

Preserving the Northeast Forage Base

Opportunities to Advance Ecosystem-based Management of Fisheries in the U.S. Atlantic

A report for The Pew Charitable Trusts
by the
National Coalition for Marine Conservation



Image courtesy of Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC

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Introduction

"You can't solve a problem from the same consciousness that created it. You must learn to see the world anew." Albert Einstein

It's been widely observed, nearly to the point of cliché, that the move to ecosystem-based fishery management (EBFM) will be "evolutionary, not revolutionary," measured in steps rather than a giant leap. Patience and persistence are the necessary virtues for those seeking a reform as paradigm-shifting as EBFM. It demands, after all, a fundamental, if not revolutionary, change in how we conserve and manage marine fisheries and, as such, requires a brand new way of thinking.

More than a decade ago, the National Marine Fisheries Service's Ecosystem Principles Advisory Panel recommended considering the effects of fishing on predator-prey relationships as the first, incremental step toward EBFM. Since the panel's 1999 report*, the case for more precautionary management of prey species to conserve predator populations has been bolstered by emerging ecological theory, which argues that merely managing fisheries conservatively under a single-species, maximum sustainable yield-based regime does not and cannot adequately protect a species' ecological role.† In fact, there is mounting scientific evidence that even so-called "sustainable fishing" for a prey species whose abundance strongly influences population size of predators can cause dramatic shifts in ecosystem communities, and that "(a)lthough overfished stocks have been known to recover, revival of communities that have changed states can be excruciatingly slow or even impossible."‡



Meanwhile, a growing number of fishing and conservation organizations are recognizing the threat posed to the ecosystems that support fish and fishing and are focusing unprecedented attention on preserving the abundance of key prey – mid-trophic level species collectively referred to as *forage fish* - in order to serve conservation of a wide range of predatory fish as well as marine mammals and seabirds.

* Ecosystem-Based Fishery Management. Report to Congress by the Ecosystem Principles Advisory Panel. 1999.

† Pikitch, E.K. et al. 2004. Ecosystem-Based Fishery Management. *Science*. 305: 346-7.

‡ Zabel et al. Ecologically Sustainable Yield, American Scientist, March-April 2003.

Preserving the Northeast forage base, as described in this report, is an opportunity to advance an ecosystems approach to managing fisheries. But more than that, it is an effort to prevent irreversible damage to marine ecosystems, while at the same time moving away, once and for all, from ecologically-harmful policies that manage each species to maximize yields to fisheries*, without regard for the impact on other species in the food web or the community as a whole.

For decades now, we've been consciously "fishing down the food web"†, that is, overfishing populations of high-value ocean predators, such as cod and tuna, then shifting fishing pressure to lower trophic level species, most notably small schooling pelagics like herring, mackerel, menhaden and squid. As a result, today's fishery managers are struggling to control two trains going in opposite directions on different tracks.

The long list of predatory fish we are attempting to restore to or sustain at healthy levels includes some of the northeast's most valuable commercial and recreational species: Atlantic bluefin tuna, swordfish, white marlin, cod, oceanic sharks, striped bass and summer flounder. As we recover their populations, the demand for prey naturally increases. But the available supply of food – the overall forage base available to them - is dwindling.

Industrial fisheries target or indirectly impact a wide range of forage fish – Atlantic herring, mackerel, river herring and shad, menhaden, butterfish and squid - fisheries whose principal goals are netting high yields for commercial uses. Generally speaking, the Northeast forage base is at an historic low, and pressures on it are expected to rise in the future. Wild fisheries long ago surpassed their ability to feed the world. Ironically, the explosive growth of open ocean aquaculture as an alternative threatens to exacerbate the problem by increasing demand for the use of wild forage fish as feed.

We need to fundamentally change the way we conserve and manage fisheries for important prey species. That means new ways to monitor and assess their ecological status and new, more precautionary management goals to determine appropriately conservative ways to fish. We need a more holistic approach to co-managing a wide array of species that serve the critical ecological function of providing forage for the ecosystem, including institutional changes; for example, management plans that link monitoring and management of northeast forage species with enhanced cooperation among state and federal jurisdictions.

Finally, we need increased public awareness in support of forage fish conservation and more aggressive stakeholder activism at the regional and national levels. Concerned fishermen and environmentalists alike must be brought into the mix, at a higher level of activity, for a sustained period of time, until preserving the ocean forage base is a fishery management priority.

Ecosystem-based fisheries management is a game-changer. As outlined in this report, the ball is being advanced at the councils and commissions where fishery policy is made, and within their scientific advisory bodies, providing unprecedented opportunities to score a long-lasting victory – for the fish, the ecosystems they are a part of, and the future of sustainable fishing. ♦

* Walters et al. Possible ecosystem impacts of applying MSY policies from single-species assessment. ICES Journal of Marine Science, 62: 558-568. 2005.

† Pauly et al. Fishing Down Marine Food Webs. Science 6 February 1998. Vol. 279.



Overview of Northeast Forage Fisheries

In the U.S. North Atlantic, small-mesh pelagic fisheries target Atlantic herring, Atlantic mackerel, Atlantic menhaden, longfin and shortfin squid, and butterfish. River herring and shad (along with a long list of other non-target species) often fall victim to the indiscriminate gear used to deliver the high volume catches these fisheries need to be profitable. In 2008, nearly 325,000 metric tons (mt) of forage fish were landed in the Northeast. A decade earlier, Northeast forage fish landings totaled over 460,000 mt (see Figure 1). For comparison, U.S. West Coast landings of forage fish managed under the Pacific Fishery Management Council's Coastal Pelagic Species plan totaled only 140,000 mt in 2008 and 222,000 mt in 2000, the highest catch in the last 25 years.

Figure 1

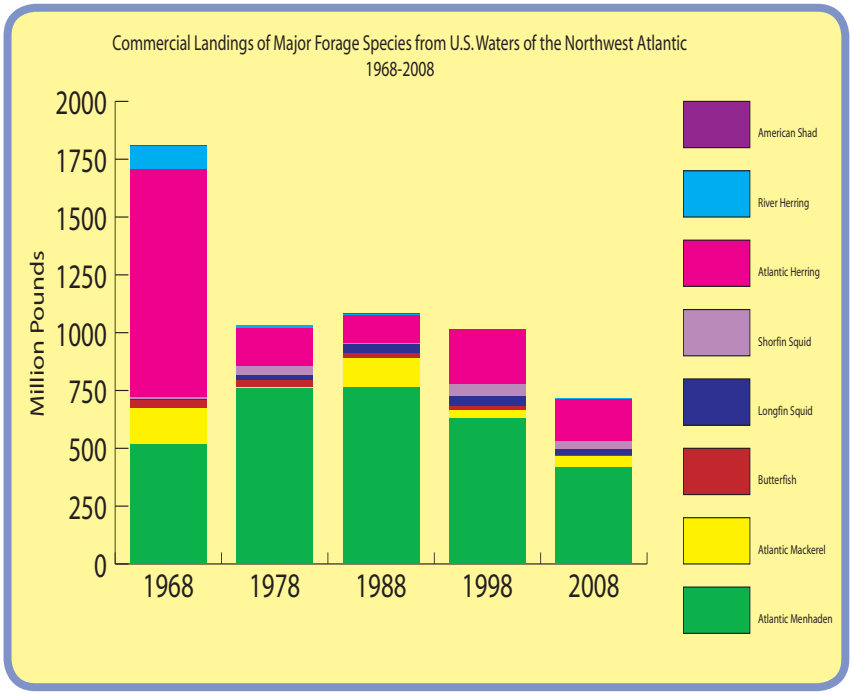
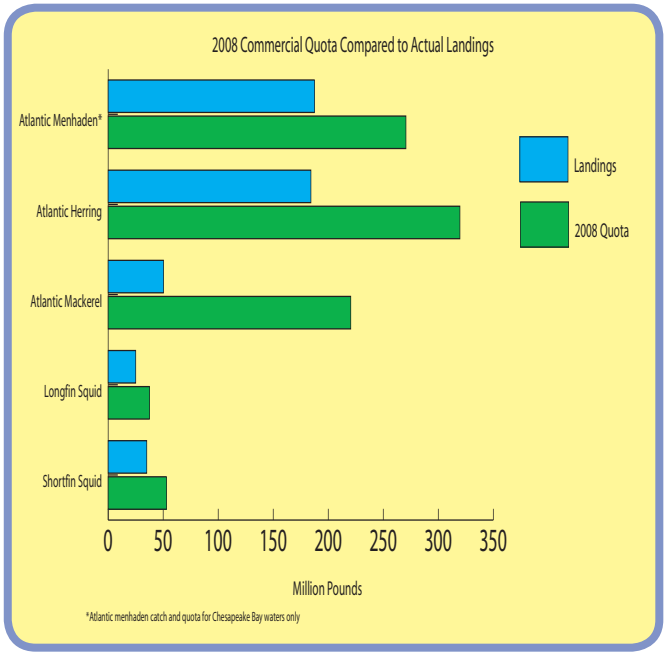


Figure 2

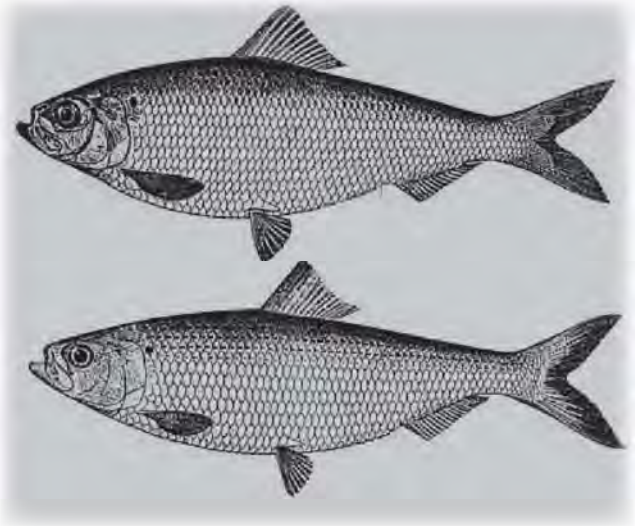


Stock status reports raise serious concern as to how much longer the Northeast ecosystem can sustain heavy exploitation of its forage base. Recent stock assessments and status reports for almost all forage species in the region - Atlantic herring, Atlantic mackerel, Atlantic menhaden, butterfish, American shad and river herring - reveal stocks in decline or nearing historically low abundance. Even landings of squids, whose populations are generally considered stable by fishery scientists, are falling far short of fishery quotas. (see Figure 2)

This chapter provides an overview of the Northeast's forage fisheries as well as a summary of recent management actions that are important for understanding the obstacles and opportunities presented by a Northeast Forage Fish Campaign.

Atlantic States Marine Fisheries Commission (ASMFC)

Interstate Fishery Management Plan for Shad & River Herring



i) **River Herring: Alewife (*Alosa pseudoharengus*) & Blueback Herring (*Alosa aestivalis*)**

Status:[2] Most recent stock assessment examined 15 stocks and found 5 overfished and 4 in decline. ASMFC produced a stock status update in 2008 that revealed coastwide patterns of age and size truncation in both alewife and blueback herring stocks, indicative of excessive mortality of adult age classes at sea. New coastwide stock assessment is underway with results expected in 2011.

Major Predators: American eel, largemouth bass, striped bass, mackerel, sharks, tuna, ospreys, bald eagles, dolphins, porpoises

Fishery:[3] Landings from directed commercial fisheries have fallen sharply since 1985, from 13.7 million pounds in 1985 to under a million pounds in 2007, a difference of 93%. Over 80% of landings occur in Maine. River herring are sold primarily for bait but also for food. Annual commercial fisheries revenues have averaged around $210,000 since 2004. River herring are taken by anglers for bait, but the magnitude of this catch and its value have not been quantified.

State moratoriums on directed fishing are in place in Massachusetts, Rhode Island, Connecticut and North Carolina. Amendment 2 to the Interstate Fishery Management Plan for Shad and River Herring directs states to close all directed fisheries (commercial and recreational) by January 2012 unless a state submits a sustainable fishery plan for Board approval by July 1, 2011. Sustainable fishery plans for North Carolina (small research set-aside fishery only), South Carolina and Maine were approved by the Management Board in 2010. New Jersey and Pennsylvania have announced intentions to implement moratoriums.

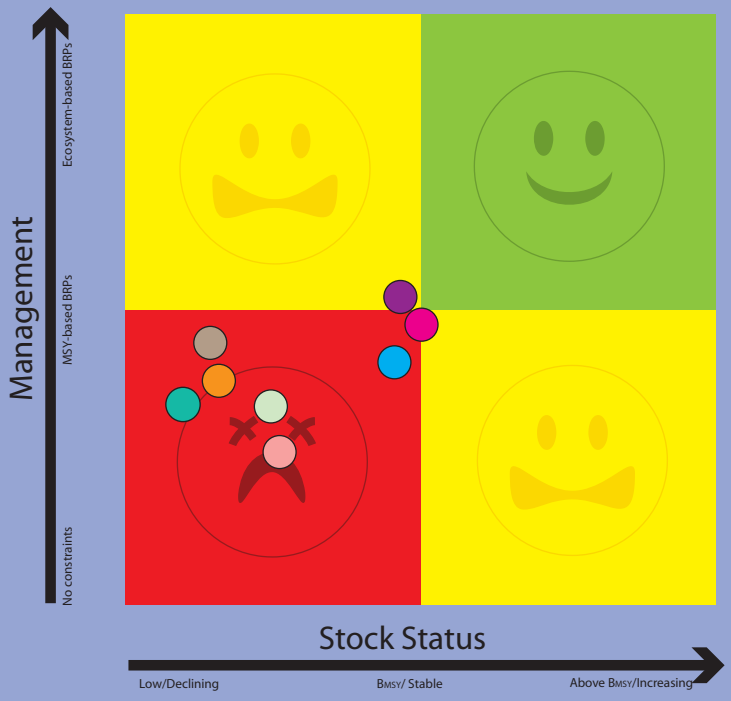
In ocean waters, river herring are captured by small-mesh trawls in pursuit of sea herring, mackerel and squid. Observer records show that most river herring captured by mid-water trawl vessels are retained, whereas most of the river herring caught by bottom trawls is discarded. Analyses of data collected by portside and at-sea catch sampling programs estimate ocean river herring bycatch at 1-2 million pounds annually. There is no catch limit for river herring in federal waters and no ASMFC landings limit, as exists for American shad.

Recent Actions/Issues:

- Amendment 2 to the Interstate Fishery Management Plan for Shad & River Herring was initiated by the ASMFC in 2007 in response to stock declines.
- In September 2008, the Maine Department of Marine Resources and the Massachusetts Division of Marine Fisheries published the first comprehensive analysis of river herring bycatch in the Atlantic herring fishery. Bycatch

THE NORTHEAST FORAGE BASE: IN THE RED

"Heavy exploitation of forage fish stocks without a framework to guide ecologically-safe levels of harvest is eroding the Northeast's forage base."

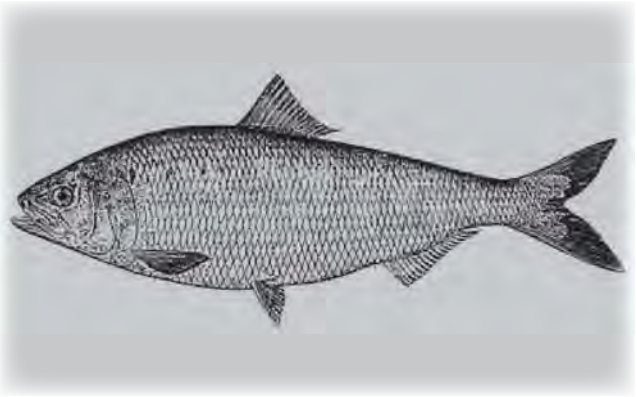


Species	Status	Management
River Herring	commercial landings have fallen by 93% in last 25 years	all directed state fisheries to be closed by 2012 unless proven sustainable (already closed in NC, MA, RI, and CT); no catch limit for federal waters and catch monitoring is poor
American Shad	stocks at record lows showing no signs of recovery	directed ocean intercept fishery closed since 2005 with 5% landed weight bycatch limit but regulations not enforced; all directed state fisheries to be closed by 2013 unless proven sustainable
Atlantic Menhaden	historically low abundance; long history of overfishing, including in 2008; poor recruitment; localized depletion in Chesapeake Bay suspected	no catch limit for federal waters, Chesapeake Bay catch cap set higher than recent landings; no B_{MSY} estimate used in management (i.e., no overfished threshold or abundance target)
Atlantic Mackerel	unknown but abundance is low; status indicators show resource in decline	MSY-based reference points; low overfished threshold (¼ B_{MSY}); current catch limits set nearly four times higher than recent landings; substantial excess capacity in fishery
Butterfish	unknown but abundance is low; severe size and age truncation in population; poor recruitment	standard MSY-based overfished reference points (Target=B_{MSY}; Threshold=½ B_{MSY}); Council did not implement rebuilding plan until 5 years after stock was declared overfished in 2005
Shortfin Squid	unknown; no stock assessment model available for management	standard MSY-based overfished reference points (Target=B_{MSY}; Threshold=½ B_{MSY}) but these are ineffective because stock status is unknown; $F_{target} = F_{MSY}$ and is based on average landings
Longfin Squid	abundance fluctuating without trend and seems to support average landings	standard MSY-based overfished reference points (Target=B_{MSY}; Threshold=½ B_{MSY}) but these are ineffective because B_{MSY} is unknown; F_{target} is based on average realized fishing mortality rate
Atlantic Herring	stock below B_{MSY}, abundance has been greatly overestimated (>40%) in past assessments and is projected to decline slightly over next few years	standard MSY-based overfished reference points (Target=B_{MSY}; Threshold=½ B_{MSY}); a rebuilding F is suppose to be implemented when the stock falls below B_{MSY}, but this was not done in 2010-2012 specifications; risk analysis used to set area TACs to prevent overfishing of stock subcomponents but no requirement to choose risk-adverse options

of river herring in the Atlantic herring fishery was estimated to equal or exceed annual river herring landings from all in-river fisheries. The study also revealed bycatch hotspots off the northeast coast and called for further investigation of river herring bycatch in other small-mesh fisheries.

- In November 2008, the New England Fishery Management Council (NEFMC) voted to include options to address river herring bycatch in Amendment 4 (split in 2009 to Amendment 5) to the Atlantic Herring FMP.
- The National Coalition for Marine Conservation (NCMC) filed a Freedom of Information Act (FOIA) request in May 2009 for river herring and shad catch data in federal fisheries. The data revealed large river herring bycatch events (over 30,000 lbs in a single haul) in the Atlantic herring and mackerel fisheries and also very large bycatch events (greater than 300,000 lbs per haul) recorded as "unknown."
- The ASMFC Shad & River Herring Management Board approved Amendment 2 in May 2009 without any bycatch measures. To appease stakeholders (the Marine Fish Conservation Network rallied over 4,000 stakeholders to call for bycatch regulation and reduction), they instead called on the Secretary of Commerce to take emergency action to increase monitoring in small-mesh fisheries so that river herring bycatch can be accurately quantified and reduced. Over 100 NGOs and both the New England and Mid-Atlantic fishery councils supported the request.
- A parallel emergency action petition was filed by seven non-governmental organizations (NGOs) including NCMC. The NGO petition provided scientific support for the emergency action and explicitly called for bycatch reduction through bycatch caps and time/area closures. Emergency action was denied in December 2009.
- In June 2009, NCMC convinced the Mid-Atlantic Fishery Management Council (MAFMC) to add a strategy to address river herring bycatch to goals for Amendment 14 to the Atlantic Mackerel, Squid and Butterfish FMP.
- In February 2010, the Shad & River Herring Management Board voted to work with NMFS, the NEFMC and the MAFMC to address river herring and shad bycatch in Amendment 5 to the NEFMC Atlantic Herring FMP and Amendment 14 to the MAFMC Atlantic Mackerel, Squid, and Butterfish FMP. Amendment 14 comments were reviewed at the August 2010 MAFMC meeting where objectives to monitor and reduce bycatch were approved. Amendment 5 alternatives are under development, and as of December 2010, include options for hotspot area closures, move along rules, and special access rules modeled after rules allowing mid-water trawl vessels access to groundfish closed areas. In September, the NEFMC voted to add bycatch cap alternatives to Amendment 5, but these have not yet been developed.
- On behalf of commercial and recreational fishermen, on September 20, 2010 Earthjustice filed a federal lawsuit against NMFS and the ASMFC for failing to fulfill their responsibilities under the Magnuson-Stevens Fishery Conservation and Management Act and the Atlantic Coastal Fisheries Cooperative Management Act for managing and conserving river herring and shad in federal waters.
- At its October 2010 meeting, the MAFMC voted to create an ad-hoc Shad and River Herring Committee "to evaluate: 1) the most effective approaches for ASMFC, MAFMC, NEFMC and NOAA cooperation and coordination in the conservation of River Herring and Shad Complex; and, 2) MAFMC options to afford River Herring and Shad Comprehensive EFH, rebuilding and bycatch protections under the Magnuson-Stevens Act."
- In November 2010, the ASMFC Shad & River Herring Management Board clarified that Amendment 2 requires sustainable fishery plans for any state fishery that retains and sells river herring, including bycatch fisheries.

ii) American Shad (*Alosa sapidissima*)



Status:[4] ASMFC's 2007 stock assessment found stocks at historic lows with no evidence of recovery. Data on annual number of fish passing upriver at dams on several Atlantic coastal rivers exhibited a coast-wide pattern of increase during the 1980s followed by a decrease in the late 1990s to early 2000s, indicating a coastwide change in environmental conditions or mortality factors that affected stocks from South Carolina to Maine.

Major Predators: American eels, striped bass, weakfish, bluefish, sharks, tunas, king mackerel, riparian birds, seals and porpoises

Fishery:[5] Historically, commercial landings (coastal ocean and in-river) of American shad have shown major long-term declines, but coastal ocean landings of American shad did increase more than four-fold after 1978. In 1980, coastal ocean landings equaled approximately 623,000 pounds. By 1989, this number had peaked at 2.1 million pounds. The 2005 closure of the ocean-intercept fishery, implemented to combat stock declines, lowered the coastwide landings of American shad, which totaled just 565,418 pounds in 2008. As of the 2007 stock assessment, the closure of the ocean intercept fishery did not appear to be contributing to shad recovery. Through Amendment 1 to the Interstate Fishery Management Plan for Shad and River Herring, states are permitted a 5% by weight ocean bycatch allowance of American shad, but only a handful of states include ocean bycatch data in their compliance reports, and there is no enforcement for states that do not submit data or exceed the 5% limit.

Amendment 3, approved in February 2010, directs states to close all in-river American shad fisheries by January 2013 unless a state submits a sustainability plan for the Shad & River Herring Management Board to review and approve. Currently moratoriums on American shad fisheries are in place in Rhode Island, Delaware (Nanticoke River only), Maryland, the Potomac River Fisheries Commission, Washington, D.C., and Virginia. New York recently shut down the fishery in the Hudson River. All other states have a recreational limit per person per day. In 2008, the bulk of the commercial landings (80%) occurred in North Carolina and South Carolina. Commercial fisheries also exist in Connecticut, New York, New Jersey and Georgia. Annual revenues from commercial fisheries have averaged $623,000 since 2004.

Ex-vessel value is dwarfed by indirect economic impact from recreational fisheries, shad festivals and related tourism. According to Amendment 3, shad fishing and related tourism along the Susquehanna River alone generates approximately $30 million annually. The estimated values of a restored shad run in Maryland range from $42 million to $178 million.

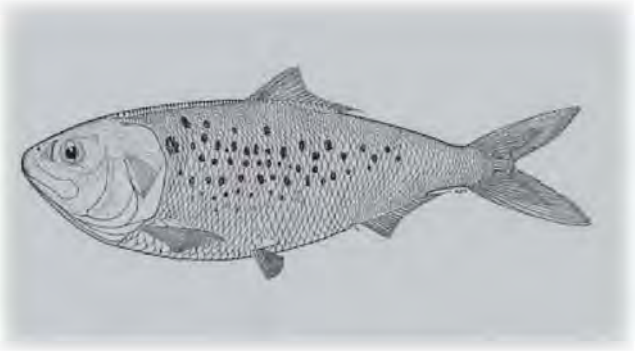
Recent Actions/Issues:

- Amendment 3 was approved by the Shad & River Herring Board in February 2010. At this same meeting, a presentation on American shad bycatch was given by Matt Cieri with the Maine Department of Marine Resources. His analyses contained large margins of error, but the Atlantic mackerel mid-water trawl fleet and mid-water and bottom trawl fleets for Atlantic herring were flagged as being responsible for the largest bycatch events. A

motion was passed to address both river herring and American shad bycatch in Amendment 5 to the Atlantic Herring FMP and Amendment 14 to the Mackerel, Squid and Butterfish FMP.

- In April 2010, at the urging of NCMC, ASMFC asked the Mid-Atlantic Council to add shad to its scoping document for Amendment 14 and the Council agreed. Objectives for monitoring and reducing shad and river herring bycatch were approved in August.
- ASMFC submitted a letter for a May 2010 meeting of the NEFMC's Atlantic Herring Oversight Committee (HOC), asking that they also consider shad species in alternatives to address bycatch. At that meeting, the HOC directed the Plan Development Team to explore feasibility of move-along rules and restricted access to areas with a history of shad *and* river herring bycatch. No shad-specific measures for Amendment 5 have been developed to date.

Interstate Fishery Management Plan for Atlantic Menhaden



Atlantic Menhaden (*Brevoortia tyrannus*)

Status:[6] A 2010 assessment concluded that menhaden are not overfished, based on current reference points, but that overfishing is occurring (in the 2008 terminal year of the analysis). An independent peer review of the assessment found the current reference points to be grossly inadequate as they led to an all-time low in abundance of age 1+ menhaden (covering the period 1955-2008) and allowed overfishing to occur in 32 out of the last 53 years.

Major Predators: striped bass, bluefish, sharks, swordfish, cod, bonito, ospreys, loons, dolphins

Fishery:[7] Atlantic menhaden are harvested mainly for reduction into fishmeal and fish oil products, but they are also caught for bait. In 2008, 76% or 141,133 mt of the coastwide catch was used for reduction; 80,000 mt was taken from the Chesapeake Bay. 2008 bait fishery landings were up 24% over the recent five-year average, mainly due to increased landings in the New England area. 2008 landings were valued at $24 million with $21 million generated from Virginia.

The reduction fishery, owned by Omega Protein, operates 10 industrial (~150 feet) purse-seine/steamer vessels out of Reedville, VA. Spotter planes are used to guide the purse seine vessels to the menhaden schools. Reduction fishing is banned in all state waters except for in Virginia and North Carolina, and the fishery does deploy vessels in federal waters. A Chesapeake Bay cap of 109,020 mt with an underage rollover cap of 13,720 mt has been in place since 2006. The cap, which was set to expire in 2010, was recently extended to 2013. There are no other catch restrictions in place for this fishery.

Recent Actions/Issues:

- Localized depletion of menhaden in the Chesapeake Bay, where the reduction fishery concentrates its efforts, has been a major concern since the mid-1990s when striped bass began to show signs of disease and malnutrition. The bay serves as the Atlantic's primary nursery for menhaden, but surveys conducted by Maryland and Virginia show severely low levels of juvenile abundance. Recruitment failure in the region has existed for well over a decade.

- The reduction fishery cap was intended as an interim measure to remain in place for five years while studies were conducted to inform ecosystem-based management strategies. The cap was set to expire in 2010, but was extended to 2013 through Addendum IV to allow more time for research. Many stakeholders viewed the decision as a failure of ASMFC to deliver on its promise of ecologically safe catch limits. The reduction fishery has been unable to land its bay allowance, leaving many to question the effectiveness of the cap.
- After Amendment 1 to the Atlantic Herring FMP was implemented in 2007, effectively banning mid-water trawlers from fishing in the inshore waters of the Gulf of Maine from June through September, some mid-water trawl vessels began to serve as "menhaden mother ships." These ships serve as fish hold and carrier vessels for menhaden caught by purse seiners operating in inshore waters from Maine through New Jersey. Menhaden landings in New England states tripled from 2007-2008 to nearly 8,000 mt, the highest in the region since 1993.
- NCMC and its allies have been working to convince the ASMFC to implement ecological reference points (targets and thresholds) for the reduction fishery to protect the ecological role of menhaden as prey. NCMC authored a white paper on the subject,[8] which was presented to the Menhaden Management Board in August 2009.
- The results of the 2010 stock assessment were presented to the Menhaden Management Board at the May 2010 meeting. The assessment team found poor recruitment, low fecundity, an all-time low abundance of age 1+ menhaden, and a long history of overfishing, including in 2008, the last year for which data were available. The findings prompted the Board to task its technical committee with developing new reference points to increase protection to the spawning stock and better account for predation. The Board voted in August to initiate an addendum to the plan that will contain options to revise the current reference points. The most conservative option equates to rebuilding the stock to 40% of an un-fished population, a standard MSY-based strategy. The current reference points allow the stock to be fished to 10% of an un-fished population. At the earliest, the addendum would be implemented for the 2012 fishing year.

Interstate Fishery Management Plan for Atlantic Herring

i) Atlantic Herring *(See Atlantic Herring under "New England Fishery Management Council")*

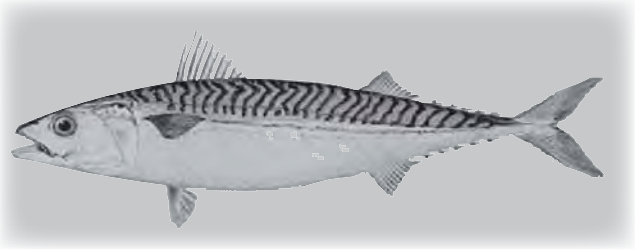
The ASMFC Atlantic Herring plan is designed to complement the federal plan managed by the New England Council. The plan implements spawning protections that include closures and landing restrictions. The plan also manages "days out" of the state waters fishery in order to maintain a steady supply of bait.

Recent Actions/Issues:

- The ASMFC Atlantic Herring Section approved Addendum II in November 2010. Addendum II implements changes to the specifications' definitions and process and establishes annual payback measures in order to comply with the federal plan's ACL and AM requirements
- Also in November, the Section initiated Addendum IV to allow small day-boats (bottom trawl and purse seine) additional landing days on 'days out' of the fishery. The intent is to allow smaller boats an equal amount of fishing days as larger vessels that can hold fish for several days. Impacts to river herring stocks will also be addressed. The draft addendum will be available for Section review and possible approval in January 2011. If approved, it will be released for public comment with final approval in March 2011.

Mid-Atlantic Fishery Management Council (MAFMC)

Atlantic Mackerel, Squid & Butterfish Fishery Management Plan



i) Atlantic Mackerel (*Scomber scombrus*)

Status:[9] Status is unknown because MSY reference points could not be determined as of 2010 TRAC; abundance is low; poor recruitment especially in last three years; lack of older fish in surveys since early 2000s; Canadian egg abundance surveys low; both Canadian and U.S. landings indicate geographic range of resource has shifted inshore and northward. Climate change is a plausible explanation but this has not been proven.

Major Predators: sharks, tuna, bonito, striped bass, cod, swordfish, skates, hake, bluefish, pollock, goosefish, weakfish, seabirds, pilot whales, dolphins, harbor seals, porpoises

Fishery:[10] The Atlantic mackerel fishery is transitioning to limited access. There were 2,622 vessels with federal mackerel permits in 2007. Amendment 11, approved by the Council in October 2010, creates a tiered limited access program of just over 400 vessels.

The vast majority of U.S. landings are taken by mid-water trawl gear. In 2007, single mid-water trawls landed 57% of the catch, followed by paired mid-water trawls at 32%, and bottom otter trawls at 8%. In 1997, just a decade earlier, bottom otter trawls landed 90% of the catch and mid-water trawls accounted for only 4%. Eighteen vessels accounted for 91% of landings from 2005-2007. Another 81 vessels account for 8.5% of landings. According to 2007 mackerel landings, all vessels that landed >1,000 mt of mackerel (13 vessels) also possess a Category A limited access sea herring permit (see Atlantic herring below).

The fishery is primarily executed off the Delmarva Peninsula north to Rhode Island. Major ports include New Bedford, MA, Cape May, NJ, Gloucester, MA, N. Kingstown & Point Judith, RI and Fall River, MA. U.S. landings have fallen dramatically in the last four years from their recent high of 58,359 mt in 2006 to 26,518 mt in 2007 and 22,798 mt in 2008. Revenues declined with landings from $17.3 million in 2006 to just $4.4 million in 2008.

Recent Actions/Issues:

- Canadian and U.S. landings have declined sharply from the recent high of 53,649 and 58,359 mt respectively in 2006 to 28,245 and 22,798 mt in 2008. Scientists who participated in the 2010 Atlantic mackerel TRAC agreed that catch should remain at current levels (80,000 mt for both Canadian and U.S. fisheries) due to concern for the resource and the high uncertainty surrounding its status. (2010 U.S. allowable biological catch (ABC) alone is 100,000 mt.) In June 2010, the Mid-Atlantic Council's Scientific and Statistical Committee (SSC) endorsed the TRAC recommended ABC of 80,000 mt for 2011. After subtracting estimated Canadian catch, the U.S. is left with an ABC of 47,395 mt for 2011. This is nearly five times the actual 2010 landings of 10,000 mt.
- In October 2010 the MAFMC selected final alternatives for Amendment 11, creating a 3-tiered limited access mackerel program. Concern over disadvantaging historical

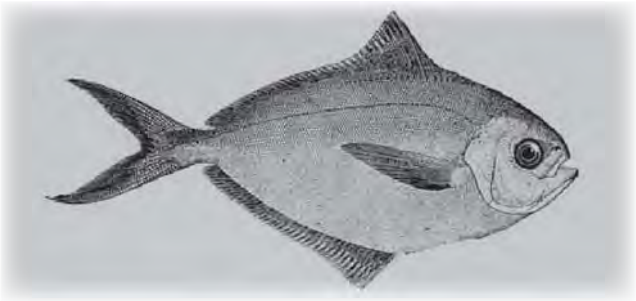
fishery participants led the Council to approve liberal "Tier 3" requirements, resulting in 329 qualifying vessels. (This number is in addition to 29 "Tier 1" vessels and 45 "Tier 2" vessels.) Trip limits will be established for each tier and for open access vessels annually during specifications. Total capacity of the new limited access fishery is estimated at 107,000 mt, but the long-term sustainable yield is estimated to be in the range of just 12,000 - 56,000 mt. It is important to note that the Atlantic mackerel fishery has been identified as having "excess capacity," defined by NMFS as "capacity in excess of actual harvest."[11] In 2007 and 2008, the U.S. fishery landed just 22% and 18% of its quota respectively.

- There is substantial overlap between the mid-water trawl fisheries for Atlantic herring and mackerel. At times, both species are targeted on the same trip, and nearly all mid-water trawl vessels participate in both fisheries. In Amendment 14 scoping (see *Recent Actions* under *River Herring and American Shad*), stakeholders called for integrated management of the sea herring and mackerel fisheries in order to effectively monitor and minimize shad and river herring bycatch.
- The MAFMC Squid, Mackerel and Butterfish Committee convened a "non-decisional" meeting in October 2010 to provide background information for developing Amendment 14 alternatives. A wide variety of presentations were given representing the perspectives and current work of the mackerel and squid fishing industries, the ASMFC, the U.S. Fish & Wildlife Service, the New England Fishery Management Council, and independent scientists.
- A MAFMC omnibus amendment to implement annual catch limits and accountability measures requirements of the Magnuson-Stevens Reauthorization Act (MSRA) of 2006 was approved for submission to NMFS at the August 2010 meeting. The amendment calls for the consideration of ecological factors when establishing catch limits for mackerel and butterfish but does not provide guidance for how this is to be done. However, in October, the MAFMC formed an Ecosystems Subcommittee of its Scientific and Statistical Committee (SSC) to advise the Council on how to "address and incorporate ecosystem structure and function in its fishery management plans (FMPs) and quota specification process."

ii) Atlantic Butterfish (*Peprilus triacanthus*)

Status:[12] Butterfish were assessed in December 2009 at the 49th Northeast Fisheries Science Center Stock Assessment Workshop. The assessment team could not determine B_{MSY}, which left the current overfished status as "unknown." The assessment did conclude that the population is declining and recruitment is poor. The cause of the population decline could not be determined, but fishing mortality estimates are well below the overfishing threshold. The natural mortality estimate used in the assessment is believed to be too low.

Major Predators: swordfish, hammerhead sharks, haddock, hake, goosefish, flounder, cod, shearwaters, gannets, fulmars, pilot whales, dolphins



Fishery:[13] A Loligo/butterfish moratorium permit was implemented in 1997 and directed fishing for butterfish is minimal. A squid/butterfish incidental permit allows vessels to retain 4.54 mt of butterfish per trip when targeting other

species.

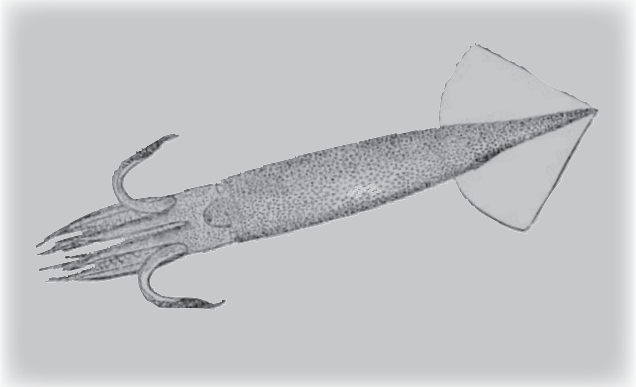
Butterfish are primarily taken by bottom trawls. 136 vessels are considered major vessels in the fishery and account for 67% of landings. Principal landing ports include Point Judith, RI, Montauk, NY, Newport, RI, Hampton Bays, NY, and New London, CT. Landings have averaged around 500 mt since 2003, significantly lower than the most recent high of 4,400 mt in 2001. Revenues ranged between $2.2-6.5 million through the 1980s and 1990s, but fell to under $1 million after 2001. The decline in landings and revenue is attributed to poor stock condition and reduced market demand.

Recent Actions/Issues:

- Butterfish discards are estimated to be twice the annual landings. Analyses have shown that the primary source of butterfish discards is the *Loligo* fishery because it uses small-mesh, diamond-mesh codends and because butterfish and *Loligo* co-occur year-round.
- Butterfish were declared overfished in 2005, but the MAFMC did not submit a rebuilding plan (Amendment 10) to NMFS until 2009. The final rule implementing Amendment 10 was published on March 11, 2010. The centerpiece of the rebuilding plan is a butterfish bycatch cap in the *Loligo* fishery, but the amendment also requires a modest increase in mesh size for the first and third trimesters of the *Loligo* fishery.
- A butterfish stock assessment scheduled for 2010 was moved up to 2009. Because overfished status could not be determined, industry is advocating for repeal of the butterfish cap. NOAA general counsel maintains that regardless of the requirement to rebuild overfished stocks, the Council is obligated to reduce bycatch as required by National Standard 9 of the Magnuson-Stevens Fishery Conservation and Management Act; therefore Amendment 10 has sound legal footing. The bycatch cap is also the centerpiece of required annual catch limit and accountability measures for butterfish, which are described in the Council's ACL/AM omnibus amendment.
- The 2009 stock assessment did find that age truncation is contributing to poor recruitment. Historically, the stock was characterized by a broader age distribution and the maximum age was six years. The lifespan is now three years. The truncated age structure results in reduced egg production, and the reduced lifespan artificially reduces the mean generation time required to rebuild the stock.

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iii) Shortfin Squid (*Illex illecebrosus*)



Status:[14] Unknown; stock assessment model under development, but assessment has yet to be scheduled because of data needs; ABC is based on average long-term catch

Major Predators: swordfish, bluefin tuna, hake, bluefish, goosefish, founder cod, shearwaters, gannets, fulmars, pilot whales, dolphins

Fishery:[15] *Illex* are primarily harvested by bottom otter trawls May-October as the squid migrate along the U.S. shelf, primarily in the Mid-Atlantic Bight. A moratorium permit for the directed fishery went into effect in 1997. Incidental permits are also issued, but these

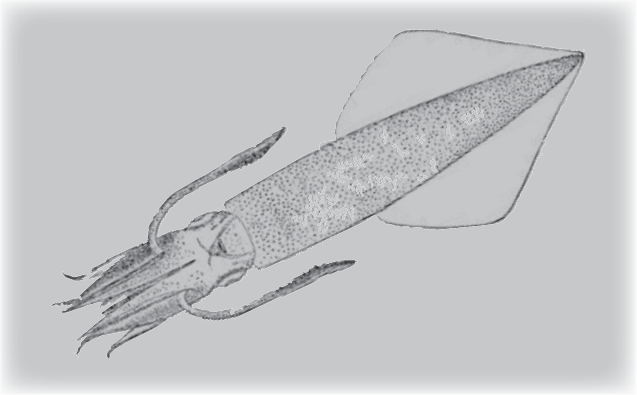
account for a minor portion of landings. At any one time since implementation, there have been no more than 77 vessels in possession of the moratorium permit. The vast majority of *Illex* landings comes from only 22 distinct vessels. Within this group, greater than 73% of the combined 2002-2006 landings by value came from four vessels. Principal landing ports include Cape May, NJ, Point Judith, RI, Davisville, RI, and Wanchese, NC. Landings averaged 17,300 mt from 2004-2006, and the revenue generated during this time period averaged around $10 million.

Recent Actions/Issues:

- In August 2009, the MAFMC voted to initiate Amendment 14 to create a catch shares program for the squid fisheries. However, the catch shares program was removed from Amendment 14 at the August 2010 meeting. The Council intends to complete a catch shares visioning program (underway) before moving forward with plan amendments to implement catch shares in its fisheries.
- Stock status is currently unknown. A stock assessment model is in development, but the next *Illex* assessment has yet to be scheduled because of data needs.
- Because their geographical range extends well beyond federal waters, *Illex* are subject to exploitation on the high seas. Landings increased dramatically in Northwest Atlantic Fisheries Organization (NAFO) subareas 2-4 from 17,700 mt in 1975 to 162,000 mt in 1979, and subsequently plummeted to less than 13,000 mt by 1982. From 1982 onwards, landings from the U.S. domestic fishery have comprised the majority of the total stock landings, and U.S. harvests have ranged between 2,800 mt and 31,500 mt.

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iv) Longfin Squid (*Loligo pealei*)



Status:[16] Overfished status is unknown because B_{MSY} could not be determined in last (2002) assessment. Overfishing is not occurring. New stock assessment commenced in November 2010 with results expected early 2011.

Major Predators: bluefish, mackerel, sea bass, summer flounder, cod, haddock, pollock, hake, dogfish, angel shark, goosefish, diving sea birds, pilot whales, dolphins

Fishery:[17] The *Loligo* fishery is managed by trimester-based landings quotas and is typically closed once per year. Approximately 400 vessels hold *Loligo*/butterfish moratorium permits (implemented in 1997), and most of these vessels deploy bottom otter trawls. The majority of vessels with *Loligo* permits target other species. About 138 vessels are considered major vessels in the fishery and account for ~ 87% of annual landings. Incidental permits are also issued, but these account for only 0-2% of landings. However, the proportion of landings from vessels with no *Loligo* permit (likely state vessels) has been increasing over the last few years, and now amounts to around 10% of annual landings. Principal landing ports include Point Judith, RI, New Bedford, MA, Cape May, NJ, Shinnecock, NY, Montauk, NY, Boston, MA, Newport, RI, Hampton Bays, NY, Point Pleasant, NJ, Narragansett, RI, Point

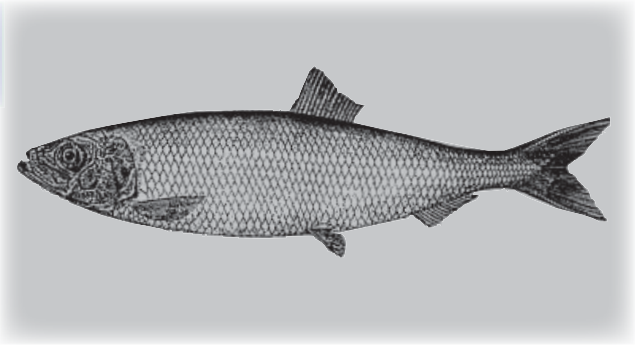
Pleasant, NJ, Gloucester MA, Davisville, RI, and Point Lookout, NY. U.S. landings have averaged around 16,000 mt from 2004-2006. Average annual revenue is around $27 million.

Recent Actions/Issues:

- As mentioned above, a catch shares program was initiated for squid fisheries through Amendment 14, but this was removed from Amendment 14 in August 2010. The Council will revisit the idea of catch shares when it completes its catch shares visioning program.
- **Discarded bycatch is a major problem in this fishery.** From 2001-2006, 32% of the observed catch in the *Loligo* fishery was discarded compared to 3% in the *Illex* fishery and 2% in the mackerel fishery. During 1997-2000, 46% of the observed catch in the *Loligo* fishery was discarded.
- A study (Staudinger 2006[18]) of squid consumption by major predators (summer flounder, silver hake and bluefish) found *Loligo* to be the dominant squid in predator diets, and also found summer and winter to be the most important seasons for squid predation. In the winter, squid and their predators migrate to the warm waters of the outer shelf, increasing the probability for predator-prey encounters. However, the fishery threatens these interactions by targeting squid on the shelf heavily in winter. Winter catches have increased substantially since the late 1980s.

New England Fishery Management Council (NEFMC)

Atlantic Herring Fishery Management Plan



i) Atlantic Herring (*Clupea harengus*)

Status:[19] The 2009 TRAC concluded that Atlantic herring are not overfished and overfishing is not occurring. A significant retrospective pattern was detected in the assessment which revealed a 40% overestimation in spawning stock biomass in past years relative to the current estimate. Biomass is projected to decline over the next three years but is not expected to fall below the overfished threshold.

Major Predators: bluefin tuna, dogfish, cod, hake, halibut, flounders, bluefish, skates, smooth hammerhead, Northern gannet, shearwater, finback whales, humpback whales, minke whales, pilot whales, harbor seal, porpoises, white-sided dolphins

Fishery:[20] The U.S. Atlantic herring fishery is prosecuted in 4 distinct management areas (Areas 1A, 1B, 2, 3), which are intended to prevent overexploitation of distinct spawning components of the resource. The fishery is limited access with four permit categories:

1. **Category A** – limited access to all management areas
   a. 41 permits in 2008
   b. 26 vessels (16 pair trawl, 3 mid-water trawl, 4 purse seine, and 3 bottom trawl)
2. **Category B** – limited access to management areas 2 and 3 only

a. 4 permits in 2008

b. 1 bottom trawl vessel

3. **Category C** – limited access with an incidental catch limit of 25 mt/trip

a. 54 permits in 2008

b. 12 bottom trawl vessels

4. **Category D** – open access for 3 mt/trip (2,272 permits)

a. 2,272 permits in 2008

b. 72 vessels (1 pair trawl, 3 mid-water trawl, 1 purse seine, 46 bottom trawl, 4 seine/weir, 25 other)

U.S. landings averaged 91,800 mt from 2004-2008. In 2008, 83,000 mt of herring were landed by the U.S. fishery. Nearly 60% of 2008 landings were by pair trawl vessels; purse seine vessels landed 32%. Most of the landings occur in Gloucester, MA, New Bedford, MA, Rockland, ME and Portland, ME. Reported revenues in 2008 were around $20 million.

Recent Actions/Issues:

- Herring specifications for 2010-2012 were completed in November following the June 2009 TRAC. This was the first specifications package for which the Council's Scientific and Statistical Committee set ABC levels in accordance with the requirements of the MSRA. Because of the large retrospective pattern in the stock assessment, the SSC chose a 40% buffer between OFL and ABC resulting in an ABC approximately equal to the actual 2008 catch. Bowing to pressure from the herring and lobster (bait) fisheries, the NEFMC asked the SSC to reconsider its decision, which it did. The result was a menu of options for ABC based on catch for the most recent year or the average catch over the last three or five years. The council (instead of the SSC) chose the final ABC, which was 18% higher than the original SSC recommendation. In addition, the buffer between ABC and OFL shrinks from 27% in 2010 to 16% in 2012.
- Amendment 4 began in 2008 largely to address inadequate catch monitoring of the high-volume Atlantic herring fishery, but was split into two parts (Amendments 4 and 5) in June 2009 in order to expedite compliance with the annual catch limit (ACL) and accountability measure (AM) requirements.
- The NEFMC completed work on Amendment 4 and voted to submit the plan to NMFS in January 2010. The proposed rule to implement the amendment was published in October. The amendment mainly serves to retrofit the current management system to new terminology in the MSRA. However, National Standard 1 (NS1) Guidelines relating to forage fish stocks are highlighted and a discussion on how forage concerns could be addressed is included. The Council's SSC is given the ability to include forage issues in their ABC recommendation. In addition, the Council can establish a separate allocation for forage should the need arise. Not all components of NS1 Guidelines are adequately addressed Major deficiencies include: 1) Lack of an ABC control rule and associated risk of overfishing policy; and 2) Systematic evaluation of stocks in the fishery, including the identification of non-target stocks like river herring for which catch limits are needed.
- The NEFMC Herring Oversight Committee is currently developing alternatives for Amendment 5 to improve catch monitoring, address river herring bycatch, increase incidental herring catch limits for mackerel vessels and regulate herring vessel access to groundfish closed areas. In addition, the NEFMC directed the Committee to develop alternatives to protect distinct spawning aggregations of the Atlantic herring stock complex, but no alternatives have been developed to date. The Committee plans to complete work on the amendment in 2011 for implementation by 2012. ♦

Chapter Endnotes

1. PFMC. 2009. Status of the Pacific Coast Coastal Pelagic Species Fishery and Recommended Acceptable Biological Catches. Stock Assessment and Fishery Evaluation. June 2009.
2. Crecco, V.A. and M. Gibson. 1990. Stock assessment of river herring from selected Atlantic Coast rivers. Atlantic States Marine Fisheries Commission. Special Report. No. 19, Washington, D.C.
3. ASMFC. 2009. Amendment 2 to the Interstate Fishery Management Plan for Shad and River Herring.
4. ASMFC. 2007. American Shad Stock Assessment Report for Peer Review. Vol. I. Stock Assessment Report No. 07-01 (Supplement). Washington, DC.
5. ASMFC. 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring.
6. ASMFC. 2010. Stock Assessment Report No 10-02 of the Atlantic States Marine Fisheries Commission: *Atlantic Menhaden Stock Assessment and Review Panel Reports*. Washington, D.C. Subsequent to publication of the assessment, a coding error in the model was discovered and fixed. As a result, the stock assessment subcommittee reported at the November 2010 ASMFC meeting that "overfishing is occurring."
7. ASMFC Atlantic Menhaden Peer Review Team. 2009 Review of the Fishery Management Plan and State Compliance for the 2008 Atlantic Menhaden (*Brevoortia tyrannus*) Fishery. May 2009.
8. Ecological Reference Points for Atlantic Menhaden. Ken Hinman, NCMC.June 2009
9. TRAC. 2010. Atlantic Mackerel in the Northwest Atlantic. TRAC Status Report 2010/01.
10. MAFMC. 2010. Draft Amendment 11 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan including Draft Environmental Impact Statement (DEIS) and Essential Fish Habitat (EFH) Assessment. January 2010.
11. NMFS. 2008. Excess Harvesting Capacity in U.S. Fisheries: A Report to Congress. http://www.nmfs.noaa.gov/msa2007/docs/042808_312_b_6_report.pdfuCapacity report
12. NEFSC. 2010. 49th Northeast Regional Stock Assessment Summary Report. January 2010.
13. MAFMC. 2010. Amendment 10 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan including Final Supplemental Environmental Impact Statement. March 2010.
14. NEFSC. 2006. 42nd Northeast Regional Stock Assessment Workshop (42nd SAW) stock assessment report, part A: silver hake, Atlantic mackerel, and northern shortfin squid. Northeast Fish. Sci. Cent. Ref. Doc. 06-09a, 284 p.
15. See note xi
16. NEFSC. 2002. Report of the 34th Northeast Regional Stock Assessment Workshop (34th SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. April 2002.
17. See note xi
18. Staudinger, M. D. 2006. Seasonal and size-based predation on tow species of squid by four fish predators on the Northwest Atlantic continental shelf. Fishery Bulletin 104(4): 605-615.
19. TRAC. 2009. Gulf Of Maine-Georges Bank Herring Stock Complex. TRAC Status Report 2009/04.
20. NEFMC. Proposed Atlantic Herring Specifications for the 2010-2012 Fishing Years (January 1, 2010 – December 31, 2012), DISCUSSION DOCUMENT, November 3, 2009.

Images

Alewife, Blueback Herring, Menhaden, Atlantic Mackerel, Butterfish, Shortfin Squid, Longfin Squid, Atlantic Herring: Northeast Fisheries Science Center Historical Photo Archives. Lineart Drawings. URL: www.nefsc.noaa.gov/lineart/

Species	Management Body	Management Plan	Stock Status	Current Assessment Used for Management	Next Assessment
Alewife; Blueback Herring (River Herring)	ASMFC Shad and River Herring Management Board	Interstate Fishery Management Plan for Shad and River Herring	15 stocks examined and 5 of these were overfished with recruitment failure; 4 stocks were not overfished but were declining	Crecco, V.A. and M. Gibson. 1990. Stock assessment of river herring from selected Atlantic Coast rivers. Atlantic States Marine Fisheries Commission. Special Report. No. 19, Washington, D.C.	underway; completion and peer review scheduled for 2011
American Shad	ASMFC Shad and River Herring Management Board	Interstate Fishery Management Plan for Shad and River Herring	stocks at historic lows and do not appear to be recovering	ASMFC (Atlantic States Marine Fisheries Commission). 2007. American Shad Stock Assessment Report for Peer Review. Vol I. Stock Assessment Report No. 07-01 (Supplement). Washington, DC.	not scheduled
Atlantic Menhaden	ASMFC Menhaden Management Board	Interstate Fishery Management Plan for Atlantic Menhaden	not overfished; long history of overfishing, including in 2008, the terminal year of the analysis; population abundance is at an all time low , recruitment has been poor for two decades	ASMFC. 2010. Stock Assessment Report No. 10-02 of the Atlantic States Marine Fisheries Commission: Atlantic Menhaden Stock Assessment and Review Panel Reports. Washington, D.C.	not scheduled
Atlantic Mackerel	MAFMC	Atlantic Mackerel, Squid, and Butterfish FMP	unknown because reference points for management could not be agreed upon.; Egg surveys, NMFS trawl surveys and fishery catch reveal declining trends in spawning stock biomass and productivity and an alarming drop in the numbers of mature mackerel.	TRAC. 2010. Atlantic Mackerel in the Northwest Atlantic. TRAC Status Report 2010/01.	not scheduled
Butterfish	MAFMC	Atlantic Mackerel, Squid, and Butterfish FMP	overfished status unknown because B_{MSY} could not be determined; stock is declining but overfishing is not occurring	Northeast Fisheries Science Center (NEFSC). 2010. 49th Northeast regional stock assessment summary report. January 2010.	not scheduled
Shortfin Squid	MAFMC	Atlantic Mackerel, Squid, and Butterfish FMP	undetermined because estimates of fishing mortality and stock biomass not available	NEFSC. 2006. 42nd Northeast Regional Stock Assessment Workshop (42nd SAW) stock assessment report, part A: silver hake, Atlantic mackerel, and northern shortfin squid. Northeast Fish. Sci. Cent. Ref. Doc. 06-09a, 284 p.	not scheduled
Longfin Squid	MAFMC	Atlantic Mackerel, Squid, and Butterfish FMP	overfished status unknown because B_{MSY} could not be determined; overfishing is not occurring	NEFSC. 2002. Report of the 34th Northeast Regional Stock Assessment Workshop (34th SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. April 2002.	December 2010
Atlantic Herring	NEFMC; ASMFC Atlantic Herring Management Board	Atlantic Herring FMP; Interstate Fishery Management Plan for Atlantic Herring	not overfished and overfishing is not occurring; retrospective pattern in recent assessment indicates biomass has been significantly overestimated in recent years; biomass is expected to decline slightly in the next three years	TRAC. 2009. Gulf Of Maine-Georges Bank Herring Stock Complex. TRAC Status Report 2009/04.	June 2012 (assessment team plans to explicitly address predation in this assessment)

Recent Management Actions

Amendment 2 was completed in May 2009 to address sharp declines in river herring landings and will close all directed fisheries by 2012 unless proven sustainable through an ASMFC-approved sustainable fishery plan. Amendment 2 calls on the Secretary of Commerce to implement emergency action to monitor river herring bycatch and dedicate resources to advance cooperative efforts between the ASMFC, NMFS and the regional councils.

Amendment 3, completed February 2010, recommends addressing river herring and shad bycatch through regional council amendments underway **(Amendment 5 to the Atlantic Herring FMP and Amendment 14 to the MSB FMP).**

Amendment 3 was approved February 2010 in response to a 2007 American shad stock assessment that found stocks at all-time lows and not recovering. Amendment 3 closes all American shad directed fisheries by 2013 unless proven sustainable through an ASMFC-approved sustainable fishery plan. Amendment 3 also contains a recommendation to address river herring and shad bycatch through regional council amendments underway **(Amendment 5 to the Atlantic Herring FMP and Amendment 14 to the MSB FMP)**

Addendum IV, approved in November 2009, extends the Chesapeake Bay reduction harvest cap from 2011 through 2013.

In May 2010, the ASMFC Menhaden Management Board voted to consider new reference points for managing the fishery. The Board tasked the Menhaden Technical Committee and the Multi-species Committee to develop a range of new reference points that better protect the spawning stock, achieve higher abundance, and account for predator needs. The committees reported back to the Board in August 2010 that they were unable to make much progress, so the Board voted to initiate an addendum based on revising the current reference points for maximum spawning potential, the most conservative of which is a MSY-based strategy that would allow the stock to be fished to 40% of an un-fished level.

Amendment 11, approved by the MAFMC in October 2010, will establish a 3-tier limited access program for the mackerel fishery in order to cap capacity. Concern over disadvantaging historical fishery participants compelled the Council to liberalize its qualification criteria for the limited access program resulting in a fleet of over 400 vessels. Anticipated implementation is 2011.

ACL/AM Omnibus Amendment was approved for NMFS review at the August 2010 Mid-Atlantic Council meeting. The amendment is process-oriented, and its scope is limited to fitting the current catch level procedures to the Magnuson-Stevens Reauthorization Act (MSRA) terminology. Annual catch targets (ACTs) will be used to address management uncertainty, and specifically for butterfish and mackerel, ecological considerations are to be addressed when setting the ACT. The amendment does not provide specific guidelines for addressing ecological concerns and does not address National Standard 1 (NS1) forage fish guidance on maintaining abundance above B_{MSY}.

Amendment 10 became final on March 11, 2010. The amendment implements a rebuilding plan for butterfish (declared overfished in 2005). The primary rebuilding measure is a bycatch cap in the *Loligo* fishery. The amendment also requires a modest increase in codend mesh size for the first and third trimesters of the *Loligo* fishing year.

ACL/AM Omnibus Amendment will establish ACTs for butterfish landings and for the discard mortality cap in *Loligo* fishery. The ACTs are to take into account ecological factors. (See ACL/AM Omnibus summary above)

Amendment 14 was initiated in August 2009; scoping ended in July 2010. Originally the amendment objectives included a catch shares program for the *Loligo* and *Illex* fisheries, but the Council removed catch shares from the amendment at its August 2010 meeting. In the time since the Council began work on Amendment 14, a catch shares visioning program was initiated. The program's goal is to evaluate the applicability of catch shares to MAFMC fisheries to determine the best way to move forward. Amendment 14 objectives now focus only on monitoring and reducing shad/river herring bycatch.

See Amendment 10 and Amendment 14 summaries above.

NEFMC –
Amendment 4 is intended to with bring the plan into compliance with the MSRA by establishing ACLs and AMs for the fishery. Plan was approved by the Council for NMFS review in January 2010, and the proposed rule to implement the amendment was published in October. Conservation and fishing groups have argued that the amendment fails to fully comply with NEPA and the NS1 guidelines.

Amendment 5 objectives include improving the monitoring of catch (landings and discards), addressing river herring bycatch, increasing incidental herring catch limits for mackerel vessels, restricting herring vessel access to groundfish closed areas, and protecting the distinct spawning aggregations of the Atlantic herring stock complex. In May 2010, the ASMFC requested the NEFMC to include shad species in the amendment's bycatch alternatives, but so far, shad data has not been reviewed for the construction of alternatives. The Council anticipates approving the amendment for NMFS review in early 2011. Amendment 5 alternatives are currently being developed by the Herring Plan Development Team and Oversight Committee.

ASMFC –
Addendum II, approved in November 2010, changes the specification definitions, administrative process and annual paybacks for catch overages in a management area. **Addendum IV** was initiated in November 2010 to allow small day-boats additional landings days on "days out' of the fishery in order to give them the same amount of fishing days as large boats that can store fish for several days. Impacts to river herring are to be considered. Final approval is tentatively scheduled for March 2011.



Obstacles & Opportunities in Protecting The Northeast Forage Base

In July 2009, the NOAA Ecosystem Assessment Program issued its status report for the Northeast U.S. Continental Shelf Large Marine Ecosystem (NES LME). "Experiencing ecosystem overfishing" was the verdict.

The report describes a steady decline in the mean trophic level of the catch since the 1960s as an important factor in the determination. "Losses incurred by fishing at low trophic levels affect the energy available to higher trophic levels."* Development of U.S. fisheries for "underutilized" Atlantic herring, mackerel and butterfish was aggressively promoted by the National Marine Fisheries Service in the 1990s following the demise of higher-value predator stocks such as cod, haddock and yellowtail flounder. Dr. Steve Murawski, Director of Scientific Programs and Chief Science Advisor for NOAA Fisheries, further explains that an ecosystem can be considered overfished if "diversity of communities or populations declines significantly as a result of sequential 'fishing-down' of stocks, selective harvesting of ecosystem components, or other factors associated with harvest rates or species selection."†

Food webs in marine ecosystems are typically "wasp-waist," meaning that there are just a few forage species that occupy the crucial intermediate levels of the food chain and serve to convert primary production into usable energy for higher trophic level species. In the Northeast, industrial fisheries target nearly all of the ecosystem's forage species, delivering catches that exceed 300,000 mt annually. While all these forage fisheries are currently managed under a federal or interstate fishery management plan, none of the plans employ ecosystem-based management strategies to ensure that large catches are ecologically-sustainable. At best these plans set catch levels based on traditional, single-species (MSY-based) targets and thresholds, which have been deemed inappropriate for forage species.‡ In the case of menhaden, the largest fishery by volume on the East Coast, there is no catch limit outside of Chesapeake Bay waters.

The promise of generous quotas encourages industrialization of small pelagic fisheries to maximize efficiency and profits. A fleet of just 10, 150-foot steamer ships, owned by a single corporation, lands over 75% of the coast's menhaden catch, which is reduced in a factory to fish meal and fish oil. A fleet of 20 midwater trawl vessels (up to 165 feet in length) lands the large majority of the nation's Atlantic herring and mackerel. Many of these midwater trawlers engage in pair trawling, a practice that is banned in many parts of the world because of bycatch of protected mammals.

It is not surprising that mammals, seabirds and predatory fish often fall victim to bycatch in forage fisheries. The large capacity and indiscriminate nature of the small-mesh gear enables entire forage schools to be taken in a single haul along with the predators feeding on that school. The long list of bycatch includes commercially important fish such as cod, tuna and sharks as well as recreational species like striped bass and flounder.

Large numbers of non-targeted forage fish are also taken. Atlantic herring bycatch is so common

* Ecosystem Assessment Program. 2009. Ecosystem Assessment Report for the Northeast U.S. Continental Shelf Large Marine Ecosystem. US Dept Commerce, Northeast Fisheries Science Center Ref Doc. 09-11; 61 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

† Murawski, S.A., Definitions of overfishing from an ecosystem perspective. Ices Journal of Marine Science, 2000. 57(3): p. 649-658.

‡ Collie, J.S and H. Gislason. 2001. Biological reference points for fish stocks in a multispecies context. Canadian Journal of Fisheries and Aquatic Sciences. 58: 2167-2176.



in the mackerel fishery that the New England Fishery Management Council is considering a significant increase to the herring incidental catch allowance for mackerel vessels to avoid wasteful discarding.* A rebuilding plan for butterfish, declared overfished in 2005, is centered on controlling bycatch in the longfin squid fishery. Discards of butterfish are twice as high as directed landings.†

While we have landings records, we actually know little about the total catch of forage fish in the Northeast. Historically poor to non-existent levels of catch sampling and at-sea observer coverage in the Atlantic's forage fisheries prevent an accurate accounting of total catch (landed and discarded) and inhibits the ability of fishery managers to effectively set safe catch levels and mitigate bycatch impacts. Though the largest fishery by volume in the region, the menhaden fishery is not observed at sea. Observers are deployed in federally-managed, small-mesh trawl fisheries, but coverage levels are a fraction of what is needed for accurate data extrapolation. Precious observer sea days are wasted when the catch is dumped or pumped to another vessel before it is sampled by the observer, practices that are permitted by current federal regulations. These practices, along with misidentification of sampled fish, result in the use of "fish unknown" or "herring unknown" classifications in observer records, rendering the haul information useless for bycatch analyses.

The forage species most at risk from poor catch monitoring are anadromous shad and river herring, which, along with menhaden, are critical to a healthy forage base in estuaries, river systems and coastal state waters. These species spend the majority of their lives at sea migrating up and down the coast to winter and summer feeding grounds, where they mingle with schools of sea herring and mackerel. Because their populations have crashed all along the eastern seaboard, directed fishing for river herring and American shad has been severely restricted or shut down all together in many states. Yet, despite large river herring bycatch events and the discovery of bycatch hotspots in the sea herring and mackerel fisheries, ocean bycatch continues to be loosely monitored. Because river herring and shad lack federal management, the issue has become a game of hot potato between state and federal fishery management authorities.

Recent stock status reports paint a grim picture of the state of the Northeast's forage base (See *Overview of Northeast Forage Species*). All commercially-targeted forage populations are either declining, at historically low levels or are not satisfying fishery quotas. Not a single stock is at a stable level above B_{MSY}, a level recommended in the revised National Standard 1 Guidelines "to enhance and protect the marine ecosystem."‡

Heavy exploitation of forage fish stocks without a framework to guide ecologically-safe levels of harvest is eroding the Northeast's forage base. Ecosystem overfishing in the Northeast will not end until ecosystem-based fishery management begins. The logical place to start is the restoration of a healthy forage base, the thread that holds together the structure and function of ocean food webs. ♦

* Draft Amendment 5 Discussion Document dated July 2010. http://www.nefmc.org/herring/cte%20mtg%20docs/100727-28/DRAFT%20AM%205%20DISCUSSION%20DOC%20JULY%2027%2028%202010%20COMMITTEE.pdf

† MAFMC. Amendment 10 the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. January 2010.

‡ 50 CFR § 600.310 (e)(3)(iv)(C)

The Challenge

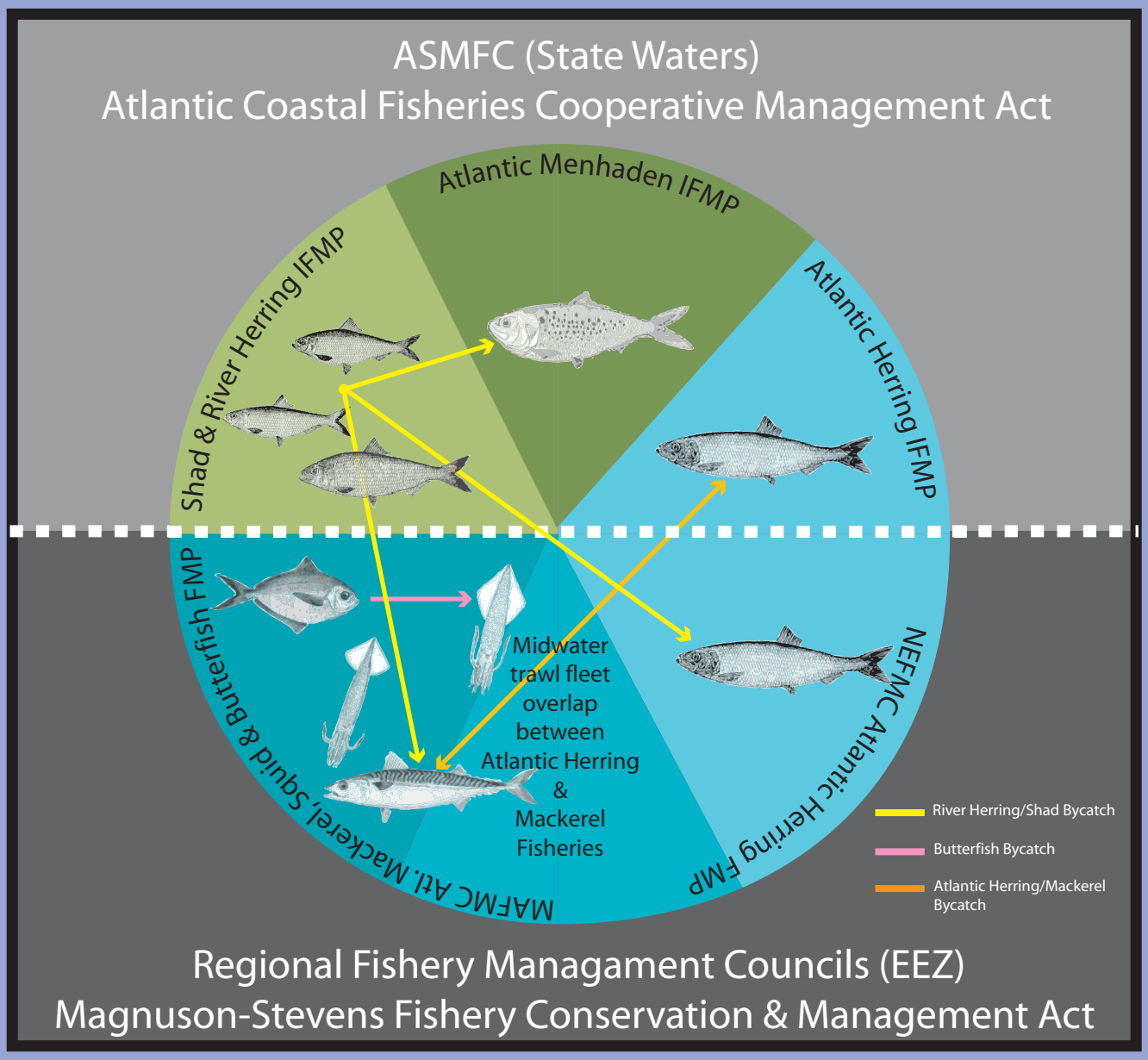
Among the biggest challenges we face in moving to an ecosystem-based approach to managing forage fisheries is institutional inertia. Advocates for more conservative management of forage fish at the New England and Mid-Atlantic Councils and the Atlantic States Marine Fisheries Commission often encounter what we call ping-pong accountability, a frustrating back-and-forth between fishery managers and their scientific advisors. Managers continue to operate *status quo*, i.e., conventional single-species management, while they wait for their scientists to advise them on whether or how to change. The scientists, for their part, are accustomed to single-species stock assessment models and are not inclined to assess the stocks differently, using ecological reference points, without instruction from the managers. In the end, both can fall back on the excuse that they are not required to take an ecosystems approach under present federal mandates.

In order to implement ecologically-sustainable catch limits for Atlantic herring, mackerel, squid, butterfish, menhaden, river herring, shad and other forage species, we must resolve the outstanding scientific issues involved in assessing the ecological status of prey species while at the same time promote new management policies that establish ecosystem-scale goals. But we also need institutional reforms to more comprehensively manage and conserve all of the species that make up the northeast forage base throughout their range, whether they are target species or bycatch, in state or federal waters. We need to merge fishery management plans that separate species that are caught in the same fisheries in the same areas often at the same time, and to expand these plans to address bycatch of associated species. We need to use the current single-species management framework as the foundation for building an ecosystems plan that includes all important forage species, including those for which fisheries and/or management plans do not exist (e.g., sand lance, krill and copepods), in order to monitor their status, their role in the food web, and eventually to link fluctuations in their abundance to the abundance of managed species and the forage base as a whole.



We need new federal mandates, through Congressional action, such as strict standards governing the use of wild forage fish in open water aquaculture and, ultimately, amendments to the Magnuson-Stevens Act that would make ecosystem-based management a required, not discretionary, part of fishery management. And finally, we must do a better job marshalling support for these initiatives by educating policymakers, the environmental and fishing communities, and the general public about the threats to forage fish, the importance of the forage base to ecosystem health and integrity, and the urgency to manage forage resources in a more precautionary manner. ♦

Figure 4


ASMFC (State Waters)
Atlantic Coastal Fisheries Cooperative Management Act
Atlantic Menhaden IFMP
Shad & River Herring IFMP
Atlantic Herring IFMP
Midwater trawl fleet overlap between Atlantic Herring & Mackerel Fisheries
Butterfish FMP
MAFMC Atl. Mackerel, Squid & Butterfish FMP
NEFMC Atlantic Herring FMP
River Herring/Shad Bycatch
Butterfish Bycatch
Atlantic Herring/Mackerel Bycatch
Regional Fishery Managament Councils (EEZ)
Magnuson-Stevens Fishery Conservation & Management Act

Implementing Ecologically-Sustainable Catch Limits

The Science: Accounting for Predator Needs in Stock Assessments

The first principle of conserving forage fish in an ecosystems context is to determine the needs of predators *before* allocating fish to fisheries.* Current management of forage fish and the stock assessments that support it allocate prey to predators *after* determining the needs of the fishery, leaving predator needs unaccounted for.

Fishery managers and their scientific advisors† have long maintained that estimating natural mortality for use in stock assessments accounts for predators. For a prey species, natural mortality is presumed to be mostly predation. But this estimate of predation is actually an *a priori* allocation of prey to predators, rather than a determination of actual predator needs, which is what is required to meet the national goal of "maintain(ing) adequate forage for the ecosystem". ‡

In an un-fished population at a natural equilibrium, total mortality for a forage species equals natural mortality, primarily predation. In a population that is at a fishing-induced equilibrium, the amount of predation is reduced to accommodate desired fishery yields. Applying a natural mortality rate to the standing stock, then, provides only an estimate of what portion of the population is being consumed by predators under prevailing conditions. The prevailing condition of a fish population under an MSY-based fishing strategy is a population reduced from its un-fished state by 50% or more§, so there is a

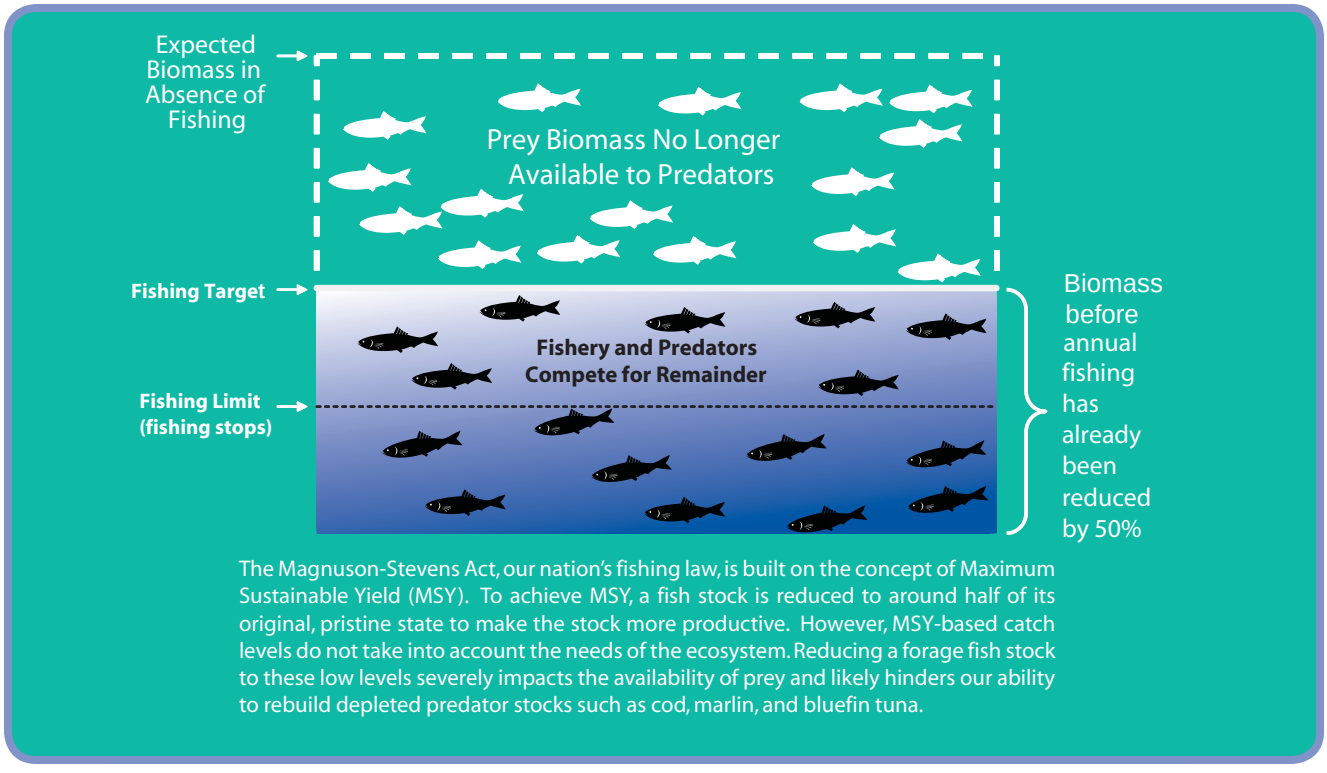
* Fisheries Ecosystem Planning for Chesapeake Bay, NOAA Chesapeake Bay Office, 2006. pp. 320-1.

† In the case of the councils, their Scientific and Statistical Committees, or SSCs; for the ASMFC, it's their Species Technical Committees.

‡ National Standard 1 Guidelines. 50 CFR Part 600.310(e)(3)(iii)(C).

§ The National Marine Fisheries Service (NMFS) estimates the stock size at MSY at approximately 40% (range 36.8% to 50%) of the un-fished or pre-exploitation stock size. NMFS National Standard 1 Guidelines (1998): 63 FR 24216.

Figure 5



The Magnuson-Stevens Act, our nation's fishing law, is built on the concept of Maximum Sustainable Yield (MSY). To achieve MSY, a fish stock is reduced to around half of its original, pristine state to make the stock more productive. However, MSY-based catch levels do not take into account the needs of the ecosystem. Reducing a forage fish stock to these low levels severely impacts the availability of prey and likely hinders our ability to rebuild depleted predator stocks such as cod, marlin, and bluefin tuna.

significant reduction in prey available for predators. A significantly reduced forage population means a corresponding reduction in predator populations.

The purpose of a fishery stock assessment is to determine what level of fishing can be permitted while maintaining the stock (and future yields to the fishery) at the desired level. Natural mortality, although a critical element of stock assessments, is one of the most difficult parameters to estimate and therefore fraught with uncertainty.* In fact, natural mortality rates are merely guess-timates of current rates of predator consumption. The conventional single-species stock assessments used for most forage fish employ a natural mortality rate, or M, that is estimated based on life history characteristics and applied to the stock as a whole - all age classes, all areas, constant over time.

The substantial uncertainty involved in the estimate of actual predation is well known. Yet recent studies demonstrate that, if natural mortality is being under-estimated, allowable yields to the fishery may be set too high and lead to overfishing of the prey population and negatively impact predators. On top of this is the even larger uncertainty in satisfying actual demand for prey, especially future demand as predator populations recover from years of overfishing. †

Because of these uncertainties and others (e.g., uncertainty in the size of the prey population, which can fluctuate significantly within a short period of time due to changes in environmental conditions), single-species assessments and management policies must acknowledge deficiencies in the ability to account for predation. In the absence of multi-species ecosystem models that can incorporate predator-prey relationships into stock assessments, fishery managers and scientists must adopt a precautionary approach to determine population thresholds and "allowable ecological catch" levels that leave an adequate reserve of forage in the water on an annual basis. ♦

Opportunities:

- As the councils and commission review membership of their stock assessment teams, there is an opportunity to add more ecologists, trained in assessing the health of fisheries from other than a single-species perspective. Similarly, NGOs could employ fishery scientists to engage in a peer-to-peer discussion of stock assessment shortcomings and recommend needed changes.

- In the catch specification process, the councils set the allowable biological catch (ABC) for each fishery and the annual catch limit (ACL), according to the National Standard 1 Guidelines. The Guidelines call for a precautionary buffer between the overfishing limit (OFL, which approximates the MSY) and the ABC to account for scientific uncertainty and a buffer between the ABC and ACL for ecological considerations to achieve a fishery's "optimum yield."

  - The SSCs, in establishing a buffer to account for scientific uncertainty, should explicitly account for uncertainty in estimating predation and predation demand; and,

  - The councils, in establishing a buffer between the ABC and ACL, should explicitly factor in ecological considerations such as maintaining adequate forage for the ecosystem.

* Hewitt, D.A. and Hoenig, J.M. Comparison of two approaches for estimating natural mortality based on longevity. Fishery Bulletin. April 2005.

† W.J. Overholtz, L.D. Jacobson, and J.S. Link. An ecosystem approach for assessment advice and biological reference points for the Gulf of Maine – Georges Bank herring complex. North American Journal of Fisheries Management, 28. 2008. *and* H. Moustahfid, J.S. Link, W.J. Overholtz, and M.C. Tyrrell. The advantage of explicitly incorporating predation mortality into age-structured stock assessment models: an application for Atlantic mackerel. ICES Journal of Marine Science, January 16, 2009.

Management: Adopting and Implementing Ecological Reference Points

Setting precautionary catch limits with buffers for uncertainty should be used an interim measure until ecological reference points are adopted and implemented. Traditional biological reference points used to assess forage fish stocks - that is, fishing mortality and biomass targets and thresholds – are established to maintain the stock at a size capable of supporting the fishery, only assuring that fishery removals do not exceed the ability of the stock to replenish itself. They are benchmarks for linking the status of the stock to achieving management goals and determining management actions in a single-species context. As such, current reference points do not account for nor can they prevent the possibility that a fishery exploiting a forage species could be overfished in an ecosystem context.

Developing ecological reference points is similar to the process used to establish traditional reference points, in that they use the same benchmarks, such as stock biomass and mortality rate, but are set with ecosystem-based management goals in mind. The key difference is that ecological reference points would require fishery managers to set management goals that specify an allocation of fish to the ecosystem. For example, reference points that would be responsive to a species' role as forage would maximize population abundance and specifically allocate fish between natural mortality and fishing mortality (i.e., allocate to both predators and the fishery).

Adopting these new reference points would not require new science, but would use existing science, since these reference points could be set relative to estimates of population size, age structure, fishing mortality and natural mortality already used in stock assessments. Just as MSY is first and foremost an economic policy (maximizing yields to the fisheries) that employs science to support it, an ecosystem-based approach to managing forage fish is a policy decision that can be implemented within our current state of scientific knowledge.

For instance, the 'predator criterion' used for Antarctic krill is an ecosystem-based management policy that recognizes that a more ecologically sustainable population level would be somewhere between B_{MSY} (population needed to produce MSY) and carrying capacity (an un-fished population); that choosing where is a subjective decision; and opts for a target midway between maximizing fishery yields and maximizing predation, i.e., 75% of an un-fished population. Other ecological reference points for forage fish are recommended in the scientific literature, and in policies being considered in the U.S. and abroad.*

In Table 1, we present what ecological reference points for forage fish might look like. B is the stock biomass, B_{MAX} is the biomass in the absence of fishing, $B_{MAX}75\%$ is 75 percent of the un-fished biomass, and B_{MSY} is the biomass associated with producing the maximum sustainable yield. F is the fishing mortality rate, M is the natural mortality rate and F = .75M is a fishing mortality rate that corresponds to 75% of the natural mortality rate. ♦

* Numerous citations are contained in Ecological Reference Points for Atlantic Menhaden. National Coalition for Marine Conservation. June 2009.

Table 1

Reference Point	Common Single-species Target	Common Single-species Threshold	Alternative Target for Forage Fish	Alternative Threshold for Forage Fish
Biomass	B_{MSY}	½ B_{MSY}	$B_{MAX75\%}$	B_{MSY}
Fishing Mortality Rate	F_{MSY}	F_{REP}	F = .75M	F_{MSY}

Comprehensive Management of Forage Fish

Improved Catch Monitoring and At-Sea Observer Coverage

Inadequate at-sea observer days allocated to small-mesh fisheries, sampling protocols which allow a large percentage of observed catch to escape proper species identification, and regulations which allow for fish to be dumped directly from the net without being sampled by onboard observers* all contribute to our lack of understanding of the magnitude of targeted catch and bycatch in forage fisheries.

For example, between 2004 and 2008, there were only 48 observed mackerel trips out of 1065.† Coverage of the *Loligo* fishery faired even worse with only 311 out of 12,716 trips observed over the same 5-year period. Coverage is not expected to improve significantly on *Loligo* trips, even though the new butterfish rebuilding plan (Amendment 10 to the Atlantic Mackerel, Squid, and Butterfish FMP) relies heavily on accurate extrapolation of discards in the *Loligo* fishery to cap butterfish mortality. For small-mesh bottom otter trawls operating from ports in the New England and the Mid-Atlantic regions, the Northeast Fisheries Observer Program predicts a shortfall of 2,100 funded sea days out of the 3,607 needed to achieve the required 30% coefficient of variation (CV) specified in the Standardized Bycatch Reporting Methodology (SBRM) Amendment.‡ (See Table 2)

* In 2007, dumping occurred on 17% of observed tows in the Atlantic herring fishery. [Van Atten, Amy, Operations Coordinator, Northeast Fisheries Observer Program. Presentation to the Herring Oversight Committee of New England's Fishery Management Council, Portland, ME, 22 May 2008. (http://www.nefmc.org/herring/cte%20mtg%20docs/NEFOP_Overview_Herring_Committee_0508_36pgs.pdf)]

† Northeast Fisheries Observer Program. Queries conducted for the Marine Fish Conservation Network between February and May 2008.

‡ Northeast Regional Coordinating Committee. (11 May 2010). Standardized Bycatch Reporting Methodology, Proposed 2010 Observer Sea Day Allocation, Consultation and Prioritization Process, Response to Comments.

Opportunities:

- *Addendum V to the Interstate Fishery Management Plan for Atlantic Menhaden* was initiated in August 2010 with options for new reference points to achieve a higher abundance of spawning age fish. This action is part of a motion approved in May to develop alternative reference points for menhaden that better protect the spawning stock and achieve higher abundance. That motion also called for new reference points that account for predation and that consider how targets and limits are set for similar forage fish. The ASMFC's Menhaden Technical Committee and Multi-Species Technical Committee are working to produce a range of options to present to the Management Board in 2011.
- *A Scientific Workshop on Ecosystem-Based Management* was recommended as a follow-up to a 2009 National Scientific and Statistical Committee Workshop on Establishing a Scientific Basis for Annual Catch Limits. A recent NMFS Report to Congress on The State of Science to Support an Ecosystem Approach to Regional Fishery Management recommended "more definitive and detailed guidance to councils on how to develop (fishery ecosystem plans)." NMFS has considered issuing technical guidance on implementing National Standard 1 Guidelines on conserving forage fish.

Table 2

2010-2011 Projected Observer Coverage for Northeast Small-Mesh Trawl Fisheries

Gear Type	Region	Total VTR trips from July 2008-June 2009	2010 SBRM Required Sea days	Anticipated April 2010-March 2011 Coverage	Estimated % trips covered (anticipated 2010 coverage/ 2008-2009 VTR trips)
Small-mesh bottom otter trawl	NE	3,259	2,192	954	29%
Small-mesh bottom otter trawl	MA	3,831	1,415	553	14%
Mid-water paired and single trawl	NE	313	379	379	121%
Mid-water paired and single trawl	MA	70	34	66	94%

Only mid-water trawls are expected to carry enough observers in the next year to meet SBRM requirements, yet a number of these days will be allocated to accompanying herring vessels in groundfish closed areas and may not improve bycatch estimates of non-groundfish species of concern. Even if SBRM could be fully implemented, these target coverage levels are inadequate for assessing retained bycatch such as river herring because coverage levels are based on discard analyses and do not take into account non-targeted catch that is landed. For example, a recent SBRM-based analysis of sea days needed to achieve a 30% CV for river herring catch focused solely on discards and thus ignored fleets, like the New England mid-water trawl fleet, with substantial landings of incidentally-caught river herring when determining and allocating the required number of observer sea days.*

There is no question that inadequate observer coverage inhibits an accurate assessment of bycatch impacts on river herring and shad populations, but just as troubling is the large amount of observed but unidentified clupeid bycatch (i.e., Herring, Not Known), which totaled a staggering 893,299 lbs from July 2007-June 2008. Fish placed in the Herring, Not Known category outnumbered identified bycatch of hickory shad, American shad, alewife and blueback herring combined 7:1.† Similarly, from July 2008-June 2009, observers classified nearly 2 million pounds of catch as "Fish, Not Known," an increase of 900% from the previous year.‡ Mid-water trawlers were accountable for 770,000 lbs and 670,000 lbs of kept and discarded "Fish, Not Known," further illustrating the need to regulate dumping of catch and prohibit pumping of catch to the pair trawl vessel not carrying the observer. ♦

* Wigley SE, Blaylock J, Rago PJ. 2009. River Herring Discard Estimation, Precision and Sample Size Analysis. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 09-20; 15 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

† 893,299 pounds of unidentified alosine bycatch was observed from July 2007-June 2008, compared with 94,618 lbs. blueback herring, 24,052 lbs. alewife, 6,426 lbs. American shad, & 784 lbs. hickory shad. [Northeast Fisheries Observer Program 2009. Standardized Bycatch Reporting Methodology: Annual Discard Report.]

‡ Northeast Fisheries Observer Program 2010. Standardized Bycatch Reporting Methodology: Annual Discard Report.

Opportunities:

- *Amendment 5 to the Atlantic Herring Fishery Management Plan* has the potential to correct most of the monitoring deficiencies in this fishery. Amendment 5 could also help improve monitoring in the Atlantic mackerel mid-water trawl fleet because of the fleet/fishery overlap. At the same time, it is important to make sure that the overlap does not create monitoring loopholes. Amendment 5 is scheduled for completion in 2011 with implementation in 2012.

- *Amendment 14 to the Atlantic Mackerel, Squid and Butterfish Fishery Management Plan* offers an important opportunity to improve grossly underfunded at-sea observer coverage for the Mid-Atlantic small-mesh bottom otter trawl fisheries. A large number of scoping comments for Amendment 14 asked the Council to investigate alternative funding sources for the observer program, including industry funding. In addition, the Atlantic Mackerel, Squid and Butterfish Committee affirmed Amendment 14 objectives at its August 2010 meeting and included an objective to "develop an effective monitoring program for the mackerel/*Loligo* fisheries that is sensitive and robust to spatial and temporal variability in alosine catch." In support of this objective, the Committee tasked its Fishery Management Action Team (FMAT) to look into a long list of reporting and monitoring requirements that included no discarding requirements, slippage (i.e., dumping) consequences, and observer facilitation measures (e.g., bring aboard cod-ends, slippage affidavits, etc.). The Council anticipates completing the amendment in early 2012 with the final rule going into effect in Fall 2012.

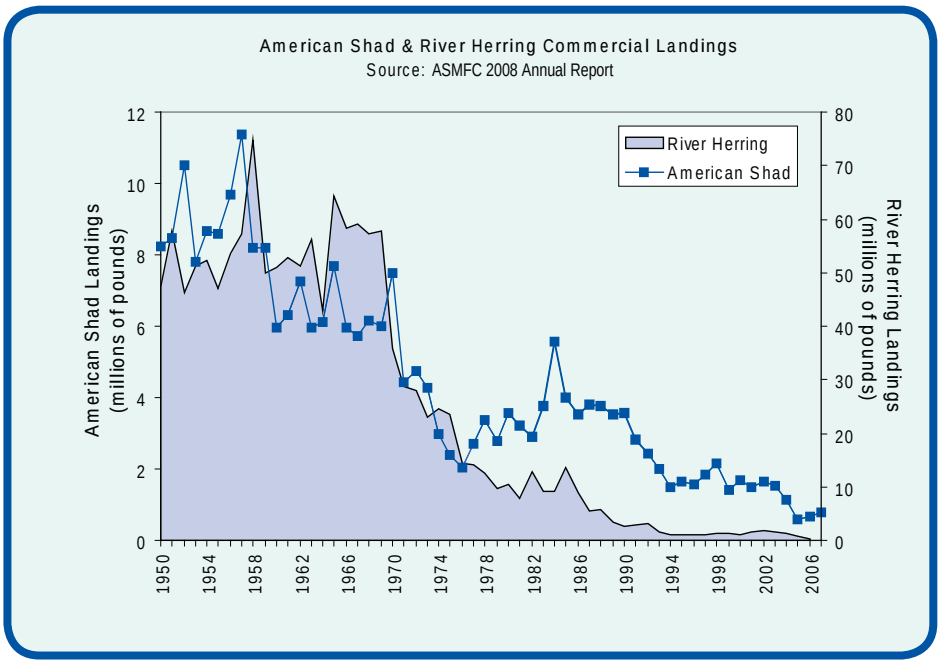
- *The Marine Fish Conservation Network recently published a thorough report on funding deficiencies in fisheries observer programs entitled "Meeting the Information Demands of 21st Century Fisheries: A Needs Assessment for Fisheries Observer Programs."** The report presents valuable information specific to the needs of the Northeast Fisheries Observer Program and could be an effective tool for educating Congress about the need for adequate program funding as well as encouraging the councils to support industry-funded mechanisms for expanded observer coverage.

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* Stump, Kenneth, and Hamed, Rebeka. (April 2010).Meeting the Information Demands of 21st Century Fisheries: A Needs Assessment for Fisheries Observer Programs. The Marine Fish Conservation Network. http://www.conserve-fish.org/storage/marinefish3/documents/ts-mfcn0101_report_web.pdf

Reducing Bycatch in Ocean Trawl Fisheries

Figure 6



Bycatch of river herring and shad in ocean fisheries exceeds the in-river landings on the east coast. A preliminary study estimates that in 2007 there were 1.7 million pounds of river herring bycatch in the small-mesh trawl fishery for Atlantic sea herring alone.* Recent observer records show that trawl vessels targeting Atlantic mackerel and *Loligo* squid encounter river herring and American shad in significant amounts, considering the low overall levels of observer coverage in these fisheries.† Management of the sea herring and mackerel, squid, and butterfish fisheries must take an ecosystem perspective versus a narrow fishery-specific view in order to reduce this bycatch.

River herring bycatch reduction is a stated goal of recently initiated amendments to both the Atlantic herring (New England) and mackerel, squid and butterfish (Mid-Atlantic) plans. Because fishing grounds and vessel operations overlap between fisheries managed by the New England and Mid-Atlantic Councils, there must be cooperation among the councils, NMFS and the ASMFC, the body responsible for managing river herring and shad, in order to create a comprehensive bycatch reduction strategy for the Northeast Region. That means establishing a process for regular communication and cooperation as they review information related to river herring and shad bycatch and management alternatives.

Locations of river herring bycatch hotspots in New England and Mid-Atlantic waters have been corroborated by three separate analyses,‡ and these areas warrant protection. In addition, a recent analysis revealed overlap between American shad and river herring bycatch areas, indicating American shad would likely benefit if the river

* Cieri, Matthew, Gary Nelson, and Michael Armstrong. 2008. Estimates of River Herring Bycatch in the Directed Atlantic Herring Fishery.

† Database query provided by the Northeast Fisheries Observer Program, NOAA FOIA No. 2009-00371. 3 June 2009

‡ Cieri, Matthew, Gary Nelson, and Michael Armstrong. 2008. Estimates of River Herring Bycatch in the Directed Atlantic Herring Fishery.

Van Atten, Amy S., Debra Duarte, Sara Wetmore and Tyler Staples. A Detailed Look at the Observed Herring Trips from 2005–2007 - Version II. Presentation to the Atlantic Herring Plan Development Team. 14 January 2009.

Cournane, Jamie Marie. May 2010. Developing Alternatives to Mitigate River Herring Bycatch At Sea. http://www.nefmc.org/herring/cte%20mtg%20docs/100517/PaperCournane_Jamie_RH_bycatch_summary_HC_May_17_2010.pdf


Courtesy NOAA Photo Library

herring hotspots are protected.*

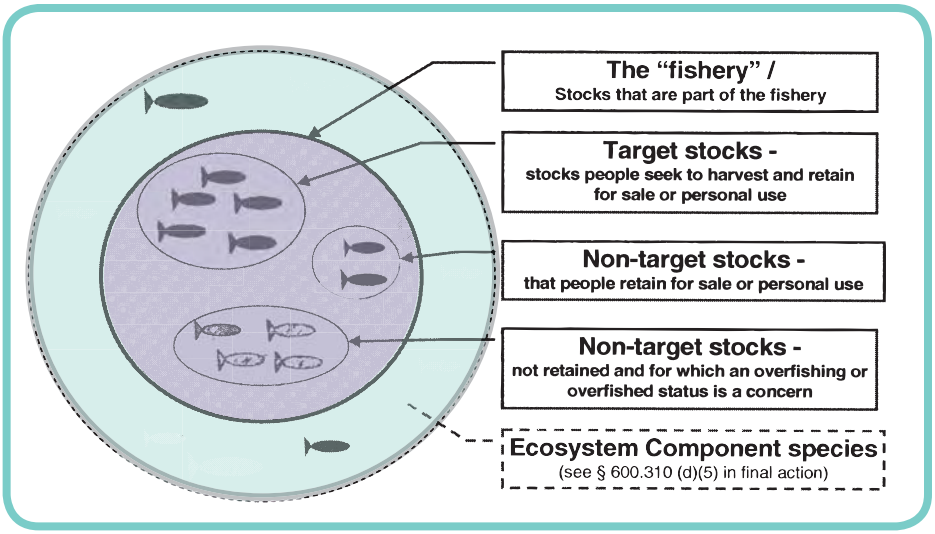
Mackerel and herring are pursued by many of the same vessels and can even be targeted together on the same trip. The New England and Mid-Atlantic Councils should explore options with NMFS for combining the herring and mackerel fisheries into a single management plan to better manage catch and bycatch in these fisheries. It will be imperative for the Councils to work together to ensure that fishery overlap does not result in unintended loopholes that allow vessels to skirt regulations. For example, existing regulations permit a vessel to "declare out" of the Atlantic herring fishery if it plans to target another species like mackerel. It will be important to ensure that bycatch reduction measures, especially those aimed at specific time/area/gear restrictions, apply to all relevant vessels regardless of target species. ♦

* Cieri, Matthew. 2010. Estimates of River Herring and American Shad Removals in the Directed Atlantic Herring Fishery: an Update with Preliminary Data. Presentation to the Atlantic Herring Oversight Committee. 17 May 2010. http://www.nefmc.org/herring/cte%20mtg%20docs/100517/RH_Shad_update_by_2_10.pdf

Opportunities:

- *Amendment 5 to the Atlantic Herring FMP and Amendment 14 to the Atlantic Mackerel, Squid and Butterfish FMP*, in tandem, could provide a comprehensive bycatch reduction strategy and framework for the northeast trawl fisheries that target forage fish as well as take significant amounts as bycatch. These amendments could: 1) Recognize river herring and shad as "non-target stocks in the fishery", a designation that would require the councils to set annual catch limits (ACLs) and accountability measures (AMs) that prevent overfishing; 2) Establish a framework for coast-wide incidental catch limits, or "bycatch caps," for alewife, blueback herring and American shad, to be reviewed and adjusted annually; 3) Protect river herring and shad in identified "bycatch hotspots" by implementing a system of time/area/gear closures that could be triggered by an established bycatch limit; and 4) create a "move-along" system that requires vessels to move away from an area when river herring or shad are encountered in significant numbers.
- A stand-alone shad and river herring federal FMP would bring these species into the fold of the Magnuson-Stevens Act, requiring ACLs and AMs as well as the designation of essential fish habitat. Such an FMP is being deliberated at the Mid-Atlantic Council and will be further explored by the Council's newly established ad-hoc River Herring and Shad Committee.

Figure 7



Moving Toward Ecosystem-Based Management of Forage Species

Overall ecosystem health and productivity depends on preserving the integrity of the food web, in both abundance and diversity. In the Northeast Region, a number of readily identifiable forage species, some the targets of fisheries, some not, exert a strong influence on the trophic dynamics of the ecosystem. Their individual populations can fluctuate, independent of one another, because of a number of natural (environmental) and/or human-induced factors. A decrease in the abundance of individual prey species, or in the diversity of prey, reduces the overall forage base, making food unavailable to predators where and when they need it, and can have profound, long-term impacts on predator populations.

The National Standard 1 objective of maintaining adequate forage for all components of the ecosystem underscores the need to consider, not only the status of target species, but the status of the forage base as a whole when setting catch limits for any single species. There are many small schooling pelagic species that are critical to the Northeast ecosystem as forage but which are not currently the target of commercial fisheries. Species such as sand lance, smelt, krill and copepods should be added to the Atlantic herring and squid, mackerel and butterfish FMPs as ecosystem component (EC) species.* Including EC species in these FMPs would encourage the gathering of available information on their role in the food web, their population status and trends in their status, all to be considered within the context of gauging the health of the overall forage base.

The inclusion of EC species is an interim measure, the first step in developing a framework for linking the monitoring and management of forage species to maintain an adequate biomass of forage as part of an ecosystem plan. Another interim measure would be to prohibit the development of any new fisheries for EC species until such time as an ecosystem plan is completed and operational.

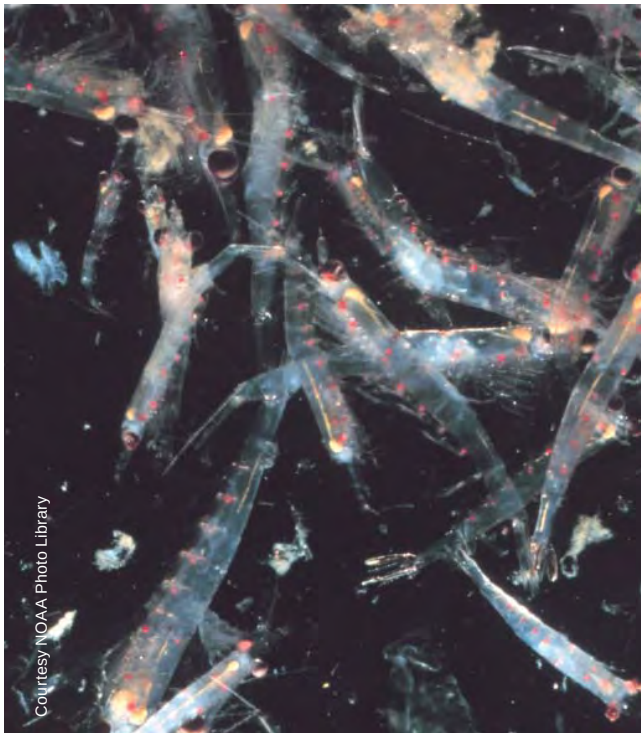
Ultimately, the evolution to an ecosystem-based forage fish plan will require that management measures for single species, including triggers for action, be linked to the status of other species, whether important partners in the prey base or key predators. As a first step, the FMP and associated SAFE documents† should gather and integrate comprehensive data that can be monitored as indicators of ecosystem health: status of forage fish populations; status of major predators (fish, marine mammals and seabirds), including trends such as recovery trajectories; and food web dynamics information demonstrating strong predator/prey linkages. ♦

* § 600.310 (d)(5)

† The annual Stock Assessment and Fishery Evaluation reports prepared for each FMP.

Opportunities:

- *The NS1 Guidelines* allow the councils to classify species as ecosystem component species, and even encourage this classification as a move toward ecosystem-based management. The addition of EC species must be done through an amendment process, and could be done through ongoing amendments to the Atlantic herring and Atlantic Mackerel, Squid and Butterfish FMPs. Prompted by ecosystems work done by the NMFS Northeast Fisheries Science Center, the councils have expressed interest in exploring the possibility of a joint ecosystem plan for the Mid-Atlantic Bight.



Courtesy NOAA Photo Library

New Federal Mandates

As evidenced over the 10 years since the NMFS Ecosystems Principles Advisory Panel submitted its Report to Congress in 1999, you can lead a horse to water, but you can't make him drink. During this time, the effort to advance ecosystem-based fishery management, focused primarily on forage fish conservation, has been an attempt to persuade the councils and the ASMFC to take action in the absence of a federal mandate to do so, because it is "the right thing to do."

Despite numerous declarations that it is the policy of the United States to protect, maintain, and restore the health and biological diversity of ocean and coastal ecosystems - by independent blue ribbon commissions, Congress and the White House - none have the force of law, i.e., they don't hold federal fishery managers accountable for adopting an ecosystem-based approach to managing fisheries. That includes President Obama's recently issued Executive Order adopting the recommendations of an Interagency Ocean Policy Task Force which, among other things, declares it a national priority to "(a)dopt ecosystem-based management as a foundational principle for the comprehensive management of the ocean, our coasts, and the Great Lakes."*

Under current law, taking a more precautionary approach to conserving prey fish to provide adequate forage for the ecosystem remains entirely discretionary. Federal fisheries decisions at the regional council level, where fishery management plans are prepared, and at the NMFS, which approves and implements these plans, are guided by the Magnuson-Stevens Fishery Conservation and Management Act. The Magnuson Act encourages

* A National Policy for the Stewardship of the Ocean, Coasts, and Great Lakes, White House Council on Environmental Quality, July 19, 2010.


Courtesy NOAA Photo Library

an ecosystems approach, but does not mandate it.*

National legislation requiring conservative standards for managing forage fisheries is needed. This could be done through a reauthorized Magnuson Act or a stand-alone bill addressing ecosystem-based management of forage fish specifically. Or it might be achieved through national legislation establishing environmental standards for offshore aquaculture, such as strict standards for use of wild forage fish in aqua-feeds. ♦

* National Standard 1 says: Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry, defining optimum yield as "(t)he amount of fish which (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from each fishery, as reduced by any relevant economic, social, or ecological factor." How to do this remains ambiguous; in fact, whether or not to do it at all is up to the discretion of the individual councils. The Magnuson-Stevens Reauthorization Act of 2006 says that "(a)ny FMP which is prepared by any Council, or by the Secretary, with respect to any fishery may include management measures in the plan to conserve target and non-target species and habitats, considering the variety of ecological factors affecting fishery populations." This most recent change to federal law regarding the protection of marine ecosystems comes under the discretionary provisions of the Act.

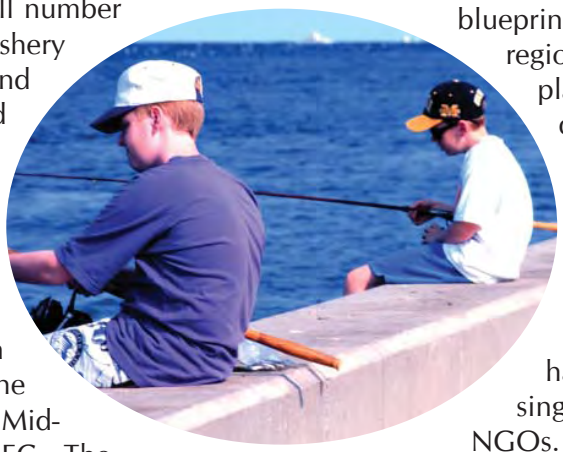
Opportunities:

- The *National Sustainable Offshore Aquaculture Act of 2009 (H.R.4363)* was introduced in the U.S. House of Representatives in December 2009. Modeled after California's Sustainable Oceans Act, the bill takes a precautionary approach by withholding permits until regional environmental impact assessments are completed, prioritizing research, and establishing clear environmental safeguards. The fishing and environmental communities should support reintroduction of this bill in the next Congress while working with the bill's sponsors to strengthen it with strict, measurable standards for the use and management of forage fish, from both the demand-side and the supply-side, i.e., permitting the use of wild fish as feed for aquaculture only if they are sourced from fisheries utilizing an ecosystem-based approach to management.

- Reauthorization of the *Magnuson-Stevens Fishery Conservation and Management Act* will likely begin in the next session of Congress (2011-12), providing an opportunity for amendments to, for instance, prohibit new fisheries for forage fish, require fishery management plans for forage fish to specify ecologically-determined targets & thresholds, and freeze catches until ecosystem-based fishery management plans are in place. The Marine Fish Conservation Network recently created a working group from among its Board of Advisors to consider options for advancing ecosystem-based approaches to fisheries management, including forage fish conservation, in the next reauthorization.

A New Public Mandate

Forage fish protection is important and of concern to conservationists and fishermen alike, whether their interest is in general ecosystem health or fisheries sustainability or both. Few other issues (habitat quality being one of them) penetrate the walls that usually separate commercial fishermen, recreational anglers and environmentalists. The potential for an unprecedented alliance of NGOs to achieve enduring changes in how prey species are conserved and managed is enormous, but to date unrealized. Although many national and regional groups have spoken out in support of forage fish conservation, a relatively small number are participating in the fishery management process in the kind of aggressive and sustained manner that is required.



The National Coalition for Marine Conservation (NCMC), as part of its national *Forage First!* program, has dedicated staff to work on a range of forage issues at the New England Council, the Mid-Atlantic Council and the ASMFC. The Herring Alliance* centers its activities in New England, but is now expanding that effort to include the Mid-Atlantic. The Marine Fish Conservation Network has had a fairly consistent presence at the Mid-Atlantic Council, while the Chesapeake Bay Foundation and Coastal Conservation Association have a long history of participation on forage issues at the ASMFC. Other groups have a more casual involvement, periodically submitting written comments and/or signing joint statements, primarily on the river herring issue.

The direct participation of environmental and fishing NGOs going forward is more critical than ever in order to build on the foundation that has been laid for improvements in forage fish conservation and to take the effort to the next level. But for non-profits to dedicate staff and resources to this cause, organizations need new and dependable (i.e., long-term) sources of funding, a coordinated campaign strategy to focus all available resources, and public outreach to secure broader political support for clearly articulated goals.

The NCMC's 2007 report, *Taking the Bait: Are America's Fisheries Out-Competing Predators for their Prey*, served to energize a national movement behind forage fish conservation, for the simple reason that it defined the problem, explained the risks, and offered an easily understood blueprint for initiating change through regional fishery management plans for key forage fish. As described in detail in the previous section (Overview of Northeast Forage Fisheries), considerable progress has been made toward protecting the ecological role of forage fish; actions that would not have been taken without the single-minded commitment of NGOs. But progress is also a learning curve, and the obstacles to future success are more clearly defined, as are what's needed to overcome them.

In 1999, NCMC held a workshop on Managing Related Predator and Prey Species in Marine Fisheries† in order to give this nascent initiative "direction and drive." A decade later, we are individually and collectively re-assessing where we are, where we want to go, and how we will get there; that is, the direction we need to take. At this point, it is clear to us that the most effective way to drive it home would be to unite a re-charged and re-dedicated conservation community in a national campaign to protect the Northeast forage base. ♦

* The Herring Alliance includes 35 regional and national organizations and is still growing. http://www.herringalliance.org/alliance-members

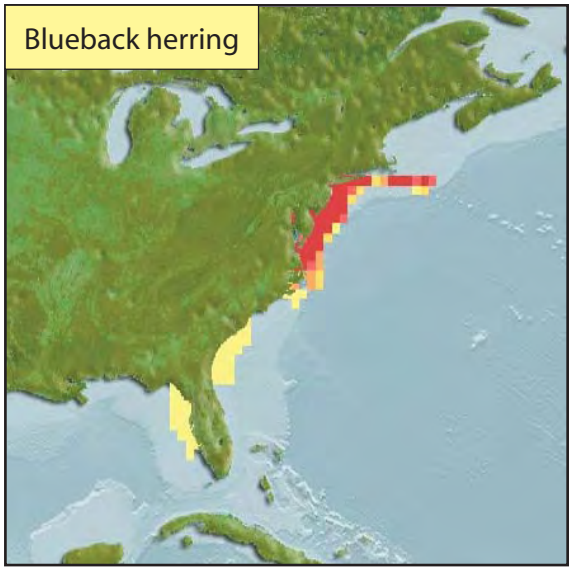
† Conservation in a Fish-Eat-Fish World. November 1999. Annapolis, MD.

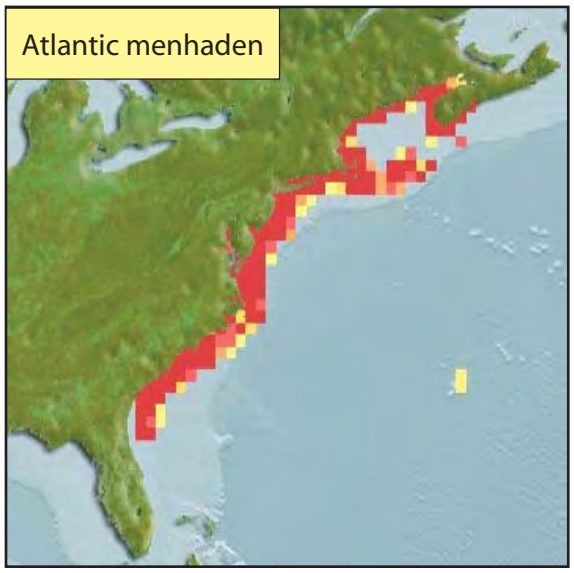


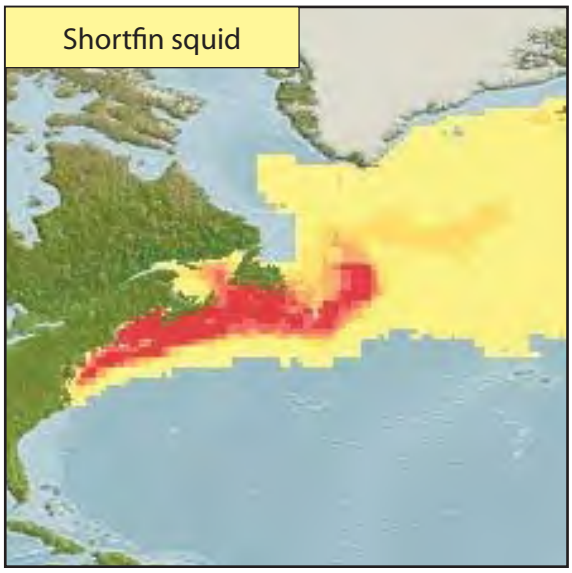
Appendix I - Distribution and Effort Maps

Figure 1. North American distribution for important forage species in the Northeastern U.S. (source: Aquamaps: Kaschner, K., J. S. Ready, E. Agbayani, J. Rius, K. Kesner-Reyes, P. D. Eastwood, A. B. South, S. O. Kullander, T. Rees, C. H. Close, R. Watson, D. Pauly, and R. Froese. 2008 AquaMaps: Predicted range maps for aquatic species. World wide web electronic publication, www.aquamaps.org, Version 05/2008.)

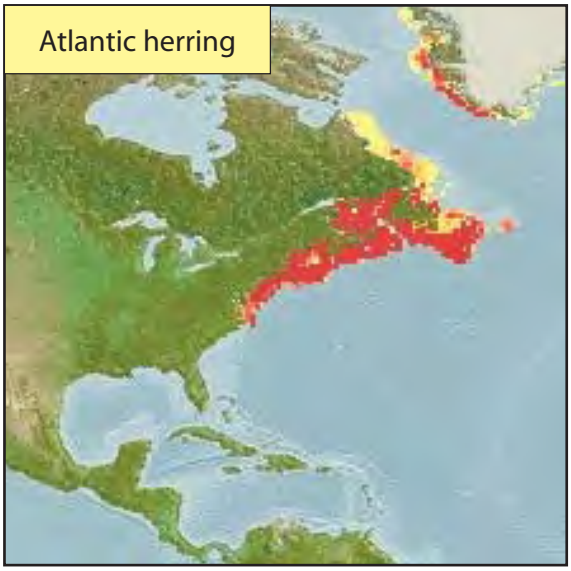


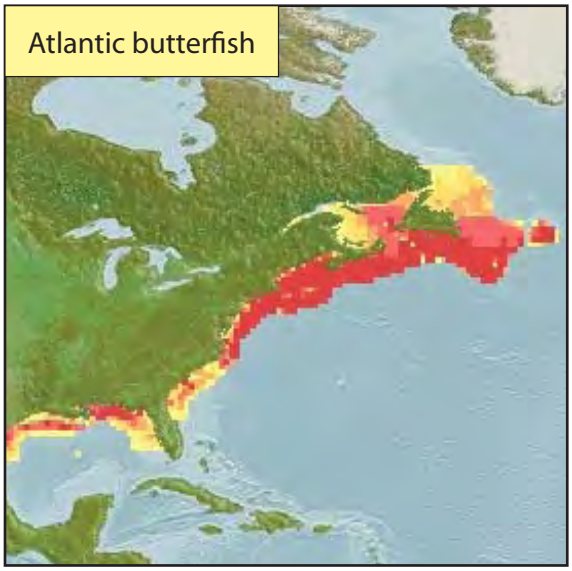


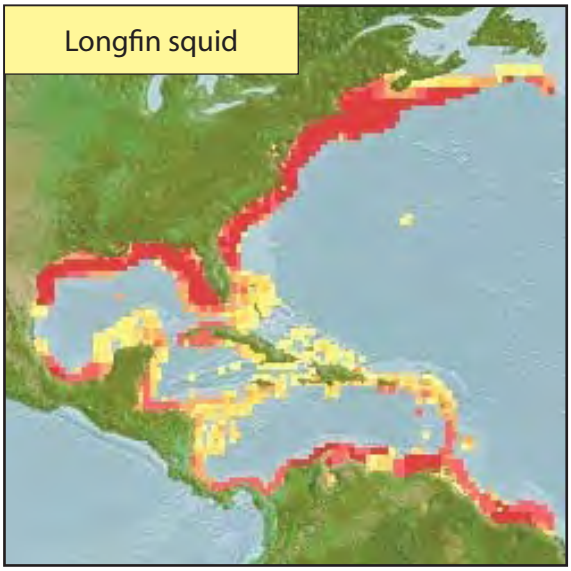


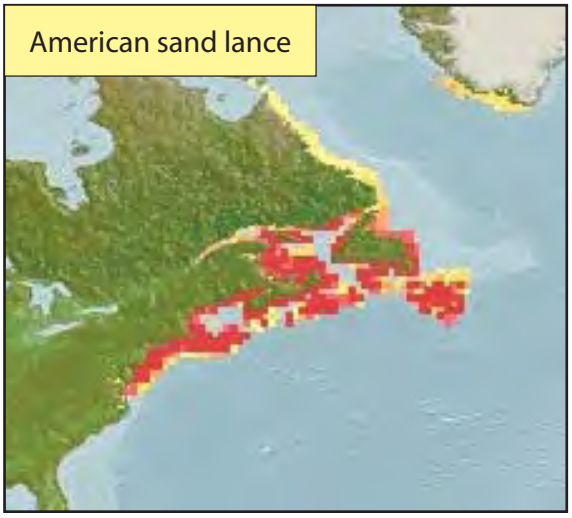












Relative probabilities of occurrence

0.80 - 1.00

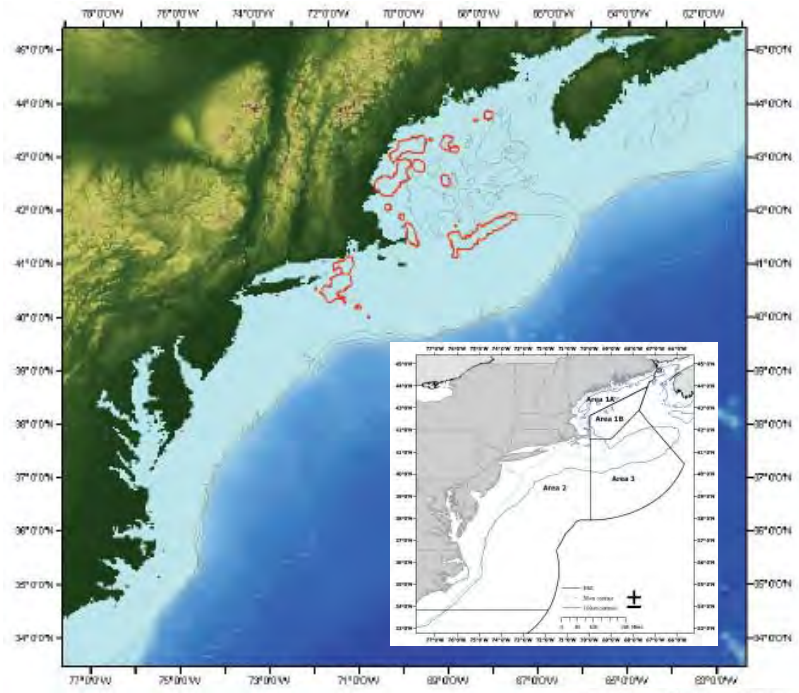
0.60 - 0.79

0.40 - 0.59

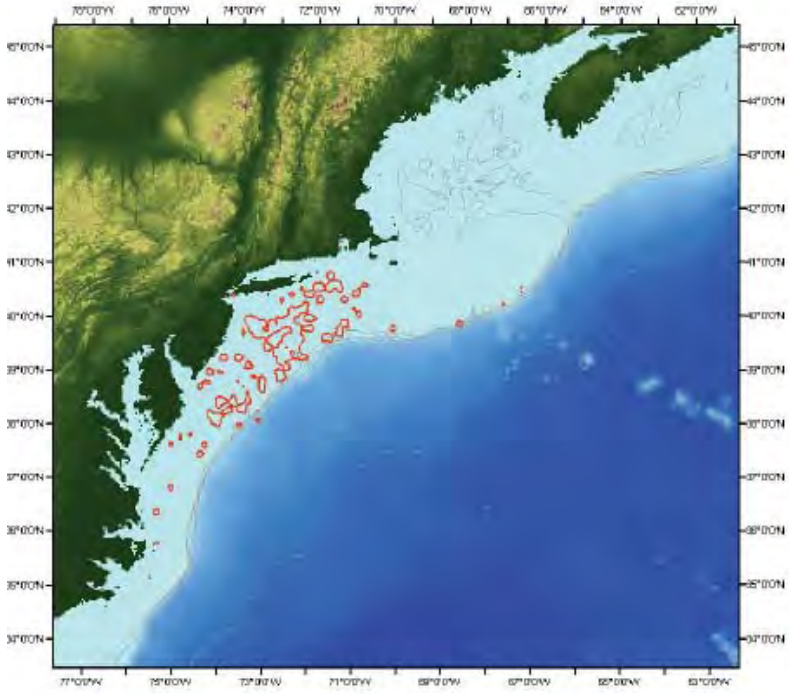
0.20 - 0.39

0.01 - 0.19

Figure 2. Distribution of U.S. Northeast and Mid-Atlantic midwater trawl effort for Atlantic herring and mackerel as the 75% effort contour (days fished) for trips that caught more of identified species by live weight than any other species (1996–2004) (source: Orphanides CD, Magnusson GM. 2007. Characterization of the northeast and mid-Atlantic bottom and mid-water trawl fisheries based on vessel trip report (VTR) data. U.S. Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 07-15; 127 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.)
Note: Data predate Atlantic herring seasonal purse seine and fixed gear-only area in the inshore Gulf of Maine that went into effect in 2007.

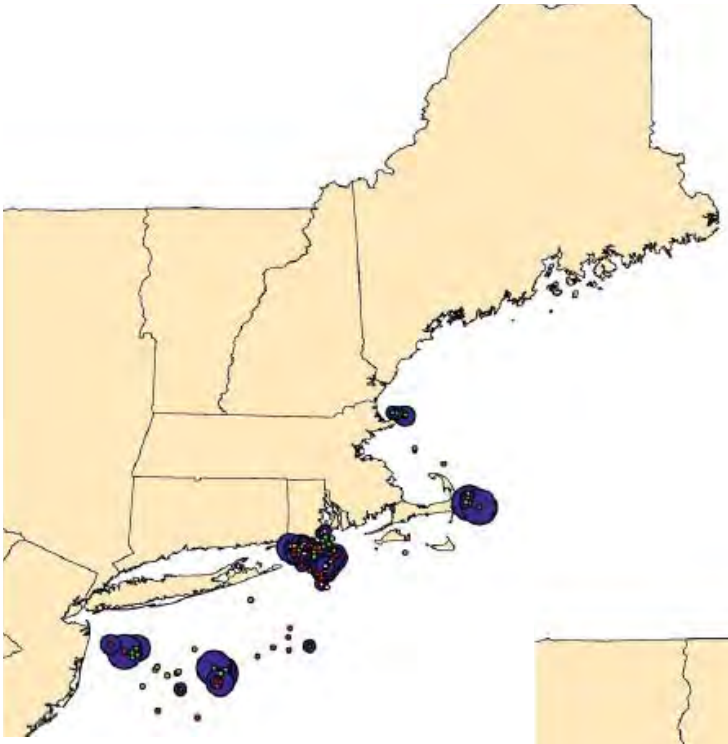


Atlantic Herring

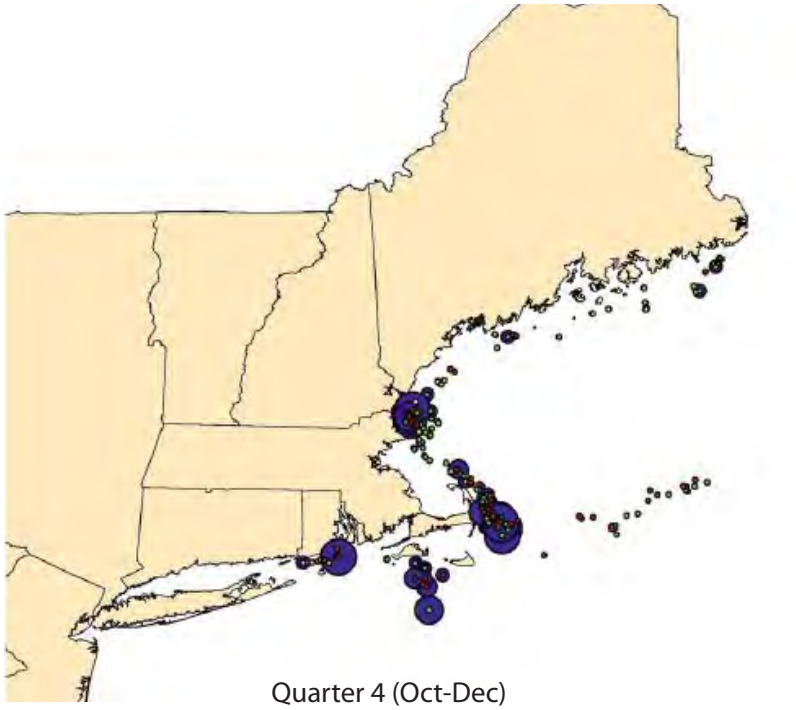


Atlantic Mackerel

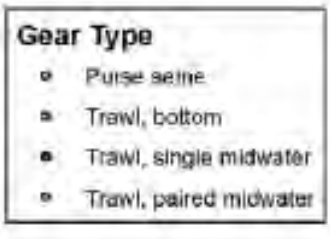
Figure 3. Atlantic herring fishery river herring bycatch hotspots. From 2005-2007 observer data. (source: Cieri, Matthew, Gary Nelson, and Michael Armstrong. 2008. Estimates of River Herring Bycatch in the Directed Atlantic Herring Fishery.)



Quarter 1 (Jan-Mar)



Quarter 4 (Oct-Dec)



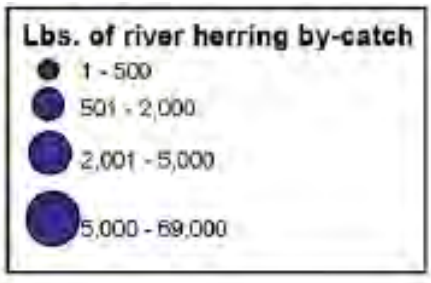
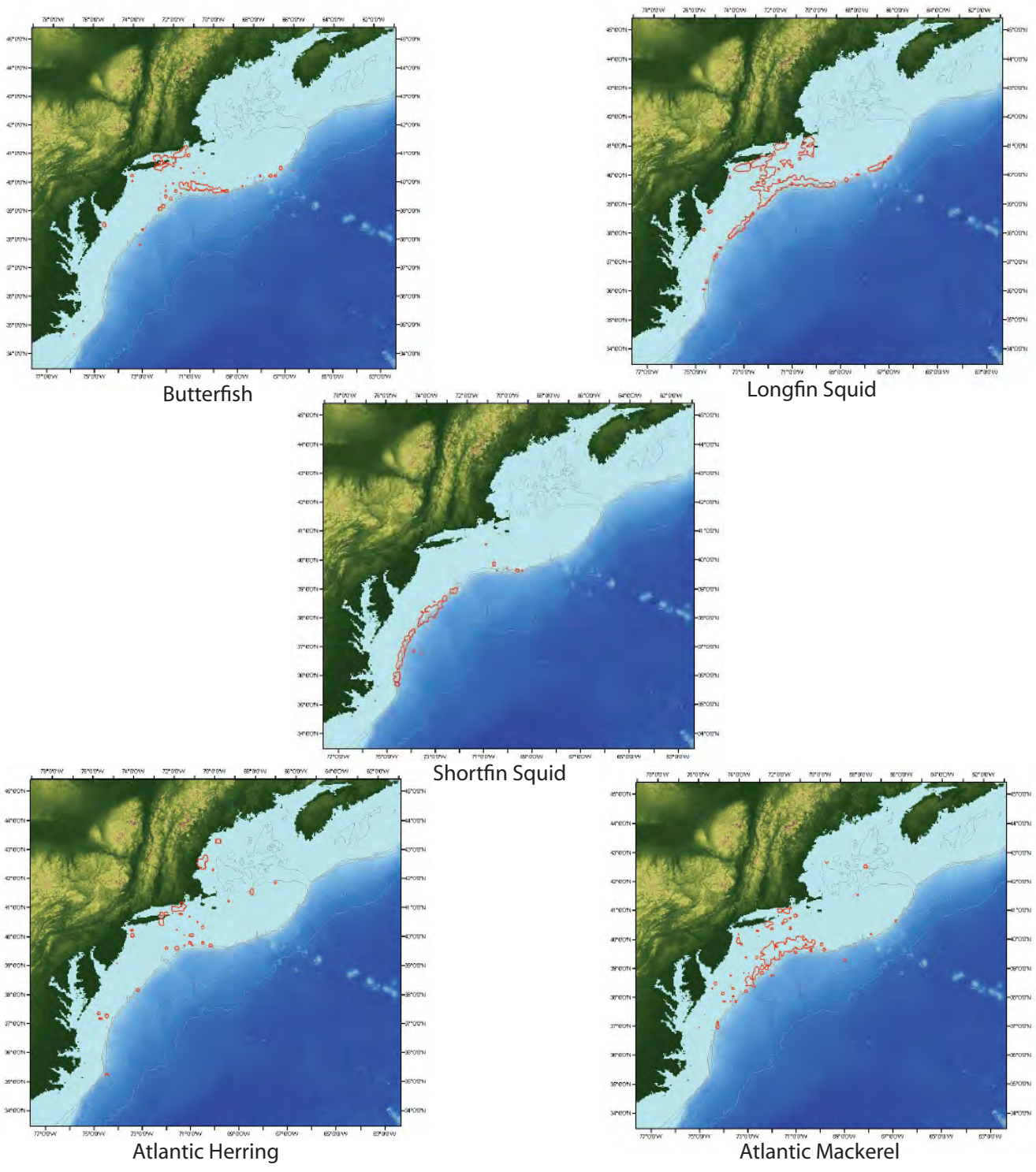


Figure 4. Distribution of U.S. Northeast and Mid-Atlantic bottom trawl effort, in days fished, by main species shown as the 75% effort contour (1996–2004). Main species is defined as the species with the greatest live weight on that trip. (source: Orphanides CD, Magnusson GM. 2007. Characterization of the northeast and mid-Atlantic bottom and mid-water trawl fisheries based on vessel trip report (VTR) data. U.S. Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 07-15; 127 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.)



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The National Coalition for Marine Conservation (NCMC) is the USA's oldest public advocacy group dedicated exclusively to conserving ocean fish. We are unique among marine conservation groups in that we are supported by conservation-minded fishermen and put the resource first, always taking positions based on what's best for the future of the oceans. We ally ourselves, formally and informally, with environmentalists and fishermen in common cause. Since our founding in 1973, we have been a catalyst for change in ocean fishery policy; changing the way we think, from a single-species focus on maximizing catches to a broader, ecosystem-based approach that reflects our increasing knowledge and expanding circle of concern for all marine life while promoting sustainable recreational and commercial fisheries.