Hard Catch Limits in the Northeast Multispecies Fishery: Balancing Accountability and Opportunity in a Multispecies Complex

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Abstract

The New England Fishery Management Council (NEFMC) manages New England’s northeast multispecies fishery with effort controls including gear restrictions, seasonal and permanent closures, trip and daily possession limits, and days-at-sea (DAS). The fishery operates on a soft or “target” total allowable catch (TAC) rather than a hard catch limit. Target TACs lack a closure provision, and do not require overages to be deducted from the following year’s recommended TAC. New England routinely exceeds target catch levels for multiple stocks, threatening rebuilding objectives and leading to more restrictive effort controls. Hard catch limits would provide greater control over total fishing mortality, ensuring that managers and fishermen are held accountable to objectives of the multispecies management plan and that rebuilding plans are successful. They would also eliminate the economic inefficiencies generated by input controls and provide fishermen with greater economic opportunities during the rebuilding process. Seven sub-programs within the northeast multispecies fishery are currently managed under hard catch limits including the Georges Bank hook and fixed gear sectors, the U.S./Canada Resource Sharing Understanding, the Category B (regular) DAS program, and three Special Access Programs. An analysis of these seven case studies is used to generate recommendations to guide the implementation of hard catch limits across the entire multispecies fishery.
Hard Catch Limits and the Multispecies Fishery

New England’s multispecies fishery is one of few fisheries that is not managed under hard catch limits. A hard total allowable catch limit (hard “TAC”) is a predetermined catch level paired with a closure provision, which requires managers to close the fishery or prohibit possession of a species when that species’ TAC has been filled. A properly administered hard TAC holds managers and industry members to a higher level of accountability because overages must be deducted from the following year’s catch limit. Over time, hard TACs ensure that fishing mortality and harvest levels remain consistent with the objectives specified by a fishery’s management plan.

Catch limits are also referred to as output controls because they limit the yield, or output, that can be harvested from a fishery. New England relies almost exclusively on effort or input controls, which regulate fishing effort by restricting where, when, how and for how long fishermen are allowed to fish. Input controls used in New England include gear restrictions (such as mesh size and the number of hooks that can be set), permanent and seasonal closures, daily and trip possession limits, and a limit on the number of days at sea (DAS) permit holders are allowed to fish per year. Instead of hard TACs New England sets soft “target” TACs which lack a closure provision. New England also does not count overages against the following year’s target TAC. Target TACs are calculated by applying the target fishing mortality rate set by the management plan against the stock size. [1]

Hard catch limits are necessary in the multispecies fishery because target TACs do not provide sufficient control over fishing mortality. Under the current system of input controls and target TACs New England routinely exceeds some TACs by 100% or more, potentially rendering stock recommendations and rebuilding plans ineffective. For example, fishermen harvested 232%, 163% and 213% of the Georges Bank cod TAC in FY 2001, 2002 and 2003 respectively. [2] Overages of this magnitude are a serious threat to rebuilding programs, many of which have already been extended well beyond the ten year rebuilding timeline specified by the Sustainable Fisheries Act (until 2026, in the case of Georges Bank cod). [3] Although the New England Fishery Management
Council ("the Council") has considered hard TAC alternatives in the past, these have consistently been rejected in favor of additional input controls.

In New England, the greatest source of resistance to hard TACs is a lingering institutional memory of failed hard TAC management, which was first established under the International Commission for the Northwest Atlantic Fisheries (ICNAF). After foreign vessels were excluded from the United States’ Exclusive Economic Zone (EEZ) by the Magnuson Act in 1976, the U.S. continued to manage cod, haddock and yellowtail flounder under a hard quota system. Additional vessels entered the open-access fishery during this period, creating a derby as members of the growing fleet raced to catch limited amounts of fish. [4]

Although the Council implemented vessel trip limits, NMFS lacked the technological and administrative capacity to monitor catch levels, collect accurate catch data and enforce regulations consistently. [4] By 1982 the Council was ready to abandon hard catch limits, and more than two decades later the Council is still wary of repeating past mistakes. Amendment 13, the most recent major amendment to the multispecies management plan, invoked the failed ICNAF regime as justification for rejecting three different hard TAC alternatives: “…A past Council attempt to manage the fishery with a hard TAC was an abject failure. It did not protect the resource and did not allow for development of a stable industry.” [5]

Managing a multispecies complex with hard catch limits will always present a unique set of challenges. Because fishing gear is not perfectly selective, catch composition cannot be expected to align perfectly with the distribution of TACs across all stocks in the fishery. This is particularly true of the New England’s multispecies fishery, because some stocks are healthy while others are depleted and/or rebuilding and require mortality reductions. The most depleted stock in a multispecies complex can function as a limiting factor or “weakest link” which unnecessarily reduces fishing mortality on healthy stocks. This in turn can result in forgone yield from the fishery, presumably threatening the Council’s mandate to achieve optimum yield from the fishery.

In certain cases TAC-related closures may result in excessive discarding and bycatch mortality of prohibited species. TACs also have the potential to create a derby
fishery in which fishermen race to catch a finite amount of fish. Derby fisheries can compress fishing effort into an artificially shortened season, flooding the market and lowering prices. They can also lead to safety concerns if the shortened season forces fishermen to fish in inclement weather. However, derby fishing effects are not exclusive to output-regulated fisheries. Input controls are known to encourage overcapitalization in the “race for fish” as well. [6]

Management strategies and monitoring technology, as well as the multispecies fishery itself, have changed dramatically since quota management was replaced with input controls in the early 1980s. Time and experience have demonstrated that theoretical arguments against hard TACs, as well as problems that were specific to the ICNAF regime, can be resolved with regulatory and information technology solutions. Managers have already acknowledged that hard catch limits are a more reliable strategy than effort controls alone. The Amendment 13 Social Impact Assessment states that “…If hard TACs are set appropriately and enforced adequately, biological objectives should be met, eliminating the need to increase restrictions on the fishery in the future.” (emphasis added) [5]

Input controls are an imprecise way of controlling fishing effort, because the relationship between inputs and outputs changes is constantly responding to changes in technology and fleet dynamics. [6] Input controls also force fishermen to fish less efficiently, essentially increasing the amount of input or effort that goes into catching the same (or a smaller) amount of fish. Output controls would remedy the inefficiencies and regulatory instability caused by input controls, creating more stable and a more profitable industry. Most importantly, hard TACs would end overfishing sooner, increasing the likelihood that rebuilding measures will prove successful. [7] New England’s fishing heritage and coastal economies are at stake. Fishing communities are struggling, stocks are not rebuilding, and fishermen have little confidence in the future of what was historically a very profitable fishery. [8] Hard catch limits will ensure that the costs borne by fishermen today will result in healthy, sustainable fisheries in the future.
Amendment 16 and the Future of Hard Catch Limits

Hard TACs are of particular relevance now because the Council is in the process of evaluating alternatives for Amendment 16 to the Northeast Multispecies Fishery Management Plan. Amendment 13 rebuilding programs follow an adaptive or phased approach that plans for further effort reductions as part of a “midcourse correction” in 2009, halfway to the projected rebuilding date of 2014. [9] Updated stock assessments will be conducted during the Groundfish Assessment Review Meeting (GARM III) scheduled for August of 2008, and Amendment 13 requires a subsequent review of all status determination criteria. If rebuilding is occurring faster or slower than predicted, this correction provides an opportunity to make adjustments.

Amendment 16 is also a chance for the Council to consider alternative management possibilities in consultation with stakeholders. Members of the fishing industry, who are frustrated with DAS management and concerned about the impending DAS reductions, are interested in exploring alternatives to input control management. The Council encouraged industry members to share their ideas early in the planning process, to provide sufficient opportunity for public comment before selecting alternatives for further consideration. The first step in the amendment process is an announcement in the Federal Register, as well as the publication of a Scoping Document to inform the public of the Council’s intent. This document was published early in November. The Council held scoping meetings throughout New England in late November and December of 2006, providing a preliminary opportunity for public comment. Formal comments and suggestions were due by December 29, 2006.

The Council could have addressed the Amendment 13 requirements with just a framework adjustment and an Environmental Assessment (EA). To consider alternative management strategies, however, requires a full amendment document with a supplementary Environmental Impact Statement (SEIS). [10] In order to identify, develop and evaluate alternative management strategies and still meet the May 2009 deadline, the Council has to operate on a tight schedule. The Council will finalize a list of alternatives in summer of 2007, and have a draft amendment and SEIS ready for comment by June or July of 2008. GARM III will take place in August of 2008, leaving the Council with a limited amount of time to incorporate this new information and have a
management document to NMFS by November. Ideally, NMFS will be able to review this management document and implement new regulations by May of 2009. As of March 2007, four management proposals were submitted to the groundfish Plan Development Team for further consideration and analysis: area management, a “point system”, and two variations on the existing DAS system. Hard TAC management will not be considered as a stand-alone measure, but catch limits could be used in conjunction with area management or the point system, as well as in any sectors that form in the future.

The point system, developed by the Northeast Seafood Coalition, would apply a standard formula converting DAS, vessel baselines (length and horsepower) and catch history from 1996-2003 into a common currency of “points.” Permit holders would be able to apply their allocation of points toward any stock in the multispecies complex, each of which would be assigned an adjustable biological point value (BPV). BPVs would be based on stock status and management objectives according to a computer model which balances the total number of fleet points with total allowable catch figures. Fishermen would be required to retain all legal-sized groundfish, and report their catch on a daily basis, eliminating the need for inefficient daily and trip possession limits. The point system would provide an efficient way to implement hard catch limits, because points are not species-specific and can accommodate variability in catch composition.

A proposal for area management was submitted by the Area Management Coalition, which represents fishermen in Maine who have been excluded from the groundfish fishery by low DAS allocations and differential DAS counting. The goal of area management is to create a nested structure of local, state and federal government in order to co-manage fisheries on a finer ecological scale. This would help some fishermen regain access to the fishery, and in theory, encourage all fishermen to take a more active role as stewards of the resource. Area management would also use hard

1 The formula for calculating baseline points would be

\[ ([\text{Length} \times 28] + \text{HP} \times 2.8) \times (\text{total effective effort DAS}) = \text{baseline points} \] (from NESC Point System proposal, 12/29/06)

2 Public Comment, Jim Wilson, Amendment 16 Scoping Hearing, November 27 2006, Ellsworth, ME

3 Public Comment, Glenn Libby, Amendment 16 Scoping Hearing, November 27 2006, Ellsworth, ME
TACs as a backstop. While it would not explicitly rely on DAS as an input control, proponents are open to incorporating DAS into area management measures. [11]

Today, hard TAC management is no longer just an abstraction or an institutional memory of past failures. There are seven program currently authorized to operate under hard catch limits in the Northeast Multispecies fishery. These include two Georges Bank cod sectors, three Special Access Programs (SAPs), the Category B (regular) DAS Pilot Program (now the Category B DAS Program), and the hard quotas set for cod, haddock and yellowtail flounder under the U.S./Canada Resource Sharing Understanding. The use of hard TACs in these seven programs can be considered acknowledgement that when access to a fishery is treated as a conditional privilege, hard catch limits afford greater control over total fishing mortality.

This paper will provide a brief description of the institutional context of groundfish management, followed by a history of the northeast multispecies management plan and the days at sea (DAS) effort control system. Each of the seven hard TAC programs will be discussed in more detail, with particular attention to how catch limits are monitored and enforced. Analyses of these seven programs are used to generate broad recommendations to guide the implementation of hard catch limits in the future, whether by way of the points system, area management, or an extension of sector management.
**Institutional Ecology of Groundfish Management**

The primary legislative mandate behind fisheries management is the 1976 Magnuson Fishery Management and Conservation Act (Magnuson Act), which was created to exclude foreign fishing vessels from the Fishery Conservation Zone (between 3 and 200 miles from shore), encourage development of the domestic fishing fleet, and establish the regional infrastructure now responsible for managing commercially exploited stocks. Authority for fisheries management resides with the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. Responsibility for the management and conservation of fishery resources is delegated to the National Marine Fisheries Service, which operates through six regional offices and eight regional councils created by the Magnuson Act.

The eight regional councils, representing the New England, Mid-Atlantic, Southeast, Caribbean, Gulf State, Pacific, North Pacific, and Western Pacific regions, are responsible for developing and implementing fishery management plans (FMPs) for the stocks fished in the Exclusive Economic Zone (EEZ). FMPs are first submitted to one of the six regional offices and finally to the Secretary of Commerce for approval. In New England, FMPs must be submitted via the Northeast Regional Office (NERO) located in Gloucester, MA. Upon final approval, regulations implementing the measures set forth by the FMP become federal law enforced by NMFS and member states.

The New England Fishery Management Council represents the coastal states of Maine, New Hampshire, Massachusetts, Rhode Island and Connecticut. The Council consists of eighteen voting members, including the regional NMFS administrator, the state official responsible for marine fisheries management in each of the five member states, and twelve members nominated by the governors of member states and appointed by the Secretary of Commerce. These members are “individuals who, by reason of their occupational or other experience, scientific expertise, or training, are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources” of New England. Appointed members serve no more than three consecutive 3-year terms. The Council also includes four non-voting members, who represent the U.S. Fish and Wildlife Service (USFWS), the Department of State, the U.S. Coast Guard, and the Atlantic States Marine Fisheries Commission (ASMFC).
The Northeast Fisheries Science Center (NEFSC), the research division of NOAA fisheries, provides information on fishery resources and the marine system and identifies “options for the conservation and utilization of living marine resources, and for the restoration and maintenance of marine environmental quality.” [15] Stock assessments are conducted, peer-reviewed and evaluated by the Northeast Regional Stock Assessment Workshop (SAW). Individual assessments are prepared according to established protocol by a SAW working group, reviewed by a Stock Assessment Review Committee (SARC), and the results presented to managers. [16] The SAW process is directed by a Northeast Regional Coordinating Council (NRCC) representing the New England and Mid-Atlantic Fishery Management Councils, the Atlantic States Marine Fisheries Commission, and NMFS. [17] A separate regional peer review process, the Groundfish Assessment Review Meeting, was first introduced in 2002 and provides stock assessment updates.

Development of Fishery Management Plans

The New England Fishery Management Council is responsible for the management of nine fisheries, including red crab, Atlantic salmon\(^4\), northeast multispecies, scallops, monkfish, herring, small mesh multispecies, dogfish and skates. With the exception of the first two, these fisheries are managed in cooperation with the Mid-Atlantic Fishery Management Council. The development and review of each fishery management plan is conducted under an Oversight Committee staffed by Council members. The oversight committee is assisted by an advisory panel and a plan development team, which are both comprised of representatives with a diversity of experience in groundfish management. Advisory panel members provide input and advice, while plan development teams identify policy alternatives, analyze data, and draft documents in cooperation with Council staff. [18] The groundfish fishery is managed under a joint oversight committee representing the Northeast Multispecies, Monkfish and Skate fisheries. A set of six additional oversight committees investigates regional concerns, and provides technical assistance by way of the Science and Statistical Committee (SSC) and the Social Sciences Advisory Committee (SSAC).

\(^4\) The Atlantic Salmon FMP prohibits possession, directed or indirect catch, and consequently does not undergo stock assessments or plan reviews. www.nefmc.org/salmon/index.html
Fishery management plans must comply with the ten National Standards set forth by MSA, including the mandate to “prevent overfishing while achieving, on a continuing basis, the optimal yield from each fishery for the United States fishing industry.” [5] All management plans must also comply with the National Environmental Policy Act (NEPA), which requires managers to identify the impacts of proposed actions and consider a range of alternative solutions through preparation of an Environmental Impact Statement (EIS); as well as the Regulatory Flexibility Act (RFA), the Administrative Procedures Act (APA), the Paperwork Reduction Act (PRA), the Coastal Zone Management Act (CZMA), and the Data Quality Act. [5] The Northeast Multispecies FMP also has to meet requirements of the Marine Mammal Protection Act (MMPA), the Endangered Species Act (EPA), and a number of relevant executive orders. [5] Finally, managers must also take public comment into consideration. After a draft FMP and EIS are drafted and submitted to the regional office, there are two rounds of public hearings before the final plan is submitted to NMFS, approved, and made into law.

**History of the Northeast Multispecies Fishery**

The Northeast Multispecies fishery management plan includes 19 stocks of 12 species, including cod, haddock, pollock, redfish, ocean pout, white hake, witch flounder, winter flounder, windowpane flounder, yellowtail flounder, American plaice and Atlantic halibut. [5] Bottom trawls are the primary gear type in the multispecies fishery, followed by hook and line (tub trawling) and finally by gillnets. [5] Most fishermen do not fish groundfish exclusively; they incidentally catch dogfish, skates and monkfish, and may also fish for tuna, scallops, lobster and striped bass. [19]

The original groundfish management plan implemented in 1977 included only cod, haddock and yellowtail flounder and set individual species quotas, based on the system used by the International Convention of the Northwest Atlantic Fisheries (ICNAF). [4] Quota-based management ended with the 1982 Interim Groundfish FMP, which relied on minimum fish size and mesh size limits. [4] Since the original northeast multispecies FMP was implemented in 1986, the fishery has been managed almost

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[5] The FMP originally included fifteen species; three of these (silver hake or whiting, red hake, and offshore hake) have been managed separately under a small mesh multispecies FMP.
exclusively with input controls including minimum fish size limits, seasonal and permanent closures, gear restrictions and daily and trip possession limits. There have been 43 framework adjustments to the plan, and a 16th amendment is now in the early phases of development.

One of the most significant changes to the management plan was Amendment 5 in 1994, which was intended to reduce fishing effort by 50% over the next five to seven years. [20] The amendment restricted new entry into the groundfish fishery with a moratorium on new vessel permits, and introduced a new input control measure limiting the number of days at sea (DAS) fishermen were allowed to fish. Amendment 7 made further DAS reductions in an attempt to meet effort reduction goals 1-2 years ahead of time. [20] Subsequent amendments have made further changes to the composition and allocation of DAS categories, but Amendments 5 and 7 are considered to have had the greatest socioeconomic impact on the fishery. [5]

In 1996, Congress amended the Magnuson Act (MSA) with the Sustainable Fisheries Act, which required managers to define “overfished” and “overfishing” with measurable criteria, prevent overfishing and rebuild fisheries within 10 years (longer if required for biological reasons). [21] The SFA also requires description, identification and protection of Essential Fish Habitat (EFH) “necessary to fish for spawning, breeding, feeding, or growth to maturity.” [21] New England was slow to bring the multispecies fishery into compliance with SFA requirements. Amendment 9 in 1999 set optimum yield for the 12 groundfish species and set new overfishing definitions, and Amendment 11 (1999) described and identified essential fish habitat. [5] However, two lawsuits brought against NMFS alleged that in spite of these amendments, the multispecies management plan failed to achieve complete compliance. American Oceans Campaign et al. vs. Daley et al. (2000) found EFH considerations to be inadequate, while Conservation Law Foundation v. Evans et al. found that rebuilding plans were inconsistent with the new overfishing definitions adopted in Amendment 9. [5]

Amendment 13, implemented by final rule in April of 2004, was intended to remedy these problems by ending overfishing, rebuilding stocks, addressing bycatch issues, and reducing latent capacity in the fishery by freezing and reducing DAS allocations from 1996-2000 levels. [5] By regulating latent effort in the fishery, the
Council hoped to prevent unforeseen increases in DAS usage, which would have had the potential to undermine or delay Amendment 13 mortality objectives. DAS were divided into three categories to distinguish between effective effort (DAS used) and “reserve” or latent capacity (DAS unused). Effective effort was defined as the maximum number of DAS used during any one year of the qualifying period FY 1996-2001, provided the permit holder landed at least 5000 lbs. of regulated groundfish species. [5]

An “A” day at sea can be used to target any groundfish species subject to current rules and regulations, a B day at sea can be used to target healthy groundfish stocks (in a Special Access Program, subject to certain qualifications and requirements), and a C day exists only as a record of past effort but could be permitted to re-enter the fishery when stocks have rebuilt. [22] The number or ratio of DAS in each category can be adjusted by a framework action, in order to meet mortality targets and to ensure that fishing capacity at a level that reflects the condition of the fishery. Amendment 13 approved two SAPs by final rule, and the Council anticipated creating additional B DAS opportunities through future framework adjustments. The number of B DAS a permit holder can reactivate for use in a SAP is calculated according to a formula specified by Amendment 13.⁶

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⁶ The formula for reactivation of B DAS is (Number of B DAS belonging to permit holder) x (Total number of B DAS allowed to re-enter / Total number of B DAS existing). The same formula would apply to C DAS reactivation. From Amendment 13, p. 81
Amendment 13 Flexibility: Setting the Stage for Sectors and B DAS Opportunities

Management of the northeast multispecies fishery involves a balancing act between two critical mandates set forth in the MSA. The 1996 reauthorization of the MSA, the Sustainable Fisheries Act, states that managers are required to eliminate and prevent overfishing, and rebuild depleted stocks in the shortest time possible. The MSA also requires managers to “achieve and maintain, on a continuing basis, the optimum yield from each fishery.” [14] Any management measures adopted in conjunction with a rebuilding plan take priority over the mandate to achieve optimum yield. As a result, “optimum yield” is a flexible goal that can only be defined within the constraints imposed by a rebuilding plan.

The Council recognized that achieving optimum yield from every stock in the fishery would be an unrealistic goal, because it is impossible to selectively reduce (or increase) mortality on a single stock. [23] At the time Amendment 13 was passed, the Council acknowledged that rebuilding measures would also reduce mortality on healthy stocks. Amendment 13 measures were considered necessary to reduce fishing mortality on Gulf of Maine cod, Georges Bank cod, Cape Cod/Gulf of Maine yellowtail flounder, Southern New England/Mid-Atlantic yellowtail flounder, Southern New England/Mid Atlantic winter flounder, white hake, and American plaice [5]; however, these reductions were also expected to reduce yield from several healthy stocks including GOM haddock, pollock, redfish, GOM winter flounder, GB haddock, GB yellowtail flounder, and GB winter flounder. [23]

Fishing gear is not perfectly selective, and yield from the entire multispecies fishery will always be constrained by measures taken to rebuild the most depleted stocks. However, any unharvested portion of the fishery, or forgone yield, amounts to additional value that could legally be extracted from the fishery without threatening the objectives of a rebuilding plan. While the phenomenon of “managing to the weakest link” is often invoked as an argument against hard catch limits, it would be unrealistic to expect catch composition to perfectly correspond with catch limits of any kind. A more reasonable goal is to harvest as many stocks to as close as optimum yield as possible, and a logical starting point is to identify opportunities to fish selectively on healthy stocks.
The Council recognized the necessity of providing opportunities for fishermen to increase yield from healthy stocks, but could not incorporate these measures in time to meet Amendment 13 deadlines. [24] Instead, the Council laid the groundwork for these opportunities in Amendment 13 in two ways: first, by making provisions for sector management, and second, by introducing programs that would allow fishermen to use their B DAS subject to certain regulations and restrictions. The two sectors currently in operation are the first two case studies that will be discussed. These will be followed by the Category B (regular) DAS Program and affiliated Special Access Programs. The US/Canada Resource Sharing Understanding, as well as the Closed Area II Yellowtail SAP, will be discussed separately.
Case Studies: Sector Management (Georges Bank cod Hook and Fixed Gear Sectors)

Background:

Amendment 13 contains a provision for sector management through which a group of groundfish permit holders can request to manage their own allocation of catch (TAC) or effort (DAS).\(^7\) In exchange for adhering to a catch or effort allocation, sector members are released from certain effort restrictions such as trip limits and hook limits. The flexibility of sector management was seen as a strategy to mitigate the adverse and unevenly distributed economic impacts of Amendment 13 effort reductions.

Currently there are two sectors authorized to receive a hard TAC of Georges Bank cod. The Georges Bank cod hook sector utilizes only hook gear (benthic longline or “tub trawl” and/or jigging), and the Georges Bank cod fixed gear sector uses a variety of fixed gear including hook gear and gillnets. Members of the two sectors share several important similarities: they fish on Georges Bank in small day vessels that leave and return to port in the same day, use a variety of non-mobile gear, and land their catch in the Chatham/Harwichport area. The Amendment 13 FSEIS observed that since 86% of the Georges Bank cod harvested between 1996 and 2000 using hook or fixed gear was landed in Chatham/Harwichport, these two fisheries were prime candidates for sector management.\(^5\)

For Cape Cod fishermen, sector management is more than just an alternative to the status quo. Cape Cod fishermen were disproportionately impacted by Amendment 13 effort reductions, because they are more dependent on the multispecies fishery than fishermen in any other region of New England.\(^5\), \(^19\) The Amendment 13 FSEIS found that “across all ports and port groups the largest reduction in annual fishing income would be in the port group of Chatham/Harwichport with three-fourths of all vessels losing at least 29.7% of fishing revenue, and half of all vessels losing more than half of fishing income.”\(^5\) Without the option of sector management, many of Cape Cod’s fishermen would no longer be in business. Instead, they have turned a dire situation into a creative model for community-based fisheries management.

\(^7\) The Sector operates under a hard catch limit, though Amendment 13 does allow the option of requesting a DAS allocation.
Sector management operates within the parameters of the Northeast Multispecies FMP, and not as an alternative management plan. While sectors have the freedom to decide how they will distribute their allocation over time and among sector members, they must adhere to common pool regulations regarding minimum fish sizes, closed areas, reporting requirements and certain gear restrictions. Sectors are self-selecting, and the members may choose to restrict membership based on important shared characteristics. These may include common fishing practices or gear type, permit category, vessel size, area fished, home port or community, and marketing arrangements.

The regulatory flexibility afforded by sector management allows sector members to increase their profit margin by operating more efficiently. This is particularly true when a hard TAC is used instead of an effort control, because effort controls reduce fishing mortality by creating inefficiencies. Some of the most inefficient effort controls are trip limits, for example, because operators have fixed costs of operation such as fuel, bait, and labor for every day spent fishing. A hard TAC sector enables fishermen to harvest a comparable amount of fish while minimizing their fixed costs and seeking efficiencies.

Hard TAC sectors also have the advantage of regulatory stability. As long as a sector does not exceed its catch allocation, thus contributing to overfishing, it will not face any further catch reductions even if non-sector vessels exceed their target TACs for the fishing year. Given the tumultuous history of groundfish management pre- and post-Amendment 13, even short term stability brings welcome relief from regulatory uncertainty. By assuring access to the fishery over a clearly defined time horizon, sector management enables fishermen, as small business owners, to practice better business planning.

A group of fishermen who wish to form a sector must submit a formation proposal and an operations plan to the Council. In addition to supplying background information about members, vessels and their respective catch histories, the operations plan must describe how the sector will document landings and discards, and prevent its members from exceeding their allocation. Sectors must also submit a signed contract and a NEPA impact assessment. Once a sector has been approved, it must continue to
submit an operations plan to the NMFS Regional Administrator on an annual basis. Upon approval of its operations plan, the sector receives an allocation based on members’ landings history. This allocation can be distributed among sector members through a system of their own choosing.

In 2007, the Council created a Sector Omnibus Committee charged with developing an omnibus amendment that will make sector management possible under all New England FMPs. The amendment will establish a general sector policy, including detailed guidelines for the formation of prospective sectors. The Sector Omnibus Committee is currently developing a standard definition of a “sector,” which needs to be specific enough to maintain consistency between sectors, but broad enough to apply across different kinds of fisheries. [25] The Council also needs to agree on a definition and policy that is flexible enough to accommodate any major changes to FMPs, particularly the northeast multispecies plan. The sector omnibus amendment has been identified as a priority for 2007, and the Council hopes to complete the amendment within a year. [26]

Georges Bank Cod Hook Sector

*Governance and Administration:*

The George Bank cod Hook Sector was authorized and implemented with Amendment 13 in April of 2004, and is now in its third full year of operation. The Georges Bank Hook Sector Inc. is a legal entity authorized to receive an annual portion of the cod allocation from NMFS, which it distributes among Hook Sector members according to a binding sector agreement. [8] In order to join the Hook Sector, fishermen must possess a valid multispecies permit and have received a DAS allocation under Amendment 13. In addition to landing 5000 lbs. of regulated species during the FY 1996-2001 qualifying period, eligible members must also have documented landings of Georges Bank cod. [19] Sector management is a cooperative venture which requires a high level of commitment in order to operate effectively. Fishermen must declare their

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[8] Framework 40B revised the original stipulation that hook sector members’ landing history only reflect cod landed using hook gear. Instead, sector members bring their entire catch history into the sector regardless of gear type. This means that any groundfish permit holder could legally join the sector, even if they do not have a history of targeting cod with hook gear.
intent to participate to the NMFS Regional Administrator on an annual basis. Hook Sector regulations require prospective members to commit themselves, their groundfish permits, and their vessels to three years of membership.

Hook fishermen are legally bound by an annual contract and an Operations Plan, which must be submitted to the NMFS regional administrator for approval before the Hook Sector can receive its quota. [19] By signing this contract, fishermen agree that the Hook Sector will not exceed its allocation of cod; moreover, if and when the TAC is reached, fishermen are prohibited from commercially fishing with gear capable of catching Georges Bank cod. [27] Once Hook Sector members are bound by the operations plan, they are legally exempted from conflicting restrictions of the multispecies management plan (including hook and trip limits) by permission of the Regional Administrator. [28] Sector members are restricted to fishing within the Sector area using approved gear, and may only land their catch at a number of designated ports. Hook Sector members adhere to a hard TAC, but like common pool members they also must declare an A DAS in order to target and land groundfish.

The Hook Sector’s Board of Directors is responsible for appointing an infractions committee, which enforces sector policies and regulations. The infractions committee is responsible for creating a schedule of penalties for violations of the sector agreement or relevant fishery regulations, and submits this document to the Board for approval on an annual basis. The Board of Directors also appoints a Sector Manager, who has authority to monitor Hook Sector members and ensure compliance with measures adopted in the annual Operation Plan and Agreement. [19] The Sector Manager also has sole responsibility for monitoring landings and reporting aggregate landings to NMFS on a monthly basis. The current Sector Manager, John Pappalardo, is also chairman of the NEFMC and a policy analyst for the Cape Cod Commercial Hook Fishermen’s Association.9

Hard TAC Regulation:

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9 The Cape Cod Commercial Hook Fishermen’s Association (CCCHFA) is a nonprofit industry association which supports sustainable fisheries and fishing communities through education and outreach, cooperative research and community-based management solutions.
The Hook Sector’s allocation is administrated under a hard TAC, and members must stop fishing when the catch limit has been reached or overages will be deducted from the next year’s allocation. To facilitate timely reporting to NMFS, and to ensure that landings data is always kept up-to-date, the Hook Sector abides by a strict set of trip-reporting timelines. Members must contact the manager before using a fishing day, and must submit a copy of the dealer report and Vessel Trip Report (a paper form indicating how many pounds of each species were caught) in person or by fax within 48 hours of their return. [19] The Sector Manager can verify these reports against a list of daily DAS sailings and VMS (vessel monitoring system) declarations supplied by NMFS. [19] All of this information is archived and compiled in a Microsoft Access database maintained in near real-time. [29] This database enables the Sector Manager to check for discrepancies between VTR and dealer reports, generate landing reports, and monitor cumulative landings relative to the Hook Sector’s aggregate allocation. When 90% of the Hook Sector’s aggregate allocation has been landed, the Manager must contact NMFS and submit reports every week. The Hook Sector must also create a revised harvest plan to harvest the remaining 10% with minimal risk of exceeding the TAC.

The Board, the Sector Manager and the infractions committee all have the authority to issue a “stop fishing” order when the Hook Sector is in danger of exceeding its aggregate allocation. By signing the Sector Contract, members agree to obey such an order, and grant the Hook Sector authority to take legal action against any member who does not comply. [27] The Operations Plan and Agreement also contains a provision whereby a Hook Sector member, the infractions committee or the Sector Manager may request to expel another member, along with his vessels and associated permits, if that member violates terms of the Sector Contract or otherwise endangers the Hook Sector. [27] At the end of each fishing year the Hook Sector submits an annual performance report to NMFS, listing aggregate landings of all regulated stocks as well as all infractions and disciplinary actions taken by or against Sector members. [27]

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10 All groundfish vessels in New England are now equipped with vessel monitoring systems (VMS), which periodically transmit the vessel’s location to NMFS. The VMS is automatically triggered when vessels cross a predetermined demarcation line, but vessels still have to specify whether they will fish a regular day or A B DAS/Special Access Program.
Hook vessels are relatively small and have a limited range, and hook fishing is a labor-intensive operation. The 3600 hook limit and GB cod trip limit reduction adopted by Amendment 13 were expected to make hook fishing less efficient and consequently less profitable. Replacing these effort controls with a hard TAC exempts Hook Sector members from both of these requirements. Eliminating the 3600 hook limit in the Sector’s offshore area\textsuperscript{11} allows hook fishermen to set more hooks and fish multiple tides, in order to selectively target cod and haddock when catch rates are high. [30] In addition to promoting efficiency, this enables hook fishermen to fish more selectively. Moreover, instead of setting a trip limit on cod, Hook Sector members practice full retention and keep every legal-sized cod they catch. Every fish is landed, sold and counted against the Sector’s aggregate allocation. Hook Sector members still have to follow trip/possession limits for other stocks.

Sector management also enables fishermen to pace their fishing effort. Rather than opening up the entire quota at the beginning of the fishing year in May, the Hook Sector divides this allocation equally by month. Members may catch no more than 8.33\% of the total allocation each month, minus a 10\% reserve, and unused quota is rolled over into the next month. Spacing the quota evenly throughout the fishing year is necessary to ensure that all Hook Sector fishermen are guaranteed the opportunity to fish, because most participate in other fisheries during certain times of the year. The establishment of a 10\% reserve was not originally required by NMFS, but the Hook Sector chose to enact this measure as a buffer against overages. [31] The Board has the authority to release and distribute this reserve and is responsible for notifying NMFS.

Performance

Hook Sector members have not contributed to overfishing of Georges Bank cod in the first three years of the Sector’s operation; however, the Sector also has not come close to harvesting its entire aggregate TAC. For 2004-2005 fishing year (FY 2004), Hook Sector vessels were granted 12.58\% of the GB cod TAC, or 371 metric tons. [19] The 58 participating vessels landed only 130 tons of cod, or about a third of their TAC. The Hook Sector did not become fully operational until July and missed two months of

\textsuperscript{11} Sector members do have an inshore hook limit of 4500 hooks
fishing, but this only accounts for a small portion of the unharvested TAC. Georges Bank cod was generally acknowledged to be in poor shape, and catch rates from the rebuilding stock simply weren’t high enough for fishermen to fill their TAC. [32] Catches in FY 2005 were equally disappointing. Membership was down by 9 vessels, though most of these were sold or operated as charter vessels. [32] The 49 sector members who renewed their membership once again caught only a third of their 455 mt allocation (11.12% of the total Georges Bank cod TAC). [33] Like all groundfish fishermen, Hook Sector members faced DAS effort reductions under Framework 42; more importantly, catch rates often weren’t consistent enough for fishermen to justify the expense of going fishing. [33] Sector members tackled both of these problems simultaneously by having sector members work together, sharing fixed costs and using the same number of DAS on fewer vessels. [32] In FY 2006, the Hook Sector’s 37 members were allocated 615 mt, 10.03% of the total Georges Bank cod TAC. [33]

Georges Bank Cod Fixed Gear Sector

Hook and Fixed Gear Sector Similarities

The Georges Bank cod Fixed Gear Sector was approved in November of 2006. Fixed gear fishermen in Chatham and Harwichport, who like hook fishermen rely heavily on Georges Bank cod and were disproportionately affected by Amendment 13 effort reductions, recognized that they would benefit from sector management as well. “Fixed gear” typically refers to gillnets, but also includes jigs, demersal longlines and handgear. The 17 fishermen who applied for a Fixed Gear Sector allocation fish with both gillnet and tub trawl (hook) gear, but are sufficiently reliant on gillnets to justify creating a sector of their own. Fishermen could theoretically belong to both sectors, but they would have to have at least two permits and two separate vessels because vessels are signed into the sector by vessel documentation number. [29]

Like the Hook Sector, the Fixed Gear Sector also chose to operate under a hard TAC in order to prevent overfishing of GB cod by sector members. Hard TAC sector management is the only way for many of Cape Cod’s fixed gear fishermen to operate efficiently enough to remain in business. Amendment 13 DAS reductions and GB cod
trip limit reductions (from 2000 to 1000 lbs.) mean that gillnetters would be bringing home fewer fish on the limited number of days they are allowed to fish. Trip limits are a particularly wasteful effort control in the gillnet fishery in terms of cost, labor and the forgone value of regulatory discards. A trip limit doesn’t reduce fishing mortality; it only affects the amount of fish that can be legally landed and sold. Because gillnet gear is very efficient and catches a wide range of groundfish species, fishermen are likely to exceed trip limits and discard the surplus. Over time, trip limits may actually compromise mortality objectives and extend rebuilding timelines. Fixed Gear Sector members are still bound by the same gear restrictions as common pool fixed gear fishermen. These include minimum mesh sizes, marking and tagging requirements, and restrictions on the number of nets that can be set per trip.

The basic prerequisites and provisions of membership are similar in both sectors. Eligible fishermen must possess a limited access northeast multispecies permit, an allocation of DAS as determined by Amendment 13, and have documented landings of Georges Bank cod during FY 1996-2001. The Fixed Gear Sector is allocated a TAC according to the same formula applied to the Hook Sector. Like the Hook Sector, the Fixed Gear Sector is managed by a Sector Manager and a Board of Directors, submits an annual Operations Plan and Sector Contract to the Regional Administrator, and receives a hard TAC of cod based on landings history and number of participants. The Operations Plan Harvesting Rules are also nearly identical to those of the Hook Sector. Sector members must notify the Sector Manager before using a DAS, practice full retention of legal sized cod, observe similar strict reporting requirements, and allow the Sector Manager to impose weekly or trip target quotas to help adjust fishing effort if necessary.

Hook and Fixed Gear Sector Differences

The Fixed Gear Sector does have several unique features, which demonstrate how a basic sector management model can be tailored to meet the needs of different groups of fishermen. The most significant difference between the two sectors is the way they allocate monthly TACs among sector members. Within the Hook Sector monthly quotas are essentially open access, and members can use DAS at their own discretion to target as
much of the monthly quota as they wish. The Fixed Gear Sector, in contrast, takes more of an individual quota (IQ) approach (not to be confused with ITQs, because the TAC cannot be transferred out of the sector). Each Sector member is permitted to catch a certain percentage of the monthly TAC according to his landing history. An individual’s unused quota is rolled over on a monthly basis, and overages are deducted from that individual’s quota the next month. The result is a “zero-sum” outcome, in which each fishermen’s catch counts against the sector’s TAC, but also counts against his own monthly and annual percentage allocation of that TAC. [29]

This approach helps Fixed Gear Sector fishermen to pace their fishing effort, but it also allows for some variability in the fishery and ensures an equitable catch distribution between Sector members. IQ management is a better fit for the Fixed Gear Sector because gillnets are very efficient, and have the potential to catch a lot of fish in a short period of time. An open-access monthly quota would likely encourage derby-style fishing, and defeat the purpose of pacing fishing effort with monthly TACs. [29] Because gillnets are so efficient, they also tend to have more interactions with protected species. Consequently, the Fixed Gear Sector is required to complete a more comprehensive Environmental Assessment than the hook sector. [29]

Another difference between the Hook and Fixed Gear sectors is that nearly all prospective members of the Fixed Gear Sector participate in a large mesh monkfish/skate fishery in the winter and early spring. Sector members plan to facilitate participation in both fisheries by setting aside about 10% of their TAC as bycatch in the monkfish/skate fishery. [29] All cod bycatch would have to be counted against the Sector’s TAC regardless, since monkfish gear is capable of catching GB cod, but reserving part of the TAC in advance helps ensure that Sector members have access to this late-season fishery even if they exceed their monthly quotas. This reserve TAC would be flexible target and operate like one of the monthly TACs. Any unused quota would be rolled over, while overages would be counted against the remaining monthly TACs. [29] The Fixed Gear Sector had also proposed enlarging the Sector Area, which would have allowed members to target monkfish offshore while accounting for their cod bycatch, but this measure was deemed inconsistent with the objectives of the multispecies FMP. [28] [29]
**Performance**

Prospective Sector members would have had to abstain from fishing until the sector was approved, which proved impractical for most fishermen. [34] The Fixed Gear Sector did not formally receive its allocation until Framework 42 took effect on November 22, 2006, more than halfway through FY 2006. Of the two members who were willing to sign the 2006 Sector Contract in June, only one was eventually deemed eligible to participate, and was allocated 56 metric tons of cod (0.91% of the total GB cod target TAC). [34] This fisherman elected to work on a scalloping vessel, and his quota is likely to go unharvested, but the Fixed Gear Sector is legally if not functionally operational. [29] The Fixed Gear Sector does not currently have a Board of Directors, but will have a functional board in place for FY 2007. The Sector is now in the process of submitting an Operations Plan, Sector Contract and Draft Environmental Assessment in order to renew its allocation for FY 2007. At least ten participants are likely to commit for the Fixed Gear Sector’s first full year of operation. [30]

**Conclusions:**

The use of hard TAC management in these two sectors has allowed sector members to operate more efficiently and with greater flexibility. Although neither sector has been in a position to exceed its aggregate TAC, both utilize a streamlined, near real-time reporting system that would likely prevent TAC overages. Both sectors pace their fishing effort in order to distribute fishing effort more evenly among fishermen and throughout the fishing year. They also adopt built-in measures (TAC reserves and a 90% TAC threshold) which in theory would help adjust fishing effort as the TAC is filled. Sector membership provides a network of peer accountability, which helps fishermen work together to overcome collective action dilemmas and work toward the best interest of the group. The Council’s decision to create a Sector Omnibus Committee and prioritize the creation of a Sector Omnibus Amendment reflects a high level of interest and confidence in community-based management among other New England fisheries.
Case Studies: The Category B (regular) DAS Program, Closed Area I Haddock Special Access Program, and Closed Area II Special Access Program

Introduction: Framework 40A and Incidental Catch TACs

Framework 40A approved three B DAS opportunities which enabled fishermen to reclaim some of the fishing effort that had been deactivated under Amendment 13. These include the B DAS Pilot Program, the Closed Area I Hook Gear Haddock SAP, and the Closed Area II Haddock SAP. The Council estimated that these three programs would increase fishing effort by 2500 to 4400 additional DAS per year. [23]

In addition to alleviating the economic hardship caused by Amendment 13 effort cutbacks, these programs were intended to address the Council’s mandate to achieve optimum yield from the multispecies fishery. Fishing mortality was expected to be at about half or target fishing mortality levels for several different groundfish stocks including GOM haddock, GOM winter flounder, GB haddock, pollock, GB winter flounder, and GB yellowtail flounder. [23] Because these stocks were able to withstand significant additional fishing pressure without compromising Amendment 13 rebuilding goals, they were considered ideal candidates for selective B DAS fisheries.

The three programs introduced under Framework 40A were a way to reintroduce and monitor B DAS usage under stricter than usual conditions. Because Amendment 13 effort reductions do not account for the use of B DAS, FW 40A notes that “any increase in fishing effort that results from using Category B DAS could threaten the mortality objectives of Amendment 13 if the catch of stocks of concern is not controlled.” [23] In order to ensure that B DAS usage remains compatible with management objectives, each program operates under multiple layers of accountability, including one or more hard catch limits, paired with stringent monitoring and enforcement requirements.

In order to facilitate B DAS opportunities while controlling the impact of B DAS usage on rebuilding stocks, FW40A sets “incidental catch” TACs for stocks of concern. Stocks of concern that were considered likely to be caught as bycatch in a targeted fishery include Gulf of Maine (GOM) cod, Georges Bank (GB) cod, Cape Cod/Gulf of Maine yellowtail flounder, plaice, white hake, Southern New England (SNE)/Mid-Atlantic (MA) yellowtail flounder, Southern New England/Mid-Atlantic winter flounder, and witch flounder. Although ocean pout, southern windowpane flounder and Atlantic
halibut are also considered stocks of concern, these species are not encountered frequently enough to require an incidental catch TAC. [24]

Incidental catch TACs do not increase total fishing mortality on stocks of concern, because this would be inconsistent with the measures adopted by Amendment 13. Instead, each incidental catch TAC is a percentage of the total target TAC which is reserved for use in B DAS programs. This percentage is higher (5%) for stocks that would experience a reduction in fishing mortality under Amendment 13, including plaice, SNE/MA yellowtail, SNE/MA winter flounder and witch flounder. This percentage was lower (2%) for GOM and GB cod, CC/GOM yellowtail and white hake, which were not expected to experience an unnecessary reduction in fishing mortality (in other words, the target TAC and total catch are approximately equal). [35] Incidental catch TACs reflect the current status of each stock, and are updated regularly by the biennial framework adjustments required under Amendment 13. The actual percentage of each target TAC set aside as an incidental catch TAC can also be changed by a management action. [23]

Within the multispecies management plan the eight incidental catch TACs function as a secondary accounting system, which serves to limit the cumulative impact of all B DAS programs on stocks of concern. Each incidental catch TAC is a fixed quantity that can be distributed among one or more B DAS programs, depending on which groundfish species the participants in each program are likely to encounter as bycatch. Incidental catch TACs are not allocated to a program if that stock is not likely to be caught, which the Council believes “would add administrative complexity without providing any conservation benefit.” [35]

The use of hard incidental catch TACs places an upper bound on the total economic value that can be harvested from B DAS, “plac[ing] a premium on judicious use of these incidental catch TACs to maximize the potential benefits.” [23] Incidental catch TACs would have to be redistributed to accommodate a new SAP or B DAS opportunity. Because each different B DAS opportunity tends to benefit particular groups of fishermen, depending on their location and gear type, redistributing incidental catch TACs could shift benefits from one group of fishermen to another. [23] Participation in a B DAS program constitutes a “bonus” rather than a right, because access is a matter of where and when opportunities exist for fishermen to fish selectively.
To prevent short-term opportunities from causing equity problems over the long term, catch history from B DAS does not count toward the catch history associated with an individual permit.

As a backup measure to hard catch limits and DAS effort controls, the NMFS Regional Administrator has the right to close the B DAS Program or the CAII haddock SAP, if continuation of either program is likely to threaten the objectives of the program or the fishery management plan in general. Although this authority was criticized as “vague”, it does provide a contingency plan in case other triggers fail to close the fishery when needed. [24]

The three B DAS opportunities introduced under Framework 40A include two Special Access Programs (SAPs) and the Category B (regular) DAS Pilot Program. The Closed Area I (CAI) Haddock SAP allows fishermen to target haddock in part of Closed Area I using hook gear, and the CAII Haddock SAP allows fishermen to fish selectively for haddock in Closed Area II using a haddock separator trawl. Both SAPs set hard catch limits on haddock as well as on cod bycatch, and were allocated (16% and 34% of the incidental cod catch TACs respectively.) Vessels may use either a Category B (regular) or (reserve) day to fish a Special Access Program. The B DAS Pilot Program allows vessels to fish selectively on healthy stocks, subject to a hard bycatch TAC on stocks of concern. Only Category B (regular) DAS can be used in the Pilot Program. Each of these programs is discussed in greater detail below.

The Closed Area I Haddock Special Access Program

Background:

The Closed Area I Haddock SAP allows vessels to target haddock in the northwestern corner of CAI during a three-month season that runs from October to December. Fishermen are only permitted to use certain kinds of hook gear, including tub trawl and longline but not rod and reel. Each year the SAP is allocated a portion of the annual Georges Bank haddock TAC, which is managed as a hard TAC and paired with a hard TAC on cod bycatch.
Fishing mortality on haddock was projected to decrease by 30 to 40% under Amendment 13, although the stock was healthy enough to accommodate an increase in fishing mortality. [5] This significant reduction in fishing mortality was expected to occur simply as a by-product of restrictions on stocks of concern, making haddock a valuable but underutilized resource. Until fishermen found a reliable way to target haddock without increasing mortality on rebuilding stocks, much of the haddock TAC was expected to remain inaccessible. In 2004 NMFS estimated the potential revenue from fishing in the closed area at $2.5 million, or more than $25,000 after costs for the 60 vessels anticipated to participate. [23] Even before Amendment 13 was passed, hook fishermen were already exploring ways to supplement their income by selectively targeting Georges Bank haddock.

In 2003, Cape Cod hook fishermen in collaboration with CCCHFA began researching techniques for targeting haddock with low cod bycatch. These fishermen were granted 100 tons of haddock and 15 tons of cod under an Exempted Fishing Permit (EFP), and managed to catch nearly all of their haddock allocation while only using about a third of the cod bycatch allocation. [19] They reduced cod bycatch by using herring instead of squid as bait, and reduced it further still with the experimental use of herring based, sausage-like fabricated baits developed for use in Norway and the Aleutians. (Because characteristics of fabricated baits such as size, shape, texture and odor can be altered to attract certain species and even sizes of fish, longlining with fabricated baits can be a very selective method of fishing.) [36] The SAP now operates in the same area, and during the same time of the year in which the experimental fishery was conducted. From an environmental assessment perspective, the impact to the fishery resulting from the experiment is considered time and location specific. Any change to the SAP season or boundaries would have to be made through an additional management action with a corresponding environmental assessment.

A Hook Sector-only CAI Haddock SAP was first proposed under Amendment 13. The program would have operated much like the experimental EFP fishery, with a hard incidental catch limit on cod. The SAP was disapproved by final rule, because the program was still in its experimental stages when Amendment 13 was drafted and there was not enough data to evaluate the impact of a directed haddock fishery on cod stocks.
Framework 40A (FW40A) to the multispecies management plan, the first framework adjustment post-Amendment 13, proposed opening the SAP to both Sector and non-sector vessels with a haddock TAC of 1000 mt. Had this measure been approved the Hook Sector component would operated under a hard incidental catch TAC as originally proposed. Non-sector vessels would have been able to fish the SAP using either A or B DAS. If an A DAS were used cod bycatch would be subject to current daily and trip limits; if a B DAS were used, all cod bycatch would count against a dedicated percentage of the total GB cod incidental catch TAC, which would function much like a hard TAC for the SAP. The 1000 mt TAC was expected to support approximately 440 trips into the SAP, based on haddock catch rates observed during the experimental fishery conducted in 2003.

NMFS disapproved access to the SAP for non-Sector vessels, noting that implementing two separate sets of regulations for sector and non-Sector vessels “would be extremely difficult to enforce and monitor, creating a significant administrative burden to NMFS.” Regulating a non-Sector SAP would also have been costly. Because only a very limited number of vessels would benefit, NMFS concluded that the high cost-benefit ratio was not justified. The Hook Sector already possessed the supporting infrastructure necessary to administer and enforce a hard TAC, which meant that management of the SAP could be streamlined with normal sector operations at minimal cost to NMFS. NMFS also determined that the proposed use of A DAS by non-sector vessels had not been sufficiently analyzed to determine the impact of the SAP on GB cod. Hook Sector vessels did not have this problem, since they would merely be redistributing a portion of the same hard TAC without any possibility of increasing total fishing mortality.

Despite these valid reasons for disapproving non-Sector access to the SAP, NEFMC was confronted with the perception that FW40A had unfairly shut non-Sector vessels out of the SAP. In September of 2005, Framework 41 opened the SAP to non-Sector vessels, which are only permitted to fish using a B (regular or reserve) DAS.
In order to prevent a derby fishery from occurring between Sector and non-Sector vessels, participants agreed to divide the three-month SAP season into two blocks of approximately six weeks each (October 1 to November 15 and November 16 to December 31). Sector and non-Sector vessels are assigned to one of these two blocks on a rotating basis, and each group is permitted to catch up to half the TAC, or 500 mt each. If the first group catches their half of the TAC before the end of the six week period, the second group can begin fishing before the Nov. 16 starting date of the second block. As in 2004, the NMFS Regional Administrator retains the authority to close the fishery when the total haddock TAC is likely to be caught.

The two halves of the CAI Haddock SAP function almost as two separate programs, though Sector and non-Sector vessels must meet many of the same requirements. All vessels must fish with longline gear (with no hook limit), have a VMS installed and declare each trip prior to sailing, notify the NMFS observer program with 72 hours advance notice, meet strict daily VTR requirements, and declare their intent to participate in the SAP by September 1. Framework 41 also prohibits all participants from using squid or mackerel as bait, or even having either of these on board while making a trip to the SAP, in order to minimize cod bycatch.

In addition to the 1000 mt hard TAC allocated to the SAP, participants are constrained by a hard TAC on incidental cod bycatch. Although the SAP is essentially managed under two hard TACs, one for haddock and another for cod, the implications of hard TAC management are different for Sector and non-Sector vessels. Sector members must retain all legal-sized cod, which are counted against the Sector’s aggregate allocation of cod. Non-Sector members observe a 1000 lb. trip limit, including discards, which counts against an incidental catch TAC allocated specifically to the CAI haddock SAP. In 2005 non-Sector vessels were allocated an incidental catch TAC defined as 14.4% of the total GB cod incidental catch TAC.\(^\text{12}\) (This percentage will be recalculated every two years under the biennial framework adjustments required by Amendment 13.)

Non-Sector participants are more likely to have access to the SAP limited by their incidental catch cod TAC than Sector members, who can apply bycatch toward their

\(^{12}\) Incidental catch TACs, introduced in conjunction with the B-DAS pilot program, are discussed in more detail below.
entire sector allocation of cod. This does not necessarily confer an advantage to Sector members beyond providing a little additional flexibility. Both sets of participants still have a strong incentive to fish selectively, in order to maximize their catch of haddock relative to a fixed amount of cod.

Performance

Although the SAP was originally scheduled to operate from October 1 through December 31, 2004, the opening had to be delayed until FW40A was approved by final rule on November 19. The final rule of FW40A set forth most of the administrative regulations of the SAP, which applied to the Hook Sector in 2004 and will continue to apply to sector vessels as long as the SAP is renewed. From an administrative standpoint there were no major changes to the SAP for hook fishermen after it was opened to non-Sector participants. Many of the strategies used by hook fishermen fishing in the Sector Area translated well to the SAP; for example, fishermen doubled up on vessels to reduce their fixed costs. [38] Sector fishermen also agreed to pace their fishing effort by setting a weekly target TAC, and by limiting the number of days each vessel could fish per week. [38] Framework 42 gives the Regional Administrator the ability to alter future TACs according to a predetermined formula, in order to incorporate new stock assessment data. [39]

In its first year of operation, Sector members harvested 48% of the SAP’s allocation of 1000 metric tons of Georges Bank haddock TAC. [40] In FY 2005, Hook Sector fishermen were allocated 500 mt of haddock and fished the first half of the SAP between October 1 and November 15. All 49 Sector vessels declared their intent to participate but only 27 of them actually fished. [38] Sector vessels caught 92% of their TAC, and non-Sector vessels caught 34% of their haddock TAC and used 32% of their incidental catch cod TAC. [40] In FY 2006 Hook Sector fishermen caught only 3% of their haddock TAC, while non-Sector fishermen caught 35% of their TAC and used only 6% of their incidental catch cod TAC. [40]

Conclusions
The collective action advantage of Sector membership made it possible for Hook Sector members to identify a profitable selective fishing opportunity, carry out a cooperative research program, and take the initiative in developing a Special Access Program. The Sector’s preexisting infrastructure was able to accommodate the reporting requirements of the SAP, which made it possible for Hook Sector members to access the SAP a full fishing year sooner than non-Sector hook fishermen. The accountability afforded by sector management provides tangible benefits to Sector members. Improving accountability and catch monitoring/reporting infrastructure throughout the multispecies fishery would enable fishermen to reduce the lag time between identifying and implementing selective fishing opportunities.

Closed Area II Haddock Special Access Program

Background

The Closed Area II Haddock Special Access Program was originally introduced under Amendment 13. If approved, the SAP would have allowed fishermen to target haddock and yellowtail flounder using a haddock separator trawl or a flounder net, subject to a hard bycatch TAC on GB cod. [5] Like the Closed Area I Haddock SAP, it was disapproved by final rule because potential impacts from the fishery had not yet been adequately assessed. [37]

The CAI Haddock SAP was reintroduced in FW40A as a two-year pilot project, which would allow groundfish vessels to target healthy haddock stocks in and around the eastern US/Canada area (statistical areas 561 and 562). Because the eastern area is far from shore, this SAP was primarily anticipated to benefit larger vessels of 70 feet or more. [23] The SAP season was restricted from May 1 to December 31 to avoid the spring spawning season, and the program was scheduled to expire in November of 2006 after two seasons of operation. At this point, the Council would have the option of renewing the SAP through an additional management action.

The purpose of this SAP is to enable groundfish vessels to use their B DAS to harvest a greater portion the haddock TAC allocated to the U.S. under the U.S./Canada
Resource Sharing Understanding. [23] The Council noted that the U.S. haddock TAC still might go unharvested if fishermen were restricted to fishing only within the SAP area, and faced the possibility of running unprofitable trips. [23] In spite of the difficulty of reporting catches from different management areas, vessels are permitted to move freely throughout the eastern U.S./Canada area and fish within the Haddock SAP, CAII Yellowtail SAP and the remainder of the shared area on the same trip, using both A and B (reserve or regular) DAS. This flexibility enables vessels to maximize their profitability by making decisions based on current weather and fishing conditions.

**Hard TAC Regulation**

Vessels are only permitted to fish this SAP using a haddock separator trawl, which reduces cod bycatch by targeting on behavioral differences between the two species. Haddock, which tend to swim upward when pursued, are retained in the upper half of the net while cod can escape through the open bottom half. [23] Use of the haddock separator trawl was expected to reduce cod bycatch between 60 and 80% within the SAP. [23] FW40A initially allowed the use of flounder nets as well, but this was disapproved by final rule because nets had not been shown to reduce bycatch of cod and yellowtail flounder when used to target haddock. [24] The NMFS Regional Administrator also has the authority to approve other gear types that have been shown to reduce bycatch on stocks of concern. (This provision was omitted from the final rule of FW40A and implemented with FW42 instead. [23])

Because this SAP takes place in the eastern U.S./Canada area it is managed under multiple hard catch limits. All haddock and cod are counted against hard TACs established under the U.S./Canada Resource Sharing Understanding. Cod bycatch is also counted against a portion of the incidental catch cod TAC (34%) which was allocated to SAP under FW40A. Both the U.S./Canada and incidental catch TACs could potentially function as triggers to close the fishery, but the smaller incidental catch cod TAC is far more likely to be filled first. If necessary, the NMFS Regional Administrator can choose to control catch rates by changing the SAP season, possession limits or gear
requirements. This provision gives NMFS the ability to respond quickly if any unforeseen problems arose in the SAP, which as a pilot program was still considered experimental.

Because the CAII Haddock SAP operates under B DAS incidental catch TACs but is located within the U.S./Canada Resource Sharing area, it can fall under two different sets of regulations depending on the circumstances. Like other B DAS programs, this SAP requires participants to notify the NMFS observer program 72 hours prior to sailing. Fishermen must retain all legal-sized cod and flip to an A DAS if they exceed the landing limit on cod, which is set at 1000 lbs./trip (rather than 100 lbs./DAS, as in the B DAS Pilot Program). After flipping to an A DAS, vessels can keep fishing but must observe eastern U.S./Canada regulations. As in the Category B (regular) DAS program, permit holders must have at least one A DAS available as backup for each B DAS that will be used, and report their catches of hard-TAC regulated stocks to NMFS on a daily basis.

FW40A applies the same trip limit, full retention policy and flipping provision to the CAII Yellowtail SAP, although this SAP had already closed for the season (never to reopen) by the time the CAII Haddock SAP was introduced. If the yellowtail SAP did reopen, these measures would streamline enforcement and compliance of catch limits for vessels participating in both SAPs on a single trip. [23] Framework 42 renewed the SAP (no longer considered a pilot program) through 2008, and changed the starting date to August 1 in an effort to reduce discards of cod and winter flounder. FW42 also introduced incidental catch TACs for yellowtail flounder and winter flounder.

Performance

In FY 2005 participants landed 65% of the SAP’s incidental catch cod TAC.[40] In FY 2006, participants landed 4% of the cod incidental catch TAC, and only a fraction of the yellowtail flounder and winter flounder TACs. [40]

Conclusions

The Closed Area II Haddock SAP provides fishermen with the flexibility to move between management areas and Special Access Programs, many of which have different
regulations. Automated, real-time trip reporting would be a cost-effective way to maintain this flexibility, and administer multiple hard catch limits, while reducing the administrative burden on NMFS.

The B DAS Pilot Program

Background

The original Category B (regular) DAS Pilot Program was a one-year feasibility study which ran from November 1, 2004 through October 31, 2005. Like all B DAS programs, the Pilot Program allows groundfish permit holders to target healthy stocks subject to hard bycatch TACs on stocks of concern. B DAS can also be used to target non-groundfish stocks (such as monkfish) that are likely to cause incidental catch on stocks of concern. Any vessel with a limited access multispecies permit and a B DAS allocation was eligible to participate in the Pilot Program. This program provided an opportunity for all groundfish permit holders to use B DAS, which was particularly important for fishermen (such as gillnetters) who were not eligible to participate in either of the newly created SAPs.

Although the Pilot Program operates under the full range of incidental catch TACs, it is significantly less structured than a Special Access Program. There are no seasonal or gear-related restrictions, and the onus is on participants to identify selective fishing opportunities, and then to conduct these fisheries selectively enough to meet the B DAS criteria described below. Based on past logbook records, FW40A identifies fifteen potential fisheries which could successfully be fished under Category B (regular) DAS, grouped by location (Gulf of Maine, Georges Bank, and Southern New England) as well as by gear type (otter trawl and gillnet). [23] These fisheries are not restricted exclusively to groundfish, because B DAS can be used to target stocks outside the multispecies complex (such as skates and monkfish) that are associated with incidental catch on stocks of concern. The opportunities identified by NEFMC were only the most likely possibilities; fishermen could pursue other fisheries that were not specifically identified so long as they met B DAS requirements.

Hard TAC Regulation:
All vessels must be VMS equipped, and participants must notify the NMFS observer program 72 hours in advance of sailing. FW40A does not specify the level of observer coverage necessary; merely that it should be “sufficient to ensure the program is working as designed.” [23] Vessels must report their catch (kept and discarded) on a daily basis, along with the statistical area that was fished. [23] Each incidental catch TAC is associated with a stock area defined by FW40A, so that only those statistical areas must be closed to B DAS usage when a TAC is filled. [23] An exception is made for white hake, which ranges throughout New England waters. Rather than closing the entire fishery for just one stock, NMFS makes possession of white hake illegal once the incidental catch TAC has been filled.

FW40A places extremely low landing limits on the eight stocks of concern, along with a full retention policy which requires fishermen to land all legal-sized groundfish. Vessels are limited to 100 lbs. /DAS for GOM cod, GB cod, American plaice, white hake, SNE/MA winter flounder and witch flounder; and 25 lbs. /DAS for CC/GOM and SNE/MA yellowtail flounder. Incidental catch TACs are paired with a DAS “flipping” provision so that if a vessel exceeds any one of these landing limits, it must continue to retain all legal groundfish, flip to an A DAS and notify NMFS prior to crossing the VMS demarcation line. [23] The flipping provision provides fishermen with the flexibility to land as much of their catch as possible, reducing the need for wasteful regulatory discards, but as a practical matter it also helps to maintain the distinction between an A and a B DAS. Without a flipping provision, it would be legal for vessels to simply discard stocks of concern in order to comply with B DAS standards. [23] This would cause participants to fill the incidental catch TACs with wasteful (and worthless) discard mortality. To ensure that vessels can be held accountable for overages, FW40A specifies that at the beginning of a fishing trip, vessels must have one remaining A DAS available for every B DAS they intend to use. [23]

In addition to setting incidental catch TACs on stocks of concern, the Council caps B DAS usage at 1000 per quarter. (A trip only counts toward the quarterly B DAS limit if it finishes as a B DAS and is not flipped.) Once this limit has been reached the Pilot Program closes until the next quarter, even if none of the incidental catch TACs have been filled. Although catch limits were intended to function as the primary control
measure, the Council implemented the DAS cap as “a secondary control that will limit
the damage that could result if it proves difficult to monitor the incidental catch TACs.”
[23] Because B DAS and incidental catch TACs are both allocated on a quarterly basis,
they function as a complementary system of input and output controls. Either one of these
controls can operate as a trigger to close the fishery on a quarterly basis.

Like the CAI and CAII haddock SAPs, the B DAS Pilot Program was expected to
provide incentives for vessels to fish selectively. Unlike the two SAPs the Pilot Program
does not specify any gear requirements, though vessels are still required to observe
Amendment 13 gear restrictions and specifications. [23] Rather than regulating
selectivity with gear requirements, the Pilot Program uses low incidental catch landing
limits and the A DAS “flipping” provision to make B DAS usage a conditional privilege.
[23] If vessels fail to meet these B DAS requirements, they lose a high-value A DAS, as
well as an opportunity to reclaim the latent fishing effort represented by a B DAS.

Although each permit holder received an allocation of B DAS under Amendment
13, access to the B DAS Pilot Program is not tied to landing history. Quarterly B DAS
allocations are open to all prospective participants on a first-come, first-served basis.
[24] The Council acknowledged that capping BDAS usage could cause a derby fishery to
develop each quarter. One purpose of organizing incidental catch TACs and B DAS
limits on a quarterly basis was to distribute fishing effort more evenly throughout the
year, allowing more vessels the chance to participate. [23]

Framework 42, approved in October of 2006, extended the B DAS Program (no
longer considered a pilot program) but reduced the total number of B DAS from 4000 to
3500. The B DAS allocated to the May-June quarter were halved (from 1000 to 500) to
reduce incidental catch of cod and winter flounder by fishermen targeting GB haddock.
[1] Quarterly incidental TAC allocations, which previously were divided equally between
the four quarters of the fishing year, had to be adjusted accordingly. 13% of each TAC is
now assigned to the May-June quarter, and the other three quarters receive 29% each.

Framework 42 also added incidental catch TACs for GB yellowtail and GB winter
flounder, and reduced the incidental catch TACs on GOM cod, CC/GOM yellowtail,
SNE/MA yellowtail, and SNE/MA winter flounder from 2% to 1% of the total target
TAC for each stock. Participants must provide 72 hours advance notice to the NMFS
observer program, and observer coverage is expected to remain fairly high (around 36%), because NMFS found evidence that flipping rates were different between observed and unobserved trips. [1] Finally, FW 42 gives the Regional Administrator discretionary authority to end a B DAS program in case an unforeseen problem (such as insufficient observer coverage or unusually high discard rates) threatens management objectives. [1]

Performance/Conclusions

The Category B (regular) DAS Program is of limited utility as an indicator for the potential success of hard catch limits in the multispecies fishery. Due to the low possession limits on stocks of concern, any trip with significant landings of stocks of concern will be flipped to an A DAS. The rate of flipping also differed significantly between observed and non-observed trips. At the end of the fishing year it appears that only a fraction of each incidental catch TAC has been filled; however, there would have been significant TAC overages without the flipping provision. The Council should continue to provide incentives for fishermen to fish selectively, but for this program to succeed the Council needs to hold fishermen to a higher standard of accountability.
Case Study: US/Canada Resource Sharing Understanding

Background

Foreign fishing vessels were excluded from US federal waters following passage of the MSA in 1976, though Canada and the U.S. continued to dispute fishing rights to the easternmost portion of Georges Bank. Both nations extended their EEZs to 200 miles in 1977, and the area now referred to as the U.S./Canada Resource Sharing Area falls within an area of overlapping jurisdiction. In 1984, after years of ongoing boundary disputes, the International Court of Justice established the international boundary across eastern GB now known as the Hague Line.

The Hague Line is only a jurisdictional boundary, and Georges Bank cod, yellowtail and haddock stocks are considered a transboundary resource. Effective management of these valuable stocks requires cooperation between fisheries agencies, so that conservation measures adopted by one country are reinforced or at least not compromised by the other. This is particularly important because the two management regimes are so different. Canada has traditionally utilized output controls, while the U.S. has increasingly relied on input controls with the DAS system.

Canada’s counterpart to NMFS is the Department of Fisheries and Oceans (DFO), the lead agency responsible for the conservation and sustainable management of Canadian fisheries. DFO maintains a stock assessment peer review process, the Regional Advisory Process (RAP) which is similar to SARC (the Stock Assessment Review Committee) in the U.S. In 1998, Canada and the U.S. cooperated to establish a Transboundary Resource Assessment Committee to coordinate SARC and RAP for the management of transboundary stocks. The Transboundary Management Guidance Committee, which formed in 2001, is the policy counterpart to TRAC. TMGC interprets the scientific information provided by TRAC, and presents non-binding policy recommendations to DFO and NMFS in the form of a guidance document. Each country is represented by a six-member delegation including two government representatives (one scientist and one manager) and four industry representatives.
**TAC Allocations**

TMGC sought to develop a management system that would respect each country’s historical participation in the fishery, while maintaining the flexibility to incorporate up-to-date stock assessment data and reflect current stock distributions. [42] In December 2001 TMGC created the U.S./Canada Sharing Agreement, which is not an official international agreement but has been incorporated into both countries’ groundfish management plans. The U.S. and Canada are allocated an annual TAC for each stock based on a formula that incorporates historic landing proportions between 1967-1994, as well as the current distribution of each stock.\(^\text{13}\)

Between 2003 and 2010, this formula will undergo a phased transformation so that by 2010 allocations will be primarily determined by current resource distribution, with only minor consideration given to historical utilization of the fishery. This adaptive strategy is particularly significant for yellowtail flounder allocations because the U.S. claims 98% of all yellowtail landings during the historical qualifying period. [42] By 2010 the relative U.S. yellowtail allocation will have decreased from 72% to 58% of the total, assuming resource distribution does not change. [42] The U.S.’ relative allocations of GB haddock and cod will also decrease, though not as drastically (from 30% to 22.5% and 27% to 20% respectively). [42]

Amendment 13 outlines the lengthy process through which each country is formerly allocated its share of cod, haddock and yellowtail. TMGC sets target TACs based on the stock assessment information generated by TRAC, and determines allocations according to the formula set forth by the Sharing Agreement. This decision is referred to NEFMC and its Canadian equivalent, the Gulf of Maine Advisory Committee (GOMAC) for review and comment. If either regional body disagrees with TMGC recommendations it can return an issue for further discussion; otherwise, they are responsible for incorporating these recommendations into management measures and submitting these to NMFS and DFO for implementation. [5]

\(^{13}\) The allocation formula adopted under the Resource Sharing Agreement is:

\[
\%\text{country share} = \alpha_{\text{year}} \times \text{country utilization} + \beta_{\text{year}} \times \text{resource distribution},\]

where \(\alpha_{\text{year}}\) = percentage weighing for utilization in year; \(\beta_{\text{year}}\) = percentage weighing for distribution in year, \(\alpha_{\text{year}} + \beta_{\text{year}} = 100\%\); country utilization = 1967-1994 historic catch percentage share; resource distribution = 30% loess smoothing of most recent 33 years. From www.mar.dfo-mpo.gc.ca/science/tmgc/background/share.pdf
The portion of Georges Bank managed under the U.S./Canada Resource Sharing Understanding is divided into the Eastern U.S./Canada Area (statistical areas 561 and 562) and the Western U.S./Canada Area (statistical areas 522 and 525). Cod and haddock are only managed under the Understanding in the Eastern area, while yellowtail are managed under the Understanding throughout. The use of different management units for these three stocks has important implications for the administration and enforcement of catch limits.

**Hard TAC Regulation:**

The Council opted to administer U.S. allocations under hard TACs “because of concerns that [target TACs] would not meet Canadian expectations for controlling catch in the area.” [5] From the beginning, the Council managed the cod TAC as a bycatch fishery in order to facilitate directed fisheries on haddock and yellowtail flounder. [5] Vessels fishing in the eastern area are only permitted to use a haddock separator trawl or flatfish net, in order to decrease incidental catch of GB cod. This gear requirement does not apply to vessels fishing the western area, since the cod TAC only applies to the eastern area. Within the eastern area there is also a cod trip limit of 500 lbs./DAS, not to exceed a total of 5,000 lbs./trip or 5% of the total catch, whichever amount is larger.

In order to monitor catches of all three stocks, vessels must report landings and discards of all three stocks daily via VMS. Amendment 13 establishes regulations pertaining to all groundfish vessels fishing in the Shared Area. All vessels are required to be VMS capable, and must declare in advance whether they plan to fish the Eastern or the Western area. Vessels can only fish in one area or the other during a single trip, and may not fish inside and outside of the U.S./Canada areas on the same trip. Vessels must also notify the NMFS observer program 5 business days in advance.

Amendment 13 originally contained contingency measures that would allow the Regional Administrator to make changes as the fishing year progresses. When 30% and then 60% of each TAC have been harvested, the Regional Administrator is authorized to make changes to gear requirements, trip limits, and other regulations in order to meet but not exceed TACs. Amendment 13 also provides a built-in trigger to slow fishing effort when any of the three TACs is approaching capacity. When 70% of a stock has been
caught—and provided the TAC is likely to be filled before the end of the fishing year—
trip limits are automatically implemented for haddock and yellowtail flounder (1500 lbs. /day and 15000 lbs. /trip for each stock). [37] FW 42 removed the 30%, 60% and 70% thresholds for yellowtail flounder, established an initial 10,000 lb. trip limit, and permits the Regional Administrator to adjust this trip limit at any point during the fishing year. [39]

The Council recognized that restrictions imposed under the Understanding might discourage fishermen from fishing in the shared area. In the final rule of Amendment 13, several commenters expressed frustration with the requirement that vessels fish only inside the shared area, and only in either the eastern or western portion in a single trip. Restricting vessels to a single area prevents them from moving freely in search of fish, which increases the risk of an unprofitable trip. [23] NMFS concluded that because the three TACs have different management units, and because different regulations and gear restrictions apply to the Eastern area, the Western area and the rest of Georges Bank, it would not be feasible to monitor and enforce catch limits if vessels were allowed to fish multiple areas on a single trip. [37]

The issue of area restrictions was raised again in Framework 40A, which proposes allowing vessels to fish a “combined” trip inside and outside the Western U.S./Canada area (but still would not permit fishing in the Eastern and Western areas on the same trip). NMFS was primarily concerned with attributing catches of yellowtail flounder to the correct stock, since yellowtail are considered a separate stock in the shared area. In the final rule of FW40A, NMFS gives vessels unlimited flexibility to cross between the two areas. To facilitate accurate mortality accounting, vessels must report their catch of yellowtail flounder every time they enter or exit the Western US/Canada area, and comply with the lowest landing limits imposed by either area. [37]

TMGC recommendations were accepted by both countries for FY2004 through 2006, though 2007 recommendations encountered some resistance from the Council. For FY 2007, TRAC found that yellowtail flounder was still overfished and experiencing overfishing. The Council rejected the original combined yellowtail TAC of 1500 mt on the grounds that it was too high, and therefore inconsistent with the stock rebuilding plan set by Framework 42. [43] The Council was concerned that even if NMFS decided to
adopt the lower allocation, DFO might follow TMGC’s original higher recommendation, putting Georges Bank yellowtail at risk even as U.S. fishermen accepted the lower allocation. [44] However, Canada agreed to accept the lower TAC and TMGC published an amended version of the guidance document.

NEFMC also took issue with Canada’s cod TAC of 1406 mt, claiming that Canada had failed to account for 200 mt of discards in 2005 and should have this overage deducted from their 2007 TAC. TMGC found that the cod TAC Canada set for 2005 was based on an assessment that did not include discards, and that a deduction was not necessary; however, all assessments since this incident have accounted for discards. Canada is also in the process of developing a reporting/monitoring system to keep track of discards.

**Performance**

In FY 2004 U.S. fishermen harvested 37% of the cod TAC, 16% of the haddock TAC, and 92% of the yellowtail flounder TAC. [45] In FY 2005 and 2006 catches of cod and yellowtail flounder remained high (94% and 84% of annual TACs respectively for cod; 73% and 80% for yellowtail) although the yellowtail TAC decreased significantly from 2004 to 2005, and again from 2005 to 2006. [45] Haddock catches only amounted to about 7% of the total TAC in both 2005 and 2006. [45]

**Conclusions:**

Daily catch reporting requirements on hard TAC stocks indicate that the Council considers real-time monitoring necessary in order to administer a hard TAC effectively. The difficulty of monitoring combined trips demonstrates the need for an automated catch monitoring system, which would enable managers to collect accurate, higher-quality information in real time. Built-in trip limit triggers are a useful way to adjust fishing effort as TACs are filled, and the discretionary powers delegated to the Regional Administrator allow NMFS to respond quickly to changing conditions in the fishery. The U.S./Canada Resource Sharing Agreement demonstrates that in a high-stakes international setting, the Council considers hard catch limits to indicate a high level of
commitment. This suggests that hard catch limits are more likely to be perceived as a viable option when TAC overages are linked to other costs of noncompliance.
Case Study: Closed Area II Yellowtail Flounder SAP

Background:

Georges Bank yellowtail flounder is one of the three stocks managed as a transboundary resource in cooperation with Canada. Yellowtail flounder was not classified as a stock of concern under Amendment 13 because it was neither overfished nor experiencing overfishing. NMFS determined that fishing mortality on yellowtail was so low, in fact, that landings could stand to nearly double. [5] Although the U.S. TAC of Georges Bank yellowtail flounder was expected to increase under the U.S./Canada Resource Sharing Understanding, landings would have fallen far short of the TAC due to DAS reductions and area restrictions. [5] The CAII Yellowtail SAP was created under Amendment 13 to help fishermen fish selectively on yellowtail flounder and harvest as much of the TAC as possible. While this SAP still exists, it has not been operational since 2004.

Hard TAC regulation:

In FY 2004, participants were permitted to fish two B DAS per month in the SAP area with a yellowtail trip limit of 30,000 lbs. Vessels were also constrained with a trip limit on cod, set at one fifth the landing limit permitted under the US/CA Resource Sharing Agreement per DAS (100 lbs./DAS) or no more than 5% of total catch. [5] All eligible vessels were required to use VMS, and to comply with all gear restrictions and notification/reporting requirements applied to vessels fishing in the shared area. The SAP was intended to remain open from June through December, and participation was capped at a total of 320 B DAS on a first-come, first-served basis. The SAP would close when all 320 trips were taken or when the yellowtail TAC was filled; whichever came first.

Performance:

The yellowtail flounder SAP, now likely entering its third closed season, is widely considered to have been a failure. In FY 2004 fishermen harvested the entire TAC within the first three months and the SAP closed on September 3. The sudden influx of
yellowtail caused prices to plummet to as low as $.10 per lb. [46], and the average price for yellowtail averaged only $.43 over the three months the SAP remained open. [47]

Flooding the market had far-reaching consequences not only for fishermen, but for everyone involved in the fishing industry. The high volume of fish was a burden on processors, who are not equipped to handle such large fluctuations in supply, and had to pay their workers overtime. [46] Moreover, the combination of low prices and excess supply forced some processors to freeze some their surplus, and frozen seafood is generally less profitable than fresh. To make matters—and prices—even worse, the SAP’s original June 1 starting date coincides with the yellowtail spawning season, and spawning fish are considered to be of lower quality. [35]

Fishermen soon recognized the necessity of lowering catch limits, but there was no incentive for individual fishermen to pace their fishing effort. Despite the two-trip per month limit, there were so many eligible participants and the 30,000 lb. trip limit was so high that under the circumstances, the SAP would almost inevitably have functioned as a derby. Any one fisherman’s decision to self-regulate or participate later in the season would simply have freed up more catch to other participants in the short term. Fishermen also adopted a “use it or lose it” approach to the DAS system and felt pressure to maintain their landing history and use their B DAS, or risk losing them at a later date. [46] For a program intended to mitigate economic hardship, the yellowtail flounder SAP proved less a bonus to fishermen than a display of their lack of confidence in the future of the fishery.

NEFMC took steps to address many of these problems in Framework 40B, primarily by adjusting the pace at which fishermen could harvest the SAP TAC. The Regional Administrator is now responsible for determining whether the SAP will reopen prior to the start of the new fishing year; and if so, the number of trips and the trip limit that will achieve but not exceed the total yellowtail TAC. This decision must take four factors into consideration: the yellowtail flounder TAC authorized under the U.S./Canada Resource Sharing Understanding, the amount of yellowtail flounder likely to be caught outside the SAP, discard estimates, and the number of vessels expected to participate in the program. [35] If there is insufficient catch to support a minimum of 150 trips with a 15,000 lb. possession limit (approximately 1020 mt) [48], the Regional Administrator has
the option to authorize zero trips, effectively closing the SAP for the fishing year. [35] FW40B also reduced the number of trips per vessel to one per month, and reduced the trip limit to 10,000 lbs. Because the original SAP starting date of June 1 coincides with the end of the yellowtail spawning season, the starting date was shifted forward to July 1.

All of these adjustments were intended for the benefit of future fishing years. When FW40B was passed early in 2005, it was already understood that no trips would be authorized for FY 2005. [35] The SAP also remained closed for FY 2006, in which the GB TAC for yellowtail flounder was only 2070 mt, by far the lowest TAC allocated since implementation of the US/Canada Resource Sharing Agreement with Amendment 13. [49] The 124 mt allocated to the SAP would have supported just 27 trips; consequently, NMFS concluded that “it would not be feasible or equitable to allocate and monitor such a low number of trips across the fleet.” [48]

The 2005 Groundfish Assessment Review Meeting (GARM II) determined that fishing mortality on yellowtail flounder has increased 140% since 2001, and that yellowtail was both overfished and experiencing overfishing. [50] GARM II in 2002 originally found that fishing mortality in 2001 was below the fishing mortality level expected to produce maximum sustainable yield (F_{MSY}); however, GARM III found that this estimate was wrong and that fishing mortality in 2001 was actually three times FMSY. [51] This is indicative of a strong retrospective pattern, which is a “consistent change in estimated quantities”—in this case, the level of fishing mortality—which is sometimes observed when new information is incorporated into a model. [51] Yellowtail flounder is now under a rebuilding plan implemented by Framework 42, which aims to rebuild GB yellowtail flounder to SSB_{MSY} by 2014 with 75% probability. [1]

**Conclusions:**

The CAII Yellowtail SAP exemplifies a worst-case hard TAC management scenario. Although fishermen were limited to two trips per month the fishery still operated as a modified derby. Fishermen lacked confidence in the equity of future DAS allocations, which created a perverse incentive for fishermen to fish unprofitably in order to use their B DAS. Fishermen also lacked peer accountability, and did not have the resources to overcome derby fishing as a collective action problem. Managers,
meanwhile, did not have the ability to gather real-time landings data and make mid-
season adjustments in order to slow fishing effort. Finally, the retrospective trend
identified by GARM II indicates the importance of adopting a precautionary approach
rather than attempting to capitalize too quickly on perceived rebuilding progress.
[52],[51] Although the Council did address these problems with subsequent management
actions, these actions treat the symptoms (pacing) rather than the underlying problems
(perverse incentives and a depleted stock).
Analysis and Recommendations

Introduction

Whether New England continues to pursue DAS management or chooses an alternative strategy under Amendment 16, output controls will demonstrate the Council’s commitment to rebuilding a sustainable and profitable fishing industry. Although it will be a challenge to incorporate hard catch limits into a fishery accustomed to input controls, the Council should look to existing hard TAC programs for guidance. The seven hard TAC fisheries managed under the northeast multispecies management can be envisioned as a series of pilot projects for New England’s transition to output controls. By examining the successes and failures of each hard TAC program, as well as changes and improvements that were made along the way, recommendations can be generated for the implementation of hard catch limits across the entire multispecies fishery.

Hard catch limits will only be effective if they can be implemented, monitored and enforced properly. Some of the recommendations below will address technological or regulatory issues, which are more directly related to the monitoring of landing data and pacing of fishing effort. Other recommendations concern the perceived costs, benefits and incentives for compliance, which determine whether or not fishermen are motivated to comply with regulations. The latter are particularly important because fishery management measures plans regulate fishing behavior, rather than the resource itself. These recommendations are intended to apply to a wide variety of hard TAC situations, whether catch limits are used as a backstop for area-based management or the points system, or reconsidered as part of a different strategy at some later date. This paper was not intended to address the problem of catch allocation; furthermore, because Amendment 16 may change the functional units of the fishery, specific recommendations will have to be tailored to suit the composition of the fishery.

The recommendations presented below are divided into three categories: information technology and real-time mortality accounting; accountability; and pacing and flexibility. These recommendations are followed by a discussion of additional issues that the Council will need to keep in mind as it evaluates Amendment 16 alternatives.

Information Technology and Real-Time Mortality Accounting
The most important step New England can take toward making the multispecies fishery compatible with output controls will be to improve catch monitoring and enforcement technology. In order to enforce a hard TAC, managers need the capability to monitor cumulative landings relative to that fishery’s catch limit. Although New England already does monitor daily catches of most hard TAC-managed stocks, this is only done on a case-by-case basis for a limited number of stocks. Particularly in the Resource Sharing Area, this piecemeal approach to catch monitoring has made it difficult for fishermen to move freely between different areas and/or Special Access Programs. It is also inefficient and expensive. In general, monitoring, control and enforcement costs increase with regulatory complexity. [53] The multispecies fishery’s diversity of gear types, vessel sizes, and management areas/programs require a more sophisticated and streamlined monitoring system.

New England also still relies on an outdated system of paper-based vessel trip reports (VTRs), which are an unnecessarily slow and labor-intensive method of mortality “bookkeeping.” Under the current system, the administrative burden of catch monitoring will be a practical constraint on New England’s ability to extend hard TAC management beyond the realm of Special Access Programs and B DAS opportunities. New England should pursue a comprehensive, technology-based monitoring strategy that will enable managers to maintain an accurate snapshot of total fishing mortality in real-time. Two major components of real-time mortality, which are currently in development, are described in more detail below.

**Advanced VMS/Electronic logbook technology:**

Upon returning to port, every vessel must fill out a Vessel Trip Report (VTR) which specifies where, when and with what gear the vessel was fishing, as well as how much of each species was caught and discarded. Although New England has real-time dealer reporting, VTR are still filled out by hand and mailed in. Fishermen have until the 15th of the month following the day of the fishing trip to submit the VTR, which means that there may up to a 45-day between the fishing trip and the time NMFS receives this information. Once NMFS receives the VTR, the information is entered by hand. This
system of paper tickets and manual data entry is unnecessarily labor intensive, and prevents NMFS from maintaining fishery-wide landings data in real time.

Extending hard TAC management without increasing the administrative burden on NMFS will require a more streamlined system of trip reporting. Since all vessels are now VMS compatible and capable of sending and receiving emails by satellite while at sea, electronic vessel trip reporting is a promising solution. E-VTR or “advanced VMS” would enable fishermen to enter and submit VTR data to NMFS electronically. This data would be automatically compiled and archived, allowing NMFS to monitor total fishing mortality, across all stocks in the multispecies complex, in near real-time. CCCHFA and NMFS are collaborating on an e-VTR pilot study involving hook fishermen and gillnetters. Although the software component is operational, NMFS has yet to complete the conversion program that would automatically upload reports to a database. [54]

In addition to providing real-time catch monitoring, E-VTR is an efficient way for NMFS to increase the quality, quantity and accessibility of the data that is collected. Each trip is assigned a unique identification number, which can be used to link trip data to other databases made accessible to managers in different parts of the agency. [55] The program itself is fairly simple, and includes only five different spreadsheets: one for trip information (departure time, operator); effort (area fished, gear used, and the number of tows or hauls); catches and discards; landings (where the catch was landed, dealer); an optional trip notes page, and final summary page that allows fishermen to review their entries before submitting the report to NMFS. [56] The software also includes an error check which will point out unusual or inconsistent entries, which will help eliminate data entry errors. E-VTR would also function like a bank account or bookkeeping system, allowing fishermen to review past trip reports and determine how many DAS they have used. [57]

Electronic monitoring (EM):

Electronic monitoring is a cost-effective way to supplement live observer coverage, particularly in SAPs or experimental fisheries which require increased observer coverage. Video surveillance and hydraulic sensors are used to record the setting and hauling of gear, sorting of catch, and interactions with protected species. EM utilizes
multiple camera angles to enable catch identification (which species were caught), enumeration (how many of each), and disposition (whether catch is kept or discarded). Hydraulic sensors fitted to the vessel’s gear automatically trigger the video system to activate when the vessel begins to haul. These sensors also collect coordinates and GPS data, so that surveillance footage and fishing activity can be spatially correlated.

Though the onboard system is fully automated, data must be downloaded dockside and analyzed by a qualified observer. All fishing activity is recorded over the course of a trip, but only a portion of the footage will ever be reviewed. The purpose of EM is to enable managers to conduct an “audit” by comparing video segments with logbook and/or landings data, in order to identify discrepancies and assess the accuracy of logbook data. By verifying vessel trip reports, dealer reports, logbook data, and observer/EM data against one another, managers can be assured accurate, high-quality landings data.

Although electronic monitoring is practical way to discourage high grading or illegal discarding, EM is not intended as a “policing” strategy. Cape Cod hook and fixed gear fishermen have been eager to participate in EM pilot studies, because EM actually provides fishermen with greater flexibility than traditional observer coverage. Many smaller vessels simply can’t accommodate observers safely and tend to leave on shorter notice. Deploying observers on short notice is more expensive and reduces the number of trips that can be observed. Traditional observer coverage will always be necessary, since only a live observer can conduct biological sampling, but EM is a cost-effective way to observe a higher percentage of all fishing trips. Where the funding of adequate observer coverage has been problematic in the past, such as in the CAI Haddock SAP, EM would be an ideal solution.

Two EM pilot studies have been conducted on Cape Cod by Archipelago Marine Research in collaboration with CCCHFA; the first on longlining vessels in 2004 and the second on gillnetting vessels this past summer. Both showed promising results. Electronic monitoring is still a relatively new technology, but is already being used in several fisheries, including British Columbia’s groundfish trawl fishery. In New England, the biggest obstacle to EM acceptance would be need for managers and fishermen to reach a data sharing agreement, specify what kind of information would be
collected, and how it would be used. [58] It will also be necessary to expand fleet awareness of EM, and develop the local infrastructure to install, collect and review EM data. [58]

In addition to supporting catch limits, accurate, up-to-the-minute fishery data, enables managers to practice adaptive management. Instead of evaluating fishery performance after the fishing year, managers can adjust limits and closures mid-season, as well as identify problems when they arise. Furthermore, full-cost accounting mechanisms have inherent feedback potential. [58] For example, reviewing electronic monitoring footage can help both observers and fishermen improve their recording techniques. As each component is developed, the entire system can be “tightened” and improved.

**Recommendations:**

New England should implement real-time mortality accounting technology and phase out paper-based vessel trip reporting. Priorities should include additional pilot projects to test the feasibility of using electronic monitoring on vessels of various sizes and configurations. New England should also conduct a series of informational meetings/workshops to distribute information on the uses and advantages of mortality accounting technology.

**Accountability**

*Institutional Accountability and Legitimacy:*

Fishermen are less likely to comply with regulations if they perceive that violations will not be detected or punished [60], particularly if the benefits of illegal activity are large in comparison to the penalties of being caught. [61] in [53] Hard catch limits have failed in the past, including under ICNAF quotas, precisely because fishermen were not being held accountable to catch limit regulations. NMFS’ inability to monitor and enforce hard catch limits undermined the legitimacy of the management plan, providing fishermen with strong incentives to cheat. The implementation of real-time catch monitoring technology will provide the foundation of an institutional infrastructure
equipped to manage hard catch limits. In addition to facilitating enforcement of hard catch limits, real time catch monitoring will provide NMFS with the enforcement credibility to discourage noncompliance in the first place.

In addition to improving the legitimacy and credibility of hard catch limit regulations, New England needs to address the complex relationships of accountability that exist between and among fishermen and managers. Fishermen need to be held accountable to NMFS, which as discussed can be achieved by increasing the credibility of enforcement. However, accountability is a two-way relationship. Managers themselves need to be held accountable for their obligation to create and then enforce appropriate regulations. They also need to increase their own credibility in order to eliminate some of the perverse incentives that have arisen due to mistrust of managers and uncertainty about the future. In the CAII Yellowtail SAP, for example, fishermen were motivated to keep fishing unprofitably because despite promises to the contrary, they were convinced that unused B DAS could be cut by subsequent effort reductions.

Managers can gain credibility and improve their own accountability by making the decision making process as transparent and cooperative as possible. Fishermen are more likely to comply with regulations when management authorities and regulations have high perceived legitimacy. [62] Meanwhile, as exemplified by the Georges Bank hook sector, fishermen are more likely to perceive fishery regulations as legitimate when they are directly involved in establishing the content, distributional effects and implementation of regulations. [63] in [53]; [62] Management institutions are also more likely to be perceived as legitimate when they facilitate open discussion of management goals, and the means by which these goals are accomplished. [64] in [63]

The Council’s willingness to consider industry proposals for the development of Amendment 16 has been a significant step in the right direction. Including fishermen in the scoping process not only bolsters legitimacy and compliance; it increases the likelihood that ensuing regulations are appropriate and a “good fit” for the fishery. [53] As one commenter noted at an Amendment 16 scoping meeting,

“The current pervasive feeling is that the Council will do what they want so a fishermen needs to get all he can. These scoping hearings are evidence that the
Council is willing to listen to fishermen. The sense of partnership and accountability will be improved.” (Ellsworth scoping meeting, Glenn Libby) [9]

Peer Accountability and Collective Action Opportunities

Fishermen need to be confident that other fishermen are being held accountable for their actions, which can be achieved not only by improving enforcement, but also by creating relationships of peer accountability. Regulatory enforcement tends to focus on deterring violations by increasing the perceived financial costs of violation, [62] rather than by creating regulations that encourage compliance in the first place. In the field of fisheries management, incentives for compliance are often characterized as either instrumental or normative. A traditional instrumental approach treats the individual fisherman as a “utility maximizer”, who is constantly weighing the financial costs and benefits of compliance. A normative approach contends that social relations and socially determined values are also factored into this cost-benefit analysis. [53] A normative perception of compliance costs seems to be the case in sector management, and could apply to area-based management as well.

The two Georges Bank cod sectors, as well as the U.S./Canada Resource Sharing Understanding, benefit from an additional layer of accountability which fosters a normative perception of compliance costs. Though these fisheries are dramatically different in scale, participants in all three are held accountable to a secondary management entity, in addition to NMFS, with the ability to impose additional costs for a TAC overage. In these three cases penalties for TAC overages are more than just a deduction from the next year’s TAC. Penalties are linked to other social or political costs, which have either immediate or highly visible consequences and long-term ramifications. Cultivating a normative perception of compliance costs can be a cost-effective way to complement traditional “MCE” (monitoring, control and enforcement measures). [53]

Sector management pairs this nested structure of accountability with positive, reward-based incentives for compliance. Members who comply with sector regulations are rewarded with the benefits of sector management: flexibility, the freedom to maximize operating efficiency, the opportunity to participate in cooperative research, and
most importantly, membership in a collective action network operating for the sector’s best interest. Members who do not comply risk losing all of these benefits, in addition to any state, federal or sector penalties. The net result is that sector members have strong, well-defined incentives for compliance and even stronger disincentives for noncompliance. As the 2004 Hook Sector Annual Report explains,

“By working under the Harvest Plan that was created through a consensus process coupled with a self-policing policy, members are invested in maintaining the privilege afforded them through the Sector Allocation. Quite simply, they are collectively responsible for the actions of the individual and have taken these responsibilities very seriously.” [19]

The most powerful deterrent to would-be cheaters is the cooperative and community-based nature of the sector itself. The similarities between fishermen that make sector membership possible in the first place make sector membership far more complex than a simple business relationship. Sector members comprise a fishing community in their own right with similar vessels and fishing methods, as well as shared fishing grounds and shore side infrastructure. This strong sense of community positions each sector member as a steward of the resource and a stakeholder in the future of Cape Cod’s fishing community. [19] Self-management and cooperative ownership creates a positive form of social or peer pressure toward compliance. [6]

Finally, in the common-pool fishery, the benefits of noncompliance (cheating) accrue to a single fisherman, while externalities are distributed across all participants in the multispecies fishery. This situation—a variation on Hardin’s “tragedy of the commons”—motivates individuals to act in their own self interest, often at the expense of their collective best interest. [60],[6] Within a sector, by contrast, members are motivated to act in the sector’s best interest. Rather than cheating a perceived abstraction of authority (“the government”, or “other fishermen”), a fisherman who violates sector protocol cheats his own sector community. [31] The costs and benefits of cheating are reversed. A fisherman who cheats undermines the sector’s ability to manage its hard TAC allocation effectively, ultimately putting his own best interests at risk.
Just as each of the two sectors is “nested” in a context of intercommunity accountability, the Understanding is nested in the context of a high-stakes diplomatic relationship. In both cases the incentives for cooperation and compliance are strong, but the disincentives for noncompliance are even stronger. The U.S. and Canada are both industrialized first-world countries with limited access fisheries and long history of fishing productively on Georges Bank. Both countries had already demonstrated their commitment to sustainable use by implementing management initiatives on their own. Most importantly, the two countries are neighbors in good standing with much more at stake than fishing rights to rebuilding stocks.

Despite the obvious and dramatic differences between Sector and transboundary management, both strategies can be characterized as collective action solutions requiring a high level of accountability and cooperation. Moreover, both strategies attempt to overcome collective action problems by linking the normative costs of noncompliance to long-term, mutually beneficial goals. Under the U.S./Canada Resource Sharing Understanding the “actors” are countries, rather than individual sector members, yet conceptually they are confronted with similar incentives and decisions. Under both regimes, participants are motivated to maximize short-term profitability while achieving long-term management objectives. The long-term success of each regime is ultimately dependant upon its members’ commitment to maintaining a mutually beneficial arrangement. In general, enforcement and compliance are simplified in both cases because all parties have a long-term interest in the health of the fishery. [6]

Recommendations:

The Council needs to re-envision accountability as a multidimensional relationship between and among fishermen and managers. Fishermen’s accountability to management regulations, as well as to one another, could be increased by way of the normative compliance costs associated with a nested or area-based management strategy. The Council should also continue to increase its own accountability to fishermen by keeping the Amendment 16 planning process as transparent and participatory as possible. Finally, the Council should continue to prioritize the passage of a Sector Omnibus
Amendment, which will allow more fishermen to create their own sectors in the near future.

**Pacing and Flexibility**

*Avoiding derby conditions*

Critics of hard TAC management are rightfully concerned about the tendency of hard quotas to induce dangerous derby-fishing conditions. Derby fishing occurred under ICNAF quotas, as well as under the CAII Yellowtail SAP, in spite of measures implemented specifically to prevent derby conditions. The trip limits NEFMC imposed under ICNAF management failed because NMFS was not equipped to monitor or enforce them consistently. The advantage of hindsight, however, is that the conditions which caused the failure of these two fisheries can be identified and remedied in future programs. Meanwhile, those programs which have successfully avoided derby conditions provide insight into strategies that could be effective in the future.

All of the seven hard TAC programs described above include regulations that were designed to pace fishing effort. Most groundfish permit holders also participate in other fisheries, and the pool of potential participants in a hard TAC program varies by season. Pacing fishing effort distributes fishing effort more evenly throughout the year, providing equal opportunity for all eligible permit holders to participate. Distributing fishing effort more evenly throughout the year helps keep prices strong by ensuring a more consistent supply of fish to consumers. [65] in [6] It also maintains fishing effort at a moderate pace, so that high fishing effort doesn’t lead to a sudden TAC overage.

Pacing fishing effort can also prevent the overcapitalization associated with derby fishing conditions are also known to result in overcapitalization. In order to catch as many fish as possible in the shortest amount of time, operators have an incentive to reinvest in vessel power and technology. Over time, this creates a cycle of “competitive escalation” in which operators are increasingly forced to invest their returns back into the fishery just to stay in business. [60] In addition to raising operation costs, overcapitalization makes it more difficult for operators to exit the fishery, which is
already a problem in New England. Pacing fishing effort allows fishermen to operate more economically and keep overhead costs down. [60]

In the seven case study fisheries, the Council used daily limits, trip limits, limits on the number of days per month a vessel can fish, and quarterly TAC distributions as strategies to pace fishing effort. Even in retrospect it can difficult to assess which pacing measures actually work—or do not—and more importantly, why. In some cases where pacing seems to have been successful it has never even been necessary; for example, in three years of operation the hook sector has never come close to harvesting its entire aggregate TAC allocation. However, it is possible to identify and subsequently avoid the conditions under which pacing efforts are more likely to fail.

Pacing efforts can fail if they are not adequately enforced, or if managers make incorrect assumptions regarding fishermen’s motivations for participating in a program. Under ICNAF management, trip limit pacing failed because NMFS didn’t have the capacity to monitor and enforce regulations consistently. NEFMC noted that “trip limits put fishermen who obeyed the regulations at a serious competitive disadvantage to those who did not.” [4] In the CAII yellowtail SAP, the two trip per month limit was unsuccessful in part because participation was higher than expected. Even after prices plummeted, fishermen were motivated to fish unprofitably for yellowtail because of the perception that unused B DAS might be cut by future effort reductions.

In both situations, pacing efforts failed due to a lack of accountability. ICNAF trip limits failed because fishermen weren’t consistently held accountable to NMFS or to each other. The CAII yellowtail SAP failed for the opposite reason: fishermen did not believe that managers would be accountable for their assurances that unused B DAS would not be lost. Although pacing measures can prevent that financial losses, overcapitalization and other negative consequences of derby fishing, the effectiveness of any pacing strategy is determined by the perceived level of accountability in the fishery as a whole.

*Mid-season adjustments and triggers:*

Hard catch limits are most likely to succeed under a dynamic management strategy, which allows managers to pace fishing effort, and respond to changing
conditions and reduce or redirect fishing effort as TACs are filled. As of Framework 42, all seven hard TAC programs provide managers (either the Regional Administrator or the Sector Manager) with the means to make mid-season regulatory adjustments. These adjustments most often involve changes to trip and/or possession limits, but may also include prohibitions on the possession of certain species and restrictions on the rate at which participants can use their DAS. This authority enables managers to react quickly to changes in the fishery, without having to undertake a lengthy formal management action.

In many fisheries, mid-season adjustments operate as “triggers” that take effect at one or more predetermined thresholds; for example, the automatic trip limit adjustment schedule for yellowtail flounder proposed to take effect when 30% and then 60% of the TAC is reached. Another example is the Georges Bank sectors, which require the sector to develop a revised harvest strategy when 90% of a sector’s aggregate allocation has been reached. Under certain circumstances these decisions can also be made at the discretion of the Regional Administrator or the Sector Manager. Framework 42 gives the RA the authority to end a B DAS program “if necessary to achieve the objectives of the management plan”; for example, if there is evidence of illegal discard. [1]

Automatic checkpoints or triggers are a useful strategy because they provide a built-in contingency plan to reinforce the basic principle of harvesting as much of a TAC as possible while avoiding overages. However, it would be impossible and unnecessary to come up with a contingency plan for every situation that might arise. Automatic triggers are a useful way to deal with eventualities, but they don’t provide managers with the flexibility to cope with emergencies or unforeseen circumstances which may arise, particularly in an experimental fishery. Managers need to anticipate the need to implement minor adjustments without having to approve and implement a formal management measure. At the same time, the multispecies management plan itself needs to provide for basic contingencies without getting bogged down in endless “what if” scenarios. [31] Providing managers with the ability to make discretionary changes, while incorporating checkpoints or “triggers” into management plans, strikes a good balance between foresight and flexibility. This combination of dynamic and contingency-based
management has gradually worked its way into most hard TAC programs, particularly with the implementation of FW 42.

**Recommendations:**

All hard TAC management strategies should be supplemented with a pacing mechanism that releases predetermined catch limits on an incremental basis and “rolls over” remaining catch into the next period. The Council should be aware that pacing mechanisms are more likely to be successful when there is a high level of accountability throughout the fishery, as discussed in the previous section. In order to practice a more adaptive style of management, the Council should incorporate both automatic triggers/checkpoints and discretionary powers into the management plan. This will enable managers to respond rapidly to real-time catch data provided by an improved catch monitoring system.
Additional Issues

*Catch composition and quota transfers*

In a multispecies fishery, it will be difficult to manage every stock with a hard catch limit without giving special consideration to depleted or rebuilding stocks. In general, yield from the fishery as a whole will be constrained by gear selectivity and the ability to minimize mortality on the most depleted stocks. With or without catch limits, however, the multispecies fishery is still a mixed-species assemblage in which some stocks can sustain higher fishing pressure than others. SFA rebuilding provisions will always prioritize the rebuilding of depleted stocks. If hard catch limits manage a fishery to the “weakest link”, this is more indicative of the condition of the fishery than the efficacy of hard catch limits.

It would be unrealistic to expect to manage every stock to the margin, with or without the use of hard catch limits. Catch data from the seven case study fisheries shows that most hard TACs never even came close to being filled, primarily because fishermen were restricted by DAS allocations. Furthermore, the Council has already acknowledged that Amendment 13 rebuilding objectives would make it difficult to extract optimum yield from the multispecies fishery; yet Amendment 13 measures were still consistent with the Council’s mandate to achieve optimum yield since the long-term benefits of rebuilding depleted stocks were thought to outweigh the minor cost of forgone yield from healthy stocks.

Similarly, hard catch limits should not be held to an unattainable definition of optimum yield that requires managing each stock to the margin. If hard catch limits can ensure that fishing mortality does not exceed target levels, thereby maximizing the likelihood that rebuilding plans will succeed, this too should fulfill New England’s mandate to achieve optimum yield. From a long term perspective, hard catch limits provide a level of accountability that more than compensates for forgone yield in the short term.

However, the Council can still identify ways for fishermen to maximize yield from healthy stocks within the constraints imposed by hard catch limits. It would be difficult to make specific recommendations without knowing which management strategy the Council will pursue under Amendment 16. However, regardless of how points or
quota are allocated by vessel, permit holder, sector, area etc., it is unlikely that these entities would be able to use precisely their allocation of points or quota—no more, and no less—in a given year. If the Council implements hard catch limits across the entire fishery, there needs to be a mechanism to allow for the transfer of quota or points. Transferability will further discourage illegal discarding by allowing fishermen to retain their entire catch, and transfer quota as needed to continue fishing. [6] Furthermore, New England could place limitations and conditions on catch or quota transfers in order to address equity concerns and preserve the diversity of its groundfish fleet.

New England should look to other hard TAC fisheries for examples of successful catch/quota transfer strategies. British Columbia’s multispecies groundfish fishery, for example, is managed under 55 separate hard catch limits. As in the New England multispecies fishery, stocks vary in their abundance and dockside value. Although the fishery is managed under ITQs, which are not an alternative up for consideration in New England, many of the quota transfer mechanisms could be adapted to a point or area-based management system. In general, fishermen are allowed to fish in an area until they reach their quota allocation for that stock area. In order to continue fishing, they have to transfer additional quota to their vessel by way of an open quota market. There is a limit on the number and volume of transfers that can be made per year, as well as a cap on vessels’ total holdings, and quota can only be transferred between active vessels. [66] British Columbia also allows fishermen to count limited overages against the next year’s quota, and carry underages over into the next fishing year as well. [66]

New England should also continue to identify selective fishing opportunities, including additional Special Access Programs. With the implementation of real-time monitoring technology these programs will become more cost-effective to administer. At the same time, managers also need to avoid “managing to the margins”, which is a tendency for managers to capitalize quickly on uncertain or marginal opportunities. [52] New England should adopt a conservative experimental approach that “errs on the side of conservation rather than increasing exploitation.” [52] All selective fishing programs should include the same triggers, pacing mechanisms and discretionary powers that are recommended for hard TAC programs in general. These will allow managers to make
mid-season changes to the fishery and provide an “exit strategy” in case the program does not progress as planned.

**Overcapitalization and dedicated access privileges**

The Council will still need to address a serious problem with overcapitalization and excess capacity in the New England groundfish fleet. It can be difficult to enforce catch limits in an overcapitalized fishery, because there is an upper limit on the number of businesses that can operate efficiently under output regulations. Overcapitalization is associated with an instrumental (economically motivated) perception of compliance costs, [53] and creates a strong incentive for noncompliance. [62] Compliance is more likely if managers can provide incentives that will remove excess or latent capacity from the fishery, and reduce participation to a more appropriate level. [62] The Council should be aware that overcapitalization has the potential to negate the positive effects of peer accountability provided by sector and possibly area management.

If New England decides to conduct a vessel buyback, managers need to ensure that the removal of vessels is removing capacity and that other vessels aren’t compensating with “capital stuffing” (further overcapitalization). [6] Buybacks tend to be more successful when they end the race to fish by introducing some variation on dedicated access privileges. [6] Dedicated access privileges, loosely defined, can include community development quotas or cooperatives, territorial rights, and individual transferable quotas. [6] Area or point-based management systems would certainly be compatible with this definition. New England fishermen have traditionally been resistant to dedicated access privileges, at least in the form of ITQs, because they improve efficiency through consolidation of the fleet, at the expense of fleet diversity. However, the social impacts of ITQs or any dedicated access privileges can be moderated with restrictions on quota transfers and leasing. [6]
Conclusions

Amendment 16 is a critical opportunity to integrate hard catch limits into the multispecies fishery, in addition to or in place of the prevailing DAS system. Hard catch limits will ensure that the fishing industry and managers alike are held accountable to rebuilding timelines, and break the cycle of effort reductions that is threatening the future of New England’s diverse groundfish fleet. Amendment 16 is also an opportunity to facilitate constructive communication between fishermen and managers, and create a system that will allow fishermen to take a proactive role in co-managing the multispecies fishery. Although New England has been slow to accept hard catch limits as a viable management strategy, managers now have the advantage of hindsight. New England should look to hard TAC-managed programs within the multispecies fishery, as well other multispecies fisheries in the United States and abroad, for strategies that can be adapted to the northeast multispecies fishery. As a backstop to either area management or the point system, hard TACs will support a flexible and highly responsive system that balances accountability with individual opportunity.
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