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Risky Decisions

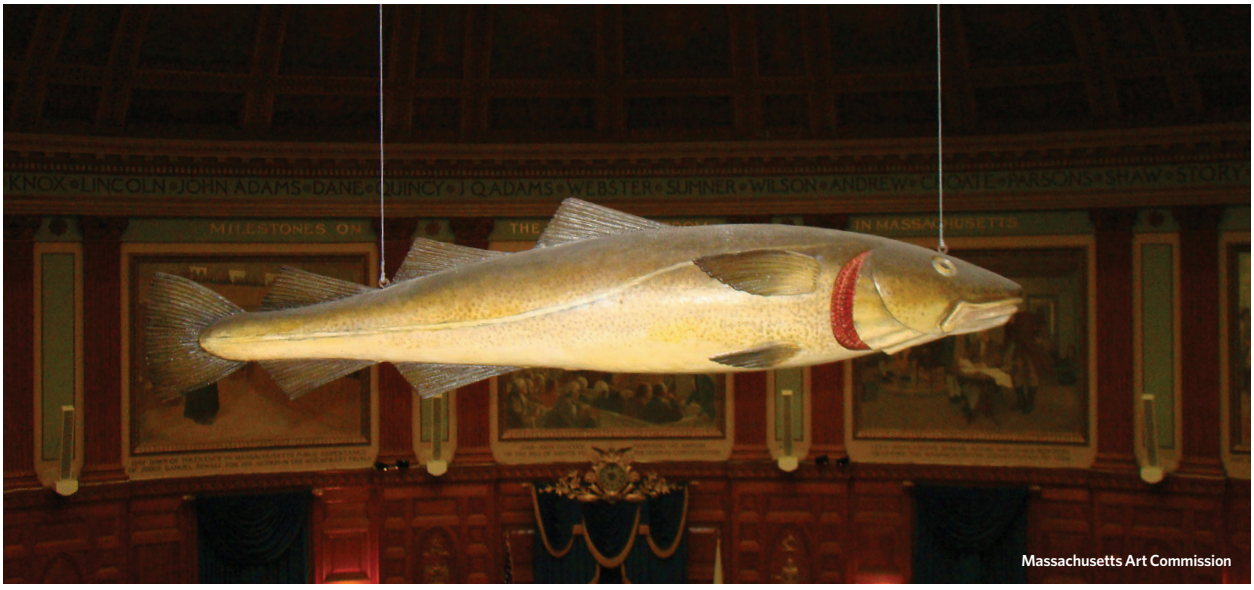
How denial and delay brought disaster to New England's historic fishing grounds

Overview

With its rich fishing history, bountiful ocean resources, and long record of leadership in marine science, New England should be the flagship U.S. fisheries management region. Instead, it is mired in an ongoing crisis that threatens the viability of the fish and the fishing communities that helped build the region's economy.

The crisis centers on Atlantic cod and several other commercially important groundfish, or bottom-dwelling species. Cod are so important in New England fishing that a wood carving, known as the "Sacred Cod," hangs in the Massachusetts State House. Once thought to be an inexhaustible resource, cod in the Gulf of Maine are rapidly declining toward commercial extinction—numbers so low they can no longer support commercial fishing.

> Once thought inexhaustible, cod in the Gulf of Maine are rapidly declining toward a state of commercial extinction.



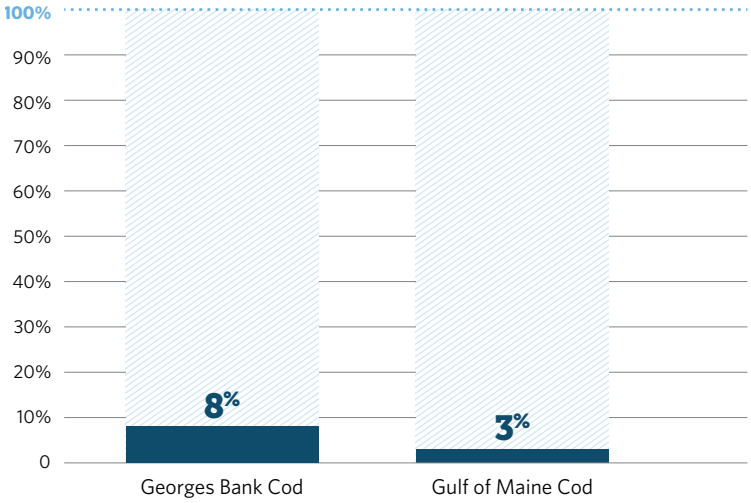
The wood carving known as the "Sacred Cod," a symbol of the importance of this fish to the New England economy, has been a symbol of prosperity for Massachusetts residents since before the American Revolution.

In August, scientists warned that the latest assessment of cod in the Gulf of Maine offers "a grim picture for the recovery of this iconic fish," with the population estimated at just 3 percent of a healthy, sustainable level.[1] Cod stocks on Georges Bank, the important fishing grounds east of Cape Cod, have also fallen to historic lows. (See Figure 1.)

Figure 1

New England's Cod Stocks at Historic Lows

Gulf of Maine cod at just 3% of a healthy level, Georges Bank cod at 8%



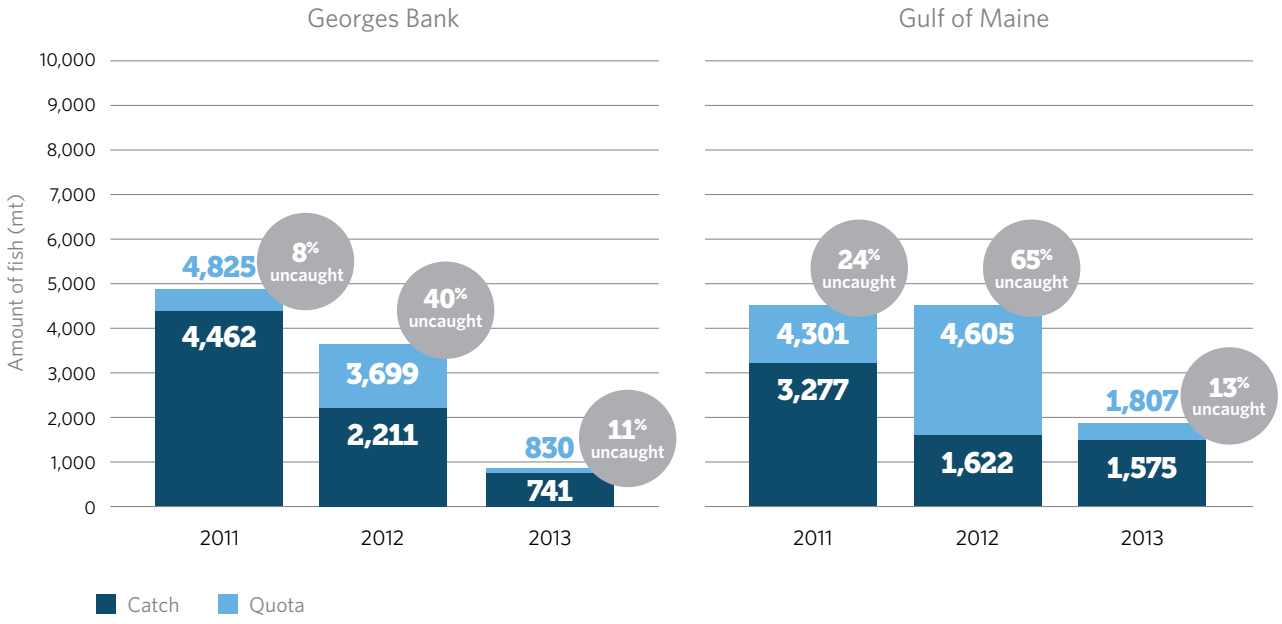
* Estimated biomass (B) as percentage of biomass desired for maximum sustainable yield (B_{msy})

Source: National Oceanic and Atmospheric Administrations' Fisheries Service, Northeast Fisheries Science Center

Figure 2

Cod Catch Is Decreasing

Despite strict limits, fishermen cannot find enough to fill allowable quotas



Source: National Oceanic and Atmospheric Administrations' Fisheries Service, Northeast Multispecies (Groundfish) Monitoring Reports, https://www.nero.noaa.gov/aps/monitoring/nemultispecies.html

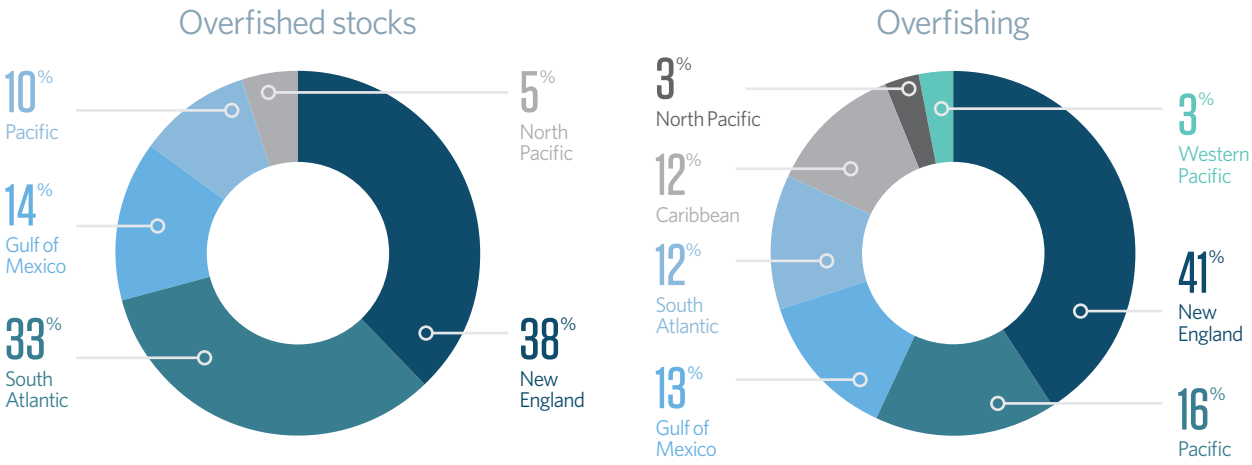
The U.S. Department of Commerce declared a fishery disaster in New England in September 2012, the second such declaration for the region in 20 years. Nearly $33 million in federal aid is being distributed to qualifying fishermen in the latest infusion of government relief funds, which have totaled roughly $130 million over the past two decades.[2]

In early 2013, New England's fishery managers took the painful step of sharply reducing the allowable catch on some of the most severely depleted stocks. Fishermen are often unable to find enough fish to meet even those curtailed quotas, and the continued rapid depletion of the cod population indicates that more must be done if the fish are to recover.

New England residents are rightly asking how one of the nation's most productive fishing grounds reached such a state and whether the public resources of our ocean waters are being managed wisely. To begin providing answers to those questions, The Pew Charitable Trusts researched the history of the region's fishery management decisions and analyzed the actions taken to attempt to rebuild depleted fish stocks. This brief documents the findings, which show a consistent pattern of risky decisions, a failure to heed warnings from scientists, and an unwillingness to take the actions needed to allow fish populations to recover from overfishing.

Figures 3 and 4

Overfished Stock and Overfishing in U.S., 2012



Note: "Overfished" means the population size for a species is unsustainably low. "Overfishing" means the rate of fishing on a species is unsustainably high.

Source: National Oceanic and Atmospheric Administrations' Fisheries Service, Status of U.S. Fish Stocks (2012), http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries

Eight regional management councils, under the oversight of the Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA Fisheries), govern fishing in U.S. ocean waters (generally 3 to 200 miles offshore). The New England region has the highest number of overfished populations and the most prevalent overfishing. (See Figures 3 and 4.) The New England Fishery Management Council's poor outcomes are due in part to the area's large number of managed fish species and the lingering damage from an aggressive foreign fishing fleet that operated in the 1960s and early 1970s before a change in federal law. But as this brief demonstrates, primary responsibility for the current crisis rests with New England's council for three decades of risky decisions in four areas:

1. Ineffectual fishing controls that enabled chronic overfishing.
2. Insufficient monitoring and limits on bycatch and discards, the incidental catch and waste of nontarget species.
3. Weak rebuilding plans for depleted or overfished populations.
4. Inadequate protection of habitat that shelters fish and their prey.

New Englanders and the nation need a clear understanding of these problems in order to chart a course to recovery and make prudent use of the tens of millions of taxpayer dollars invested in the New England fishery over the past 20 years.

Overfishing: Avoiding hard choices on hard catch limits

For nearly three decades, the New England council avoided the one management tool that could most effectively encourage sustainable fishing: hard limits on the total allowable catch. Enforceable, science-based caps on the amount of fish that can be taken allow commercial fishing to operate at levels that do not deplete fish populations.[3] Despite repeated warnings from the scientific community and even court orders, however, the council resisted hard catch limits.

In the early 1980s, U.S. fishing capacity was expanding to fill the void left when federal law (later known as the Magnuson-Stevens Fisheries Conservation and Management Act) phased out foreign fleets from waters within 200 miles of the U.S. shore, establishing an exclusive fishing zone. Stock conditions improved and new fishing technologies were available, giving fishermen hope that better times were ahead.[4]

During this period of fishing expansion, New England's council considered but decided against a system of hard catch limits, which had scientific merit but were unpopular in the commercial fishing industry. The council instead opted for a complex, ineffective system of indirect controls on fishing effort known as "days at sea," which restricted the number of days that fishing vessels could operate.[5]

With no direct limits on the total catch and a fleet with increasingly sophisticated technology, fisheries boomed and landings—the total number of fish brought to shore—increased. But the council had failed to heed the warning that recovering fish populations were still severely depleted and vulnerable to boom-and-bust cycles.[6] Subsequent scientific assessments warned that rates of fishing mortality—the amount of fish killed by fishing activity—had reached dangerously high levels and were not sustainable.

In 1985, as overfishing persisted, the council developed the Northeast Multispecies Fishery Management Plan to set rules for fishing of all groundfish species. Again, the council decided not to include catch limits.[7] Conditions in the New England fishery continued to deteriorate.

From the mid-1970s to mid-1980s, the first decade of council management, the abundance of New England groundfish declined by 65 percent.[8] By the late 1980s, virtually all the major species regulated under the fishery management plan were in poor condition.[9] The council's Technical Monitoring Group, made up of fisheries scientists, advised council members that the plan was failing to rebuild and maintain stocks,[10] but the council still did not take decisive action. By the early 1990s, most major groundfish stocks were severely overfished or had collapsed.[11]

It took a lawsuit by the Conservation Law Foundation and the Massachusetts Audubon Society in 1991 to compel the council to take action on depleted fish.[12] In its decision, the U.S. District Court for Massachusetts ruled that

the council's policies had not prevented overfishing and did not constitute a rebuilding program for overfished stocks, in violation of federal law. A consent decree required that an adequate plan be developed by September 1992, but controversy and political pressure resulted in delays.

Meanwhile, the condition of major commercial species such as cod, haddock, and yellowtail flounder worsened.[13] For example, in 1993, a stock assessment workshop, in which scientists reviewed the status of fish populations, resulted in a special advisory recommending immediate catch reductions of at least 60 percent to prevent further decline in cod stocks.[14]

In March 1994, nearly five years after the council first acknowledged that stocks were severely overfished, its final rule in response to the court order took effect. Unfortunately, the plan included a "phased" rebuilding program, which failed to heed scientists' warning that major reductions in fishing mortality were needed immediately. Instead, the council emphasized short-term economic impacts, reducing allowable days at sea slowly over a five-year period.[15]

Despite well-documented shortcomings and a fundamental lack of accountability in the days-at-sea system, it remained the council's principal management tool for controlling fishing for the next 15 years.[16]

Monitoring and bycatch: Turning a blind eye to wasteful fishing

Even when catch limits are in place, the goals of preventing overfishing and rebuilding depleted stocks can be achieved only with the support of strong accountability measures. Ensuring adherence to catch limits requires a monitoring and reporting system that delivers timely, reliable estimates of the total catch, including discards (undesirable or illegally caught fish that are thrown overboard) and bycatch (nontarget species and juvenile fish). Effective enforcement of fishing rules is also needed to prevent illegal fishing.

Because the groundfish fishery consists of multiple species, it presents particular challenges for managers. Vulnerable, overfished species and healthier ones occupy the same areas and are frequently caught together in nonselective gear such as bottom trawl nets.[17] This challenge has been compounded by an insufficient number of independent fishery observers and limited reporting of bycatch and discards.

> A 2010 study estimated that 12 to 24 percent of New England's total catch of groundfish was taken illegally.

Pew's review of management decisions regarding these matters shows that the lack of adequate monitoring and reporting has been a perennial concern in New England and continues to vex managers.[18] Beginning in the 1980s, the New England council was warned that its systems did not adequately monitor bycatch. In fact, limits on allowable fishing trips and regulations on minimum fish sizes created powerful incentives for fishermen to discard smaller or unmarketable fish. Research has demonstrated that most fish that are thrown back do not survive.[19]

In 1993, a special advisory from a stock assessment workshop expressed concern that the lack of data on bycatch and discards could lead managers to underestimate the number of juvenile fish being killed.[20] The next year, the council mandated the use of electronic vessel monitoring to document the times and places where fishing occurred, but that directive would not be implemented for 12 years.[21]

The fishery management systems that the council implemented throughout the 1990s also failed to establish effective accountability measures. With minimal at-sea observer coverage and dockside catch monitoring, the council could not effectively validate dealer reports of how many fish were taken from the water and sold, or compare those numbers with data on fish thrown overboard.

Even after a second court decision in 2002 that ordered the council to improve the catch monitoring system by providing at least 10 percent observer coverage for fishing trips, shortfalls in federal funding hampered progress.[22] In March 2005, conservation groups again successfully sued the council over inadequate observer coverage, but the council did not comply for nearly three years.[23] From 2006 through 2008, observer coverage in the fishery ranged from 2 to 10 percent.[24]

The beginning of the 2010 fishing season brought a major upgrade to fisheries management in New England: In response to changes in federal law, the council established the region's first system of hard science-based limits on total allowable catch, replacing the failed days-at-sea approach.[25] This finally put some teeth into the regional implementation of the Magnuson-Stevens Act's requirements to prevent overfishing and rebuild depleted stocks. However, the council's inadequate monitoring and enforcement system hampered the effectiveness of this critical policy shift.

Evidence suggests that cheating by fishermen—some of whom ignore rules on minimum fish size and underreport catch—is distorting the picture of the amount of fish killed in New England. For example, a 2010 study estimated that 12 to 24 percent of New England's total catch of groundfish was taken illegally and thus was never accounted for in scientific assessments or management. The midpoint of that estimate (18 percent) would amount to more than 11 million pounds of fish, worth about $13 million on the retail market. Further, had those illegally caught fish been left in the water to grow and reproduce, they could have contributed 65 million pounds to the overall biomass of the groundfish stock within five years. That extra supply would be a welcome bounty today.[26]

Rebuilding depleted populations: Choosing the riskiest path

The New England council's move to science-based catch limits is already contributing to improvements in the conditions of some depleted species, including Acadian redfish, which was declared successfully rebuilt in 2012.[27] Such successes are still too few in New England, however, especially in the troubled groundfish sector, where managers continue to choose weak, slow strategies for restoring depleted fish populations. These rebuilding plans have less chance of success, make fish stocks more vulnerable to collapse,[28] and tend to increase the likelihood of even more painful cuts in fishing in the future.[29]

Federal law states that when a fish population is determined to be overfished, managers must slow the rate of fishing as part of a formal plan to rebuild the stock to a healthy level in no more than 10 years, except in cases where species biology indicates that more time is needed. (In those cases, a longer rebuilding plan is based on the biology of the species.)[30]

According to a recent National Research Council (NRC) report on fisheries management, rebuilding plans require scientists and managers to make choices about targets, limits, and the probability of rebuilding that "reflect judgments about expected benefits and costs, and the level of risk that can be tolerated."[31]

Among the risks that officials must consider is the potential negative effect of artificially small population sizes. Depleted populations are more susceptible to environmental effects, such as stress from predation or warming waters, and may be less successful in normal reproductive behavior because of their scarcity. In general, the vulnerability of the population is highest while it is most severely depleted.[32]

A longer, slower rebuilding plan allows more fishing in the near term and raises the risk of further biological harm to the fish population. The most basic decision that managers must make, therefore, concerns the duration of the restoration plan. Quick rebuilding requires the largest cutbacks in fishing in the short term but reduces the risk of complete population collapse, which could end fishing altogether.

Balancing multiple variables such as species characteristics and ocean conditions means there is always some uncertainty, even with strong scientific data, about the response of a depleted population to a rebuilding strategy. To acknowledge and account for this element of ambiguity, rebuilding plans typically include an estimate of the probability that the population will return to the target size within the selected time period. The minimum probability allowed under the law is 50 percent. Thus a fishery management council can adopt a plan that has only a 1-in-2 chance of successfully restoring the population within the selected time frame. Managers can reduce risks by choosing a higher probability for success.

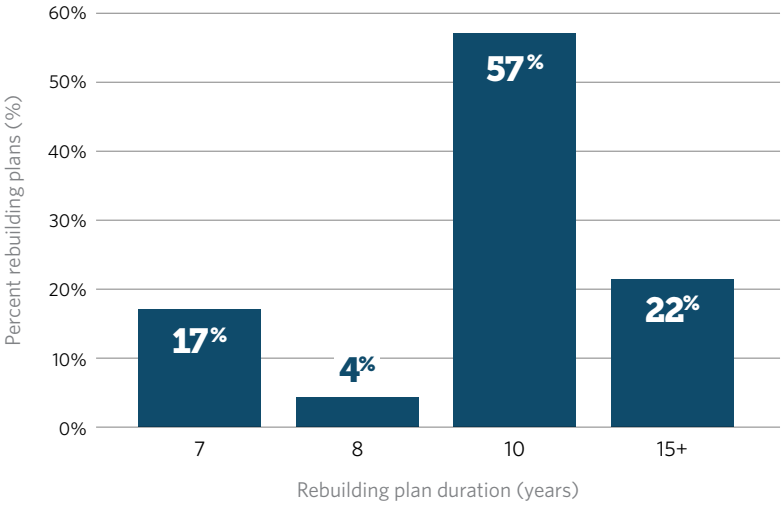
To assess the New England council's judgments on risk relating to rebuilding plans, Pew researchers focused on two important areas where managers have discretion under the law: the length of time allotted to rebuild a stock and the scientific estimate of a plan's likelihood of success. The analysis found that most often, the New England Fishery Management Council chose high-risk rebuilding plans.

Pew's analysis of the council's decisions over the past decade reveals a preference for only modest changes in fishing at the expense of relatively high biological risk. The New England council has made 23 major decisions regarding formal rebuilding plans since 2003.[33] Pew researchers classified the plans as high risk or low risk based on their time frames and probabilities of success.

Figure 5

Majority of New England Fishery Management Council Rebuilding Plans Are the Slowest Allowed

Fish stocks are left vulnerable to risks of depletion for longer periods



Sources: Analysis by The Pew Charitable Trusts; data from New England Fishery Management Council and NOAA Fisheries, Northeast Multispecies Fishery Management Plan Amendments and Framework Adjustments (2003–14), http://www.nefmc.org/management-plans/detail/northeast-multispecies

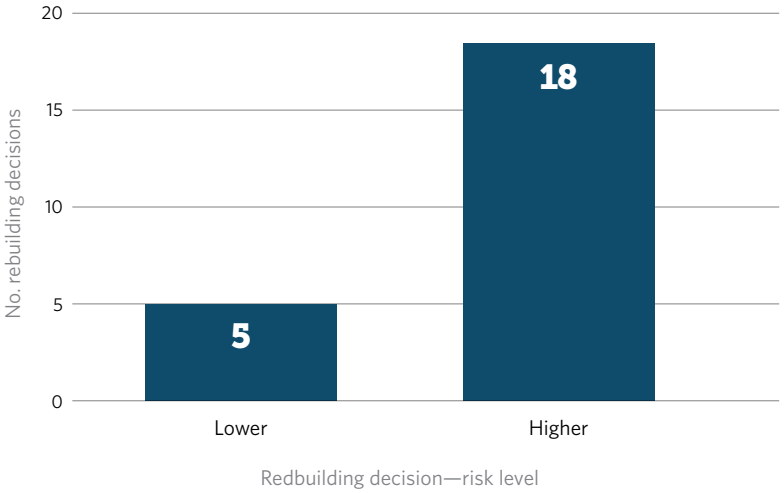
In more than half of the plans (14), the council chose the longest time frame allowed (10 years) with the minimum possible chance of success (50 percent). In four additional cases, much longer time frames were chosen (19-51 years) based on biology, and those plans also had only a 50 percent chance of success. These 18 plans were classified as high risk.

In five cases, the council chose slightly lower-risk time frames (seven or eight years), and three of these had a higher probability of success at 75 percent. (In the remaining two cases, the probability of success was unknown.) These five plans, just under one-quarter of the total, were classified as low risk.

Figure 6

Majority of New England Fishery Management Council Rebuilding Plans Are High Risk

Plans designated as high risk take the longest allowable time and have the lowest allowable chance of success



Sources: Analysis by The Pew Charitable Trusts; data from New England Fisheries Management Council and NOAA Fisheries, Northeast Multispecies Fishery Management Plan Amendments and Framework Adjustments (2003–14), http://www.nefmc.org/management-plans/detail/northeast-multispecies

These findings echo those from the NRC report, which noted that in most cases for New England stocks, the longest allowable rebuilding period was selected (typically 10 years). The NRC contrasts this tendency with management council decisions in the Pacific region, which generally resulted in rebuilding periods that were substantially shorter—and therefore less risky. Thanks to those measures, and enhanced monitoring and habitat protection, Pacific fishermen now benefit from having several species receive favorable listings from independent reviews of sustainable fishing, such as the Monterey Bay Aquarium Seafood Watch program.

The choices reflected in these rebuilding plans suggest that the New England council prefers near-term benefits of catching more fish over the significant benefits that would accrue in the longer term from less risky plans.

Marine habitat: Degrading the places where fish make more fish

Fish, like all animals, need sufficient healthy habitat in which they can find shelter and food, grow, and reproduce. The reauthorized Magnuson-Stevens Act of 1996 requires fishery management councils to identify essential habitat in their regions, minimize adverse effects caused by fishing as much as is feasible considering economic and other factors, and find ways to enhance essential fish habitat.[34]

The New England council's first attempt to respond to these requirements ended in failure when a federal judge in 1998 ruled the council's initial habitat protection plan to be legally defective.[35]

The act also requires that councils update and improve habitat programs at least once every five years. The New England council's habitat management plan was due for a five-year review in 2004 that has not been completed.

The region's most effective means of protecting habitat has been closure of large areas to the most damaging forms of fishing. These closings have their origins in a previous New England fisheries crisis. In the mid-1990s, several groundfish populations approached alarmingly low levels, and NOAA fisheries officials issued an emergency rule prohibiting the use of any fishing gear capable of retaining groundfish in three areas east and south of Cape Cod. Two additional closures were later established in the Gulf of Maine.[36]

Juvenile fish among the kelp forest on Cashes Ledge, one of the protected areas in the Gulf of Maine.

As early as 1994, both NOAA and the council recognized the importance of these groundfish closed areas in protecting habitat where fish gather to spawn or where juvenile fish seek shelter.[37] Subsequent studies found that the closed areas improve the quality of habitat and contain larger and more abundant haddock and cod.[38] Larger fish are important to the reproductive success and recovery of depleted populations because they produce more eggs, which are also more viable.

Researchers also identified a "spillover" effect of higher catch beyond the boundaries of the closed areas, a benefit that extended to other commercially important marine life.[39] For example, the biomass of scallops across the New England fishery region increased dramatically in association with the closures on Georges Bank. New Bedford, Massachusetts, has the highest fishing revenue in the nation because of scallops.[40]

The creation of these year-round refuges may have been the single most important action taken to protect groundfish in the 1990s. For nearly 20 years, the refuges have allowed habitats degraded by destructive bottom-trawl and scallop-dredge gear to recover.[41]

Despite these gains, however, Pew's review found that the closures have not realized their full potential benefit because of council attempts to erode protections in response to pressure from the commercial fishing industry. For example, while the council was introducing closed areas to the Gulf of Maine in the 1990s, it also was preparing to reopen portions of the closed areas on Georges Bank to an experimental scallop fishery.[42] This decision, and a subsequent program to allow scallop dredges inside closed areas on a rotating schedule, posed risks for groundfish, given the depleted status of some species in the area. Groundfish bycatch in scallop dredges was a concern, particularly for rebuilding cod, haddock, and yellowtail flounder.[43]

In another decision that undermined the habitat protections, other gear types with known bycatch of groundfish species, such as midwater trawling for herring and mackerel, were also allowed to operate in the closed areas. In its efforts to maximize scallop production and promote industrial herring fishing, the council failed to consider the effects on groundfish and their essential habitat.[44]

Then, in late 2012, with stocks of cod and other groundfish once again badly depleted, the council made the difficult but necessary choice to sharply reduce fishing quotas. However, in an effort to ease the economic pain of the reductions, it undermined their potential effectiveness by proposing to eliminate large portions of the remaining closed areas in the Gulf of Maine, Georges Bank, and southern New England.

The proposal met with strong negative reaction from the public and the scientific community. More than 100 scientists signed a letter to NOAA Fisheries officials spelling out the benefits of closed areas.[45] Eventually, NOAA rejected most of the council's proposal for the 2013 fishing year.[46]

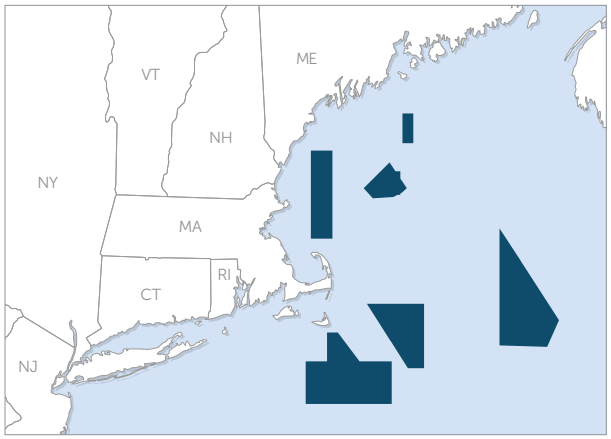
Now, as part of the long-overdue update of its habitat protection plan, the council is once again considering a variety of proposals to eliminate most closures.

For example, Georges Bank, where cod populations are seriously depleted, could lose 96 percent of its remaining protected area. Overall, if the council chose the smallest closed-area option for each subregion, the total area afforded year-round protection would drop by 71 percent to just 1,909 square nautical miles. Such a change would eliminate protection for a combined area roughly the size of Connecticut.[47] (See maps of closed areas and potential changes under consideration.)

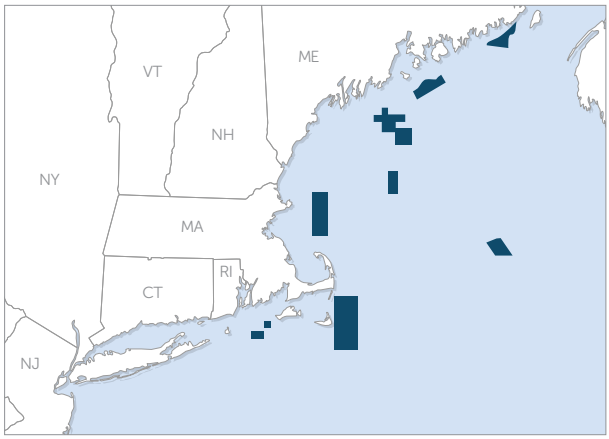
Figures 7 and 8

Groundfish Areas Closed in New England: Current and Worst-Case Scenario

Closed areas in 2014



Changes under consideration could cut the total protected area by 71%, eliminating safeguards for a combined area roughly the size of Connecticut



Source: New England Fishery Management Council Omnibus Essential Fish Habitat Amendment 2 Draft Environmental Impact Statement, Vol. 3, pp. 33–91 (May 19, 2014), http://www.nefmc.org/library/omnibus-essential-fish-habitat-amendment-2-draft-environmental-impact-statement-deis

The council has identified retention of one of the existing large closed areas, in the western Gulf of Maine, as its preference among the alternatives, and the eastern Gulf of Maine could receive a net gain in protection. However, the council has the option of making other choices for those regions with less area protected, and most of them stand to lose substantial ground.

A course forward in a changing environment

A growing body of scientific evidence shows that the effects of climate change now compound the challenges facing fish populations and the marine ecosystem. Scientists have documented ocean warming in the region and some of its effects on marine life, such as movement in fish populations and disruptions to the food web.[48] In 2012, sea surface temperatures in New England rose to their highest levels in the 150 years of instrument data, and 2013 was the second-warmest year on record for the region's waters.[49] Although 2014 temperatures appear to be moderating somewhat, scientists warn that the Gulf of Maine is warming faster than 99 percent of the world's oceans.[50] Researchers called this phenomenon an "ocean heat wave" and say it offers a glimpse of where the long-term temperature trend is going: a future of warmer waters, for which humans must prepare. (See Figure 9.)

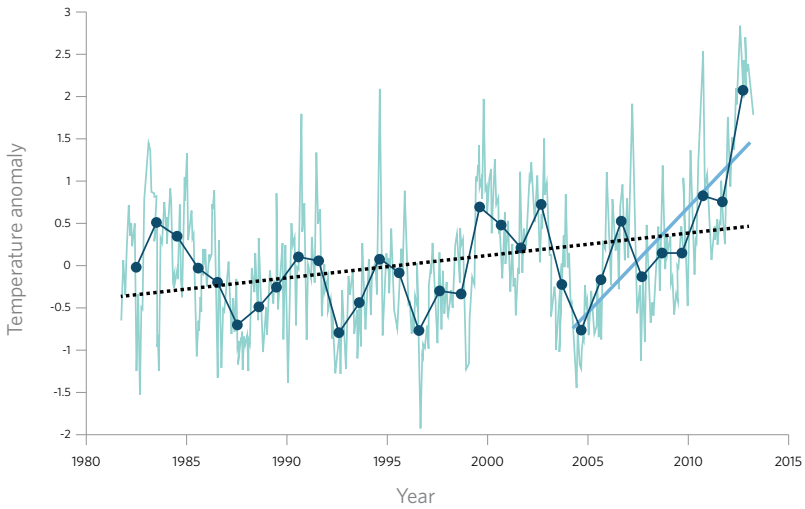
Despite this dramatic warming, the available evidence does not indicate that climate change alone caused the current disaster in New England groundfish fisheries. Indeed, the management failures that precipitated the crisis—decades of overfishing and habitat degradation—have made fish populations more vulnerable to the stresses stemming from climate change, such as increased temperature, ocean acidification, and indirect effects on the ecosystem. In turn, these added factors probably make fish less able to respond to restoration efforts.

The reality of climate change should not be an excuse for delay or for a return to failed approaches of the past. Rather, the climate challenge is one more good reason to stay on course with efforts to rebuild stocks, enhance habitat protection, and rapidly move to fisheries management based on modern ecosystem science.

Figure 9

Sea Surface Temperatures in the Gulf of Maine Show Prolonged Warming and an Abrupt Recent Jump

Scientists say the long-term warming trend is an effect of climate change, which exacerbates natural variability



Sources: Andrew Pershing, Gulf of Maine Research Institute; data from K.E. Mills et al., "Fisheries Management in a Changing Climate: Lessons From the 2012 Ocean Heat Wave in the Northwest Atlantic," *Oceanography* 26, no. 2 (2013): 191–195 http://dx.doi.org/10.5670/oceanog.2013.27

Two management tools now under consideration by the New England council hold profound implications for the fishery's ability to recover from past damage and build resilience to the coming effects of climate change: habitat protection and the implementation of ecosystem-based fisheries management (EBFM).

EBFM not only keeps track of individual fish species, but it also allows managers to account for the relationships between predators and prey, the effects of fishing on the rest of the ecosystem, and the impact of environmental changes on fish. The New England council has taken the first steps in this "big picture" approach and is beginning to make better use of the available science on the function of ocean ecosystems. This already solid body of evidence points to the importance of the fabric of nature that supports fisheries.[51] EBFM would reduce the likelihood of management actions that harm fish populations by degrading important habitat or depleting forage species that predator fish need, and it would allow managers to more easily recognize and respond to environmental change such as ocean warming.

The benefits of habitat protection are clear, and the challenge of ocean warming adds urgency to decisions relating to habitat management. Studies of protected areas show that the ecosystems they contain are better able to withstand the stress of warming.[52] NOAA, in partnership with the White House and federal and state agencies, prepared a 2012 strategy to help wildlife adapt to climate change,[53] led by a goal of protecting marine habitat. With pronounced warming and other changes underway in New England, the council should protect more marine habitat, not less. However, as noted previously, the council is considering industry-sponsored proposals to greatly reduce protections, a move in the wrong direction that could prove a fatal blow to weakened cod stocks.

Recommendations for recovery

The New England Fishery Management Council has a critical responsibility to protect both the economic and environmental health of the region. This means not only addressing the current crisis but also creating an effective long-term management plan that controls overfishing, protects habitat, and mitigates the effects of climate change to ensure a viable fishery for coming generations. To meet this obligation, Pew recommends that the council adopt the following policies:

1. **Prevent overfishing and rebuild stocks.**

- Adopt more conservative fishing limits.
- Regulate fishing to maintain robust populations by systematically reducing fishing pressure when a stock falls below the target, long before the overfished limit is reached.
- Adopt low-risk rebuilding plans to increase the chances of successful recovery and reduce the likelihood of future fishery disasters.

2. **Reduce bycatch and improve monitoring.**

- Achieve a more complete accounting of the number of animals killed by fishing.
- Minimize bycatch and discards and improve data on total fishing mortality through enhanced monitoring and enforcement.

3. **Augment habitat protection measures.**

- Expand the network of areas afforded year-round protection from damaging forms of fishing.

- Increase safeguards for existing protected areas.
- Protect large areas with a variety of habitat types that support multiple stocks and ecological functions within each of the area's subregions.

4. Adopt an ecosystem basis for management.

- Implement ecosystem-based fisheries management promptly to better address how fish interact in the ocean and respond to changes in their environment.
- Incorporate multispecies and ecosystem approaches in the process as soon as possible to determine sustainable rates of fishing for the suite of managed species.

Conclusion

As New England fishermen await another round of federal disaster assistance, the sense of déjà vu is unmistakable. The current calamity comes 20 years after a similar federal declaration when groundfish stocks were depleted in 1994. Today, cod and yellowtail flounder on Georges Bank and in the Gulf of Maine remain severely overfished, and the nation's historic fisheries are in crisis yet again.

This preventable disaster was the result of short-term thinking and risky decisions. Managers were slow to respond to repeated scientific warnings that they should rein in overfishing, control bycatch, and secure meaningful habitat protection. Because overfishing and habitat damage were allowed to persist, many depleted New England groundfish stocks are far less productive than they otherwise would be. One study conservatively estimated that New England commercial fishermen missed out on 79 percent of potential revenue in 2009 as a consequence of catch losses resulting from overfishing, at an economic cost of at least $149 million.[54]

A history of overfishing and the growing effects of climate change may make recovery of New England's cod stocks less likely. But it is also true that a number of stocks such as Georges Bank haddock, Acadian redfish, white hake, pollock, and plaice recovered when fishing pressure was reduced effectively. Numerous studies have shown that stock depletion is, in almost all cases, reversible if fishing mortality is controlled and if fish have access to ample habitat, including feeding, spawning, and nursery areas.[55] Since adopting hard catch limits in 2010, New England has made incremental but steady progress in curbing overfishing and removing some stocks from the overfished list, but in the coming years, the managers' resolve to rebuild groundfish populations will be tested. Now more than ever, it is important to heed the lessons of history, avoid repeating past mistakes, and set a course to rebuild the region's fisheries.

Endnotes

1 Northeast Fisheries Science Center, Gulf of Maine Atlantic Cod: 2014 Assessment Update, 3, http://www.nefsc.noaa.gov/saw/cod/pdfs/GoM_cod_2014_update_20140822.pdf.

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