tissue.[183] However, excessive PCB contamination in New Bedford Harbor (MA) and the Acushnet River (MA) has led to a ban on eating winter flounder caught in these locations.[184] Yet the impracticality of tracking these fish when they migrate offshore and mix with other stocks, compromises the protection offered by this ban. In general, outside of these two areas, most winter flounder do not exceed the health risk thresholds established under the US Food and Drug Administration Tolerance and Action Levels.[185] However, the ASMFC does note that those people who eat more than 132 lbs/year may be doing so at some risk.[186]

In some locations, power plant-related mortality can be extremely detrimental to a local stock. Power stations with open coolant systems demand large volumes of water from nearby waterways. If these intake pipes are located in close proximity to a winter flounder nursery area, many larval and juvenile fish are often indiscriminately killed as they become entrained or impinged in an intake pipe. Entrainment is the process whereby eggs and larvae are trapped and drawn into a coolant system by the suction turbulence of an intake pipe. As noted by the ASMFC,

[182]Supra note 136 at 28.
[183]Supra note 103 at 15.
[184]Ibid.
[185]Ibid. at 13.
[186]Ibid. at 15.

> winter flounder larvae are particularly susceptible to entrainment mortality by power plant intakes during and after metamorphosis because they are weak swimmers and their benthic habit places them near intake pipes designed to draw bottom water. Mechanical forces, elevated temperatures, and chlorination cause nearly complete mortality of all fish larvae and most fish eggs drawn into the coolant water stream of power plants.[187]

Impingement mortality on the other hand, is most common for juvenile fish. It is the process whereby fish that swim too close to an intake pipe are drawn against its protective screens. Even those fish that escape these two dangers still face another potential problem; the higher water temperatures near power plants, due to the release of coolant water, may inhibit juvenile fish from feeding .[188] Since winter flounder usually return to their natal inshore waters year after year to spawn, and do not mix with other populations, the additional strain of this mortality, in conjunction with overfishing and unfavorable environmental conditions, can be catastrophic for a local population.

In southern New England, the Millstone Point plant in Waterford, Connecticut and the Brayton Point plant in Somerset, Massachusetts on Mt. Hope Bay, are two power stations where this problem is a major concern. Both electrical plants abut important local winter flounder nursery areas. It is estimated that the Millstone Point and Brayton Point plants entrain approximately 79-192 and 266-686 million winter flounder larvae and impinge 16,700 and 6,000 fish each year, respectively .[189] Further adding to this problem is that "this additional mortality targets the small percentage of larvae (and juveniles) which have survived the very high natural mortality rates experienced by younger planktonic stages." [190]

Specifically concerning the Narragansett Bay stock, the Brayton Point power plant has in all likelihood greatly contributed to the collapse of an important subpopulation of

[187] Ibid.
[188] Supra note 98 at 24.
[189] Supra note 103 at 16.
[190] Ibid.

fish. As previously mentioned, Mt. Hope Bay is a major winter flounder spawning area. This power plant, which is owned by the New England Power Company, produces electricity through 4 coal-fired generators. As part of the terms of its operating license, Marine Research, Inc. regularly conducts a fixed-station research survey to monitor any potential impact the plant may have on the local population of marine fish. As measured through this survey, the Mt. Hope Bay subpopulation of winter flounder has dramatically declined over the past ten years, even more so than the rest of the population in Narragansett Bay and other comparable populations throughout all of New England (see figure 3.8).

The most recent returns from the trawl survey conducted by Marine Research, Inc. indicate that there are relatively few remaining winter flounder left in Mt. Hope Bay. As of 1985, this population has been in a stage of recruitment collapse. The occurrence of this downward trend happens to coincide with the same year that the Brayton Point plant switched one of its four cooling units from a closed to an open cycle, which resulted in a 47% increase in water usage.[191] In a stock-recruitment study, female spawners in Mt. Hope Bay were found to produce only a tenth of the age 1 recruits as did those in other parts of Narragansett Bay and throughout New England.[192] It is estimated that the high larval entrainment rate results in a 1.3 million loss of age 3 fish, which is a "significant" portion of this population.[193] The consequences of this loss, in combination with above-average winter water temperatures and overfishing has "reduced the population essentially to zero."[194] Rather than embarking upon a spirit of cooperation to find a mutually agreeable solution to this problem, it appears as if the New England Power

[191]Supra note 136 at 13.
[192]Ibid. at 22.
[193]Ibid.
[194]Ibid. at 3.

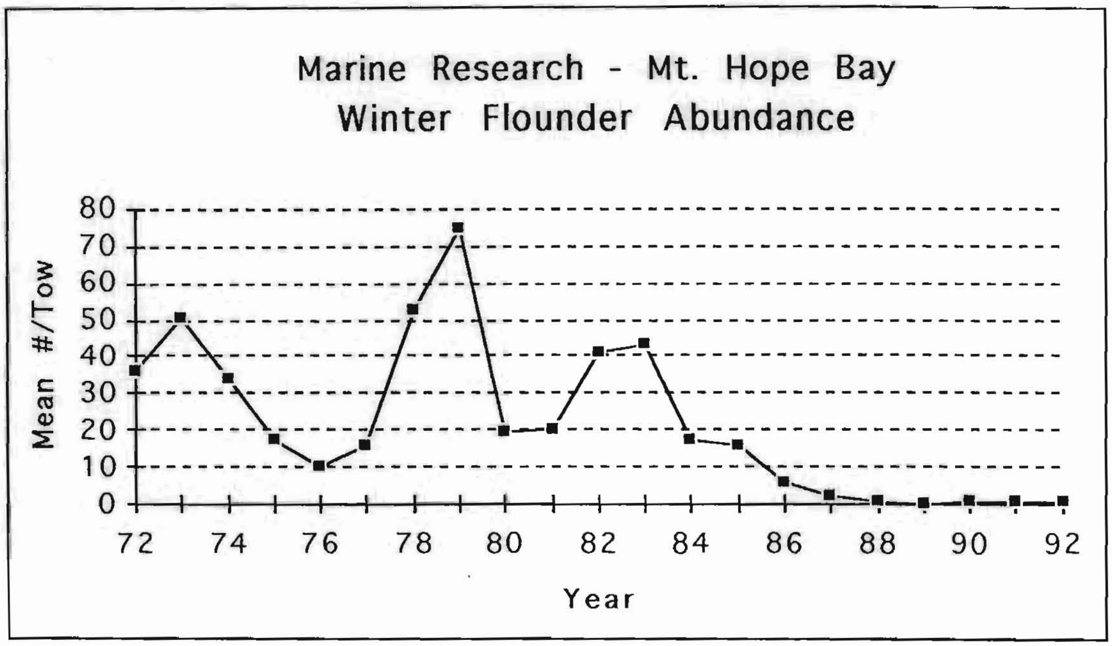

Figure 3.8: Marine Research, Inc., Annual Mean Number of Winter Flounder per Tow, 1972–1992[195]

[195]Source: Ibid. at 53 (Table 14)

Company has recently hired a legal firm experienced with this type of case, possibly to dispute the conclusions of the RIDFW.[196]

ABUNDANCE TRENDS

The winter flounder is one of the most commonly studied groundfish in the Northeast. This is especially true of the stock in Narragansett Bay. Its importance to both commercial and recreational fishermen has led the RIDFW, the NMFS, and Marine Research, Inc. to carefully monitor its abundance. Additionally, its tendency to be found relatively close to shore, within in the range of small research vessels, has contributed to it being a common species to study by students and professors at the University of Rhode Island Graduate School of Oceanography. Consequently, there is a wealth of fishery-dependent and independent data to help assess its status. For example, in addition to the commercial and recreational fishery statistics compiled by the NMFS, there are three trawl surveys ongoing in Narragansett Bay, as well as a fourth survey just offshore. The one irrefutable conclusion that can be drawn from these various sources is that the abundance of winter flounder in the Bay has precipitously declined over the past ten years to the point where it is at an all-time record low level.

Commercial fisheries data are collected through the NMFS weighout port sampling program. In Rhode Island there are three reporting specialists strategically located in Pt. Judith and Newport. Catch and effort data are gathered through point-of-first-sale weighout receipts and interviews with fishermen as they land their catch.[197] Additional landings information is obtained through annual or monthly surveys of dealers

[196] As discussed by RIDFW biologist Mark R. Gibson at RIMFC Council Meeting Oct. 93.
[197] Supra note 104 at 19.

who buy directly from fishermen.[198] Unlike other species, like summer flounder and swordfish (*Xiphias gladius*), which have mandatory reporting requirements, fishermen are not compelled to submit data concerning winter flounder, and do so only on a voluntary basis.[199]

The commercial otter trawl catch in NMFS statistical area 539 is one important source of data by which to gage the general abundance of winter flounder in Narragansett Bay. Information about catch locations is gathered through the weighout port sampling program mostly by interviewing fishermen immediately upon the completion of a fishing trip. Catch and effort data are geographically stratified into 10 by 10 minute latitude/longitude landings blocks and their corresponding broader statistical areas. Statistical area 539 is situated immediately offshore of the eastern half of Rhode Island (statistical area 611 abuts the western half) (see figure 3.5). Narragansett Bay and Rhode Island Sound are two important components of this area. Tagging studies have demonstrated that the vast majority of the Narragansett Bay winter flounder population confines its offshore migrations within the spatial boundaries of this area. For example, in a recent (1986–1990) RIDFW tagging study of 7000 winter flounder from the upper Bay, 96.5% of the 802 recoveries were from Narragansett Bay and Rhode Island Sound.[200] An earlier tagging study of fish released into Mt. Hope Bay and the Sakonnet River found that 92% of those total recaptured were from the same areas.[201] A tagging survey of winter flounder from the salt ponds concluded that most of these fish migrated in Block Island Sound (statistical area 611), with only a small component venturing into Rhode Island Sound.[202]

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[198]Ibid.

[199] Reporting requirements have since changed while this thesis was being completed. Mandatory reporting is now required of all commercial fishermen in the East Coast through a system of logbooks.

[200]Supra note 136 at 6.

[201]Ibid.

[202]Ibid.

The commercial otter trawl catch in statistical area 539 provides a continuous time series of landings data since 1964 (see figure 3.9). Over this entire time span, there appears to be a cyclical pattern of abundance with two distinct peaks occurring during the mid-1960s and early 1980s, followed by two subsequent troughs during the mid-1970s and as of the present. However, it should not be mistakenly believed that this trend will hold true for the future and that the present depressed CPUE will subsequently recover For as noted in the RIDFW stock assessment of 1993, "The long term abundance trends indicate that flounder populations [in Narragansett Bay] have fluctuated strongly before and recovered. However, fishing mortality was not as high then and abundance not as low."[203] Present CPUE has declined from 75–90% since the early 1980s, and is currently at an "unprecedented" low level.[204]

Recreational fishery data are collected through the NMFS Marine Recreational Fisheries Statistics Survey (MRFSS). The MRFSS is comprised of two independent but complementary surveys. The telephone survey of randomly selected households collects effort information on the number, location, and dates of fishing trips over a two month recall period.[205] Due to reporting inaccuracies inherent in this recall period, descriptive catch data, such as size, weight, amount kept and released, are only gathered in the fishing site survey.[206] Data from both surveys are combined to produce estimations of total angler participation, effort, and catch. These statistics are further stratified by, among other things, state and region, fishing mode (i.e. shore, party/charter, and private/rental), and distance fished from shore. Because of the low sampling intensity prior to 1988, regional catch and effort data for southern New England were combined so

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[203]Ibid. at 1.
[204] Ibid.
[205]Supra note 105 at 1.
[206]Ibid.

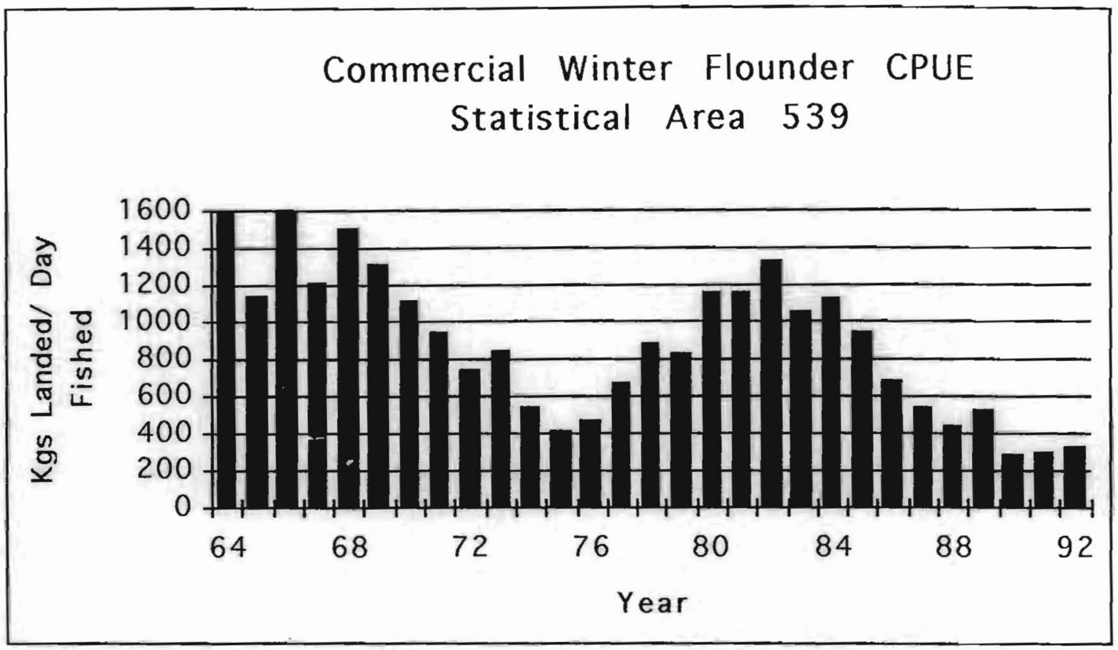

Figure 3.9: Otter Trawl CPUE of Winter Flounder in NMFS Statistical Area 539, 1964–1992[207]

[207]Source: Supra note 136 at 37–38. Note: data for 1992 based on preliminary estimates.

that the total catch in Rhode Island could be estimated with a greater degree of confidence.[208]

Based on total catch estimates derived from MRFSS data, recreational anglers caught just over one-third (36%) of the winter flounder landed in Rhode Island.[209] Supplementary data from the results of a number of tagging studies of winter flounder from Narragansett Bay and the salt ponds, dating back to 1947, provide varying estimates, ranging from 13 to 51% of total landings.[210] The MRFSS data may be more reliable since in each tagging study the fraction of fish landed by commercial versus recreational fishermen varied between locations (a greater percentage of the recreational returns came from fish tagged in upper Bay sites, while commercial recoveries were higher for lower Bay tagging locations).[211] Since 1980, the trend in the recreational catch has been decisively downward. (see figure 3.10). Whereas in 1980, anglers caught over one fish per trip, as of 1990, the last full fishing year prior to the inshore moratorium, over two trips were necessary just to catch a single fish.

There are certain drawbacks from assessing a stock solely from fishery-dependent data. As noted by the NMFS, "in fisheries that are heavily dependent on the incoming age group to the fishery each year... fishery data alone can not be used to forecast catches, since very small fish are generally not taken with standard fishing gear."[212] Additionally, catch per unit effort trends for schooling pelagic species may not be reflective of the true status of the stock.[213] Furthermore, time series of catch per unit effort do not standardize changes in technology that may account for increased landings

[208]Ibid. at 7 for details.
[209]Ibid.
[210]Ibid. at 6.
[211]Ibid.
[212]Supra note 104 at 30.
[213]Ibid.

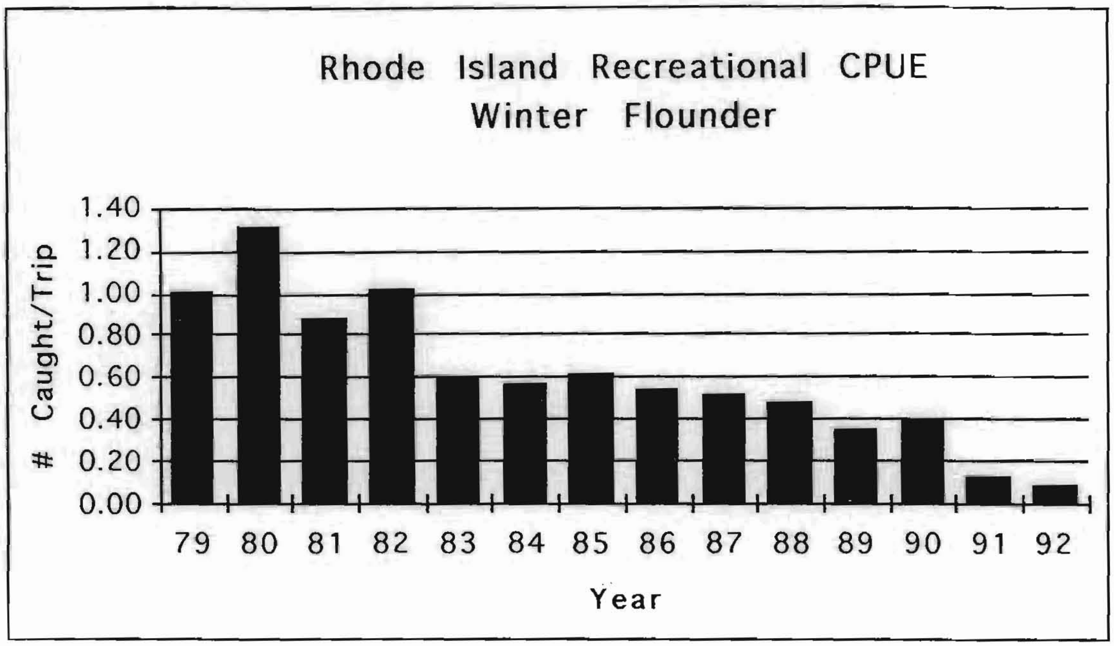

Figure 3.10: Rhode Island Recreational Winter Flounder CPUE as Estimated from MRFSS Data, 1979–1992[214]

[214]Source: Supra note 136 at 39 (Table 2). Note: data for 1992 based on preliminary estimates.

over previous years.[215] For these and other reasons, fishery-independent data as collected through research surveys are also of vital importance.

The abundance of winter flounder in Narragansett Bay and the general Rhode Island vicinity is monitored through four regularly-scheduled research surveys conducted by the University of Rhode Island Graduate School of Oceanography (URIGSO), the Rhode Island Division of Fish and Wildlife (RIDFW), Marine Research, Inc. (MRI), and the National Marine Fisheries Service (NMFS) (see table 3.4).[216] In each survey the amount of winter flounder in Narragansett Bay and southern New England has plummeted over the past ten years to the lowest level on record.

The URIGSO research survey provides the longest continuous time series of winter flounder abundance data in Narragansett Bay. This survey has sampled the fish population on a weekly basis since 1959, at its two fixed stations, near Fox Island in the West Passage and Whale Rock at the western entrance to the Bay.[217] The results of this survey are decidedly negative. From 1979 to 1985 the mean number of winter flounder dropped from to 279.12 to 19.33 fish per tow. (see figure 3.11) While there was a slight rebound during the late 1980s, the catch has subsequently fallen to 12.45 fish per tow in 1992 — an all time low since the inception of the program.

Unlike the URIGSO survey which is limited to sampling from only two stations, the RIDFW research survey covers Narragansett Bay, Rhode Island Sound, and Block Island Sound. This survey provides the greatest spatial coverage of Narragansett Bay, in which there are 42 potential stations divided into two strata, with Stratum 1 designated for those areas less than 6.1 m deep and Stratum 2 for the remainder of the Bay.[218] The results of this survey roughly parallel those of the URIGSO study. Since 1979, the mean

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[215]Supra note 104 at 30.

[216]Additionally, since 1986 the RIDFW has conducted a beach seine survey for young-of-the-year winter flounder at 16 sites in Narragansett Bay. However, the time series of data from this survey is too recent to discern any noticeable patterns or trends.

[217]Supra note 156 at 10.

[218]Ibid.

Table 3.4: Research Surveys in Narragansett Bay

Narragansett Bay – Southern New England Research Surveys				
	URIGSO	RIDFW	Marine Research, Inc.	NMFS
Initial Year	1959	1979	1971	1963: Autum Survey 1968: Spring Survey
Sampling Intensity	Weekly (Generally 3 to 5 samples per month)	Spring & Fall Surveys (Generally 26–42 tows per Survey in Narragansett Bay)	Biweekly: 1971– Nov. 1981; Monthly: Dec. 1981–Present	300 Trawls per Survey
Survey Design	Otter Trawl–Fixed Station	Otter Trawl–Random Stratified by Depth	Otter Trawl–Fixed Station in Mt. Hope Bay	Otter Trawl–Random Stratified by Depth and Geomorphic Characteristics
Trawl Net Design	Length: 14 m long, tapering from 10 m across at the mouth to 1 m at the throat; Stretched Mesh Size: 7.6 cm in the front half and 5.1 cm behind the throat.	Length: 3/4 Scale, University of Rhode Island 340 High Rise with a 11.9 m headrope and a 16.5 m footrope; Stretched Mesh Size: 10.2 cm in the wings, 6.4 cm on top of the belly, 5.1 cm in the bottom of the belly, and 2.5 cm in the cod end, with a 0.6 cm cod end liner.	Length: 11.4 m long, with a 7.6 m headrope and a 11.1 m footrope; Strecthed Mesh Size: 11.3 cm in the wings and 3.8 cm in the cod end.	Length: #36 Yankee Trawl approximately 30 m long with a 18.3 m headrope and a 24.4 m footrope; Stretched Mesh Size: 12.7 cm in the wings and 11.4 cm in the cod end with a 1.3 cm liner (note: #41 Yankee Trawl used for Spring Survey from 1973–1981.)

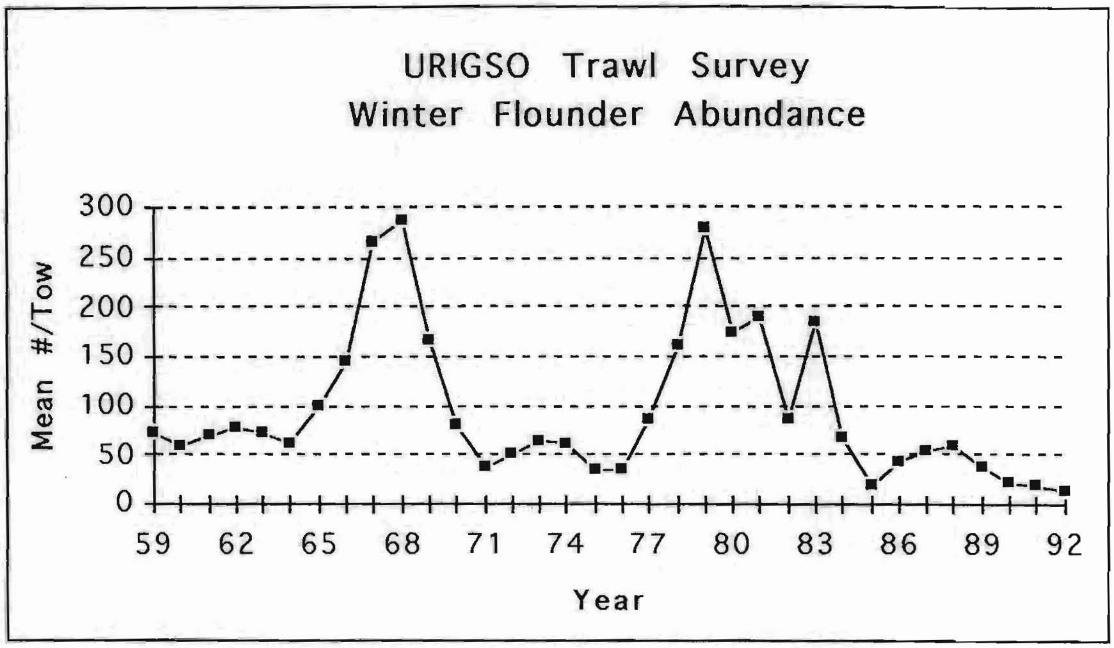

Figure 3.11: URIGSO Trawl Survey, Annual Mean Number of Winter Flounder per Tow (Combines Data for Fox Island and Whale Rock Stations), 1959–1992[219]

[219]Source: Supra note 136 at 51 (Table 12).

number per tow of winter flounder landed in the Bay in the spring and fall surveys has nose-dived from 140.56 and 138.30 to 3.41 and 8.32 fish per tow in 1992, respectively. (see figure 3.12) For the spring survey this was an all time low, whereas the results for the fall were just slightly above the record low of 2.72 fish per tow in 1991.

As previously noted, a separate trawl survey is conducted in Mt. Hope Bay by Marine Research, Inc. for the New England Power Company. The intended purpose of this study is to monitor any potential impact that the Brayton Point power plant may be having upon the marine life of the Bay. It is strongly suspected that as a consequence of the high rate of entrainment and impingement of larval and juvenile winter flounder, the population of fish within the bay has crashed. The dramatic effects of this collapse can be observed through the results of this survey; whereas in 1979 the survey averaged 74.60 winter flounder per tow, since 1988 it has averaged less than one fish per tow. (see figure 3.8)

On a broader scale, the abundance of winter flounder for all of southern New England has also precipitously declined over the past ten years. Catch data from strata 1–12, 25, and 61–76 in the NMFS spring and fall bottom research surveys provide abundance information about the regional stock of winter flounder[220] Between 1981 and 1984, the amount of winter flounder recorded in the survey fell from an average of 1.97 to 0.49 kilograms per tow. After a short-lived rebound in 1985, the catch has subsequently fallen off to less than a third of a kilogram per tow since 1989. (see figure 3.13)

One common argument made against becoming too alarmed over the present scarcity of winter flounder is that this species, like many others, has historically varied in abundance and will therefore naturally decline from time to time. For example, commercial log books note periods dating back to the 1920s, when there seemed to be

[220]Ibid. at 14.

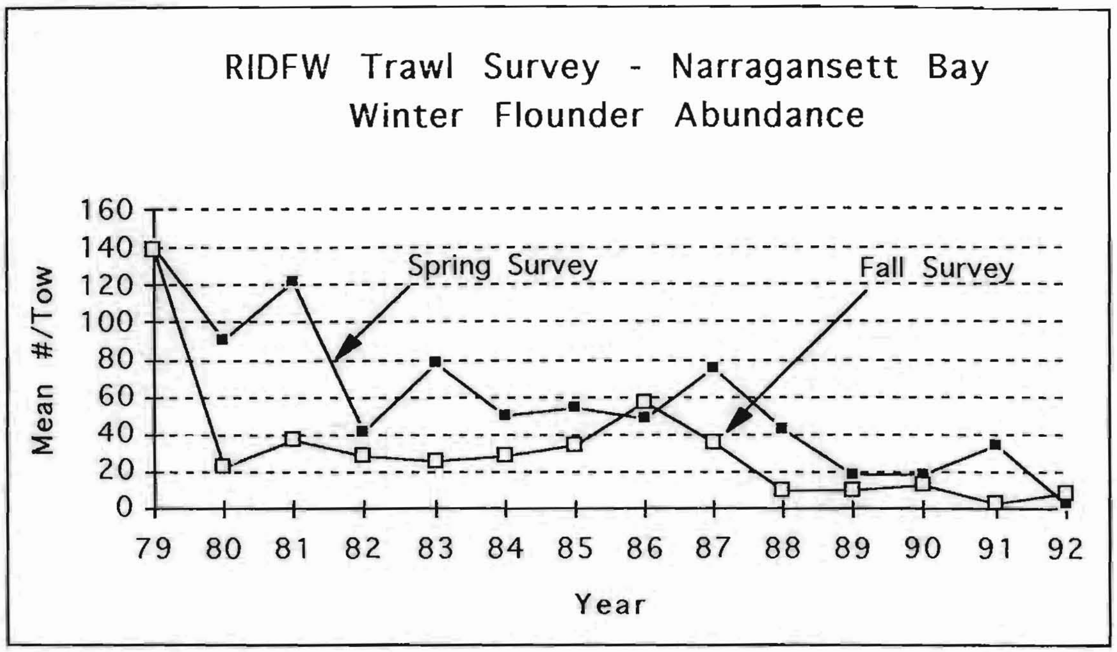

Figure 3.12: RIDFW Spring and Fall Trawl Surveys in Narragansett Bay, Annual Mean Number of Winter Flounder per Tow, 1979–1992[221]

[221]Source: Supra note 136 at 48 (Table 9)

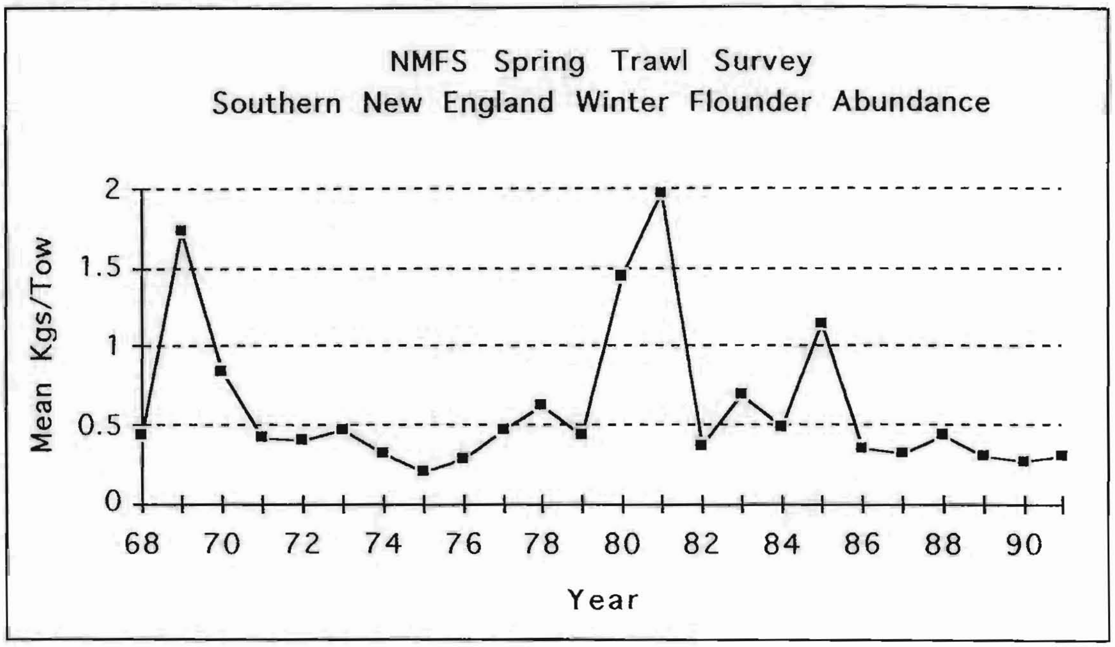

Figure 3.13: NMFS Spring Survey Trawl, Annual Mean Kgs. per Tow of Winter Flounder, 1968–1992[222]

[222]Source:Ibid. at 58 (Table 19).

relatively more or less fish available than during previous years. In specific reference to Narragansett Bay, the cyclical pattern of abundance in the URIGSO time series seems to indicate that this species has rebounded in the past when its numbers were down. However, caution should be taken not to assume that this pattern will repeat itself in the future. For as noted earlier in the chapter, the present low abundance is unprecedented in the history of the survey. That is, more specifically, the 34.16 winter flounder per tow in 1975, the former all-time low prior to the present crash, is almost three times greater than the 12.45 fish per tow in 1992. Consequently, under present conditions, the parental stock of fish may be insufficient to take full advantage of more optimal conditions when they occur. For as noted by the RIDFW,

> ... models provide compelling evidence that preserving spawner biomass is important. If spawner biomass declines sufficiently due to overharvest, a point is reached where good year classes cannot be produced regardless of winter water temperature. This may have been the case in 1992. The number of recruits per spawner in 1992 was the highest since 1980 and is associated with a decline in mean water temperature. However, total recruitment remained low because spawning biomass and egg production were low.[223]

Therefore, without a rebuilding program to help augment stock biomass, future recruitment into the fishery may be only a fraction of its total potential regardless of environmental conditions.

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[223]Ibid. at 1.

CONCLUSIONS

At this late stage, it is no longer a matter of whether or not the Narragansett Bay winter flounder stock is in poor condition. Clearly, the cornucopia of evidence from both fishery-dependent and -independent data sources should put this question to rest. The time has come when the severity of this situation demands immediate action. The crux of the problem centers upon what measures should be taken to to help conserve and rebuild the stock. The ASMFC's *Fishery Management Plan for Inshore Stocks of Winter Flounder,* which has been extensively referenced throughout this section, offers the most comprehensive list of recommendations to resolve this issue. However, many of the habitat proposals (discussed later in this chapter), while an absolute necessity for any long-term rebuilding program, may not be feasible in the short term. The economic costs and inherent delays likely to be encountered with their employment, makes their implementation over the next several years doubtful. Additionally, with the exception of the high entrainment rate by the Brayton Point power plant and above-average winter water temperatures, models by the RIDFW indicate that excessive fishing mortality is the overwhelming factor inhibiting stock production.[224] Therefore, since winter water temperatures are mostly uncontrolable, the most realistic future rebuilding strategy, for the short term, should rely almost exclusively on limiting fishing mortality and resolving the crisis in Mt. Hope Bay.

The inshore winter flounder moratorium, effective as of July 1991, was a long-overdue step to help protect the population of winter flounder endemic to Rhode Island.[225] However, preliminary models indicate that this may not enough. The seasonal movement of fish out of the protected zone, the transferal of fishing effort to areas just beyond the closure line, and illegal fishing within the Bay all have combined to limit the

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[224]Ibid. at 3.

[225]This issue is discussed in greater detail in the following chapter.

effectiveness of this regulation.[226] Therefore, the Council may have to consider additional protective measures, in the next year or two, if it eventually hopes to rebuild this fishery.

In its simplest terms, the problem is that for too long fishermen have caught too many winter flounder. The long-term effects of continuous overfishing, where more fish are removed each year than are added through recruitment, have resulted in a gross depreciation of stock size. This predicament is analogous to a spendthrift who continuously decided to live off the principal of his investments instead of the interest — eventually he will go bankrupt.

Theoretically, in a well-managed fishery, only enough winter flounder would be removed as are added to the stock through recruitment. Due to the natural variability of stock size from year to year, in practice, finding and maintaining a fishery at this point of equilibrium has often been elusive. Since this condition tends to be more of an ideal rather than reality, it may be more realistic to work towards maintaining a minimum stock biomass to protect against a stock collapse.

To calculate the annual total mortality rate (commonly referred to as "Z") in a fishery, scientists can use both fishery-dependent and -independent data sources such as commercial landings, tagging programs, and research surveys. The rate of fishing mortality (commonly referred to as "F"), is derived by subtracting a previously determined natural mortality rate (commonly referred to as "M") from the total mortality rate (F=Z-M). As a result of the abundance of winter flounder data collected in Narragansett Bay, the RIDFW has had the luxury of being able to use all three of the above-mentioned data sources to improve the accuracy of its estimates. (See table 3.5 for fishing mortality rates for the winter flounder stock over the past twenty years) Throughout much of the late 1980s, up until the last year or two, 0.55 was the fishing

[226]Ibid. at 2.

mortality rate associated with the stock's maximum sustainable yield. It comes as no real surprise that, based on its findings, the RIDFW has concluded, "These [fishing mortality] rates have exceeded optimal reference rates for so long..., that the stock has been severely depressed."[227]

Period	Fishing Mortality
1972–1977	0.95
1978–1982	0.94
1983–1987	0.98
1988–Present	1.26

Table 3.5: Historical fishing mortality rates on winter flounder stock in Narragansett Bay.

Recent models by the RIDFW indicate that because the stock has been driven to such a low level, that the previously-mentioned maximum sustainable fishing rate of 0.55 is no longer valid. Based on its estimates of stock recovery probabilities over a ten year planning horizon under variable fishing rates, the RIDFW concluded that, "There is little prospect of stock recovery regardless of stock productivity at fishing rates above F=0.30. Under average stock productivity, fishing rates must be reduced to F=0.10 in order to have a better than even chance of recovery."[228] Because the stock is in such poor condition, it is no longer realistic to expect an increase in abundance without a major curtailment of fishing effort. Or, as it was more succinctly stated by the RIDFW, "stock recovery and minimized fishing losses are mutually exclusive objectives."[229] What is even more pessimistic to note, the RIDFW has further warned that, "Little chance of stock recovery exists..., [if] winter water temperatures continue their upward trend so that

[227]Ibid.
[228]Ibid. at 20.
[229]Ibid. at 2.

spawning success is reduced."[230] Therefore, given this set of circumstances, a recovery of the winter flounder population in Narragansett Bay, even with the present moratorium, is far from certain.

Rebuilding this fishery is highly dependent upon substantive action being taken at the state level. Although a small percentage of the Narragansett Bay stock is caught in federal waters, approximately 80% of the returns in the RIDFW tagging study were from fish caught in Rhode Island waters.[231] Because of its predictable migration pattern year after year, fishermen know how to capitalize on winter flounder when they congregate at staging areas exiting and entering Narragansett Bay during the spring and fall. Therefore, the Council must play an active role curtailing overfishing within its jurisdiction if the stocks are going to recover.

While embarking upon a rebuilding program that emphasizes controlling fishing mortality as its primary objective, it would be foolhardy to ignore the previously-mentioned habitat issues. It may not be possible to mitigate all of the critical environmental issues confronting the winter flounder in Narragansett Bay, yet any long-term rebuilding strategy should at least seek to prevent the further deterioration of its habitat while controlling fishing effort. As part of its *Fishery Management Plan for Inshore Stocks of Winter Flounder,* the ASMFC recommends, among other things, that:

1. Waste water treatment plants should be upgraded while also reducing sewage discharge;
2. Enforcement of water pollution laws should be strengthened;
3. Dredging should be prohibited during the winter flounder spawning season;
4. Power plants should be required to use the best available technology to minimize entrainment and impingement mortality;

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[230]Ibid. at 20.

[231]Mark R. Gibson, Rhode Island Division of Fish and Wildlife, Personal Contact, 29 August 1994.

5. Cautioned should be taken to avoid siting future power plants near winter flounder nursery areas; and
6. Non-point source pollution should be minimized.[232]

Most of the above-listed suggestions would benefit not only the winter flounder but the marine environment in general. Preventive measures such as siting future electrical power plants in non-critical areas and avoiding dredging activity during and immediately after the spawning season may be possible to implement by amending the state's coastal zone management program. However, costs, construction delays, and legal entanglements present a more formable obstacle for the other recommendations.

Some of the recommendations, such as improving wastewater treatment plants, strengthening water pollution laws, and minimizing non-point source pollution were previously addressed through the Narragansett Bay Project, an intergovernmental task force designed to improve the overall quality of the Bay, created by the United States Environmental Protection Agency under the auspices of the National Estuary Program. Unfortunately, their adoption anytime in the near future remains doubtful due to a combination of high costs and the present economic climate. For example, the Commission's prescription to improve the overall water quality of the Bay, if taken as a whole, would cost nearly $685 million.[233] Additionally, forging a spirit of cooperation with the State of Massachusetts, which has jurisdiction over nearly 60% of the Bay's watershed, presents still another obstacle to overcome. While individual parts of its plan would obviously be less expensive, it still waits to be seen how much money will be appropriated by the General Assembly.

Despite the obstacle of a shortage of funding, one major program is currently under way that would help improve the overall water quality of the upper Bay, and thereby potentially benefit the winter flounder. The final amendments have been

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[232] Supra note 103 at 52–53.

[233] Peter Lord, "Prescription for a healthy Bay" Providence Journal 24 Nov. 1991, pp. B1 & B8

approved for the Narragansett Bay Commission's sewage-containment project to help prevent untreated-sewage overflows during heavy rains. However, the construction of this massive system, which will help contain 226 million gallons of rainwater and sewage, is not scheduled to be completed until the year 2008.[234]

One present habitat problem that needs to be addressed is the entrainment of winter flounder larvae by the Brayton Point power plant in Mt. Hope Bay. As previously mentioned, steps must be taken to substantially reduce this mortality if the Mt. Hope Bay subpopulation of fish is to ever be expected to recover from its present dismal condition. The inclusion of RIDFW blackback biologist on the Technical Advisory Committee, which supervises the plant's biological monitoring requirements, is an important step towards meeting this objective. While there is strong evidence indicating the plant is responsible for the collapse of this subpopulation, there are several questions still need to be addressed before it can be conclusively proven:

1. What fraction of the cohort is actually being killed by the plant?
2. Why have other species declined in parallel with the winter flounder?
3. Why have all age groups of winter flounder declined simultaneously rather than in a staircase fashion?[235]

Resolving these issues will require additional time to conduct further studies before steps can be taken to mitigate this problem. Also, as previously mentioned, it appears as if the New England Power Company may be getting ready to legally dispute the findings of the RIDFW rather than embarking on a path of mutual cooperation. Similar cases in the past have often proven to be tedious and highly contentious.

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[234]Robert C. Frederiksen "Epic sewage-containment project amended; cost up" Providence Journal-Bulletin 14 Dec. 1993 D5

[235]Supra note 136 at 23.

In comparison to regulating fishing effort, mitigating the above-mentioned habitat problems provides a more uncertain and less quantifiable means of rebuilding stock abundance. Resolving these habitat issues, solely to benefit the winter flounder, with the possible exception of the entrainment situation, requires that the public take a leap of faith to incur costs with unknown results. As noted by the ASMFC:

> The relationship between habitat quality and YOY [young of the year] production is not well understood and has not been quantified. Managers do not know what kind of habitat changes result in a 20–50% change in flounder production. Enhancing flounder populations by reducing fishing mortality via more conservative regulations is more straightforward and therefore presents less risk to managers than undertaking habitat restoration programs.[236]

Therefore, while it is important to address these habitat issues as part of a long term rebuilding plan, for the immediate future the only realistic means by which managers can hope to conserve and rebuild the present stock is through limiting fishing mortality.

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[236] Supra note 103 at 18.

CHAPTER IV
WINTER FLOUNDER MANAGEMENT HISTORY

INTRODUCTION

The winter flounder population in Rhode Island did not mysteriously collapse overnight. As early as 1984 there were indications that it was on the precipice of decline. Yet despite being kept abreast of the condition of the stocks, the Council was unable to take effective action to reverse their decline. This is not to imply that nothing was attempted to try and help protect the fishery. Several regulations were passed including: the first state–wide minimum size limit (which was subsequently increased); a minimum mesh size requirement for the coastal salt ponds and parts of Narragansett Bay; and finally the inshore moratorium. However, in each case these rules were enacted in a knee-jerk response to a crisis and for the most part, were too little too late.

The intent of this chapter is not to argue that careful stewardship would have prevented a decline in the fishery from its heyday during the late 1970s and early 1980s. For as was shown in the previous chapter, this species naturally varies in abundance, and this period was when it was at the peak of its cycle. Additionally, certain extrajurisdictional factors beyond the Council's control, such as unfavorable environmental conditions, habitat degradation, powerplant-related mortality, and excessive fishing effort on Rhode Island stocks in federal waters, all took their toll on the resource. Yet, since records have been kept, never have the stocks degenerated this drastically. Furthermore, these factors should not excuse a management system that time after time was unwilling to take the necessary measures to prevent the stocks from deteriorating to the point of recruitment failure and collapse.

The management system in Rhode Island seriously needs to revise its decision-making process if it is to be expected to take timely and substantive action to better ensure the viability of the state's inshore commercial and recreational fisheries. To illustrate this argument, this chapter presents a thorough review of the management history of the winter flounder fishery, dating back to 1984. The bulk of the information for this section is derived from RIDFW trawl survey data, annual stock assessments, minutes of Council meetings, and personal interviews. Although all of the participants initially worked together to pass some of the first regulations, as the stocks continued to decline and more substantive restrictions became necessary, things quickly deteriorated. As the chronology of events unfolds, it will become apparent that internal conflicts severely impeded the effectiveness of this system. In many instances, this dissonance stemmed from participants who seemed to be working towards dissimilar, if not mutually exclusive goals.

BACKGROUND

As previously discussed, the winter flounder has experienced periods of relative abundance and scarcity. As recently as the late 1970s and early 1980s, it was at the height of its abundance cycle. During this period, commercial landings and catch per effort in statistical areas 539 were the highest on record since the mid-1960s.[237] Because of its plentiful supply in inshore waters and its relatively high market price, it is not surprising that between the late 1970s and the early 1980s this species was annually one of the three most valuable finfish landed in the state.[238] This trend was also reflected in the URIGSO trawl survey in Narragansett Bay; the 279.12 winter flounder averaged per tow in 1979 was the second highest amount on record since the inception of the survey in 1959.[239] As is so common when a fishery is at the peak of its abundance, there was little foresight to

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[237]Source: Supra note 17 at 28.

[238]RI Commercial Fisheries Landings, NMFS

[239]Supra note 17 at 41. (The leading year was 1968 with a mean of 287.66 fish per tow.)

adopt conservation measures. In fact, at this time it was not unusual to use small winter flounders as lobster bait.[240]

1984

The Council minutes for 1984 are silent about any serious discussion regarding this fishery. In the fall, the RIDFW completed its annual review of important commercial species captured in its trawl survey from the previous year.[241] The results form this report were mixed; while the mean number and weight of winter flounder increased, a continuance of this trend was in jeopardy due to a paucity of young recruits. Compared to 1982, the number of fish in the smallest size class (≤ 12 cm) decreased by 43%.[242] Another area of concern was the reduction in the rate of increase of the largest size class (≥23 cm), which happened to be those fish that were commercially valuable and sexually mature.[243] Based on its findings, the RIDFW warned that "a strong year class must appear in 1984 if sufficient numbers of fish for both recreational and commercial harvest (≥23 cm) are to continue."[244] This was especially critical for Narragansett Bay and Rhode Island Sound due to the extensive inshore fisheries in these regions.[245] As a precautionary measure, the report recommended that a minimum size limit (with no specific size indicated) be adopted.[246]

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[240]Tom Halavik, Rhode Island Marine Fisheries Council member, Personal Contact, 28 Nov. 1991.

[241]This report, and others mentioned for 1985, 1986, 1988, and 1989, which included only a cursory review of the major commercial and recreational species recruited in the RIDFW trawl survey, should not be confused with the comprehensive statistical stock assessments completed in 1987 and annually since 1990.

[242]Timothy R. Lynch, Fishery Resource Assessment for the Coastal Waters of Rhode Island (Jan. 7, 1983 - Dec. 31, 1983) Rhode Island Division of Fish and Wildlife, (7 November 1984): 14.

[243]Ibid.

[244]Ibid.

[245]Ibid.

[246]Ibid.

1985

The Council responded to the RIDFW's advice by adopting the state's first winter flounder minimum size limit. In November, an 11 inch size limit was approved, effective as of January 1, 1986.[247] For the most part, there was little opposition to this regulation. This was probably because the minimum commercially acceptable size was somewhere around 10 to 11 inches.[248] Therefore, this rule only codified what was already generally the status quo. However, in all fairness, this regulation also coincides with the species' approximate size of sexual maturation.[249]

The RIDFW trawl survey continued to indicate a dearth of small fish. Due to the decline of young recruits, the overall mean number of winter flounder per tow declined 17.3%.[250] In the 13 to 22 cm size class, the number of fish dwindled by 25%, which was relatively modest compared to the 83% reduction in the smallest size category (≤12 cm).[251] In its analysis, the RIDFW cautioned:

> attention must focus on the ≤12 cm size class (age 0-1).because the 83.0% decrease noted in 1984 is in addition to the 43.0% decrease noted in 1983. It is this size class that will eventually recruit to the fishery (commercial and recreational) and its strength is very important for future harvests... In addition, for the first time since 1979, the ≥26 cm size class (those commercially preferred in Rhode Island) experienced a 5.0% decline in mean number per tow. Although not considered significant, this percentage represents a break in a five year trend and one which may continue.[252]

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[247] Rhode Island Marine Fisheries Council Minutes 5 November 1985.

[248] Supra note 112 at 292.

[249] Mark Gibson, Preliminary Assessment of Winter Flounder (Pseudopleuronectes americanus) Stocks in Rhode Island Waters Rhode Island Division of Fish and Wildlife, Sept. 1987: 2.

[250] Timothy R. Lynch Coastal Fishery Resource Assessment (Jan. 1, 1984 - Dec. 31, 1984) Rhode Island Division of Fish and Wildlife.

[251] Ibid.

[252] Ibid.

1986

After adopting the state's first winter flounder minimum size limit during the previous year, the Council did not follow through with any additional regulations in 1986. There were two petitions to curtail the inshore commercial fishery, yet neither suggestion was brought to a vote. One request was for a ban on otter trawl fishing for winter flounder in Charlestown and Quonochuntaug Ponds.[253] The other more sweeping demand sought to prohibit the commercial harvest of winter flounder in Mt. Hope Bay, the coastal salt ponds, and Little Narragansett Bay.[254]

Results from the RIDFW trawl survey once again provided more depressing news about the condition of the stocks. The overall mean number and weight of winter flounder per tow decreased significantly in Rhode Island Sound, Block Island Sound, and Narragansett Bay.

Percentage Decrease of Winter Flounder From 1984

Location	Mean Weight	Mean Number
Rhode Island Sound	91%	88%
Block Island Sound	90%	75%
Narragansett Bay	62%	36%

Table 4.1[255]

On one positive note, in a reversal of the trend from the past several years, the mean number of fish in the smallest size class (≤12 cm) increased by 50%.[256] In regards to this phenomenon, the RIDFW cautiously noted:

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[253]Letter to the Rhode Island Marine Fisheries Council, 1986.

[254]Rhode Island Marine Fisheries Council Minutes 10 Dec. 1986.

[255]Timothy R. Lynch Coastal Fishery Resource Assessment (Jan. 1, 1985 - Dec. 31, 1985) Rhode Island Division of Fish and Wildlife.

[256]Ibid. (Remember that these results are for 1985 and were not influenced by the 11 inch size limit effective as of 1986.)

However encouraging this increase may be, it is not believed significant. Repeated annual increases in the mean number per tow as well as the survival to maturity and harvestable size is desired. To this end, the Rhode Island Marine Fisheries Council instituted an eleven inch minimum harvest size effective January 1, 1986. It is speculated that with prudent adherence to this regulation, fishing mortality will decrease and population size increase.[257]

1987

In the fall of 1987, the RIDFW completed its first comprehensive assessment of the state's winter flounder stocks. The origins of the report stem from the continuing decline of the fishery and from a request by Council member and eminent marine biologist Saul Saila.[258] Unlike in previous years, this study was solely devoted to a single species. As a result, it was able to include in depth statistical modeling to gage specific bench marks such as fishing rates associated with optimum yield, overfishing, and potential stock collapse. The Council did not address the salient points raised in the document until the beginning of 1988.

According to the assessment, the resource was suffering from overfishing, yet the condition was not critical. By conducting a cohort analysis from data obtained through the RIDFW's trawl survey and tagging program, fishing mortality was estimated to be between 0.515 and 0.60.[259] Through forecasts derived from stock production models, maximum sustainable yield for the fishery was calculated to be 5.1 million pounds at a fishing rate of approximately 0.245.[260] Optimum yield was associated with a range of fishing mortality between 0.25 and 0.40. Based upon these findings, excessive fishing effort was believed to be inhibiting the potential optimum yield from the fishery, yet there

257 Ibid.
258 Supra note 249.
259 Ibid. at 7.
260 Ibid. at 8.

was no imminent danger of recruitment failure or stock collapse.[261] However, in specific reference to the salt pond stocks, which represent "discrete reproductive units," the models indicated that any increase in effort "could be dangerous."[262]

To prevent further damage to the fishery, the assessment recommended first stabilizing effort, which was growing annually, and then reducing fishing mortality by 25%.[263] To accomplishing this goal, it suggested a seasonal closure during the winter spawning period.[264] Raising the minimum size limit was discouraged due the likelihood of increasing the discard rate.[265] Furthermore, area closures were not endorsed because of the natural tendency of the species to travel beyond the prohibited zones and the ability of fishermen to transfer effort elsewhere.[266]

While the assessment reported that the stocks were not in any immediate danger, it did recommend that the Council take precautionary measures to manage the fishery rather than having to react to a crisis sometime in the future. It warned that continued growth in fishing effort would lead to potential trouble.[267] In what now seems prophetic, the report further noted:

> Because of economic inertia, stock collapses are very hard to reverse. Environmental effects on recruitment make it very difficult to feel the pulse of the fishery with high certainty. Without conservative management, a stock collapse will be sudden and nearly unpredictable.[268]

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[261] Ibid.
[262] Ibid. at 48.
[263] Ibid. at 9.
[264] Ibid.
[265] Ibid.
[266] Ibid.
[267] Ibid. at 8.
[268] Ibid. at 1.

1988

1988 was a pivotal year in the management of the state's winter flounder fishery. Whereas previously this issue was not a top priority, from this point until 1992, it was, for the most part, the center of the Council's attention. Like a firebell in the night, the stock assessment sounded a warning that instigated a mad dash of activity. Throughout the year, the vast majority of Council and Finfish Committee meetings were devoted to finding a mutually agreeable solution to help conserve the stocks. Yet despite this effort, by year's end not only were no new regulations agreed upon, but the strain of prolonged negotiations started to take an effect upon the participants. User groups were becoming increasingly frustrated as they tried unsuccessfully to develop a plan, through the Finfish Committee, to meet the 25% reduction-in-effort target goal. Additionally, the working relationship between the Council and the RIDFW started to disintegrate as they argued over their respective roles in the rule-making process.

From its initial meeting of the year, the Council weighed various proposals to ostensibly help conserve the stocks. In January, a minimum mesh size requirement for winter flounder nursery areas such as Narragansett Bay and the coastal salt ponds was proposed.[269] This suggestion never made it pass the discussion stage. In March a public hearing was held to gather input on, among other things, a possible 12 inch minimum size limit for winter flounder.[270] By nearly a three to one margin, those in attendance at the hearing, who were mostly commercial fishermen, spoke in opposition to the measure.[271] As an alternative, some supported a minimum mesh size requirement.[272] Others were against any new regulations because they claimed they would create too much of a financial hardship.[273]

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[269]Rhode Island Marine Fisheries Council Minutes 6 Jan. 1988.
[270]Rhode Island Marine Fisheries Council Minutes 9 Mar. 1988.
[271]Ibid.
[272]Ibid.
[273]Ibid.

Prior to the conclusion of the hearing, several commercial fishermen complained that the Council did not truly represent their interests.[274] They felt it needed to include more people who were sympathetic to the plight of otter–trawl fishermen.[275]

During the spring and summer, the Finfish Committee, which tends to be dominated by small inshore draggers, met several times to develop an alternative plan. Based on some of their earlier comments at previous Council meetings, it was no surprise that the members of this group endorsed a proposal calling for a minimum mesh size to ostensibly help protect juvenile fish. They were willing to abide by a requirement calling for a four inch minimum mesh size (cod end) while fishing in Narragansett Bay, the Sakonnet River, Charlestown and Quonochontaug ponds, Little Narragansett Bay, and the Pawcatuck River during the winter months of November through February.[276] After reviewing the historic monthly catch records and tag returns, the RIDFW noted that the corresponding curtailment in effort would not be sufficient to effectively reduce fishing mortality.[277]

As the year drew to a close, little if any headway was made towards reaching an agreement over the proper course of action needed to help conserve the fishery. The inability to resolve this issue led to a confrontation between the Council and the RIDFW. The major point of contention was over the responsibilities of each group in the development of management proposals. On at least two occasions, the Council requested the RIDFW to submit a list of pre-approved options for it to vote upon; which would satisfy the 25% effort reduction, for it to vote upon.[278] Each time the RIDFW declined, stating that it wanted to stay within its prescribed duty, which, as it claimed, was to provide technical assistance and advice, not to formulate specific rules.[279] Its reluctance to accept

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[274]Ibid.
[275]Ibid.
[276]Rhode Island Finfish Committee Minutes 9 May & 9 Aug. 1988.
[277]Rhode Island Marine Fisheries Council Minutes 29 Sept. 1988.
[278]Rhode Island Marine Fisheries Council Minutes 29 Sept. & 27 Oct. 1988.
[279]Rhode Island Marine Fisheries Council Minutes 27 Oct. 1988.

this offer eventually resulted in a public disagreement during the October Council meeting.[280]

A similar problem developed between the RIDFW and the Finfish Committee. The practice whereby the RIDFW evaluated proposals only after the Finfish Committee labored to reach a consensus, created tension and resentment.[281] Committee members demanded more input while they were formulating proposals for the Council.[282] In response to this criticism, the RIDFW sent its chief winter flounder expert, Mark Gibson to lend assistance at some of its subsequent meetings.

By the end of the year, when tensions started to settle, both the Council and the RIDFW agreed to work together to jointly develop a winter flounder management plan in 1989.[283]

1989

Throughout 1989, finding a solution to conserve the state's winter flounder stocks continued to be the major focus of attention. In response to criticism from the previous year, the RIDFW took a more active role during the initial stages of the decision-making process. At nearly every Council and Finfish Committee meeting, state biologists were on hand to lend assistance and provide technical advice. In January, the RIDFW completed a special report about the potential effectiveness of size limits in reference to the winter flounder fishery.[284] According to the study, the rate of fishing mortality was well above the preferable level for the 11 inch size limit (F=0.758 versus 0.470), and was dangerously close to the collapse rate (F=0.818).[285] It went on to state that without any further attempt

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[280]Ibid.
[281]Ibid.
[282]Ibid.
[283]Rhode Island Marine Fisheries Council Minutes 1 Dec. 1988.
[284]Mark Gibson, Size Limits with Special Reference to Winter flounder in Rhode IslandRhode Island Division of Fish and Wildlife, Jan. 1989.
[285]Ibid. at 9 & 10.

to seriously lessen fishing mortality, the fishery would, in all probability, collapse in three years.[286] This message seemed to kindle a sense of urgency and seriousness in the Council to find a solution to the problem.

For most of the year, the Finfish Committee devoted its undivided attention to the winter flounder crisis. Initially, its members supported a combination of limited seasonal and area closures, a ban on night dragging, and a minimum mesh size for inshore waters.[287] When it appeared that an increase in the size limit would also be required to meet the target goal of a 25% effort reduction, they reluctantly backed a proposal raising the size limit by a half of an inch to 11.5 inches.[288] However, some commercial fishermen were against the measure, claiming that out-of-state fishermen would prosper from their sacrifice because of the smaller size limits in neighboring states (such as in Connecticut and New York).[289]

While the Finfish Committee was developing its ideas, for the first time ever, the RIDFW presented a formal set of recommendations to help manage the fishery. This action represented a major change in policy; whereas previously the Division had limited its input to commenting on proposals made by the Council or Finfish Committee, it was now introducing proposals for the Council to decide upon. The Division's recommended:

1. A 12 inch minimum size limit, effective as of January 1, 1990;
2. A seasonal (exact months not specified) mesh size of 5 inches for Narragansett Bay and the southern coastal salt ponds;
3. Adopting a formal policy that only proposals which are readily quantifiable be considered;
4. Committing the Council to an annual fall review of the status of the stocks by the RIDFW.[290]

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286 Ibid. at 11.
287 Rhode Island Finfish Committee Minutes 28 Jul. 1989.
288 Rhode Island Finfish Committee Memo 15 September 1989.
289 Rhode Island Finfish Committee Minutes 20 Jun. & 28 Jul. 1989.
290 List compiled from Rhode Island Finfish Committee Minutes 26 Sept. 1989.

These suggestions attempted to address the immediate short-term need to conserve the stocks while at the same time they also offered a framework for future regulatory actions. Under item four, if the 1990 assessment continued to indicate a reduction in stock size, the Council was supposed to "raise the minimum size or lower catch levels effective January 1, 1991."[291]

The first two recommendations were derived from the previously mentioned report on size limits. Based on its models, the Division calculated that maximum sustainable yield could be attained if winter flounder were first recruited into the fishery at 11.5 to 12 inches.[292] However, in that same study, it qualified its findings with two important conditions:

1. Fishing effort needed to be stabilized to prevent fishermen from trying to maintain their past catch levels by either fishing more intensely or making longer trips.[293]
2. Sublegal fish accidentally captured will need to survive after being discarded.[294]

As was pointed out in the study, meeting these conditions was not very realistic.[295]

The first two recommendations also contradicted the RIDFW's previous analysis of potential management alternatives. In its 1987 winter flounder stock assessment, the RIDFW noted that, "Size limits are not considered effective due to the high mortality of discards and high minimum limit needed to accommodate current fishing rates."[296]

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[291] Rhode Island Marine Fisheries Committee Minutes 28 Sept. 1989.
[292] Supra note 284 at 10.
[293] Ibid.
[294] Ibid. at 2 & 3.
[295] Ibid. at 12.
[296] Supra note 249 at 1.

Additionally, it also warned that, "Area restrictions are problematic because of the migratory nature... of the stocks."[297] While the minimum mesh size proposal was intended to reduce the incidental bycatch of small fish, its effectiveness would be compromised by its temporal and spatial limitations. Immature fish remain inshore throughout the year and would therefore be vulnerable to fishermen using small mesh outside of the seasonal restrictions. Additionally, mature winter flounders disperse offshore into deeper waters where they could still encounter mesh sizes less than 5 inches.

While some Council members remained dissatisfied with the range of options offered, the proposals were nonetheless brought to a public hearing in October. At the hearing, most of the commercial fishermen in attendance were in opposition to the first two choices. The following reasons were stated as to why the new size limit and the minimum mesh size requirement were unsatisfactory:

1. More time was needed to determine if the 11 inch size limit was helping the stocks recover;
2. The new minimum size would give New York and Connecticut (which had smaller legal size limits) fishermen an unfair advantage over Rhode Island fishermen;
3. The decline in catch brought on by the new minimum size and mesh size regulations would cause fishermen to go broke;
4. The new mesh size restriction would not be feasible in a mixed species fishery.[298]

Other industry representatives were more willing to find some common ground to reach an agreement. Jim McCauley, from the Rhode Island Fishermen's Cooperative, favored area closures over a size increase.[299] A spokesman from a recreational fishing club supported the 12 inch size limit as long as all user groups were required to abide by the same

[297] Ibid. at 9.
[298] List compiled from Rhode Island Marine Fisheries Council Minutes 26 Oct. 1989.
[299] Ibid.

regulation.[300] However, there were also others in attendance who argued against the necessity for any regulatory intrusion. They felt that the Council should not interfere in the lives of fishermen and should let the laws of economics control fishing effort.[301]

During its November meeting, the Council voted to increase the size limit (effective January 1, 1990) to 12 inches and require all otter trawler vessels to use a 5 inch mesh size cod end while fishing in Narragansett Bay (north of a line running from Bonnet Point to Beavertail Point to Brenton Point, then from Sachuset Point to the Sakonnet Light House) and Quonochuntaug and Charlestown ponds from November through February.[302] However, after an outcry of protest that the new regulations were too drastic and would cripple the industry, the Council backed off its original plan. The new size restriction was divided into incremental increases of 11.5 inches for 1990 and 12 inches for 1991.[303] Additionally the 5 inch mesh size area was pushed north in Narragansett Bay, to a line drawn stretching from Carrier Pier to Conanicut Point to the T Pier on Prudence Island to Carr's Point, and from Sachuest Point to Sakonnet Point — an area that receives significantly less otter trawl fishing effort (see figure 4.1).[304]

As in 1988, the RIDFW did not prepare a formal winter flounder stock assessment. However, the results of its trawl survey released during the fall, brought more depressing news about the fishery. Once again, there was a marked reduction in abundance of winter flounder in Narragansett Bay, Rhode Island Sound, and Block Island Sound.[305] The most significant decline was in Rhode Island Sound, where the mean weight and number per tow in the spring survey plummeted by 90% from the previous year.[306] In Narragansett

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[300]Ibid.

[301]Ibid. (According to this argument, as the number of fish decline, catch rates will fall, requiring fishermen to switch to more abundant stocks, thereby automatically reducing fishing mortality.)

[302]Rhode Island Marine Fisheries council Minutes 30 Nov. 1989.

[303]Rhode Island Marine Fisheries council Minutes 28 Dec. 1989.

[304]Ibid.

[305]Timothy R. Lynch, Coastal Fisheries Resource Assessment—Trawl Survey Rhode Island Division of Fish and Wildlife, 1988:6.

[306]Ibid.

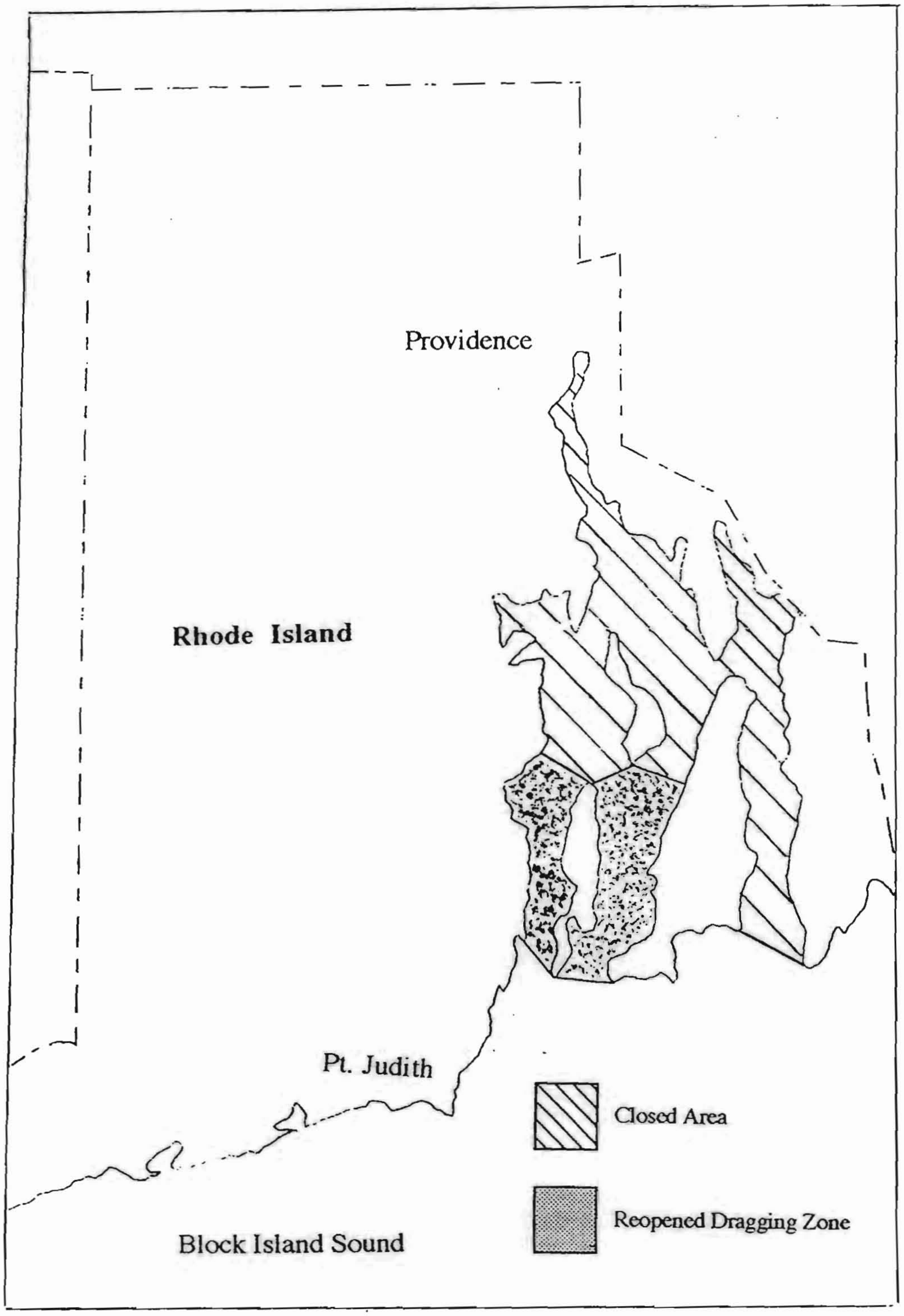

Figure 4.1: Revised 5 inch minimum mesh size area in Narragansett Bay

Bay the news was little better; the total weight and number of fish recruited in the fall survey fell by 67% and 72.3%, respectively.[307]

1990

Despite considering several proposals to further conserve the winter flounder stocks, throughout 1990 the Council did not take any decisive action. In retrospect, 1990 was a lull between two strife-ridden years. After undergoing the draining ordeal of implementing and rescheduling the new size limits late in 1989, most Council members were inclined to hold off on any additional regulations. Furthermore, their hesitancy was due in part to the anticipation of a detailed stock assessment, similar to the 1987 report, scheduled to be presented late in the year. To the Council's credit, it did not seriously consider several attempts to further weaken some of the measures previously enacted.

Contrary to their earlier position, a group of commercial fishermen, acting through the Finfish Committee, attempted to repeal the mesh size restriction in Narragansett Bay. They claimed that the regulation would not help the fishery because it was difficult to enforce (due to the variability of mesh size measuring devices) and that it was "impractical" because it did not cover a wide enough area.[308] In lieu of the requirement, they proposed a ban on night dragging by otter trawlers fishing north of bridges in Narragansett Bay.[309] This suggestion was never seriously considered by the Council.

The 1990 assessment released in the fall, continued to bring more pessimistic news. It noted that fishery-dependent statistics were at critically depressed levels. Both recreational and commercial catch per unit effort were at record low levels.[310] Based upon survey results compiled through the NMFS's Marine Recreational Fishery Statistics

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[307]Ibid.

[308] Rhode Island Finfish Committee Minutes 19 Mar. 1990.

[309]Ibid.

[310]Mark Gibson, RI Winter Flounder Stock Assessment Update 1990: A Report to the Rhode Island Marine Fisheries Council Rhode Island Division of Fish and Wildlife, (December 1990): 2 & 3. (Note: These records have subsequently been surpassed.)

Survey, on average, anglers required approximately five trips to catch a single winter flounder while fishing in Rhode Island waters.[311] Catch by otter trawlers in statistical area 539 declined to approximately 750 lbs per day.[312]

Indices of abundance, derived from the trawl surveys, paralleled the depressed catch statistics. In 1989, the surveys by the RIDFW, the NMFS, and the URIGSO recorded very low abundance levels, with the first two studies setting all-time records.[313] These results were a reflection of continuous year class failures dating back to 1987.[314] In Narragansett Bay, the news was even more distressing. Based on its models, the RIDFW stated that the species had entered a stage of recruitment failure.[315] Estimates calculated from information provided through the survey trawls, indicated that the level of spawning stock abundance was below 20% of its maximum potential — a benchmark used by many biologists to denote a stock that is in critical condition.[316]

Based upon its findings, the RIDFW warned there was a "significant probability of stock collapse under current fishery conditions."[317] To improve the situation, it urged for additional reductions in fishing effort than those previously suggested. According to the RIDFW, "The 12" minimum size limit is insufficient in and of itself to initiate recovery. Substantial reductions in the mortality rate are required (40 to 50%)."[318] To achieve this goal, the assessment recommended implementing "large, permanent area closures."[319]

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[311]Ibid.
[312]Ibid. at 10. (Source: graph of catch per unit effort in statistical area 539)
[313]Ibid. at 3.
[314]Ibid.
[315]Ibid. at 4.
[316]Ibid. at 5.
[317]Ibid. at 6.
[318]Ibid. at 7.
[319]Ibid.

1991

In 1991, the acrimonious struggle between proponents who wanted to keep the fishery open and others who supported severely curtailing fishing effort resulted in: an internal split within the RIDFW that was eventually escalated to the Director of the DEM; a ruling by the DEM legal counsel stating that the Council had failed to abide by the Administrative Procedures Act while adopting the inshore winter flounder ban; a further disintegration of the working relationship between the Council and the RIDFW; and a polarization of the Council into two factions deeply entrenched on opposite sides of the issue. Yet ironically, from this debacle emerged one of the strictest regulations ever passed by the Council: a total moratorium on the harvest of winter flounder from Narragansett Bay, the coastal salt ponds, the Pawcatuck River, and Little Narragansett Bay. However, as the year drew to a conclusion, this measure was jeopardized by a counteroffensive to rescind the ban and replace it with more moderate restrictions.

The major catalyst for this controversy was the negative winter flounder stock assessment issued late in 1990 calling for further reductions in fishing mortality. Starting with the its first meeting, the Council spent the vast majority of the year wrestling with this issue. In January, John Stolgitis, the then Chief of Fisheries for the RIDFW, read a list of suggestions that included prohibiting the harvest of winter flounder from Narragansett Bay.[320] However, he qualified his remarks by noting that he was not presenting a formal set of recommendations and that the staff was still divided over the potential of the 12 inch size limit to help rebuild the stocks.[321] By February, the Division was able to officially endorse a 40% reduction in effort, however it did not provide specifics on how this goal should be met.[322] Instead, it urged the Finfish Committee to develop more stringent proposals to curtail some of the excessive fishing mortality.[323]

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[320]Rhode Island Marine Fisheries Council Minutes 29 Jan. 1991.
[321]Ibid.
[322]Rhode Island Marine Fisheries Council Minutes 26 Feb. 1991.
[323]Ibid.

In March, the Finfish Committee presented the following ideas to ostensibly help eliminate 40% of the effort in the fishery:

1. A four fish rod and reel limit;
2. A continuation of the 5 inch mesh requirement and the 12 inch size limit;
3. Prohibiting night fishing by otter trawlers in Narragansett Bay north of a line stretching from Point Judith to Sakonnet Point;
4. A cessation on the deployment of gillnets on designated winter flounder spawning grounds;
5. Banning the possession of winter flounder taken with nets from December 1 through March 15 in Narragansett Bay north of the same line stipulated in the third recommendation; and
6. Making it illegal to fish for flounder in the coastal salt ponds, the Pawcatuck River and Little Narragansett Bay during January and February.[324]

It was decided to bring these recommendations to a public hearing.[325] However, Council member Tom Halavik requested that the RIDFW accompany each proposal with a confidence interval for its potential to meet the 40% target reduction.[326] Sometime after this request, yet prior to the May public hearing, the following proposals were added to the list:

1. A two fish (instead of four as suggested by the Finfish Committee), year round, hook and line bag limit for all Rhode Island waters along with a ban on catching winter flounder by nets between November 1 to April 1 north of a line drawn from the Point Judith Light to the Sakonnet Point Light (Loran C line 43960).

324Rhode Island Finfish Committee Minutes 15 Mar. 1991.
325Rhode Island Marine Fisheries Council Minutes 26 Mar. 1991.
326Ibid.

2. No possession of winter flounder taken by any means north of the Loran C 43960 line.
3. A complete year round moratorium on winter flounder fishing in all Rhode Island waters.[327]

There is no mention in the minutes about their origins. However, during the January meeting, John Stolgitis commented that some of his staff favored prohibiting the retention of winter flounder while fishing in Narragansett Bay.[328] According to the RIDFW's calculations, only the above stated options would meet the 40% curtailment in effort.[329] Therefore, all of the proposals suggested by the Finfish Committee, even in combination, were deemed to be inadequate.

Unlike what has occurred previously or since then, most of those in attendance at the May public hearing fully supported taking immediate action to help rebuild the stocks. The general consensus at all previous meetings was for as little regulatory interference as possible. One reason for this reversal may have been the lack of prior notice fully explaining the range of options that were going to be reviewed. Originally, the Council agreed to only consider the Finfish Committee's proposals, none of which, in all likelihood, would have been of major consequence for the commercial industry.

The sentiment expressed at the public hearing, was overwhelmingly in support of a closure. Based on this input, the Council unanimously voted to implement the year-round moratorium in Narragansett Bay, the coastal salt ponds, the Pawcatuck River, and Little Narragansett Bay (see figure 4.2).[330]

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327 Handout of management options considered at the 1 May 1991 public hearing.

328 Supra note 320.

329 Supra note 327.

330 Rhode Island Marine Fisheries Council Minutes 28 May 1991. (The vote was 7 - 0; council member Bob Smith did not vote because he was pending a legal decision on whether or not his participation in the issue represented a conflict of interest.)

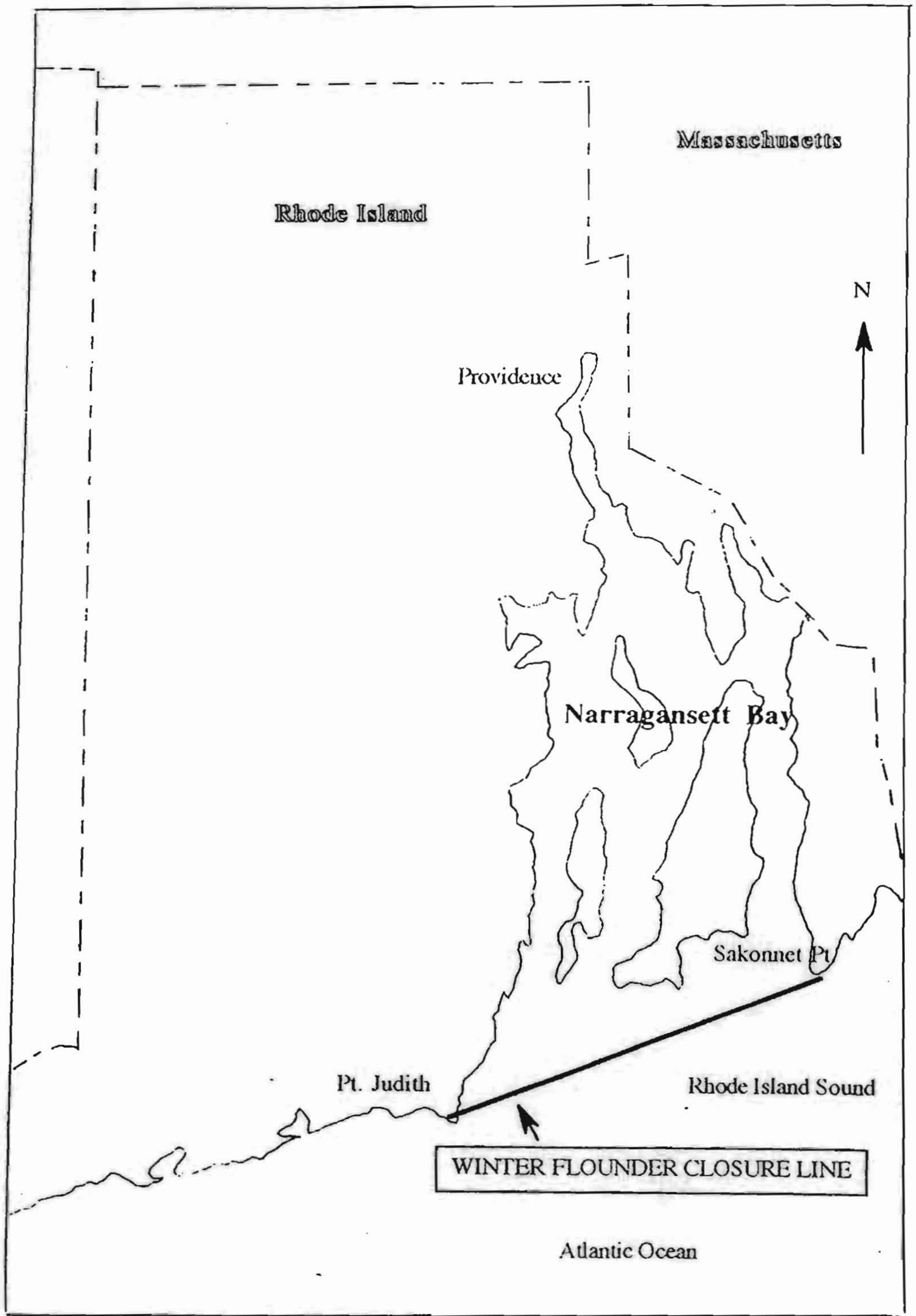

Figure 4.2: 1991 Winter Flounder closed area for Narragansett Bay

Immediately prior to the approval of the moratorium, John Stolgitis unsuccessfully tried to persuade the Council to pass a less restrictive plan.[331] Once again, the internal division within the RIDFW resurfaced. Despite the overwhelming support for the closure by his staff, he nonetheless recommended that a four fish hook and line limit coupled with a ban on night dragging during the winter would be sufficient to control overfishing and help restore the stocks.[332] Even after the passage of the moratorium, he continued to press for less restrictive regulations.[333] Eventually, to avoid a continuation of this situation, which was undermining the recommendations made by the RIDFW's winter flounder biologist, a group of staff members (including both deputy chiefs) elevated the matter to the Director of the DEM who decided in favor maintaining the moratorium.[334] While John Stolgitis' recommendation was overruled, the disunity exposed by this incident may have added impetus to the drive to rescind the ban.

News of the moratorium shattered the complacency of those who were economically dependent on the fishery, like commercial fishermen and bait and tackle store owners. They argued that the new restriction would put them out of business.[335] Additionally, many commercial fishermen felt they were being compelled to assume an inordinate amount of the burden to help the species recover. According to their perception of the problem, pollution, environmental change, predators (such as cormorants), and acidic seaweed (desmerestia) were responsible the collapse of the winter flounder population.[336]

In an attempt to invalidate the moratorium, several commercial fishermen threatened to initiate judicial proceedings on the grounds that the Council violated the guidelines

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[331]Ibid.

[332]Ibid.

[333]Tom Meade, "Flounder fishing will return to Rhode Island," Providence Journal 16 Feb. 1992, Section D: 14.

[334]Tom Meade, "Support remains strong to continue the flounder ban." Providence Journal 22 Dec. 1991, Section B: 14.

[335]Rhode Island Marine Fisheries Council Minutes 27 Aug. 1991.

[336]Ibid.

specified under the Administrative Procedures Act.[337] In an opinion rendered by Kendra Beaver, chief legal counsel for the DEM, it was decided that the announcement of the public hearing failed to explicitly state that the Council was considering such a closure and furthermore, comment was not sought on its potential economic impact on small businesses.[338] Therefore, based on this decision, another public hearing was held in November to address these issues. Although many small inshore draggers vehemently voiced their opinions that the winter flounder moratorium would lead to their financial demise, the Council decided to retain the ban.

Shortly after the conclusion of the second public hearing, the RIDFW presented its annual winter flounder stock assessment for 1991. The report offered a continuation of the depressing news concerning the health of the fishery. Both fishery-dependent and independent measurements used to gage abundance were at extremely low levels.[339] Since 1980, the amount of winter flounder had declined from 60 to 95%.[340] During this same period, the commercial catch had fallen by 75 to 90%.[341] In Narragansett Bay, the stocks were so decimated, that they were classified as being in a state of collapse and recruitment failure.[342] Furthermore, it noted that while estimates of fishing mortality in Narragansett Bay, derived from 1990 survey data and catch curve analyses, indicated that the rate of fishing mortality had fallen from 1.25 to 0.62, the unpredictability of fish stocks reduced to such critically low levels negated any comparison to traditional reference points (F0.1, Fmsy, and Fmed).[343]

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[337]General Laws of Rhode Island §§45-35-3.

[338]"New hearing set for RI winter flounder closure," Commercial Fisheries News Nov. 1991, Section A:1 4.

[339]Supra note 17 at 1.

[340]Ibid.

[341]Ibid.

[342]Ibid.

[343]Ibid. at 20 & 21.

Based on the recorded level of mortality, the assessment reported that the probability of recovery, even with the moratorium, was less than 25%.[344] It suggested that the ban may not be sufficient to ensure a recovery without additional restrictions.[345] Due to the seasonal migratory habits of the species which carry it beyond the closed areas, and the high probability of fishermen transferring their effort to coincide with the period when fish vacate the protected zone, the impact of the regulation was calculated to incur only a 22% reduction in fishing mortality.[346] Therefore, to increase the likelihood of a recovery within the next decade, the assessment advocated the need to further reduce fishing effort by 70 to 100%.[347] The report recommended that additional measures, possibly including a complete closure, were necessary; otherwise it warned, "If spawner biomass is driven low enough by overfishing, recruitment may fail regardless of climatic conditions."[348]

1992

As 1991 drew to a close, the movement to rescind the winter flounder moratorium gained momentum. The struggle to reopen the inshore fishery was one of two major contentious issues addressed by the Council during the first half of 1992.[349] It is no coincident that this movement coincided with the reinstatement of Council member Bob Smith, a commercial fisherman who had previously refrained from participating while the state Ethics Commission determined whether his involvement in the management of this fishery represented a conflict of interest. Immediately upon his return, he helped organize a coalition of four members (including himself) that sought to placate the demands of those who were against the closure.

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[344]Ibid at 21.
[345]Ibid.
[346]Ibid.
[347]Ibid. at 2.
[348]Ibid. at 10.
[349]The quahog digger - diver controversy was the other major issue.

In early 1992, the state Ethics Commission cleared Council member Smith to participate in the management of the winter flounder fishery after it determined that he did not earn in excess of $5000 or 5% of his income from the sale of this species.[350] Around the same time, members William Palombo, Ralph Boragine, and Nick Butziger (two commercial representatives and a charterboat captain), withdrew their support for the moratorium in response to the subsequent continuous outcry against the measure. As a result, the Council was divided four to four over the issue. This deadlock led to a more active role for the chairman, Malcolm Grant, who is empowered to cast the deciding ballot to make or break a tied vote.

In February, the first meeting in which Bob Smith was once again permitted to participate, the coalition attempted to replace the ban with more moderate restrictions. Council member Nick Butziger stated that the moratorium was too stringent especially since in his opinion, "fisheries management is an inexact science" and therefore conditions may not be as dire as they are made out to be in the stock assessments.[351] He suggested the following recommendations in lieu of the closure:

1. A continuation of the 12 inch size limit;
2. Instituting a minimum mesh size of 5.5 inches to retain winter flounder;
3. Prohibiting night dragging by otter trawlers working north of the Loran C 43960 line;
4. Banning the possession of winter flounder while commercial fishing from December 1 to March 1 north of the Loran C 43960 line as well as in the other currently closed areas;
5. A four fish recreational bag limit; and
6. Permitting a 25 pound by-catch allowance for vessels fishing during the closed season or with smaller mesh than 5.5 inches.[352]

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[350]Rhode Island Marine Fisheries Council Minutes 11 Feb. 1992.
[351]Ibid.
[352]Ibid.

On the initial vote, the proposal was deadlocked four to four, which required chairman Grant's participation who broke the tie by voting against the motion.[353] Rather than going on to new business, a long drawn-out struggle ensued to reach a compromise. After making some slight modifications, the proposal was once again defeated by a five to four margin.[354] On the third attempt, when the time period in item four was extended to include the month of November, three of the proponents of the moratorium (Saul Saila, Louis Othote, and Robert Randal) gave in and the motion carried by a seven to one vote.[355] The explanation for their reversal is not exactly clear. However, the marathon session which had been in progress for over four hours coupled with the constant vehement arguments in opposition to the moratorium by nearly everyone in the packed room, probably weighed heavily in their decisions.

Due to technical and procedural problems, the plan was never implemented. One of its major defects was that it failed to specify the geographic range for the 5.5 inch minimum mesh size limit and could therefore be interpreted, as written, to include all of the state's jurisdictional waters. Additionally, DEM legal counsel ruled that the action was invalid because, as specified in the Administrative Procedures Act, the Council failed to consider the economic ramifications of its decision.[356] Furthermore, it stated that the major revisions incorporated in the proposals required the scheduling of a new public hearing to solicit comment on the issue.[357]

A formal evaluation of the plan by the RIDFW indicated several deficiencies, foremost of which, was that it would not sufficiently reduce fishing effort to permit a reasonable chance of a stock recovery. Even without attempting to account for effort transfers, under the proposed package, the reduction in fishing mortality would be 17.4%

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[353]Ibid.
[354]Ibid.
[355]Ibid.
[356]Rhode Island Marine Fisheries Council Minutes 11 Mar. 1992.
[357]Ibid.

resulting in only a 30% probability that the stocks would recover by the year 2002.[358] Its major weakness was that the prescribed closure did not coincide with months traditionally known for producing the most winter flounder. Based on historical catch records, only 17% of the commercial and recreational occurs between November through February.[359] Additionally, the effectiveness of the night ban could not be calculated due to insufficient data.[360] As the report pointed out, another drawback with temporary spawning closures in general, is that any reduction in mortality is usually offset by an initial surge of fishing effort immediately after the restriction is lifted.[361] The RIDFW suggested, that if the Council was intent on reopening the fishery, the following alternatives be included for public comment:

1. Rearranging the close season to encompass the months of April, May, June and July to coincide with the peak period of productivity in the fishery;
2. Reducing the recreational bag limit to two fish;
3. Considering a 1% bycatch of winter flounder during the closed season.[362]

After the above-stated recommendations were approved as additional alternatives, the Council voted on whether or not to bring the proposals to a public hearing. Initially, it appeared as if the motion carried on the first try by a four to three margin, however, chairman Grant set a major precedent by voting to make a tie (four against - four in favor)

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[358]Mark Gibson, Evaluation of Winter Flounder Management Measures Discussed and Clarified at the March Meeting of the Rhode Island Marine Fisheries Council Rhode Island Division of Fish and Wildlife, Apr. 1992: 3.

[359]Ibid.

[360]Ibid. at 2.

[361]Ibid. at 3.

[362]Ibid. at 2.

and thereby (as specified in *Robert's Rules of Order*) defeating the majority needed to pass the proposal.[363]

POSTSCRIPT

In February of 1994, bait and tackle store owners spearheaded a successful drive to modify the ban to permit a limited recreational fishery. By a four to one vote, the Council passed the following new regulations:

1. To maintain the existing area closure for flounder fishing;
2. A state–wide five (5) inch minimum mesh size to keep and possess winter flounder;
3. A limit recreational fishery of four winter flounder per day during the month of April.[364]

In an attempt to rationalize reopening a limited recreational fishery, it was argued that the additional mortality imposed by the one month fishery would be offset by the five inch minimum mesh size requirement.[365] However, as noted by RIDFW biologist Mark Gibson, it was unclear as to what effect this plan would have on total fishing mortality.[366] Therefore, despite no real improvement in stock abundance, other than a better than average 1992 year class, the Council elected to pass its first major exemption to the inshore moratorium — just a few months shy of its three year anniversary.

Although it was uncertain at the time of the meeting, subsequent analyses have determined that this measure will raise overall fishing mortality. This is especially bad news because in addition to hindering a recovery, as things currently stand, the state has exceeded the recommended fishing mortality rates developed by the ASMFC in its Fishery

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363 Rhode Island Marine Fisheries Council Minutes 10 Apr. 1992.
364 Rhode Island Marine Fisheries Council Minutes 16 Feb. 1994.
365 Ibid.
366 Ibid.

Management Plan for Inshore Stocks of Winter Flounder.[367] Whereas in the past these guidelines were nonbinding, as a result of the Atlantic Coastal Fisheries Cooperative Management Act (passed as Title VIII of H.R. 2150, the Coast Guard Reauthorization Bill), all management plans passed by the ASMFC are now mandatory. Modeled after the highly successful Striped Bass Act of 1985, those states out of compliance with ASMFC plans risks having a moratorium imposed an all fishing for the species in question by the Secretary of Commerce. Consequently, sometime in the near future, the Council will have to take action to better protect the stocks.

CONCLUSIONS

The absence of clearly expressed goals and objectives has seriously hindered the management of the winter flounder fishery in Rhode Island. In reviewing the regulatory history of this fishery, it is apparent that there was no predetermined plan or guidelines by which to manage, never mind conserve, this species. Instead, time after time, actions were taken in response to a crisis, and not as part of a preconceived strategy to help protect the stocks. Additionally, Council members solely determined by themselves what actions to take, and were therefore compelled to make value-laden judgements about the proper course of management. Given the diversity of members involved in the decision-making process, and therefore diversity of opinions about what is good or bad for the fishery, it is not surprising that the management process was marred by infighting and incessant delays, all of which has been to the detriment of the resource. Combine this with a willingness to foremost accommodate the needs of the fishermen instead of those of the resource, and it

[367]Mark R. Gibson, Rhode Island Division of Fish and Wildlife, Personal Contact, 29 Aug. 1994.

becomes even more apparent why the Council was unable to pass substantive regulations to stem the collapse of this fishery.

In retrospect, the Council bears most of the responsibility for the current poor health of the winter flounder population. Yet, the RIDFW is also shares some of this responsibility. Although it has provided many invaluable stock assessments and technical advice, at other times it has offered contradictory recommendations (which will be discussed in greater detail later in this chapter). However, the intent of this analysis is not to assign blame after the fact; instead, it is intended to review the decision-making process so that faults within the system can be identified and hopefully rectified in the future.

In looking back at the stewardship of this fishery, and bearing in mind that in a period of about ten years the abundance of winter flounder in Narragansett Bay went from near–record highs to an all time low, it becomes apparent that something went terribly wrong. While some may look to blame unfavorable natural conditions such as above-average winter water temperatures, or other causes like the combination of pollution and the loss of critical habitat, according to the best available data, the driving force behind the collapse of this fishery has been the inability to curtail the overfishing that has taken place year after year. It is true that overfishing in federal waters and coastal development and pollution are partially responsible for the present state of affairs, yet stock models by the RIDFW indicate that the vast majority of winter flounder originating from Narragansett Bay are caught in state waters and that it is excessive fishing mortality, not habitat degradation, that is most responsible for reducing stock size (with the possible exception of the power plant mortality in Mt. Hope Bay). Unlike in some fisheries, where incorrect decisions are made due to a lack of data, the managers in this fishery have had the luxury of numerous data sources and stock assessments. While maintaining the stock at its former peak of abundance from the late 1970s and early 1980s is unrealistic (due to several unseasonably warm winters), it is not too much to expect that it could have been prevented from collapsing the way it did. At the very least, more timely conservation measures would have, in all likelihood, maintained a greater spawning stock biomass so that it would not require a decade or more to rebuild the population.

The lack of management goals and objectives makes it extremely difficult to objectively assess the performance of this management system. As previously discussed in an earlier chapter, an organization's goals and objectives help to identify what it is striving to attain. Since its goals and objectives are unclear, by what measures or standards should the Council's management of the winter flounder fishery be judged a success or failure? In other words, what is its specific purpose? Is it the job of the Council, in conjunction with advice from the RIDFW, to protect the living marine resources under its jurisdiction or to see that these resources are fully utilized with little regard for the future? As things currently stand, nowhere is it written that the Council is supposed to even prohibit overfishing. It is these questions that have not only perplexed the author, but have also left the Council without the guidance to better handle the problems it encountered in trying to manage this fishery.

Under this management system, regulations are born out of crisis situations, not as part of a preconceived strategy to conserve the stocks. Most, if not all of the regulations in the winter flounder fishery have been passed in response to stock assessments supplied by the RIDFW. For example, the first minimum size limit (11"), passed in 1985, came about after the RIDFW noted during the previous year that such a measure would be beneficial. As another example, the 1991 inshore moratorium came about after the 1990 stock assessment noted that more stringent regulations were needed to increase stock abundance. This process, whereby advice from the RIDFW initiates the Council to take action, is not bad in and of itself. In fact, it is healthy sign that the Council, in some situations, is at least responding to the data provided by the RIDFW. However, it is mostly after the Council receives this information, when it must try to act in a timely fashion and reach a consensus about what measures to take, that things start to fall apart.

In its strictest sense, Rhode Island does not truly have a *management system* for its marine fisheries. As previously discussed, an essential element of management is trying to reach some predetermined goals and objectives. The Council provides a forum whereby regulations can be promulgated, yet it is does not seek to achieve any one specific aim. Instead it responds on a case-by-case basis, or more specifically crisis-by-crisis basis, whereby its members ostensibly work to resolve the problem at hand. In this process, Council members are free to individually determine what is a desirable outcome. These decisions are shaped by their values, which often vary from individual to individual, or user group to user group. This would not be such a major obstacle they all could agree to prioritize long-term sustainability ahead of all other matters. Ideally, this should be the case; however in practice, where short-term economic concerns often exert pressure against conservation, this is usually unrealistic — especially for those managers who make a living from commercial or recreational fisheries.

In specific reference to the management of the winter flounder fishery, like in most other fisheries, this disparity in values can often be a source of contention. One commonality that runs throughout the period under consideration (1984–1994), is the fundamental difference of priorities between the biologists from the RIDFW and those who earn an income from commercial or recreational fisheries. In most cases, the biologists have recommended a risk-averse strategy to manage the fishery; fishermen, on the other hand, have generally opposed this advice. For example, in its formal stock assessment of 1987, the RIDFW suggested that while the winter flounder stocks were not in any immediate danger, precautionary measures should be taken.[368] Yet subsequently, several months later in March of 1988, during a public hearing in which input was sought on a possible 12 inch minimum size limit, many commercial fishermen in attendance advocated against the measure, arguing that if would cause too much of a financial hardship and that

[368]Supra note note 249.

the previous 11 inch size limit was not given enough of an opportunity to prove its effectiveness.[369] A year later, despite a growing sense of urgency to take some measures to conserve the stocks, many fishermen once again protested against a proposal for a 12-inch size limit and a 5-inch minimum mesh size based on nearly identical arguments from the year before.[370] Almost every subsequent recommendation by the RIDFW to conserve the fishery has been meet with stiff resistance because of financial reasons.

Naturally, this discord has spilt over into the Council. In general, the Council is commonly divided between those who those earn an income from fisheries and those who do not. While this is not always a given, it usually seems to work out this way. Those representatives who make a living from commercial or recreational fisheries tend to be more inclined to place the short-term economic needs of fishermen ahead of the biological needs of the resource. For example, this dichotomy was blatantly obvious when the Council tried to rescind the inshore moratorium in April of 1992. The motion eventually failed to carry a majority, with the vote split evenly, with those members who do not earn an income from fisheries voting against it and the other members, a charter boat captain and the three commercial representatives, voting to pass it.[371]

It is this difference in values, where some are more willing than others to jeopardize long-term sustainability for greater short-term rewards, that makes fisheries management so contentious. Unfortunately, when there is no mechanism to resolve these differences, such as in Rhode Island, the result is usually incessant turmoil where management decisions are delayed at the expense of the resource. For example, as noted previously, in its 1987 stock assessment, the RIDFW recommended that precautionary measures be taken to help conserve the stocks and protect the viability of the fishery.[372] Yet despite this warning, the Council did not pass any new regulations until November of 1989, nearly two years later!

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[369]Supra note 270.
[370]Supra note 298.
[371]Supra note 363.
[372]Supra note 112 at 8.

Additionally, these regulations, a half-inch size increase (11.5") and a 5-inch mesh requirement for the lightly-fished (commercially) northern Narragansett Bay, did not take effect until January of 1990.[373] During this time, the stock rapidly deteriorated to where the RIDFW went from advising that there was no immediate danger of a stock collapse in 1987, to warning in 1990 that there was a significant probability of a stock collapse. Throughout this critical period, the Council was embroiled in nearly constant quarrels over what action, if any, to take. Eventually, after failing to develop any substantive regulations on its own, it turned to the RIDFW to suggest proposals that it could vote upon.[374] (As discussed earlier in this chapter, this in turn precipitated another battle over whose responsibility it was to develop such proposals.) Consequently, the Council squandered this two-year window of opportunity to take more immediate action to help conserve the fishery.

To help facilitate and expedite the decision-making process, a system of goals and objectives would be of invaluable assistance. As noted in the second chapter, goals and objectives, if stated clearly and concisely, can make conflicting activities more recognizable and help evaluate choices when there are conflicts. For example, a goal such as to conserve the stocks by preventing overfishing (which would of course have to be further specified through more detailed objectives) could help to alleviate some of the differences between Council members by prioritizing their values, at least in the context of this decision-making process. That is, it would compel those members who feel otherwise, to accept the fact that their foremost responsibility is to ensure the viability of the resource, not protect the short-term economic needs of fishermen. Most importantly, it would accelerate the decision-making process to more quickly respond to a rapidly changing situation, such as occurred in the winter flounder fishery. Disagreements may still ensue over the best

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[373]Supra note 303.
[374]Supra note 291.

course of action to protect the stocks, yet it would narrow the focus of these arguments from a contest over allocation rights to that of a struggle over strategies of conservation.

It is important to remember that such goals, if they are to be useful in facilitating the decision-making process, should be stated in a straightforward manner and not leave any doubt about an organization's foremost priority. For example, consider the situation on the national level, where fisheries are supposed to be managed according to, among other things, the nebulous concept of optimum yield, which is defined as the maximum sustainable yield "as modified by any relevant economic, social, or ecological factor."[375] Such a goal can hardly be said to make conflicting activities more recognizable and help compare choices to resolve differences, since it simultaneously makes four things, maximum sustainable yield as well as economic, social, and ecological factors, all of equal importance. Therefore, fishery meetings on the national level can, and do, become bogged down as different user groups vociferously argue to protect their own parochial interests while its councils are left without much guidance to resolve these differences.

A system of concise goals and objectives, in addition to facilitating the decision-making process, could be extremely beneficial in developing a more risk-adverse fisheries management program. It is important to bear in mind, that under the current system in Rhode Island, not only are managers often unable to make timely decisions, but their eventual decisions usually cater more to the fishermen than the resource. That is, there is a greater willingness to err favoring the economic interests of the fishermen than protecting the viability of a fishery.

For example, consider what transpired when the Council passed two substantive measures to protect the winter flounder fishery in the late fall of 1989. As previously discussed, after delaying for nearly two years, in November of 1989, the Council finally managed to adopt a 12 inch minimum size limit and a 5 inch minimum mesh size

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[375] 16 USC 1802 § 3(7).

requirement to possess winter flounder while fishing in Narragansett Bay—north of an imaginary line drawn from Bonnet Point to Brenton Point and from Sachuset Point to Sakonnet Point.[376] Subsequently, after an outcry of protest that these measures would be too financially devastating, a month later, the Council gave in and modified its original regulations. The 12 inch size limit, which was to take effect in January of 1990, was broken down into two progressive size limits of 11.5 inches for 1990 and 12 inches for 1991. Even worse, the 5 inch mesh size requirement was substantially weakened by pushing the line further north in the Bay to an area that received much less fishing effort from otter trawl vessels.[377]

As another example, consider what the Council has attempted since it passed the inshore winter flounder moratorium in the spring of 1991. Once again, after an outcry of protest, some members have changed their position on the ban. Despite no new data indicating any improvement in the condition of the stocks, in 1992 a serious attempt was made to repeal the ban, because, as one of the proponents put it, "fisheries management is an inexact science."[378] Therefore, according to this argument, because of the imprecisions of forecasting stock size, it is better to err in favor of the fishermen than that of the resource. If not for a technicality, the moratorium would have been replaced by a serious of measures that taken as a whole, were much less effective in reducing fishing mortality. In 1994, another attempt to modify the ban, spearheaded by bait and tackle store owners, was successful in pushing through a limited one-month open recreational fishery with a four fish bag limit.[379] While some may argue that the simultaneously-passed 5 inch minimum mesh size requirement for all state waters would afford additional protection for the resource, as noted by RIDFW biologist Mark Gibson, the effects of such a trade off are

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[376]Supra note 302.
[377]Supra notes 303.
[378]Supra note 350.
[379]Supra note 364.

uncertain.[380] Therefore, once again, it was better to gamble with the viability of the fishery than risk hurting the fishing industry.

Throughout the history of the management of this fishery, the RIDFW has been of invaluable assistance providing technical stock assessments and quantitative analyses of regulatory proposals. Yet, in some situations, internal strife within the RIDFW has led it to provide contradictory recommendations. Nowhere was this more evident than when the inshore winter flounder moratorium was passed in 1991. At the time, the then Chief of the RIDFW, John Stolgitis, vehemently disagreed with a group of biologists on his staff, including both deputy chiefs, over the necessity of a moratorium. Even after the passage of the moratorium, he continued to argue that it was too Draconian. In addition to being a public embarrassment, this division also served to undermine the credibility of his own biologist's stock assessments and subsequently provided further impetus to try and rescind the moratorium.

In conclusion, a once vibrant resource has been reduced to a shadow of its former self. In a period of just over a decade, the near-record abundance of winter flounder in Rhode Island waters, especially Narragansett Bay, has drastically dwindled. Today, its spawning stock biomass is so low, that it is incapable of producing a dominant year class even under favorable natural conditions. The real tragedy is that despite ample warning of an impending crisis, the Council failed to take substantive measures to help prevent the collapse of this fishery. Instead, regulations were passed in fits and spurts, and usually only after a crisis had developed. Without a system of goals and objectives to define its purpose, the Council struggled to make timely decisions and often failed to take the necessary precautions to conserve the stocks. Consequently, a once important commercial and recreational fishery has been squandered.

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[380]Ibid.

CHAPTER V
RECOMMENDATIONS

INTRODUCTION

The conservation of marine fisheries starts with the recognition that they are a foremost a public resource, and as such, are held in trust for everyone, including generations yet to come. It is widely understood that fisheries are of enormous social, economic, and ecological value. If used wisely, they can provide a continuous source of food, employment, and recreation, without endangering their biological role in the marine environment. Unfortunately, in practice, this is rarely the case. In Rhode Island, no where has this failure been more evident than in the collapse of its winter flounder stocks over the past ten years. In an effort to help revitalize this resource and provide the framework to better manage many other of the state's marine fisheries, this reports offers the following four recommendations:

Recommendations
1. A system of unambiguous goals and objectives should be adopted to improve the efficiency of the Council.
2. Conservation — as defined through sustainable production — not allocation, should be the overriding priority when administering the state's marine fisheries.
3. The Rhode Island General Assembly should provide more guidance for the Council by stating that its foremost responsibility is to promote sustainable production.
4. Scientific advice should play a greater role in the decision-making process.

Additionally, this section will include a case study of the Atlantic striped bass fishery and its management over the past ten years, to illustrate how the recommendations listed above have been put into practice to help rebuild a fishery that, similar to Rhode Island's winter flounder fishery, was inefficiently managed for many years.

The failure to halt the decline of Rhode Island's winter flounder fishery is a microcosm of the problems occurring on both a global and national level. For example, the total world-wide catch has regressed nearly 5 percent since 1989.[381] Some regions have been harder hit than others; four areas in particular — the east-central Pacific and the northwest, west-central, and southeast Atlantic — have declined by approximately 30 percent during this same period.[382] According to the United Nations Food and Agriculture Organization, four of the world's 17 major fisheries are commercially depleted.[383] (While it is true that in some instances multiple factors are responsible for the decline, for the most part, excessive fishing mortality remains the principal source of depletion.) Closer to home, on a national level, 42 percent of the 153 species assessed by the NMFS are designated as overfished.[384] In the Northeast, as a result of the severe overfishing of traditional fish stocks such as cod, haddock, and yellowtail flounder, the New England Fisheries Council has shut down a large section of Georges Bank — what was once the nation's most prolific fishing grounds.

Many fishing industry representatives have cautioned, that marine fisheries often occur in cycles, and therefore managers should not overreact to the present scarcity of some species. For example, as noted in historic catch records and research survey data, the winter flounder in Narragansett Bay was at the peak of its abundance during the mid to late 1960s, only to decline for most of the 1970s, and subsequently rebound later in the decade and throughout the early 1980s (see figures 3.9 and 3.11). Therefore, according to this argument, the present condition is just a natural trough in its abundance cycle. However, it

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[381] Scott Sonner, "Oceans' bounty nearly depleted," Providence Journal, 24 Jul, 1994 sec. A: 1 & 11.

[382] Ibid.

[383] Colin Nickerson, "Stripping the sea's life" The Boston Globe, 17 Apr. 1994: 1 & 24-25.

[384] Marine Fish Conservation Network A National Agenda to Protect, Restore, and Conserve Marine Fisheries, Pamphlet.

is important to keep in mind that as time progresses, so does technology. For example, on a very broad historic scale, since the establishment of the first European settlements along the Bay over three hundred years ago, fishing technology has evolved from crude spears and fish traps to powerful motorized trawlers armed with a vast array of sophisticated technology designed to increase their harvest. More recently, over the past several decades, fishermen have acquired, among other things, precise satellite positioning, larger and stronger synthetic fishing nets, fish-finding sonar, and more powerful vessels. It is becoming increasingly apparent, that without precautions, modern fishing fleets are now powerful enough to severely deplete a stock in a short period of time.

In reference to the winter flounder fishery in Narragansett Bay, the RIDFW has warned that spawning stock biomass, as it currently stands, is so depressed that the species may not be able to produce a good year class even under optimal natural conditions. This may have been the case in 1992, when despite the advantage of a relatively cold winter, recruitment only improved marginally and there failed to appear a strong year class.[385] The RIDFW continues to warn that a subsequent recovery and consequently better landings may not be forthcoming without further harvest restrictions. Unfortunately, some continue to argue that its present low abundance is not so dire, claiming that its current status is a natural phenomenon that has occurred from time to time in the past (before accurate records were kept) and is not the result of continuous fishing year after year. However, considering the consequences of what may occur if little or no action is taken (commercial extinction), the state must now act responsibly and adopt a risk-averse management program.

Some still continue to argue that the winter flounder's current depressed status is the result of a combination of factors, including pollution and the loss of habitat, and therefore fishermen should not be singled out to bear the burden of rebuilding the stocks.

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[385]Subsequently, in 1993 recruitment strength remained poor despite conducive winter water temperatures. The same appears to be true for 1994. (Mark Gibson, Personal Contact 26 August 1994.)

However, for reasons previously discussed, reducing fishing mortality is the only practical and feasible way to increase stock abundance over the next decade (see chapter 3).

Proponents of Rhode Island's council system contend that despite its shortcomings, it provides adequate protection of the state's marine fisheries. For example, although it took years to come about, the Council ultimately passed an inshore winter flounder moratorium. However, before accepting this as being indicative of what can be expected of this system, it is important to review the conditions under which it was adopted and what has since transpired. As discussed in the previous chapter, in looking back over the minutes of the Council, it is interesting to note the unusual circumstances under which the moratorium came about. For instance, the original proposal for such a restriction did not originate from the Council and was not formally agreed upon to be brought to a public hearing. Instead, somehow — most likely through the input of the RIDFW — immediately prior to the public hearing in which it was approved, it found its way onto a list of innocuous proposals previously submitted by the Council that even in their entirety would have done little to change the status quo and conserve the resource. In what had previously or since occurred, most of those in attendance at the public hearing supported the closure. As many opponents argued afterwards, had they known that the Council was considering taking such action, they would have attended the public hearing and spoke out against it. This may sound like a poor excuse, yet it is worth remembering that the subsequent public hearing advised by the DEM legal counsel, was due in part to this specific oversight.

Since its passage, several members have rescinded their support for the moratorium. As noted in the previous chapter, over the past several years there has been intense pressure to revoke or weaken the ban. In two instances, the moratorium just barely survived. If not for a technicality, less than a year after being adopted, it would have been replaced with a much weaker seasonal (winter) closure. Another attempt to reopen the fishery failed only after the chairman set a precedent to make a tie vote and thereby undo the majority needed to pass the proposal. Finally, in 1994, a movement lead by bait and tackle store owners succeeded in securing a limited recreational fishery, despite no real improvement in the status of the stocks. As a result, the state is currently out of compliance with the mandatory fishing mortality rates stipulated by the ASMFC and therefore, as stated under the Atlantic Coastal Fisheries Comprehensive Management Act, faces a possible imposed moratorium if conditions remain unchanged. In retrospect, considering the unique set of circumstances under which it was adopted and what has transpired since its passage, the moratorium seems more like an aberration rather than proof of the Council's commitment to conservation. Additionally, considering these circumstances, it seems quite likely that the fishery will eventually reopen due to outside pressure, rather than as the result of a true stock recovery.

With this in mind, and with many of its other marine fisheries also suffering, it is important, now more than ever, that the state make it a priority to better steward these valuable natural resources. Under the present system, the state has abdicated its management responsibilities to the sole discretion of a citizen-based council dominated by commercial and recreational fishermen. Its past performance has proven that this arrangement is unreliable in safeguarding fish stocks from overexploitation. Yet rather than implementing a brand new system, which in addition to being a long drawn-out process would most likely be plagued by unforeseen start-up problems, the following recommendations may provide a remedy to revamp the Council and make it a better guardian of long-term sustainable production.

RECOMMENDATION 1

A system of unambiguous goals and objectives should be adopted to improve the efficiency of the Council.

The stewardship of Rhode Island's marine fisheries would greatly benefit from a system of unambiguous goals and objectives. In comparison to most other states, Council members operate in one of the lease restrictive environments. They are free to pass regulations without subsequent approval by a supervisory agency nor are they responsible for meeting any predetermined legislative requirements (i.e. such as to prevent overfishing). With the exception of some procedural restraints, the state's fisheries are administered solely at their discretion. Furthermore, in an attempt to accommodate a broad spectrum of interests in the rule-making process, the Council is inclusive of both commercial and recreational fishermen as well as others skilled in fisheries biology. The combination of these two conditions has proven to be anything but successful. To understand why, it is important to keep in mind what can be expected of the current set up, which brings together a diverse group of participants each with their own expectations or goals. Each individual's values, and how they are prioritized, play an important role in which goals are selected. They shape his perception of the issue at hand and what course of action to follow. Unfortunately, in fisheries, seldom is their a consensus as to which values are most appropriate. This is especially true when dealing with people of different backgrounds. Consequently, it should not be surprising that on the Council, each member's values often differ, or even worse, are at cross purposes to one another. And therefore, it is not unusual for individual members to be working towards dissimilar or opposite goals from each other.

Without a system of goals and objectives, the Council operates at a great handicap at recognizing conflicting activities or comparing choices when differences occur. The result is a decision–making process that is prone to incessant delays as Council members struggle to reach a consensus on what course of action to take. This inability to make timely decisions or adopted precautionary measures is largely to blame for the precarious position the winter flounder is in. The magnitude of the decline of this once-abundant species is reflected in the deterioration of its fishery. Since the early 1980s, the commercial CPUE of winter flounder caught in and around Rhode Island waters has plummeted nearly

81% while the recreational CPUE has fallen off by 90%.[386] Additionally, its abundance, as determined in several local trawl surveys, is at or near record low levels. Yet despite being kept abreast of the situation through stock assessments provided by the RIDFW, the Council has been generally ineffective in stemming the decline. For example, no where was this more apparent than when the Council delayed for two years before it responded to the 1987 RIDFW recommendation to take precautions to help conserve the fishery before conditions worsened. By time it took action in late 1989, the population was in a tailspin. By its next major move — the inshore closure of 1991 (nearly two years later!) — continuous overfishing year after year had decimated stock biomass to the point where a reasonable chance of a recovery was (and still is) estimated to take about a decade.

The state can take great strides towards improving the efficiency or responsiveness of the Council by compelling it to adhere to a system of unambiguous goals and objectives. Such a measure would help instill a truer sense of management, where decisions are made as part of a preconceived strategy rather than in reaction to a crisis. In understanding the pivotal role that goals and objectives serve in any management program, whether it concerns the stewardship of a natural resource or the business decisions of a multibillion dollar corporation, it is important to keep in mind the definition of management as stated in the second chapter:

> Management is the art and science of determining, coordinating, and utilizing human and material resources to reach the goals and objectives of an organization. It is a process that includes elements of planning, giving direction, coordinating, organizing, and controlling [an] organization to reach its goals and objectives.[387]

For the Council, a system of goals and objectives would provide a common thread to help bring its divergent interests together. If clearly stated, they can specify its ultimate purpose

[386]Supra note 24 at 16.
[387]Supra note 4.

and help reconcile the disparity of values of its membership — at least in the context of its decision-making process.

RECOMMENDATION 2

Conservation — as defined through sustainable production — not allocation, should be the overriding priority when administering the state's marine fisheries.

As things currently stand, the Council is a state regulatory body that operates without a specific purpose other than to administer the state's marine fisheries as it so determines. As previously discussed, seldom do participants involved in the decision-making process agree over what goals should be selected. If a system of goals and objectives is adopted as suggested in the first recommendation, it is imperative that conservation be made unequivocally the foremost priority. Given the disparity of values of its members, under no circumstances should these goals and subsequent objectives be ambiguously stated. Such a situation would only precipitate what has occurred on the federal level, where the nation's fisheries are managed under the nebulous goal of optimum sustainable yield. Therefore, it must be absolutely clear that issues of allocation are secondary to maintaining sustainability.

While it may seem that the ultimate aim of fisheries management is conservation, in practice this is often not true. Unfortunately, administrators are generally driven by obtaining benefits that are accruable solely to themselves, not the resource. As previously noted, "a fundamental premise [of fisheries management]... is that all benefits derivable from fisheries management are accruable solely to man."[388] While some environmentalists and biologists who are also policy makers would disagree with this statement, it is

[388]Supra note 87.

important to keep in mind that many citizen-based regulatory bodies are dominated by user groups, not ecologists or scientists. For example, on the Council, two-thirds of its members are commercial or recreational fishermen. Consequently, there is an inherent conflict of interest for those who are supposed to serve as guardians of the resource and yet at the same time make a profit or derive some other means of satisfaction from harvesting this same resource.

Fisheries management would be a fairly simple task if all participants subscribed to the goal of sustainable production. That is, to harvest the resource so as to maintain a spawning stock biomass that can reasonably be expected to perpetually regenerate those losses due to natural attrition and fishing mortality. Unfortunately, in practice, the realization of this goal has proven to be elusive. In addition to the conflict of interest discussed in the previous paragraph, there are several other reasons why fishermen are generally reluctant, outside of what they may ostensibly claim, to support sustainable production. Some of their reluctance stems from the innate inefficiencies of harvesting a common property resource. For example, in such a fishery, the best intentions of those fishermen who are conservation minded can be easily thwarted by less scrupulous fishermen willing to risk their future for greater short-term profits. Additionally, the benefits derived by forsaking present catch can be easily dissipated by others who enter the fishery when conditions improve.

The present state of affairs is in some respects analogous to Winston Churchill's criticism of appeasement, in which he compared it to that of feeding an incessantly hungry alligator those people standing around you in the hopes that you will be the last one eaten. As things currently exist, in fisheries, different user groups and individual fishermen are in fierce competition with one another to maintain or increase their present catch with little regard for the future. Ultimately it winds up being a struggle to be the last one in business as the resource dries up. This may be an overstatement, however it is a fairly accurate analysis of the mentality that drives the management process. While concessions are occasionally made to reduce fishing mortality, seldom are these measures ever taken as a precaution, nor do they ever go far enough to make any significant difference by the late crisis stage in which they are adopted. All too often, it a case of too little, too late. In the end, when the resource ultimately is depleted, the exact condition they are trying to avoid — to incur any major disruptions that will effect their profits — has become a reality anyway. While it may be true that abiding by a strict set of conservation guidelines will impose smaller annual harvests, at least all concerned parties can continuously generate some revenue without the disastrous results of long-term closures that all too often seem to be a natural progression under the current system.

RECOMMENDATION 3

The Rhode Island General Assembly should provide more guidance for the Council by stating that its foremost responsibility is to promote sustainable production.

As previously noted, the Council is a regulatory body that operates without a specific purpose other than to administer the state's marine fisheries. With the exception of some procedural constraints, it is accountable to no one and can make decisions as it feels appropriate. Such an arrangement, which has been a boon for fishermen seeking to operate with a minimum of regulatory interference, has come at the expense of protecting the interests of the general public. It has catered to the fishing industry's demand to maximize its short-term profits. Consequently, a resource that is in theory held in common by all citizens of Rhode Island to enjoy and appreciate, is being allocated for the benefit of a privileged few. While it is true that in many instances these individuals have invested heavily in harvesting capital and have the most to lose if their catches are reduced, they also stand to profit greatly if conditions improve. Considering what has transpired since the inception of the Council back in 1976, the state must act to reform the present management system so that its marine fisheries are held in trust for all to enjoy, including generations yet to come.

To help accomplish this, the state must more definitively define the overall purpose of the Council. Throughout its existence, the Council has been severely hindered by a lack of guidance to help direct the decision-making process. Without repeating much of what is stated above, this deficiency has been further exacerbated by the diversity of its membership. The result is a decision-making process prone to incessant delays and incapable of adopting pre-emptive strategies to avert a crisis. Without an operating directive, its members can and often do support policies that are at cross purposes to each other. As previously noted in chapter two, the closest example of an operating guideline can be found in the 1981 act that recodified Title 20 of the General Laws of Rhode Island. Under this law, "the animal life inhabiting the lands of the state... and the marine waters... can be developed, preserved, and maintained for the beauty that wild animals bring to the environment."[389] While such a goal offends no one, it is of little functional value. For example, is it realistically possible to both simultaneously "develop" and "preserve" a natural resource? What should take priority when there is a conflict of such a nature? While the General Assembly does go on to state that harvest restrictions should be adopted for the "conservation and perpetuation of all species of fish and wildlife"[390] it still must more definitively prioritize conservation ahead of allocation. The failure to do so will continue to ensure that when administering the state's marine fisheries, the interests of the general public will fall by the wayside in the industry-dominated Council.

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[389]Rhode Island Public Law 1981, chapter 197.
[390]Ibid.

RECOMMENDATION 4

Scientific advice should play a greater role in the decision-making process.

It is not uncommon to hear Narragansett Bay compared to that of a specimen under a microscope. That is, with the nearby prestigious University of Rhode Island Graduate School of Oceanography, federal representatives who take an active interest in maritime issues, and a dedicated state environmental agency, there is a plethora of academic and government studies focusing upon the Bay. A number of these programs are dedicated to monitoring the status of its fisheries in one way or another. For example, there are four major trawl surveys inside and just outside the Bay that provide a continuous time series of abundance data on numerous species, including the winter flounder. Additionally, commercial and recreational catch and effort data are collected by or under the supervision of the National Marine Fisheries Service. All of this information is processed and analyzed by the RIDFW and summarized in annual or periodic stock assessments. Despite the time, effort, and money spent on collecting and processing this data, it is only of marginal use in managing the state's marine fisheries.

As previously discussed, the Council is free to administer the state's marine fisheries as it so decides. Its decisions are final and do not need subsequent approval from a state agency or have to conform to some pre-establish guidelines, such as to prevent overfishing. Therefore, it can ignore or act in direct defiance to the best available data as presented by the RIDFW. No where has this been more true than in its attempt to reopen the winter flounder fishery after the 1991 inshore moratorium. Despite the continuous warnings of the RIDFW that additional precautions are necessary to realistically promote a recovery, the Council has attempted on several occasions to rescind or weaken the ban. As noted previously in chapter 4, in 1992, less than a year after adopting the closure, the

Council voted to reopened the fishery with only some minor restrictions. If not for a technicality, this would have become a reality. Later that same year, the chairman had to set a precedent by interceding to make a tie vote to prevent a similar motion from being approved. Finally, in 1994 the Council voted to allow a limited, one-month recreational fishery despite continued urging by the RIDFW to further curtail fishing mortality.

It should be remembered that fisheries management is a human-centered not resource-centered process. That is, in essence, it is a contest by individuals or user groups for the largest share of the pie. All too often, it is a process where the benefits secured by fishermen — to minimize regulatory interference and maximize their total allowable catch — come at the expense of the long-term health of the resource. To reverse this trend, scientific data should serve as a tool to restrain fishing mortality by setting up minimum thresholds below which stock abundance may not fall if there is to be a reasonable chance of maintaining sustainable production. Yet rather than getting into a general discussion of how such a precaution can be employed, it would be better to present a case study of how this idea and the goals mentioned above have actually been put into practice to help rebuild and efficiently manage a fishery.

MANAGEMENT OF THE ATLANTIC STRIPED BASS FISHERY: A CASE STUDY

Under the ASMFC Interstate Management Plan for Striped Bass, a system of goals supported by quantifiable objectives has been the cornerstone of a highly successful effort to help protect and rebuild this fishery. Just a decade ago, the future of the Atlantic striped bass fishery appeared to be in serious jeopardy. Between 1973 and 1983, the commercial harvest of striped bass had plummeted from a record high of 14.7 million pounds to an all-time low of 1.7 million pounds (see figure 5.1).[391] The recreational catch, as estimated through the MRFSS, paralleled this trend, nose diving from 6.6 million pounds in 1979 to 1.0 million pounds in 1984.[392] Furthermore, throughout this same period, year class strength, as measured through several research surveys, remained dangerously weak for over ten years (see figure 5.2). Although this fishery experienced ups and downs in the past, the severity of this decline was alarming.

To better understand what happened, it is helpful to briefly review some aspects of this species' life cycle. The striped bass is an anadromous fish that is rarely found far from shore (see figure 5.3). The Atlantic population, which ranges from northern Florida to the St. Lawrence River in Canada, is chiefly comprised of three stocks emanating from the tributaries of the Chesapeake Bay in Virginia and Maryland, the Hudson River in New York, and the Roanoke River in North Carolina.[393] Although this percentage varies annually and by location, the Chesapeake stock is believed to be the dominant contributor, accounting for approximately 90% of the total population.[394] After spawning in these river systems during the spring, it migrates up the coastline. During the late fall it retraces its path and winters in or near these estuaries.

Its nearshore distribution, coupled with its superior fighting ability and culinary quality, has made the striped bass a popular species with both commercial and recreational fishermen. Its plentiful abundance and value as a source of food was recognized by the first European settlers. As noted in one early account from 1635,

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[391]Atlantic States Marine Fisheries Commission, Fisheries Management Report No. 16 of the Atlantic States Marine Fisheries Commission: Supplement to the Striped Bass FMP Amendment #4, Mar. 1990: 4.13-4.15 (Although total coastwide landing further declined throughout the 1980s, this was after ASMFC instituted stringent fishing restrictions under its interstate management plan.)

[392]J.E. Weaver, R.B. Fairbanks, and C.M. Wooley, "Interstate management of Atlantic coastal striped bass," Proceedings of the 11th Annual Marine Recreational Symposium, 1986: 77.

[393]Supra note 391 at 4.66.

[394]Ibid. at 3.5.

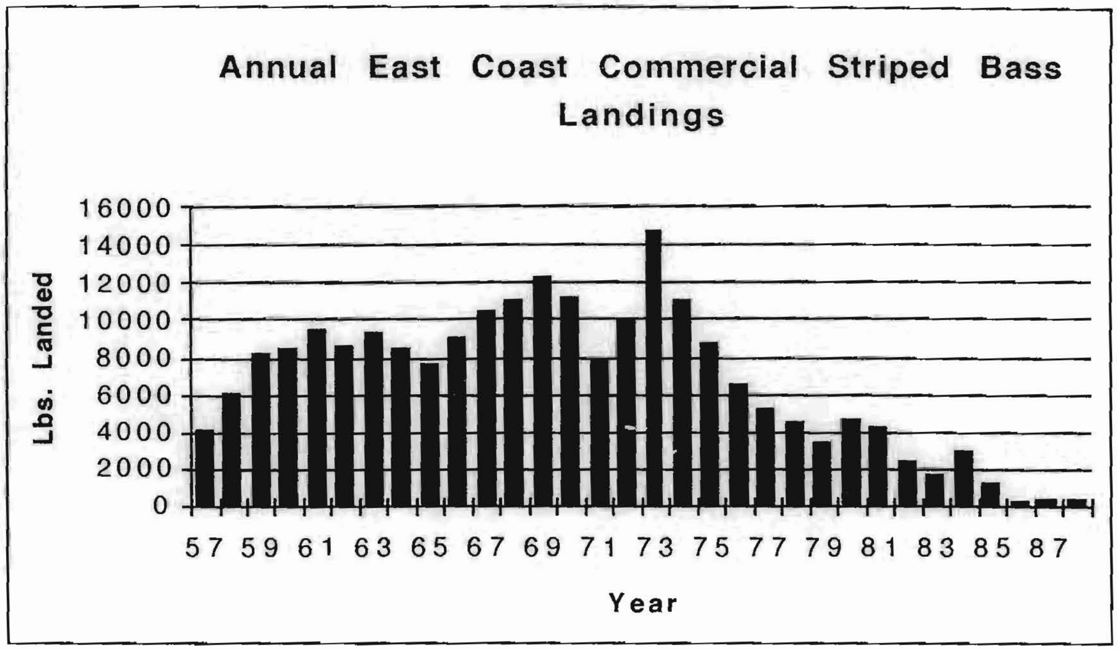

Figure 5.1: Commercial Landings of Striped Bass. Note landings after 1984 affected by stringent catch restrictions imposed under Amendment 4 to the ASMFC Striped Bass Management Plan.[395]

[395]Supra note 11 at 4.13–4.15.

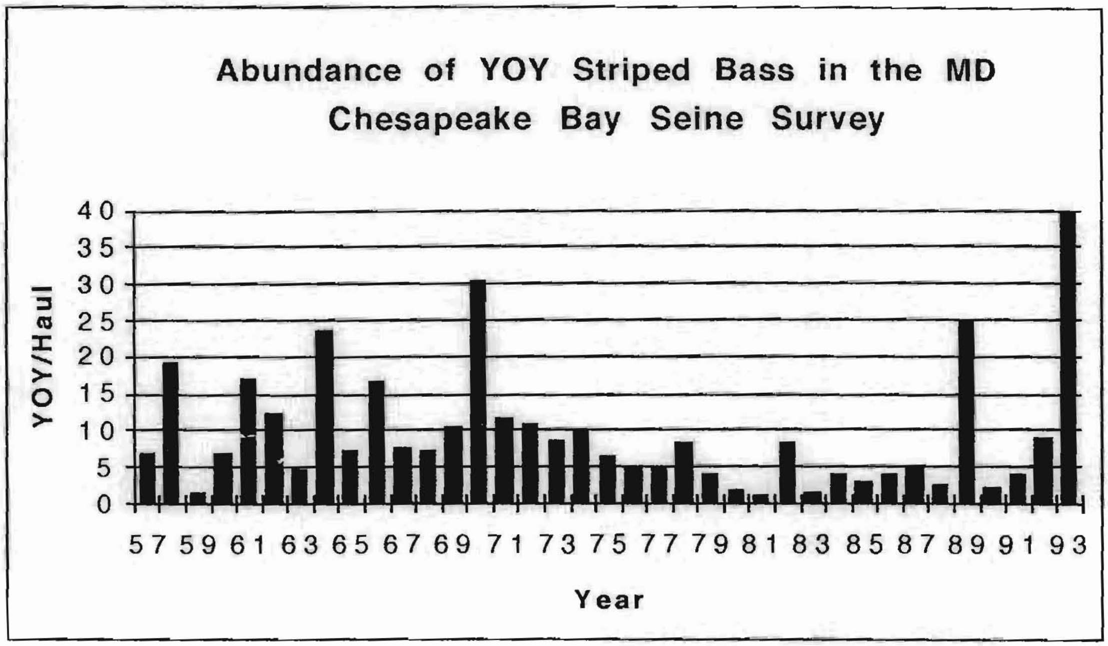

Figure 5.2: Year class strength of striped bass as measured by the Maryland Department of Natural Resources Chesapeake Bay young-of-the-year seine survey.[396]

396 Ibid. at 4.23. Data for the years 1990–1993 gathered through personal contact with John Fields.

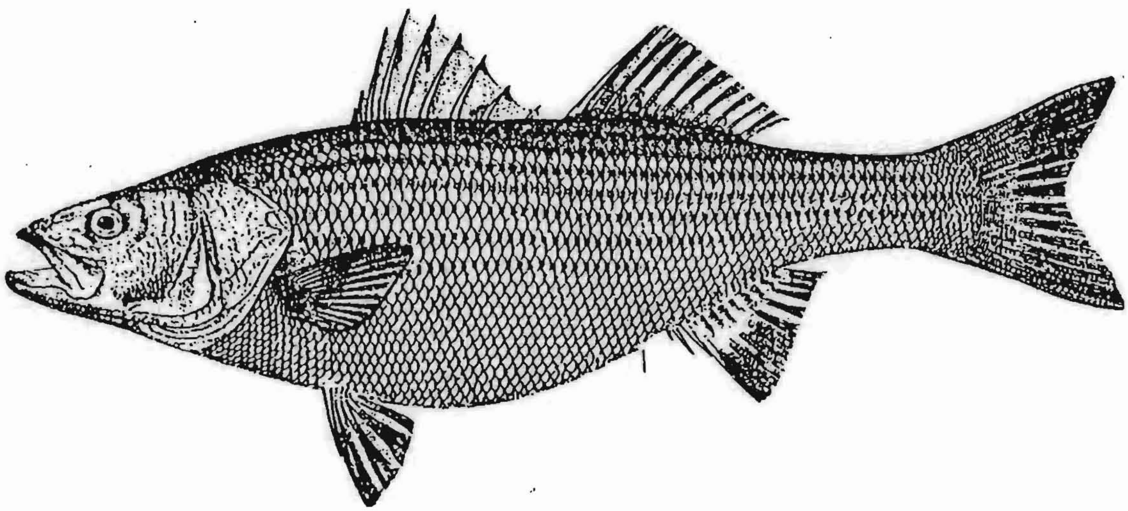

Figure 5.3: Striped Bass, Morone saxatilis[397]

[397]Source: Henry B. Bigelow and William Schroeder, Fishes of the Gulf of Maine, Fishery Bulletin 74 of the Fish and Wildlife Service, vol. 53, Washington: GPO, 1953.

> The Basse is one of the best fishes in the country.... the way to catch them is with hooke and line: the fishermen taking great codline, to which he fasteneth a piece of Lobster, and throws it into the sea, the fish biting it pulls her to him, and knocks her on the head with a stick.... the English at the top of an high water doe crosse the creeks with long seanes or Basse nets, which stop the fish; and the water ebbing from them are left on dry ground, sometimes two or three thousand at a set....[398]

In more recent times, the striped bass has been commercially harvested generally by rod and reel, beach seines, gillnets, and fish traps. Just prior to its collapse, from 1966 to 1975, commercial landings were around 10.6 million pounds a year.[399] Its high price, averaging $1.78 per pound in 1983, provided an incentive to continue fishing even after its numbers had fallen off.[400] For recreational anglers, this species may be the quintessential sport fish. Its willingness to strike a bait or lure, strong fighting ability, relatively large size (the all-tackle angling record is 78.5 pounds), and availability in nearshore waters, all serve to make it a favorite target of recreational fishermen. In the two decades preceding its collapse, it is estimated that the recreational catch equaled or exceeded the commercial harvest.[401]

Continuous overfishing year after year eventually took its toll. The striped bass is dependent upon occasionally strong or dominant year classes to provide a large pool of spawners to last through periods of poor recruitment. By the early 1980s, the abundance of the critical Chesapeake stock, as observed through Maryland's young-of-the-year research survey, was in very poor shape. By that point, it had failed to produce a strong year class throughout most of the 1970s (see figure 5.2). It is true that spawning success is generally determined not so much by the abundance of parental fish, but by random

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398 From William Wood in *New England's Prospects* (1635) as quoted in: Nicholas Karas, The Complete Book of the Striped Bass, South Hackensack, New Jersey: Stoeger Publishing Company, 1974: 113.

399 Sura note 391 at 4.10.

400 Ibid. at 3.6.

401 Ibid. at 3.1.

environmental factors such as water temperature and fresh water inflow,[402] and consequently, the amount of new recruits is more of an indicator of future rather than present stock abundance. However, during this period, a combination of perennial overfishing and poor spawning conditions, and to a lesser extent coastal pollution, had so dramatically decreased the population of sexually mature fish, that a dominant year class could not occur even under favorable natural conditions.[403]

Prior to 1984, large-scale efforts to promote conservation generally failed. To understand why, it is important to remember that the striped bass is usually found in coastal waters and generally does not venture far offshore. Consequently, approximately 90 percent of the striped bass catch was (and still is) harvested within state jurisdictional waters.[404] Protecting and rebuilding the stocks therefore required interstate cooperation throughout its entire range. Unfortunately, this is easier said than done. During this period, management was administered on an individual state basis. Throughout its southern range, conservation efforts traditionally aimed at protecting the breeding stock. As a result, size limits permitted the harvest of smaller, sexually immature fish while protecting those that were larger and mature. This was in direct contrast to those states from New Jersey on north, where size limits were specifically designed to protect smaller, immature fish. An initial attempt by the ASMFC to promote more consistency through a variable minimum size limit, which called for a 14 inch minimum size limit in those states with producing estuaries and a 24 inch size limit elsewhere, was meet with stiff resistance.[405] Various user groups complained that the restrictions would cause too much of a financial hardship and states bickered with one another about their share of

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[402]Ibid. at 4.72.
[403]Ibid. at 4.83.
[404]Ibid. at 3.5.
[405]Supra note 392 at 78 & 80.

responsibility to curtail fishing mortality.[406] With compliance voluntary, efforts to promote conservation throughout its range floundered.

With the states unable to work together, the federal government took a more active role in the management of this fishery. In 1979, Congress passed the Anadromous Fish Conservation Act (P.L. 96-118), which called for, among other things, a study to determine the causes for the decline of the Atlantic striped bass population. In the meantime, as the states continued to make little headway resolving their differences, the fishery deteriorated to a record low level. Finally, after growing impatient waiting for a resolution, in 1984 Congress passed the Striped Bass Conservation Act (P.L. 98-613), which made it mandatory for each state to comply with the ASMFC's Interstate Management Plan or risk facing a federally-sanctioned moratoria on striped bass fishing. From this point on, individual states up and down the East Coast fell into compliance with the ASMFC's management plan.

Adaptive management is a central element of the this plan. Instead of utilizing the traditional management precept of maximum sustainable yield, which is reliant upon several stock assumptions which do not hold true for the striped bass, the primary strategy of this plan is to restrain the harvest of dominant year classes so they can continuously contribute to new stock recruitment over an extended number of years.[407] By controlling fishing effort, the plan is designed to promote "the restoration and maintenance of historical levels

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[406]Ibid. at 80.

[407]Supra note 391 at 4.103. (According to the ASMFC, MSY was rejected because the Atlantic striped bass population did not meet the following criteria:

A. The stock must be self-regulating. "A self regulating population is one in which population dynamics forces will result in an increase if the population level drops below the equilibrium, while if the population exceeds the equilibrium, natural factors will cause a decline towards the equilibrium point.";
B. Habitat suitability for production must be comparable to suitability in earlier decades;
C. There is a necessity for long-term historical catch and effort data. As noted by the ASMFC, there was a lack of effort data in the striped bass fishery and "Changes in the nature of the fisheries over the past five to ten years... cause an underlying nonstatutionarity in the landings data which would have to be used in any calculation of MSY." (Ibid. at 4.102-103)

of the stocks" rather than targeting a specific production level.[408] As noted the the ASMFC,

> Adaptive management inherently takes into account the fact that existing information and data available on the species is often incomplete or inaccurate. In the face of such uncertainty, management regimes are developed based on the best information available, and the consequences of implementation of those regimes are closely watched through rigorous monitoring of the fishery and stock. New information collected via this monitoring is then analyzed, and the results of the analyses are used to modify the initial management approach. Monitoring is a continuous permanent element of an adaptive management approach, as is the modification, correction or tuning of the management regimes implemented.[409]

Adaptive management acknowledges that there are uncertainties in forecasting stock parameters and therefore provides a flexible framework to more efficiently respond to changes in stock conditions as new information becomes available.[410] Furthermore, as noted in the quote above, management strategies are modified based upon observable or quantifiable data collected through constant monitoring, not according to the whims of fishing groups. While it is true that most management regimes eventually adopt new courses of action as more experience is gained, adaptive management regimes, through the constant feedback of their monitoring programs, are designed to more immediately institute changes when necessary.

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[408]Ibid. at 4.103.

[409]Atlantic States Marine Fisheries Commission, Fisheries Management Report No. 15 of the Atlantic States Marine Fisheries Commission: Supplement to the Striped Bass FMP Amendment #4 , Oct. 1989: 5.

[410]Ibid.

A cornerstone of the Striped Bass Management Plan's success is the manner in which its goals are supported with quantifiable objectives based upon careful monitoring of the stocks. The main goal of this plan (which has been revised since its inception) is to "perpetuate the striped bass resource throughout its range so as to generate optimal social and economic benefits to the nation from its commercial and recreational harvest and utilization over time."[411] One of the objectives to meet this goal is to "restore and maintain self-sustaining spawning stocks, minimizing the possibility of recruitment failure, as determined by YOY [Young of Year] indices, or other measures of spawning success."[412] This objective has been further refined through several amendments to the original plan. In October of 1985, the ASMFC adopted Amendment 3, which designated that 95 percent of the females from the 1982 and subsequent year classes of the Chesapeake Bay stock was to be protected against fishing mortality and, that 95 percent of these fish was to be allowed the opportunity to spawn at least once.[413] This amendment applied until the three year running average of the Maryland's young-of-the-year index reached 8.0.[414] As per this stipulation, various coastal states adopted stringent regulations, ranging from total closures to a combination of prolonged seasonal closures and very large size limits — reaching a minimum of 33 inches total length by 1987.[415] Amendment 4, which was adopted in October of 1989, set up an structured plan to relax these restrictions upon meeting the target goal of an 8.0 three year running average for the Maryland juvenile index. Under this amendment, a transitional recovery fishery was established, with a target fishing mortality rate of 0.25 (which is equivalent to a 20% loss of legal size fish due to fishing effort).[416] Additionally, if the three year average falls below 8.0, reductions in fishing mortality are to

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[411]Supra note 391 at 3.9.
[412]Ibid.
[413]Supra note 392 at 82.
[414]Ibid.
[415]Ibid.
[416]Supra note 409 at 6.

be taken into consideration.[417] Furthermore, under this amendment, the 1960 to 1972 Chesapeake Bay stock size was set as the benchmark population size for designating the stock as fully recovered, at which the allowable fishing mortality rate will be increased to 0.50.[418]

As alluded to in the objective and amendments discussed above, a critical component of the monitoring process under this plan is the careful tracking of new recruits produced in each year class. While this index can vary widely due to environmental factors, the assumption is that its magnitude is reflective of future stock abundance and reproductive capacity of each specific year class.[419] The Maryland index was chosen because studies have demonstrated that it accounts for 60 to 90 percent of total coastal landings.[420] As noted by the ASMFC,

> The rationale for using young-of-year indices as triggers in the management plan is that they represent an "early warning" signal of low stock abundance. Low reproductive success demonstrated by a low index value allows management actions to be taken which will conserve those year classes of fish which may not yet have been exploited because of protective minimum size limits, thus ensuring that a sufficient breeding stock is available in future years.[421]

Some critics have argued that it was premature to relax restrictions in the fishery upon attaining the 8.0 three year running average since one exceptionally large year class, as was the case in 1989, can unduly influence the three year average despite the continuance of low

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[417]Ibid. at 13 (Under Addendum III to Amendment 4, the arithmetic mean has been replaced by the geometric mean in an attempt to reduce index variability and increase the reliability of estimating annual harvest quotas.)

[418]John Fields, Atlantic States Marine Fisheries Commission, Personal Contact, 29 Jul. 1994.

[419]Supra note 391 at 4.17.

[420]Supra note 409 at 8.

[421]Ibid.

stock abundance. While this may be true, it is the concept of using a juvenile index as an early warning indicator of potential future problems, that this analysis is primarily interested in. Such a system provides a framework to develop proactive strategies to better avert a crisis rather than managing in response to one.

Under the guidance of the ASMFC's Interstate Management Plan, the Atlantic striped bass has undergone a dramatic restoration over the past ten years. It is currently projected that on January 1, 1995, after having reached the population benchmark discussed under Amendment 4, the striped bass will be designated as fully recovered.[422] This recovery is reflected in greater CPUE by commercial and recreational fishermen, as well as through vastly larger projected stock size estimations. Additionally, although year class size is greatly affected by environmental conditions, there has been more consistent periodic strong year classes. In fact, Maryland and Virginia's young-of-the-year indices for 1993 were the highest on record.[423] In an area plagued by one disappointment after another, where many traditional fisheries are in desperate shape due to overfishing, this is one of the few bright spots for fishery management efforts in the Mid-Atlantic and New England region. Additionally, in an attempt to repeat this accomplishment, Congress passed the Atlantic Coastal Fisheries Cooperative Management Act,which is modeled after the Striped Bass Conservation Act of 1984. As a result, ASMFC management plans are now binding on all coastal states.

The success of the Interstate Striped Bass Management Plan is due in large part to manner in which it clearly and specifically states what it is trying to accomplish. Unlike many other fishery management programs, which are so often riddled with unrealistic and nebulous goals that only complicate and confuse the decision-making process, this plan unambiguously makes conservation its top priority. As a result, those officials involved in the management process were able to work towards a single purpose. To their credit, they

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[422]Supra note 418.
[423]Ibid.

developed a set of objectives, further refined through amendments, that rebuilt the fishery in a step-by-step process. Through the Draconian fishing restrictions imposed under Amendment 3, overfishing ceased and the stocks were afforded a chance to recover. While it is true that these measures put some fishermen out of business, the alternative of doing anything less would have prolonged the recovery process or even worse, left the population in poor condition. The 8.0 three year running average trigger mechanism developed under Amendment 4, reopened the fishery in a gradual fashion with specific target levels of fishing mortality designed to minimize the risk of overfishing the stocks. Furthermore, allowable fishing mortality, which is carefully monitored by the ASMFC, is associated with total stock abundance. Under Amendment 5, scheduled to become effective starting in 1995, total allowable fishing mortality will be further increased based upon the Chesapeake stock having reached the 1960-1972 target population size. The end result is that under this plan, the ASMFC successfully rebuilt the Atlantic striped bass fishery through a carefully thought out, proactive and systematic strategy.

ADOPTING THE FRAMEWORK OF THE ASMFC STRIPED BASS MANAGEMENT PLAN TO RHODE ISLAND'S WINTER FLOUNDER FISHERY

The framework of this plan can be of invaluable assistance in improving the overall management of Rhode Island's marine fisheries. More specifically, it can serve as a model to help steward the winter flounder fishery. Instead of leaving the fate of this resource to a free-for-all fight between various user groups, as has been true in the past, the ASMFC's Striped Bass Management Plan provides a framework to rebuild this fishery based upon an objective review of stock conditions and in a risk-averse manner. Such a change in strategy would be of great assistance as administrators struggle over what to do next. Even today, with the moratorium in place, the future status of the winter flounder fishery remains uncertain. Fishing mortality since the closure, indicates that greater restrictions may be necessary to realistically expect a recovery. Due to a number of possible factors, such as a transferral of greater fishing effort into open areas outside of the closure line or even the illegal continuance of fishing within Narragansett Bay, too many fish are still being removed.[424] Additionally, as noted previously, under the Atlantic Coastal Fisheries Cooperative Management Act, the Council is legally obligated to reduce fishing mortality or risk a moratorium. The long and acrimonious fight to manage the fishery over the past ten years has splintered administrators into different factions; some members of the RIDFW are pressing for even stricter regulations while the Council seems to be divided into two groups, one of which is guardedly optimistic that the ban may yet still succeed while the other wants to reopen the fishery as soon as possible. The end result is that without a clear directive, these differences are bound to lead to another prolonged round of endless arguments, paralyzing administrators from effectively managing this fishery.

If the decision-making process is to be reformed, the state legislature should intercede and make conservation the primary goal of management. In addition to prioritizing the biological needs of the resource ahead of the parochial interests of commercial and recreational fishermen, such a measure would help to create a more responsive management system. This would be the first step towards developing a proactive stewardship program where administrators can pre-plan their strategies to coordinate and organize their activities to better respond to changing conditions. Such a measure would provide a common thread to unite the disparity of values that have hindered the system in the past. By prioritizing what they are trying to accomplish, managers can better evaluate choices and resolve conflicts when they occur. Additionally, it would provide the framework to develop a series of objectives so that decisions can be made

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[424] Supra note 26 at 2.

based more upon objective stock assessments rather than the short-term economic needs of fishermen.

As previously discussed, under the ASMFC's Striped Bass Management Plan, the goal to "perpetuate the striped bass resource" is further defined through an objective specifying that "[Young of Year] indices, or other measures of spawning success" be used as a criteria to determine if this goal is being meet. The Maryland young-of-the-year index was selected because of its proven ability to account for a large percentage of the variation in total coastwide commercial striped bass landings. The 8.0 three year running average served as a trigger by which to gage if the strict restrictions imposed under Amendment 3 were helping to perpetuate the striped bass population. Upon meeting this condition, allowable fishing mortality was increased in a gradual and cautious manner under Amendment 4. It may be possible to implement a similar system, utilizing data from one or more of the local trawl surveys, to manage the winter flounder population in Narragansett Bay.

Young-of-the-year indices or some other measure of prerecruitment strength, can serve as an indicator of potential stock abundance. Models that can project these indices forward in time, while accounting for appropriate growth and mortality rates, can provide a forecast of future conditions in the fishery. With this information, managers can take preemptive measures to restrict or relax fishing mortality as necessary. However, an important first step in developing such a program is to demonstrate a relationship between one or more of the juvenile indices and landings. A famous study by C. Phillip Goodyear compared commercial striped bass landings to the Maryland young-of-the-year index.[425] Through multiple regression analysis, he established that the magnitude of the index could account for up to 83% of the variation in annual commercial landings by comparing the index data 2,3,4, and 5 years prior to the year of landings. Such a time lag allowed the

[425]See: Supra note 30 at 92–96.

juvenile fish to reach marketable size. As a result, he concluded that the index could be used for "monitoring recruitment into the population and as a basis for management decisions."[426] By conducting a similar study, it may be possible to show a statistically significant link between prerecruitment winter flounder abundance in Narragansett Bay and subsequent commercial catch of winter flounder off Rhode Island.

As previously discussed in chapter 3, there are several surveys conducted individually by the URIGSO, Marine Research Incorporated, and the RIDFW that monitor the abundance of winter flounder specifically in Narragansett Bay. Of these studies, the time series of winter flounder abundance broken down by size (so that it can be converted into age categories) is too recent to utilize URIGSO trawl survey and the RIDFW young-of-the-year beach seine data.[427] Of the other two surveys — the RIDFW Spring and Fall trawl surveys and the Marine Research trawl survey in Mt. Hope Bay — the greatest variation in landings can be explained by the data of age 0 (Young-of-the-Year) winter flounder in the RIDFW Fall survey.

This brief study will set out to show through a multiple regression analysis that the abundance of age 0 winter flounder observed in the RIDFW Fall trawl survey accounts for a large part of the variation in commercial landings of winter flounder in NMFS statistical area 539. As discussed previously, commercial catch information is collected by the NMFS through port agents who interview fishermen dockside. Through these interviews they also collect location of fishing activity and effort data. To avoid any bias that may result from annual variations in fishing effort, this analysis will standardize catch by using catch per unit of effort (CPUE) (recorded in kilograms per day fished). Therefore, CPUE and not landings will serve as the dependent variable. Winter flounder recorded in the RIDFW Fall (as well as the Spring) trawl survey are measured and subsequently

[426]Ibid. at 92.

[427]The URIGSO survey only started categorizing winter flounder into size categories on an annual basis starting in 1986. The RIDFW beach seine survey began in 1986. Consequently, the data are too recent to show any significant relationship.

categorized by age. Indices are recorded by age for the mean catch per tow. The three independent variables are the: age 0 index three years prior to the year of landings (noted as age 3 fish in table 5.2); age 0 index four years prior to landings (noted as age 4 fish in table 5.2); and age 0 fish five years prior to landings (noted as age 5 fish in table 5.2). For example, in 1983, those fish listed as age 3 were the observed age 0 fish in the 1980 survey; the age 4 fish were the age 0 fish in 1979; and the age 5 fish were the age 0 fish in 1978 (see tables 5.1 and 5.2). Age 3, 4, and 5 fish were used because they constitute the bulk of the commercial catch. Younger fish have generally been too small to market and starting in 1985, were less than the legal size limit. Older fish are not caught in large quantities because of high fishing mortality rates. Because the first five years of the age 1 abundance data were required to complete the first series of independent variables, the analysis was restricted to landings from 1983–1993. These data were then subjected to multiple regression. As noted in table 5.3, approximately 89% of the variations in reported CPUE in statistical area 539 can be accounted for by the age 0 indices 3, 4, and 5 years prior to the year of landings.[428] This result is significant at the 95% confidence level (see figure 5.4 and tables 5.3). Therefore, this index may serve as a means to assess future abundance and make proactive management decisions.

Eventually, as a greater time series of abundance data are collected, some of the other surveys may prove more effective. However, for the time being, the age 0 index of winter flounder in the RIDFW Fall trawl survey can serve as an important component to develop proactive strategies to steward the winter flounder population in Narragansett Bay. For example, through the establishment of a benchmark or trigger index of year class strength, such as the 8.0 three year running average in Amendments 3 and 4 of the Striped Bass Management Plan, allowable fishing mortality can be regulated based upon projections of future conditions in the fishery. Such a measure would be of great

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[428]Similar analyses using data from the RIDFW Fall survey and the Marine Research Survey in Mt. Hope Bay found that respectively, they accounted for only 55% and 51% of the CPUE.

Rhode Island Division of Fish and Wildlife Fall Trawl Survey Narragansett Bay	
Year	Age 0 Winter Flounder (Mean Number per tow)
1978	34.30
1979	16.18
1980	0.53
1981	9.85
1982	10.74
1983	1.41
1984	1.10
1985	2.60
1986	4.76
1987	0.46
1988	0.16
1989	0.82
1990	0.70
1991	1.40
1992	5.42
1993	0.08

Table 5.1: The abundance of age 0 (Young-of-the-Year) winter flounder observed in the RIDFW Fall Trawl Survey in Narragansett Bay.[429]

[429] Age 0 winter flounder data gathered from Mark R. Gibson, "Stock Assessment of Winter Flounder in Rhode Island 1993," page 41.

Predicted CPUE of Winter Flounder in Statistical Area 539					
Year	Reported Commercial CPUE	Age 3	Age 4	Age 5	Predicted Commercial CPUE
1983	1069	0.53	16.18	34.3	1067
1984	1139	9.85	0.53	16.18	1165
1985	941	10.74	9.85	0.53	1025
1986	720	1.41	10.74	9.85	675
1987	582	1.10	1.41	10.74	605
1988	550	2.60	1.10	1.41	531
1989	906	4.76	2.60	1.10	655
1990	419	0.46	4.76	2.60	461
1991	457	0.16	0.46	4.76	448
1992	410	0.82	0.16	0.46	412
1993*	256	0.70	0.82	0.16	405

Table 5.2: Data table of age 0 (Young-of-the-Year) winter flounder two, three, and four years prior to year of reported CPUE (Kgs. per trawler day fished) and multiple regression estimation of CPUE.[430]
*Reported CPUE data for 1993 is preliminary

[430] Ibid at 54-55.

Multiple Regression Analysis of Age 0 Winter Flounder

Count	R	R^2
11	.94	.89

Source	Degrees Freedom	Sum Squares	Mean Square	F-test	Probability
Regression	3	782116.02	260705.34	18.69	.001
Residual	7	97625.61	13946.52		
Total	10	879741.64			

Variable	Coefficient	Standard Error	Standard Coefficient	T-Value	Probability
Intercept	358.26				
Age 3	54.60	9.82	.71	5.56	.0009
Age 4	7.25	8.82	.13	.82	.4381
Age 5	16.41	4.62	.57	3.55	.0093

Tables 5.3: Multiple regression analysis of age 0 (Young-of-the-Year) winter flounder two, three, and four years prior to year of reported CPUE (Kgs. per trawler day fished).[431]

[431] Analysis generated from Statview II with Abacus Concepts, Inc., Berkeley, CA.

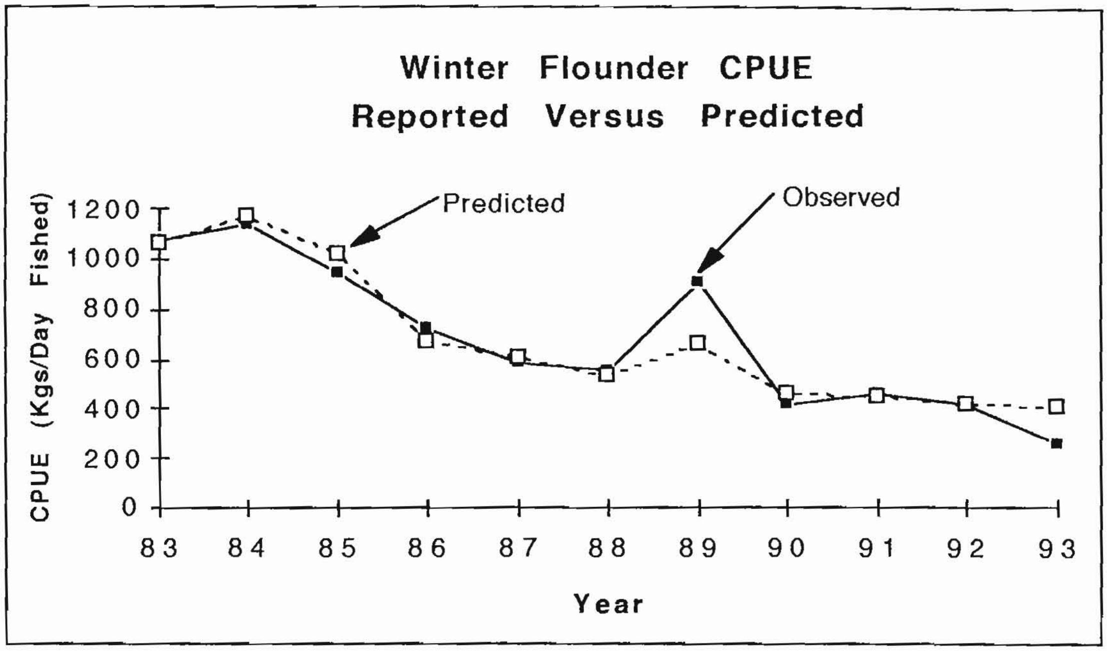

Figure 5.4: Reported versus Multiple Regression estimation of CPUE of winter flounder in NMFS Statistical Area 539.

assistance in precluding the endless rounds of delays that plague the present system. This index, which would in all probability be developed by the RIDFW, could be based upon some historical average of year class strengths when conditions in the fishery were better. However, rather than using it as an index to relax restrictions in the fishery, it may better serve as an indicator to provide an early warning of worsening conditions. For example, one extremely good year class can have a have an overbearing influence upon an average index and thereby prematurely trigger an increase in allowable fishing mortality even when the surrounding year classes are still very poor.[432] Such may have been the case when restrictions were relaxed in the Atlantic striped bass fishery based upon an exceptionally good year class in 1989.[433] Therefore this index can better serve as an early warning signal to decrease allowable fishing mortality rather than relax restrictions in a fishery. However, a measure of year class strength can still be utilized to increase allowable fishing mortality as stock abundance increases. As currently in use in striped bass management, the results of the Maryland juvenile index are plugged into a spawning stock biomass model (based upon the Maryland Harvest Control Model) which projects total recruitment strength for each year class over its entire life span, taking into account appropriate growth and mortality rates.[434] As a result, the effects of various scenarios of fishing mortality on total stock size can be modeled to help managers make a more informed decision. Similar to the early warning signal, by using an historical average of total stock size when conditions were better in the fishery, a benchmark can be developed to serve as a trigger to relax restrictions as warranted.

Under such a system, the power of the Council would be limited to regulating the state's marine fisheries within some pre-established guidelines, yet it would still serve an important function in deciding what strategies to incorporate to meet a stipulated level of

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[432]Mark R. Gibson, Rhode Island Division of Fish and Wildlife, Personal Contact, 26 Aug. 1994.

[433]Ibid.

[434]Ibid.

fishing mortality. Additionally, it would help to better infuse stock assessment data provided by the RIDFW into the decision-making process.

Due in large part to uncontrolled overfishing, time is quickly running out for some of the state's most important commercial and recreational marine fisheries. As noted by Stuart O. Hale, in an historical perspective of Narragansett Bay,

> Today salmon have disappeared, the numbers of alewives and shad are greatly reduced, and squeteague are far fewer in number. The Bay's menhaden fishery fluctuates from year to year. Among the shellfish, the oyster are gone, scallops are few, lobster are still in residence, soft-shell clams can be found in diminished quantities. Quahaugs appear to have held their own and have probably increased.
>
> It is unwise, however, to state flatly that certain species are gone for good or are about to disappear. Both food stocks and predators are subject to cyclical variations, environmental factors change, and fishing pressures increase and decrease. Nevertheless, it would seem that in general the Bay today provides a less varied and dependable fare for palates of those who live along its shores.[435]

Unfortunately, since this assessment was originally published over a decade ago, some things have worsened; today, the quahaug appears to be less numerous than it once was. Additionally, within the last several years, the tautog (not mentioned above) has similarly declined. Therefore, now more than ever, it is imperative that the state work to protect and conserve the living natural resources that still inhabit the Bay.

The winter flounder is in especially desperate shape. Years of poor management have jeopardized the future viability of a species that was once the most abundant fish found in state waters. Despite relatively good natural conditions during the past two winters, recruitment into the fishery has remained poor. It now appears that conditions are

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[435] Stuart O. Hale, Narragansett Bay: A Friend's perspective, Rhode Island: Rhode Island Sea Grant, The University of Rhode Island, 1980: 77.

so poor that the present spawning stock is incapable of rejuvenating the fishery. Unfortunately, because this fishery does not exist in a vacuum, rebuilding the stocks may be more difficult than originally believed. As many traditional commercial species, such as the yellowtail flounder, have nearly disappeared from local southern New England waters, many fishermen continue to concentrate on the winter flounder despite its low numbers. With so few available options, many small vessel fishermen are willingly to risk venturing further offshore, beyond the closure line, so that they can continue to catch winter flounder and still make a living. The state is now at a crossroads, where it must decide if its going to continue the status quo that is responsible for this predicament or adopt changes that will better ensure that its marine fisheries remain a viable resource for future generations to enjoy.

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