# Annual Catch Limits Reinforced by Fishery Closure Provisions (hard TACs): Essential for Ending Overfishing in New England

## A report for the Pew Environment Group

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## Introduction

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSRA) mandates that fishery management plans must prevent overfishing. National Standard One (NS1) requires that 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.* According to NOAA Fisheries (2006), Optimum Yield (OY) may be defined as *the amount of fish that 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. MSY constitutes a "ceiling" for OY. OY may be lower than MSY, depending on relevant economic, social, or ecological factors. In the case of an overfished fishery, OY should provide for the rebuilding of the stock to* $B_{MSY}$. MSY is *Maximum Sustainable Yield* and $B_{MSY}$ is the Biomass that is sufficient to support MSY (NOAA Fisheries 2006).

In 2009, with most of our groundfish stocks in New England overfished, subject to overfishing, or both, it is imperative that the current Amendment (Amendment 16) to the Northeast Multispecies Fishery Management Plan do all that it possibly can to end overfishing. Overfished stocks (70% or 14 of 20 in the Draft Environmental Impact Statement for Amendment 16) cannot rebuild while overfishing is occurring. Of the 46 overfished stocks under US federal management, 37% of them (17) are in New England, nearly double that of the next poorest management unit as of the 2008 4$^{th}$ quarter report (NOAA Fisheries 2008). Thirteen of 19 groundfish stocks (68%) continued to be subjected to overfishing according to the most recent stock assessment for New England (Northeast Fisheries Science Center 2008).

Recent history in New England shows that setting annual TAC targets without a closure provision does not provide sufficient control over fishing mortality. Ending overfishing demands setting precautionary, science-based Annual Catch Limits (ACLs) and stopping fishing before these limits are exceeded – every year. Annual catch limits reinforced by fishery closure provisions (hard TACs) are essential for ending overfishing in New England and must be used throughout the groundfishery in order to achieve Optimum Yield (OY). This paper reviews relevant scientific literature on the use of hard TACs and mechanisms for ensuring their successful application.

## Definition: hard Total Allowable Catch (*hard TAC*)

A hard total allowable catch limit (hard "TAC") is a predetermined catch level (TAC) that is paired with a within-season closure provision. When the TAC is reached, either the fishery must be closed or all catch of the species for which the TAC has been reached must be prohibited (Latanich 2007). The Total Allowable Catch is calculated by applying a target fishing mortality rate to an estimated exploitable biomass.

## The mandate to end overfishing and to rebuild

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSA) provided a clear statutory mandate to end overfishing and to rebuild those fish stocks that had already been depleted by overfishing. The law directed that overfished stocks be rebuild as rapidly as possible, and specifically in less than 10 years except in specific instances where more time was required by stock biology or other circumstances. For most species, rebuilding within a decade is biologically possible (Safina et al., 2005).

Over a decade after the MSA, the US track record on stock rebuilding is poor (Rosenberg et al., 2006) and New England is far from an exception (Northeast Fisheries Science Center 2008; NOAA Fisheries 2008). As of 2005 (Rosenberg et al 2006), most (95%) of the overfished US stocks in federal rebuilding programs had not yet been fully rebuilt; more than 85% of the stocks were still being subjected to overfishing or remained in an overfished state. Analysis of US rebuilding program showed that many (48%) of the programs were working in the sense that stock biomass was on a positive going trajectory. Nevertheless, an alarming proportion of stocks in rebuilding plans continued to be overfished (45%). Rebuilding plans cannot succeed without reducing fishing pressure (i.e., lowering F, the proportion of the fish removed from the stock each year; Rosenberg et al., 2006).

In New England, roughly 80% of the groundfish stocks identified in the DEIS for Amendment 16 to the *Northeast Multispecies Fishery Management Plan* (New England Fishery Management Council, 2009a) are overfished, presently subjected to overfishing, or both. Ending overfishing requires that fishing mortality be held at or below at a level corresponding to maximum sustainable yield ($F_{msy}$). We have repeatedly failed to do this for New England's prized groundfish (Sinclair and Murawski 1997).

There are a number of reasons why management measures in New England have failed the mandate to rebuild stocks. Preeminent among these are (1) a failure to end overfishing and (2) a failure to adhere to programs that have a high probability of rebuilding within less than 10 years. The recent reluctance to apply one of the most important, common sense, accountability measures – stopping fishing when annual catch targets have been reach through hard TACs is a major obstacle to ending overfishing. Precautionary annual limits must be set, based on the best available biological and management science, and fishing must end within the season to prevent overfishing – in all components of the groundfishery.

## Effective management measures mitigate the adverse responses to hard TACs.

In the debate about whether or not hard Total Allowable Catch (hard TAC) rules should be applied uniformly across the New England groundfishery, to both the newly formed sectors and the common pool, concerns have been raised about inducing *derby fishing* in the common pool leading some to oppose a hard TAC. Derby fishing is generally defined as a situation in which there are no individual quotas but a fishery is under a hard TAC (National Research Council, 1999). These situations can lead to a number of unintended negative consequences such as intense fishing over a short periods time (i.e., *pulse fishing*), leading to flooded markets, inefficient fishing, and stimulating a race to fish in which safety is jeopardized. Pulsed fishing effort can be harmful to stocks as well when, for example, effort is concentrated on aggregations of spawning fish in a race to get as many fish as possible before a fishery closure.

The period following the establishment of the Exclusive Economic Zone ( EEZ; 1976-1982) witnessed a rapid growth in New England fishing capacity (i.e., overcapitalization) and a hard TAC system for the open-access groundfishery - under the International Commission for the Northwest Atlantic Fisheries (ICNAF; Apollonio and Dykstra 2008). In the absence of appropriate monitoring and enforcement, a derby fishery ensued accompanied by a number of negative consequences. This experience lead to the genesis of the input-control based system we have today (days-at-sea with trip limits, but not a hard TAC; National Marine Fisheries Service 1994; Latanich 2007).

Those who fear the reemergence of the hazardous derby fishing seen under ICNAF quotas, cite safety as a major reason for avoiding a hard TAC for the common pool in Amendment 16. However, the imposed trip limits that were intended to mitigate derby fishing failed during this earlier period because the

enforcement and management capacity of NMFS was not sufficient to support effective use of trip limits (Latanich 2007).

The obvious benefits of strict adherence to science-based annual quotas for ending overfishing, together with the recognition of the undesirable consequences of derby fishing, has focused considerable attention on management measures that can reduce derby fishing. A number of derby fisheries have been substantially improved by allocating catch (i.e., quota) to individuals or groups of individuals (National Research Council, 1999). These strategies work because they spread out landings over the season, pacing the fishery and thus eliminate pulse fishing (Hackett et. al., 2005).

With the deployment of the resources we have today, trip limits, combined with an ensemble of other management measures, the groundfishery can be paced to effectively prevent derbies. Other pacing mechanisms that have been used include daily limits, limits on the number of days per month a vessel can fish, limits on trip duration, and TAC distributions that segment the year (Latanich 2007; New England Fishery Management Council 2005). The success of pacing mechanisms will always depend upon effective monitoring, enforcement, and accountability.

When applied effectively, these pacing mechanism improve safety and also have a number of other benefits. Pacing the fishery usually increases the supply of fresh fish throughout the year, and making the fishery more profitable (Copes 1986). Maintaining a more uniform distribution of fishing effort has the added benefit of reducing the tendency to over-capitalize, thereby further reducing the risk of overfishing.

Nevertheless, the memory of the derby fishery of the 1970's and 1980's surfaces today during New England Council meetings and is presented by some as a obstacle to applying a hard TAC to the common pool portion of the groundfishery (Plante 2008a, 2008b; New England Fishery Management Council 2009b). Safety concerns are often cited, though surveys do not place safety as a top-level concern for fishermen generally (Herbert 2000).

Much has changed over the intervening three decades since the ICNAF era, with improvements in monitoring, safety procedures and equipment, and enforcement, and the development of new strategies for coping with potential unintended consequences of hard TACs. Hard TACs are essential for rebuilding overfished stocks as mandated by law. They must be applied uniformly throughout the groundfishery, not just to the nascent sectors which hold so much promise for the future of fishing in New England (Johnston and Sutinen 2009).

It should be noted that derby-like fishing is not the sole province of hard TACs. Derbies may also occur under input controlled systems such as days-at-sea (Branch et al., 2006), and can be triggered by a number of factors including the population biology of particular stocks. Moreover, even without a hard TAC on the common pool, each precious fishing day expended under the days-at-sea system is in and of itself something of a derby – with individuals racing to get as much fish as possible in the face of "closure" after the 24 hour clock runs out. The days-at-sea system with a 24 hour clock is not without its hazards, safety and otherwise. But safety issues attendant to hard TACs, and other fisheries scenarios, are critically important. They must be addressed, but they do not justify taking hard TACs off the table as a management measure.

## The DEIS for amendment 16 offers an effective plan for a hard TACs on the common pool

The DEIS for Amendment 16 (New England Fishery Management Council 2009a) offers a well developed plan for mitigating any tendency for a hard TAC on the common pool to promote derby fishing. Following the best available science reviewed above, the DEIS outlines a plan to ensure that landings will be spread out throughout the fishing season by developing hard TACs based on a trimester system. This hard TAC plan is presented as Alternative 1 within the DEIS (New England Fishery Management Council 2009a, pp I-162/3). The plan originated within the Council and was supported by a majority vote that included industry representatives. With the improvements in monitoring and enforcement over the years, and that will continue with recent funding from NOAA (Lindsay 2009), a hard TAC system can be used for the common pool, allowing in season adjustments and ensuring a relatively uniform deployment of fishing effort.

The trimester plan proposed in the DEIS offers a good alternative that, when coupled with better catch monitoring and enforcement, will decrease the risks of continued overfishing in the common pool. The trimester plan will complement the existing days-at-sea system in which days can be reduced further, and daily and trip limits on catch will also mitigate against the race to fish. Measures that pace the fishery, improve monitoring, strengthen enforcement, and ensure that fishing stops when biological limits are reached will pay major economic dividends for New England as it strives to rebuild its fish stocks (Johnston and Sutinen 2009).

## Substantial risks attend a common pool without a hard TAC

When considering the possible risks associated with a hard TAC for the common pool, it must be borne in mind that there are also substantial risks associated with allowing the common pool to operate without a hard TAC (Latanich 2007). If sectors go forward under a hard TAC, and the Council fails to put in place a hard TAC for the common pool, New England will be headed for an unusual scenario fraught with difficulties. Within a single FMP, about half the fishermen will potentially pursue the groundfish without a strict adherence to a science-based annual limit while the other half is committed to ceasing fishing operations when annual limits are reached (i.e., those in sectors). Beyond the obvious issues of fairness there are other potentially serious consequences.

Overfishing has occurred repeatedly in this fishery with only input controls (i.e., days-at-sea). New England leads the nation in overfishing. Hard TACs as a backup for input controls is the only way to ensure that overfish will not continue to occur. If overfishing prevails, rebuilding plans will continue to fall short of statutory rebuilding time frames, or worse (Rosenberg et al., 2006). The economic losses associated continued delays in rebuilding are expected to be substantially greater than the short-term losses associated with catch forgone in the interest of rebuilding (Sumaila and Suatoni 2006).

Overfishing by the common pool will introduce a substantial risk of failure for newly formed sectors, decreasing available resources just when the sectors are bearing the burden of heavy start-up costs. The two sectors we have in New England have struggled to catch a modest part of their annual cod allocation due to competition with the common pool and the scarcity of fish. NOAA Administrator Dr. Lubchenco recently indicated NOAA's commitment to the "...setting up the infrastructure for the new management system based on sectors and catch shares" in New England (NOAA 2009). This commitment to the successful transition to sectors cannot succeed if a major component of the fishery is allowed to operate without a hard TAC. This is a substantial risk that we should not take.

The overfishing and discarding within the common pool, expected based on history, will erode the benefits of sectors for maintaining healthy stocks and fostering rebuilding of overfished stocks. Similar scenarios have arisen in which a federal management plan strives to rebuild overfished stocks while a substantially under-regulated fishery depletes the same stocks. For example, on the U.S. Pacific Coast programs put in place during the early 2000s to rebuild bocaccio (*Sebastes paucispinus*; a rockfish) were seriously compromised because the recreational catch was substantial and not appropriately limited (Weiss 2004). The recreational landings of bocaccio were on the same scale as those of the commercial fishermen regulated under the federal FMP (Coleman et al., 2004). The recreational industry in this example operated as an open-access type fishery with similarities to the common pool in New England; management focused on input controls and discarding was substantial. Rebuilding plans were undermined in the early years of the rebuilding effort by the recreational fishing sector effectively operating without a hard TAC, driving the overall quota for subsequent years much lower than it otherwise would have been. Without a hard TAC on the common pool in New England we should expect similar unfortunate consequences.

## The experiments have been done: sector-based harvest cooperative perform well and can offer overall economic, social, and biological benefit to the Nation

### The economic case for sectors and output-based management

In a recent report, resource economists examined the New England groundfishery from an historical and international perspective (Johnston and Sutinen 2009). Their analysis lead to a bleak picture of our attempt at managing fisheries with days-at-sea limits, pointing out that no multispecies fishery anywhere in the world has ever prospered or been rebuilt successfully with days-at-sea limits. While the New England fishery is still grapples with badly depleted stocks, and diminished landings and revenues, a transition to more responsible output-based management, including harvest cooperatives with enforced annual catch limits (i.e., sectors), can provide significant economic gain. Based on their review of available data and models they estimate that rebuilding stocks could have a cumulative net present value near $300 million or higher, potentially reaching $400 million to $500 million in some scenarios (2003 dollars).

According to Johnston and Sutinen (2009) cooperative fishery management under output controls are paying off worldwide. Harvest cooperatives such as the Montauk Tilefish Association, Alaska Pollock Conservation Cooperative, Pacific Whiting Conservation Cooperative, and others show clear biological and economic benefits including longer seasons, increased sustainable landings and profits, reduced bycatch and waste, higher product quality and recovery rates, and safer fishing.

Sectors offer many advantages not often provided by individual fishing quotas. These include the ability to coordinate harvest timing and location, product mix and marketing to increase net benefits. Sectors also present an opportunity to coordinate fishing activity among sector members to minimize fishing costs.

### Sectors in New England

In New England, sectors have been proposed as a way to provide fishermen with the flexibility to set their own fishing guidelines so they can run their businesses more efficiently and profitably while fish populations recover. Johnston and Sutinen (2009) examine this solution and compare it to other fisheries

management alternatives. Their findings offer compelling case that appropriately-designed sectors offer the potential for more responsible, profitable and sustainable fisheries in the future.

In New England, there are currently two sectors and 17 other fishing groups in New England have submitted proposals to establish sectors (New England Fishery Management Council 2009a). Although the two sectors currently in operation represent only a small proportion of the whole groundfish fleet, they have many of the attributes needed to achieve optimum yield and serve as important models for the region. They do not overfish their quota, they live by a hard TAC, they provide exemplary catch data with industry supported monitoring, and discard rates are very low. Nevertheless, the full potential of these sectors is no doubt partially masked because the overwhelming majority of fishing in the region is common pool fishing (i.e., based on input controls without a hard TAC), and a majority of stocks are overfished.

The performance of the New England sectors, as reviewed here, comes from the DEIS for Amendment 16 (New England Fishery Management Council 2009a) unless other sources are noted; the DEIS primarily summarizes data from NMFS.

### *The Georges Bank Cod Hook Sector*

*The Georges Bank Cod Hook Sector* was formed in 2004. It is made up of a fleet of relatively small vessels (25 – 50 feet) fishing out of a localized community on Cape Cod. The only other New England sector (i.e., GB Cod Fixed Gear Sector) was subsequently spawned from this same community, including some of the original members of the Hook Sector.

The marketed catch of the Hook Sector has diversified since it was formed, becoming a harvesting cooperative that is directly dependent upon over fifty ecosystem component species. As a percentage of annual catch, landings of Georges Bank cod has been relatively stable with an average of about 12% (2004-2007) with the remainder (88%) distributed over of a wide diversity of other finfish and shellfish. As a percentage of annual revenues, the contribution of cod has increased steadily, from about 11 to 29% (average 21%). The revenues associated with each groundfish permit in this sector have increased by about 75% since formation – an impressive boon to the economic outlook for sector members. This increase in revenues was accompanied by a relatively modest increase in overall landings of about 34% as well as a reduction in the number of permits in the sector since it was formed. This sector has always remained well within its allocation of the Georges Bank cod, on average catching about a fifth of its annual allocation (2004-2007). The allocation of cod to this sector has been in the neighborhood of 10% of the total for Georges Bank cod.

In terms of discarding, the data provided by the Georges Bank Cod Hook Sector indicate outstanding performance, with discard rates for cod under 10% for 2006 and 2007 (i.e., 9.7% and 5%; Georges Bank Cod Hook Sector 2007 Annual Report). The 2007 discard rate is more than a factor of four better than the overall discard rate for Georges Bank Cod in 2007 (22%) reported in the most recent groundfish assessment, GARM III (Northeast Fisheries Science Center 2008). With few exceptions (e.g., spiny dogfish) the discard rates for the numerous other species caught by this sector are also very low.

There are many factors that have contributed to these social and economic benefits for the individuals in the GB Hook Sector, including the use of hook gear that is relatively selective (longlines, tub trawls, handlines) thus keeping bycatch and discard rates low. The habitat impacts are also relatively low with these methods.

### *The Georges Bank Cod Fixed Gear Sector*

*The GB Cod Fixed Gear Sector*, based in Chatham on Cape Cod, began fishing in 2007. This sector is also made up of a fleet of relatively small vessels (23 vessels in 2009, 35-50 feet), using sink gillnets, tub trawls, and handlines. The allocation of Georges Bank Cod to this sector was 12% of the annual total catch in 2009. Like the hook sector, this sector also catches a wide diversity of other ecosystem component species with Georges Bank Cod making up about a third of landings and just over half of the total revenues (2007).

During 2007, the sector fished well within its allocation of Georges Bank cod, catching only 54% of the allocation. When the catch and revenue history for the permits destined to form the fixed gear sector are used as a comparison (averages for 2004-2006), it is seen that vessels increased cod landings and revenues by about double during the first year of operation in 2007. Fixed Gear Sector membership (in terms of vessels) has increased by over 40% since 2007.

Data compiled by the observer program for the GB Fixed Gear Sector during 2007 reveal substantially lower discard-to-kept percentages for the sector (4-7% of cod discarded) compared to non-sector vessels (10-36%) (Figure 53, Amendment 16 DEIS). This sector also collected data on catch and discards, above and beyond the observer program. According to this self-monitoring, 2007 discard rates were slightly lower at 3%. According to the most recent stock groundfish assessment, GARM III (Northeast Fisheries Science Center, 2008), the overall discard rate for Georges Bank Cod in 2007 was 22%. Thus, together, these data indicate discard performance that was at least four fold better for the sector than the fishery as a whole.

During the 2004 to 2006 period, prior to the fixed sector going into operation, the vessels destined to for the sector also tended to have fewer discards, with rates slightly below those of other gillnetters during most (67%) half year periods examined. Sectors do not have trip limits so discarding generally occurs in response to problems with catch quality or fish size.

### New England Sectors in Perspective

All things considered, the sectors in New England have been a huge success and their potential going forward is substantial. They have not exceeded their allocations of cod, they are ecologically diversified, their discard rates are low, as is their impact on habitat. Sector economics have shown promising signs and should continue in a positive direction as overfishing is brought under control and stocks are rebuilt. To date, sectors have prevailed under highly adverse conditions, competing for overfished stocks within a fishery dominated by common pool vessels operating without a hard TAC. These initial experiments with sectors bode well for a future in which they will serve as an important model.

## Applying a hard TAC to the common pool will level the playing field

There is little justification for applying a hard TAC in one part of the fishery and not in the other. This would place those in sectors at an unfair disadvantage, effectively allowing overfishing on the very stocks that the sectors were founded upon. In brief, National Standard Four (NS4) requires that "conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (a) fair and equitable to all such fishermen; (b) reasonably calculated to promote conservation; and (c) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive

share of such privileges" (NOAA 2006). Allowing the common pool to fish without a hard TAC amounts to the kind of unfair allocation of which NS4 speaks. In addition to promoting stock rebuilding, a hard TAC on the common pool will level the playing field – making the FMP more equitable.

If the application of a hard TAC to the common pool were to make sectors more attractive to some of those who are weighing the costs and benefits associated joining a sector, this would enhance the transition to sectors – a goal articulated at the highest level within NOAA. At the level of the Council and its committees, it is clear that the hard TAC question is a key decision variable for many fishermen (see Plante 2008b).

Without a hard TAC on the common pool, the common pool may appear to offer more fish in the short-term because the fishery will not be closed when the catch limit for the common pool is reached. That is, overfishing is tacitly permitted in a given season, with the expectation that the excess fishing would be paid back in a future season – without interest. Since sectors must operate with a hard TAC, remaining in the common pool may appear to be a better short-term business decision despite the other well known benefits of sectors. By applying a hard TAC to the common pool (Alternative 1, page I-162, Amendment 16 DEIS) this important difference between the two major options that New England fishermen have is eliminated, essentially unveiling the appealing attributes of sectors such as self management, and increased efficiency.

For these reasons, it is anticipated that choosing the hard TAC option for the common pool will effectively add an incentive to join sectors and more of the fleet will migrate to sectors.

## Summary

The true potential of sectors will be seen more clearly as stocks are relieved of overfishing, and an increasing proportion of the New England fleet moves to output based management with improved catch monitoring. Nevertheless, the sectors we have stand as an excellent model for improving the economic outlook for sector members, fostering a commitment to ecosystem stewardship through a diversified fishery, reducing bycatch and habitat damage through lower impact fishing methods, greatly reducing the waste of fish (i.e., lower discard rates) and fostering the participation of community-based groups, fishing near the home port in small vessels.

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