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U.S. Ocean Fish Recovery: Staying the Course

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With many ocean fish populations at unprecedented lows and declining (*1*, *2*), management should now emphasize population rebuilding. The United States assumed leadership here with the rebuilding provisions of the Sustainable Fisheries Act of 1996. Unfortunately, attacks by some in both Congress and the courts would cut the heart out of the act and take policy backwards.

Currently the act mandates that federal fishery managers must adopt plans to end overfishing, and, within 10 years (unless biology dictates longer), rebuild depleted populations to levels that can support "maximum sustainable yield" (MSY). This recovery mandate is unique, and the United States now has numerous species whose incipient and ongoing population recoveries can be linked to management actions, most designed to meet these mandates. Retaining and strengthening these mandates is crucial. Attacking the recovery provisions tends to go against the long-term interest of the nation and its fishing and seafood communities and businesses.

Nonetheless, both the United States's mandate to end overfishing and its rebuilding time frame are under assault. Because rebuilding means that fishing mortality must first be reduced, commercial fishing interests, and certain members of Congress, are attacking the 10-year time frame as too rigid, aggressive, and arbitrary. In March, a federal court ruled, somewhat illogically, that managers could allow overfishing during a recovery plan's rebuilding period, as long as the population is rebuilt by the end of the period (*3*).

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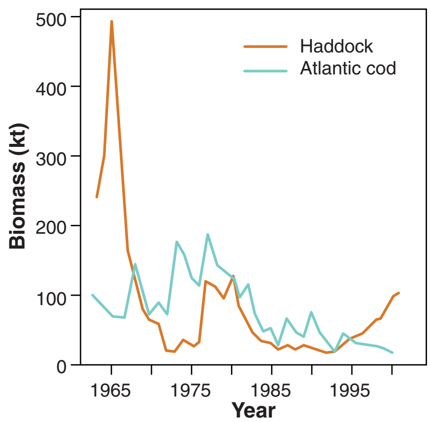


Depletion and renewal. Population trajectories of haddock and Atlantic cod on Georges Bank, off New England (kilotons).

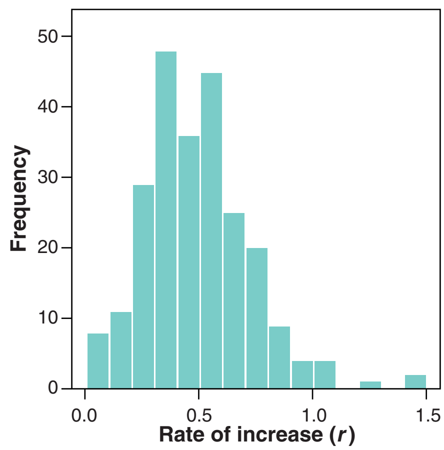
Recent legislation proposed in the House (HR 3645) and Senate [S 482, S 2066 (*4*)], and new circulating drafts, would change the mandate "end overfishing" to "address overfishing," and delay or even eliminate the rebuilding time frame.

NOAA's National Marine Fisheries Service, the agency responsible for implementing fisheries conservation and management legislation, has recently published proposed changes to the guidelines for applying overfishing and rebuilding standards in fishery management plans. The guidelines are used by the agency and the regional fisheries management councils set up under the Magnuson-Stevens Act when developing fishery rebuilding plans for overfished fisheries. The new proposals still call for rebuilding in as short a time as possible in principle. However, instead of a clear, unambiguous 10-year time frame for most stocks, the proposed rebuilding time frame is to be based on a theoretical rebuilding time under no fishing plus one mean generation time, defined as the average age of spawners for an unfished stock. The effect of the proposal may shorten some rebuilding windows, but in many cases is likely to result in a longer rebuilding schedule, particularly because the mean generation time for an unfished stock may be very much longer than that for an overfished stock with a highly truncated age distribution. The comment period on the proposed rule is open until 22 August 2005.

Evaluating the 10-Year Window

Both the U.S. Commission on Ocean Policy and the Pew Oceans Commission clearly emphasized last year that the nation's ocean resource policy must focus on rebuilding populations and ending overfishing (*5*). Ten years is a reasonable and beneficial rebuilding window. During drafting of the Sustainable Fisheries Act, several population dynamics experts pointed out that many depleted marine organisms were capable of rebuilding to target levels within about 5 years if fishing for them ceased. Drafters then looked at balancing the need for resource rebuilding with short-term concerns of managers and fishers. But the drafters also recognized that too long a rebuilding time frame would facilitate years of inaction, continued overfishing, and even increased catches, causing further population declines as has happened elsewhere (*6*). Ten years (twice the time the majority of populations require for rebuilding) was chosen to avoid Draconian mandates; to help ensure that managers actually commence rebuilding; to increase chances for success; and to minimize future ecological, social, and economic costs. This optimizing balance was deliberate and compassionate, not arbitrary.

Atlantic black sea bass, scup, summer flounder, sea scallops, yellowtail flounder, and king mackerel are examples that owe their success to the fact that fishery managers acted early in the rebuilding window to reduce overfishing so as to hit projected targets within 10 years. All these species are



Distribution of intrinsic rates of increase (*r*) for 242 fish populations of commercial value (*25*, *26*).

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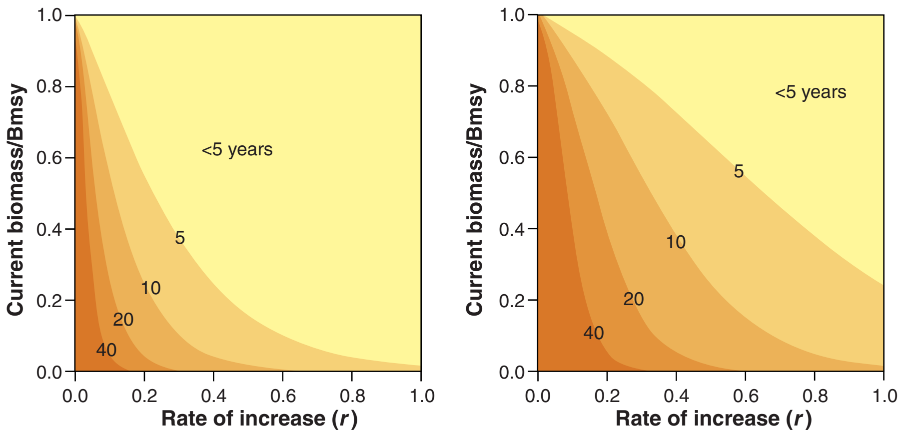

Years required for rebuilding fish population. (Left) Rebuilding times with no fishing, assuming a Graham-Schaefer model [(*27*), Eq. (2.9)]. Rebuilding time depends only on the intrinsic rate of increase r, fishing mortality F, and the biomass at the onset of rebuilding B_0, expressed as a proportion of the biomass needed to produce MSY B_{msy}: $t = [1/(r–F)\ \ln\{[(B_0/B_1)^{-1}\ 2(1–F/r)–1]/[2(1–F/r)–1]$. Most combinations have rebuilding times less than 5 to 10 years (yellow, orange). (Right) Rebuilding times with fishing mortality at 80% of the rate associated with MSY.

significantly more abundant now than a decade ago, so that fishing can increase.

In our opinion, this approach fails when management delays resulting from political pressure allow continued overfishing; the rebuilding clock keeps ticking and populations decline further. This failure to act early, necessitating deeper fishery cuts to rebuild populations within the time limit, has prompted critics to argue that a longer rebuilding window will be necessary (*7*).

It doesn't work that way. Human predilection for inaction necessitated the rebuilding time frame in the first place, and deadlines will be needed unless and until human nature changes. New England cod and haddock populations—classic overfishing examples (*8*)—exemplify the contrast (see figure, page 707, top). Fishing pressure on haddock was abruptly reduced, but managers phased in cod fishing reductions slowly. Haddock rebounded quickly, now supporting lucrative fishing. Cod have scarcely increased, and restrictions are affecting and will affect the industry years later, when recovery could be nearing completion.

Risks of Prolonging Overfishing

Delaying rebuilding puts ecosystem components at risk (*9–11*). Gulf of Maine cod, for example, are missing from nearly half their coastal spawning grounds of 50 to 70 years ago, apparently because many small local populations are now extinct (*12*). Atlantic pollock have similarly disappeared off Block Island (*13*), Atlantic bluefin tuna are gone from large parts of their range (*14*), and other extirpations have likely gone unnoticed. Overfishing truncates a population's size and age distribution, lowers genetic diversity, and suppresses reproductive and recovery capacity (*15, 16*). Biocomplexity is critical for resilience, and population persistence will likely require adaptation to changing conditions (*17, 18*). Warming is already challenging heavily exploited Atlantic salmon, North Sea cod, Long Island Sound lobsters, and others (*19–21*). Prolonged depletion also incurs ecosystem cascades; e.g., blue crab overfishing has contributed to mass salt-marsh grass die-off, because predatory crabs normally suppress herbivorous snails (*22*). In sum, the longer managers allow overfishing, the more depletion undermines subpopulations' diversity, resilience, and adaptability; risks ecosystem structure and functioning; reduces chances for eventual recovery; and raises social and economic costs.

Rebuilding Imperatives

The great majority of marine fish populations have intrinsic increase potential (see page 707, bottom) that, absent fishing, would rebuild them to target levels within 10 years (see figure above, left). Fishing at half the fishing mortality rate associated with MSY would only moderately delay rebuilding. However, fishing depleted populations at 80% of the fishing mortality for MSY [as suggested in S2066 (*4*)] would greatly delay rebuilding (see figure above, right).

Overfishing must be quickly prohibited, and management must be required to keep depleted populations continually increasing. The North Pacific Fishery Management Council, widely acknowledged for managing one of the most stable, high-volume, and lucrative fisheries in the world, automatically reduces fishing mortality as a population declines below its target level (*23*), i.e., more fishing when there are more fish, less fishing when there are fewer fish. It need surprise no one that this sensible approach generally maintains robust exploited populations, high levels of fishing activity, and big money. Such a sensible approach should be universally required and is well suited for populations biologically incapable of rebuilding within 10 years.

Maximizing economic, social, and ecological benefits requires ending, not tolerating, the damages of costly overfishing. The United States must retain its leadership with its timed, mandated approach to rebuilding depleted fishery populations. A required time frame is most desirable for starting and assessing rebuilding progress. For most species a 10-year rebuilding window accomplishes these objectives and should be retained. These minimum recommendations do not address the need to reduce unwanted bycatch or to maintain ample quantities of prey, rare species, high-quality and refuge habitats, and other ecosystem concerns.

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