

Complexities of collaboration in fisheries management: the northeast United States tilefish fishery

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1. INTRODUCTION

In recent years, the social and economic impacts of depleted stocks on fishing businesses, families and communities in the northeast United States have been significant. Regulatory regimes to reduce fishing pressures have often exacerbated these impacts. In some cases, new regulations have heightened competition between fishery sectors or among stakeholders with the result of suboptimal prices and more dangerous fishing practices. In other cases, fishers have reacted to this environment by cooperating with others to improve the viability of their livelihoods. Numerous groups in the Northeast US have organized themselves to become more active in the management process and in the decisions affecting their livelihoods (Pinto da Silva and Kitts, 2006). These initiatives are changing the way fishers relate to other fishers, to the stocks they depend on and to the management process that governs their fishing activities.

This paper presents a case study of the complexities of creating long-standing collaborative management arrangements within the construct of the existing US regional fishery management council system. It reviews the history of the North Atlantic golden tilefish (*Lopholatilus chamaeleonticeps*) fishery, the development of the Tilefish Fishery Management Plan (FMP) and the evolution of collaboration between permit holders in the vessel categories (A, B and C) established in the FMP. Category A members have achieved positive outcomes through collaboration since the development of the FMP. Categories B and C vessel owners have been less successful in achieving similar results. This fishery is ideal as a case study due to its small size (approximately 30 permits and 12 active vessels) and its simple marketing structures.

Collaboration among fishers was not an explicit objective of the Tilefish Fishery Management Plan. The organizations and relationships that have developed have done so despite the management process. This paper expands on earlier work by the same authors on emerging co-management initiatives in the Montauk Tilefish Association (Kitts, Pinto da Silva and Rountree, 2007; Pinto da Silva and Kitts, 2006) to tilefish fishery participants in all three permit categories. This paper examines the different outcomes for these other participants and highlights various policy implications related to this experience.

2. BUILDING COLLABORATION IN FISHERIES MANAGEMENT

Fisheries management in the United States has frequently been criticized for failure to foster trust between fishers and government agencies (Gilden and Conway, 2001; Grafton, 2005). An adversarial environment has been the backdrop for the fisheries management process (Kaplan and McCay, 2004). Although the US Regional [Marine] Fisheries Management Council system (coupled with the requirements of the National Environmental Policy Act) provides ample opportunities for participation, most of these are limited to passive forms of participation (GAO, 2006). Improving the quality of participation by fishers is considered by many as essential for achieving more sustainable, equitable and efficient management outcomes (Pinto da Silva and Kitts, 2006; Ostrom, 1990; McCay and Jentoft, 1995; Weber and Iudicello, 2005).

Collaborative management of marine resources involves shared responsibility between government and fishery stakeholders. In the Northeast US, collaborative approaches among fishers have emerged despite the absence of an enabling environment. In principle, fostering greater fisher participation should be simple: in practice, stakeholder groups need to be ready, willing and able to assume greater responsibility. Our study suggests that the ability of fishers to organize themselves to participate in the management process depends, in part, on the existence of social networks and trust among the fishers involved. It also suggests that obstacles to collaborative behaviour can occur at regulatory, community, family and individual levels.

The literature on common property resource theory points to design principles that can determine the ability of user groups to sustain cooperative behaviour. Ostrom's (1990) well-known principles include small group size, effective monitoring and enforcement, and minimal rights to organize. Critical too are relationships between resource users and the relationships between resource users and the government. Ostrom (1990) also identifies the degree of trust and sense of shared identity within a group as important ingredients. Local-level social capital facilitates such management by providing the social relationships and the trust upon which rules and monitoring can be based (Grootaert, 1998). Putnam (1992, p. 167) defines social capital as "trust, norms and networks" that facilitate social co-ordination and co-operation for mutual benefit. Social capital generally refers to the institutions, relationships and norms that shape the quality and quantity of a society's social interactions. Social cohesion is critical for economic prosperity and for sustainable development (Ostrom, 1990; Ghai and Vivian, 1992; Pretty and Ward, 2001). Social capital is not simply the sum of the institutions or individuals underpinning a society; it is the 'glue' that holds them together.

Baland and Platteau (1996) assert that government should support communities in areas that complement local capabilities. Such areas include providing a legal framework that legitimises collaborative arrangements and furnishing technical assistance or guidance. When relevant, economic incentives for participation and rule compliance should also be considered.

3. THE TILEFISH FISHERY

Since the early 1900s, tilefish have been harvested off the Mid-Atlantic and New England coasts using longline gear, and to a lesser extent, otter trawls. The trawl fishery, developed in New England after World War II, accounted for most of the landings through the mid-1960s. In the late 1960s and early 1970s, a directed commercial longline fishery rapidly developed and subsequently expanded into the Mid-Atlantic region. Barnegat Light, NJ, quickly became known as the 'tilefish capital of the world'. The initial gear used was tub trawl gear as used in earlier years of fishing for cod. This gear has since evolved to the circle hooks that all tilefish longliners use today. Currently, longline vessels account for more than 80 percent of the commercial catch. Longline vessels typically set 40 to 45 miles of gear a day and fish between 4 000 and 4 500 hooks a day. Gear is set during the day and hauled back at night. Hooks are

snapped on by hand, a fairly labour intensive process and baited with *Illex* squid or frozen mackerel. Many of the longliners in Barnegat Light are related to each other by family or friendship and think of tilefish as historically significant to their personal histories and community.

As the size of the fish decreased in the early 1980s, several Barnegat Light vessels switched to other longline fisheries such as swordfish and tuna. Others diversified further to survive financially and, as many fishers argue, to give the stock time to recover. By the late 1980s and early 1990s, participants in the tilefish fishery were primarily from eastern Long Island, NY and were using upgraded vessels adapted to newer technologies. These larger, steel-hulled vessels from New York were more resilient to bad weather and able to fish further offshore. As a result, trip length increased and the New York fleet became more dedicated to, and dependent on, tilefish fishing. The historical shift from New Jersey ports to ports in New York is illustrated in Figure 1.

The majority of the tilefish catch comes from an area in the offshore Mid-Atlantic region between the Hudson and Veatch Canyons (Figure 2). Tilefish (also known as golden tilefish) (Photo 1) inhabit the outer continental shelf from Nova Scotia to South America and are relatively abundant at depths between 80 m and 440 m (NEFSC, 2005). Tilefish reach lengths of up to 1.3 m and live as long as 35 years. They are bottom-dwellers and are generally found around canyons, where they dig out large burrows on the ocean floor.

Most tilefish landed are gutted, iced and trucked to New York City's Fulton Fish Market and sold on consignment. Small fish markets in New York, New Jersey and Connecticut buy whole tilefish daily from the Fulton Fish Market in one of two carton quantities (132 or 264 kg). Tilefish purchased at the retail level are primarily cooked at home or used for sushi. While landings at Long Island, NY are the primary source of tilefish for the Fulton Fish Market, other vessels truck some to the New York market from New Jersey, Rhode Island and Massachusetts. In an attempt to avoid the price sensitivity of Fulton, vessels landing in NJ have sought out more diverse markets, both nationally and internationally.

The market price for tilefish is significantly affected by the amount of product on the market at any one time. The ex-vessel price of tilefish tends to be sensitive to both the timing and quantity of tilefish landed. When the market is flooded (i.e. if more than 27 tonnes are landed in one week), prices typically decline as much as \$2.20 a kilo.

4. THE REGULATORY ENVIRONMENT

4.1 Development of the Fishery Management Plan (FMP)

Prior to implementation of the Tilefish FMP on 1 November 2001, the tilefish fishery was an open access fishery. The stock was determined to be in an overfished condition (MAFMC, 2001). Fishing trips were about 10 days long, crews worked up to 22 hours a day and full-time vessels fished up to 330 days a year. Vessels came to port only

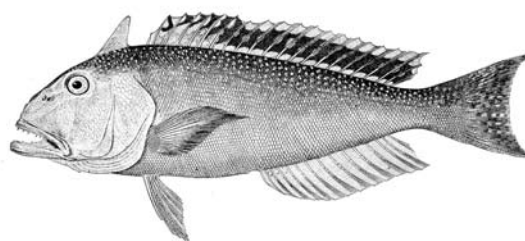
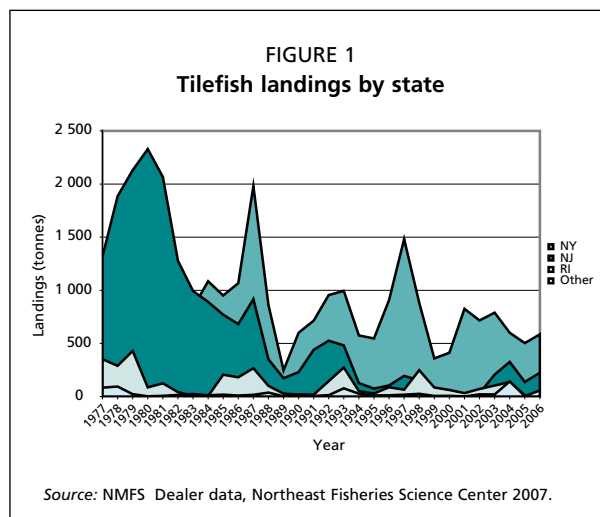
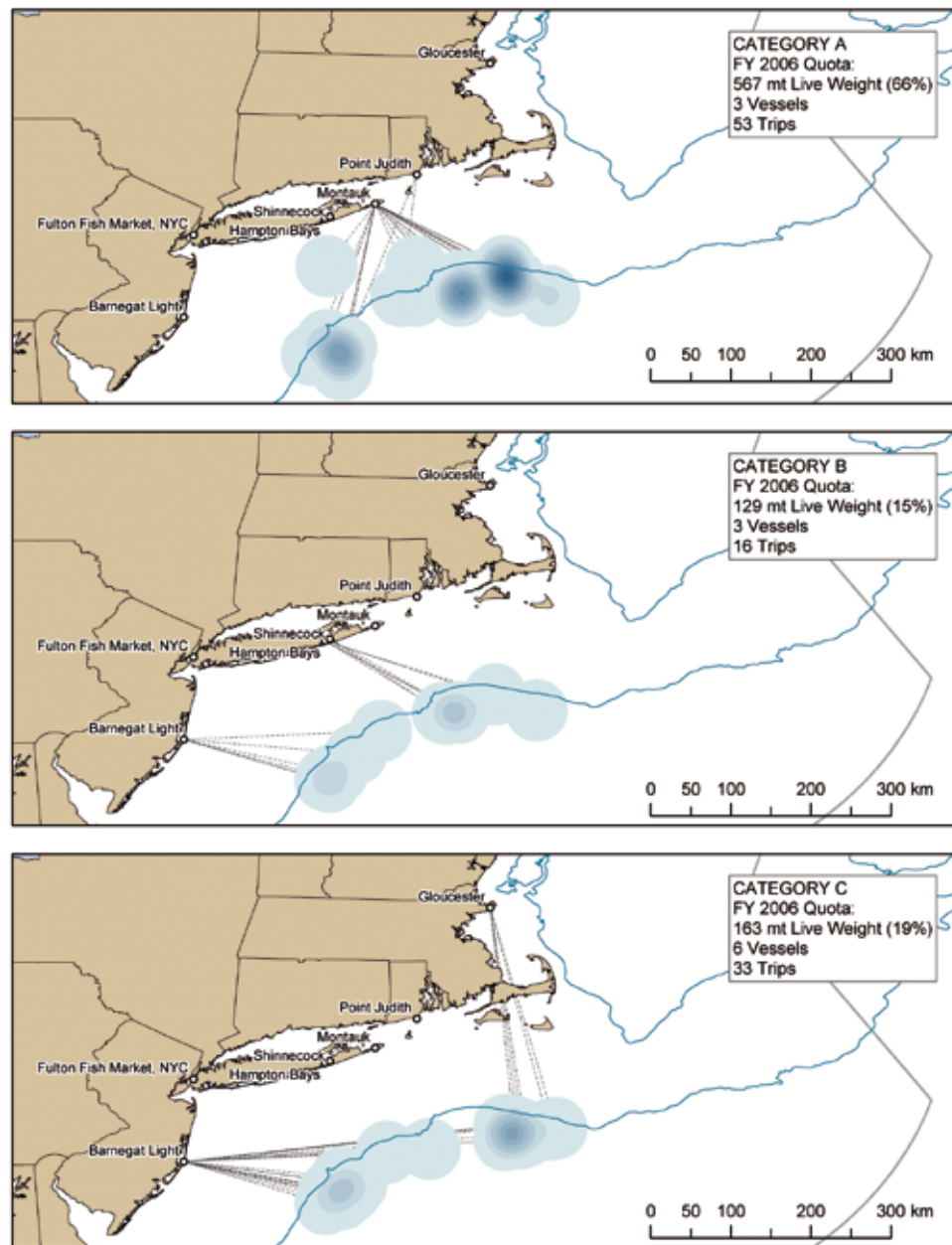


PHOTO 1
Tile fish (*Caulolatilus chrysops*)

FIGURE 2
Tilefish fishing areas, 2007



Source: US Department of Commerce, National Marine Fisheries Service, Northeast Fisheries Science Center Vessel Trip Reports and Northeast Regional Office Permit Records. Created by Charles Fulcher, Northeast Fisheries Science Center, 2007.

long enough to land their catch, to replace crews and to perform necessary vessel maintenance.

The goals of the FMP are to eliminate/prevent overfishing, rebuild the tilefish stock, prevent overcapitalisation in the fishery and limit new entrants. Although some tilefish fishers were in favour of using individual fishing quotas (IFQs), the US Congress had imposed a moratorium on IFQs during this time. The tilefish FMP applies to US waters north of the Virginia/North Carolina border: tilefish south of this border are managed under the South Atlantic Fishery Management Council's FMP for the Snapper-Grouper Fishery.

The FMP enacted a suite of management measures. The principal measures included a: 10-year stock rebuilding schedule; a commercial quota divided into full-time (with

TABLE 1
Qualification criteria per permit category

Permit category	Number of qualifiers	Proportion of quota	Qualification criteria
Category A	4	66%	>250 000 lb of tilefish a year for any 3 years between 1993 and 1998
Category B	5	15%	> at least 1 lb of which was landed prior to 15 June 1993 > 30,000 lb a year for any of 3 years between 1993 and 1998 > at least 1 lb of which was landed prior to 15 June 1993
Category C (part-time)	42	19%	10 000 lb of tilefish in any one year between 1988 and 1993 and 10 000 lb in any one year between 1994 and 1998, or landed 28 000 lb of tilefish in any one year between 1984 and 1993, at least 1 lb of which was landed prior to 15 June 1993

two different tiers), part time and incidental categories; a trip limit for the incidental category; and limited entry for the full-time and part-time categories. An annual Total Allowable Landings (TAL) fishing quota of 905 t live weight was established, which reduced landings by half. A limited access program established three permit categories (A for one full-time group, B for a second full-time group and C for part-time). In developing the qualifying criteria for the limited-access program, the Mid-Atlantic Council considered a number of alternatives to address historical participation in the fishery. Access was limited and quota allocations were based on tilefish landings from 1988 to 1998 (see Table 1). The FMP qualified 51 vessels, only nine of which were considered full-time. The number of vessels that have maintained their qualification status since the FMP has gradually declined to 30. Photo 2 shows an example of a vessel targeting tilefish.

The development process for the Tilefish FMP provided the impetus for the initial collaboration of different fishery stakeholder groups. One of the groups to emerge was the Montauk Tilefish Association (MTA), a group of four highly active tilefish fishers in Montauk, NY whose combined harvests accounted for 90 percent of the total US Northwest Atlantic commercial tilefish landings in the three years prior to the FMP (1998–2000). The members of this group later became the only vessels in Category A. Since landings were to be reduced under the FMP, the MTA's primary concern was that reductions occurred proportionally across all vessel size categories. The MTA did not want to incur what they felt was more than their fair share of the cost of rebuilding.

The Historical Tilefish Coalition (HTC) was also formed during the development of the FMP by approximately 24 fishers and dealers from Barnegat Light, New Jersey and Hampton Bays, New York. HTC members had developed the longline tilefish fishery during the late 1970s, but, by the beginning of the 1980s, many Coalition members had left the tilefish fishery to pursue other fisheries. Unlike the HTC, whose strength was in landings early on, the MTA's strength was in landings just prior to the FMP. Since limited access programs were becoming increasingly used as a management tool in



PHOTO 2
F.V. Restless, a tilefish vessel based in Montauk, New York

the Northeast and qualifying criteria were usually based on landings history, the main concern of the HTC was to secure future access to the tilefish fishery. Members of the HTC would emerge from the FMP divided between the B and C categories.

The annual TAL is distributed among the three categories after deducting quota for incidental bycatch of tilefish and research projects (not yet utilized). Of the remaining TAL, 66 percent is allocated to Category A vessels, 15 percent to Category B vessels and 19 percent to Category C vessels (see Table 1).

4.2 Amendment 1: The potential for IFQs

The Congressional moratorium on IFQs has now been lifted and the current administration is encouraging market based management (NOAA, 2005). Amendment 1 of the Tilefish FMP is currently under development (as of 2007) and incorporates the implementation of IFQs for one, some, or all permit categories. The most controversial issue for IFQs is the determination of initial shares. Initial allocations are currently being proposed to be based on historical landings from one of three time periods: average landings from 1988 to 1998 (the same period used in the FMP); average landings from 2001 to 2005 (landings since the FMP); and average landings for the best five years from 1997 to 2005 (five years before the FMP until 2005).

Interviews with permit holders from each permit category revealed varying opinions about the merits of IFQs. Those with nothing to gain under any time frame remain strongly opposed to the IFQ suggestion and those with higher relative landings were likely to be supportive. These varying opinions will be discussed in detail in following sections, as it is one of many factors that influence the degree of collaboration in the fishery.

4.3 Licence and association fees

There is no license fee for this fishery: vessels receive an allocation for an individual vessel quota (IFQ) under their federal fishery permit, which they receive at no charge. However, a public hearing document for Amendment 1 to the tilefish fishery Management plan was submitted in September 2007 in which IFQs are proposed. It is expected that this will happen for some or all of the participants. This plan suggests that a cost recovery fee of 2% be collected for the first year only. The issue will be re-addressed after the first year when the marginal increase in costs is better known.

The MTA do not pay any association fees, but rather share the cost of any item that is incurred, e.g. the need to hire a lawyer for some reason. The New Jersey sector might hire a lawyer for the public comment period and share that cost, but otherwise they have no formal association fees.

5. COLLABORATION IN THE TILEFISH FISHERY

5.1 Experiences among three permit categories

With no expectation of cooperation and, more importantly, no conditions placed on the allocations of TAL to foster cooperation, the Tilefish FMP became an 'experiment'. Participants were free to cooperate or not with no regulatory consequence of either path. This becomes an interesting case study that serves to illuminate the contrasts in cooperation among the three vessel categories. Table 2 reveals, in a simplified manner, some of the factors that have supported and constrained collaboration among the different categories of permit holders.

A general sense of how fishing behaviour differed among the categories can be seen in the 2006 fishing year landings patterns (Figures 3, 4 and 5). Category A vessels (i.e. the MTA vessels) spread their landings evenly over the year. Category B landings followed a steady progression similar to Category A but fell short of reaching the TAL and landings flattened at the beginning of August through November 2006. This was due to the National Marine Fisheries Service (NMFS) closing the fishery for this

TABLE 2

Factors affecting collaboration among fishermen in the tilefish fishery in the NE United States

Permit Category	A	B	C
Level of current collaboration	High	Low	Low
Number of vessels	3	5	22
Number of active vessels – FY2006	3	3	6
Vessel size	Large	Med/Lg	Small/Med/Lg
Homogeneity of geography within permit category	High	Low	High
Level of dependence on tilefish	High	Mix	Medium
Trust and familiarity among category members	High	Mix	Mix
Participation in FMP development	High	Med	Low
Individual satisfaction with expected IFQ allocation	High	Uncertain	Uncertain
Number of years in fishery	Medium	Mix	High

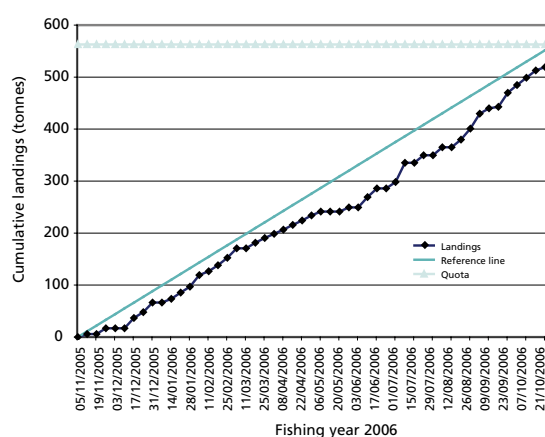
category in anticipation of reaching its TAL. Category C vessels landed (and exceeded) their quota in four and a half months, which resulted in a prohibition on landing tilefish by these vessels for the remainder of the fishing year (until 1 November 2006). This pattern indicates a race to fish that was confirmed via interviews with Category C permit holders.

The consequences of racing to fish are well documented (Leal, 2002; Committee to Review Individual Fishing Quotas, 1999) and are also well understood among fishers. This fishing strategy leads to over-investment in fishing inputs and induces such behaviour as fishing in bad weather and delaying needed repairs. Derby fishing shortens the fishing season, which generates shortages and gluts in the market. Members of all categories noticed that when multiple vessels landed tilefish at the same time, ex-vessel prices dropped. Consumers and fish dealers prefer and are willing to pay more for a steady supply of fresh fish. In the tilefish fishery, the benefits of a steadier landings pattern can be seen by comparing the average monthly prices among categories. Figure 6 illustrates that Category A vessels generally receive the best prices followed, respectively, by Category B and C. Recognizing these price differences, members of all categories attempted to avoid derby fishing. The outcomes from their attempts differed widely.

5.2 Collaboration in Category A: Montauk Tilefish Association

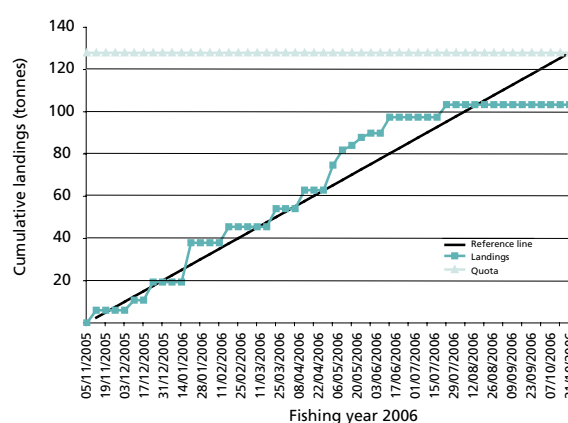
Members of Category A have had the most success in establishing cooperative institutions. They were organized before the implementation of the FMP and had formed a registered non-profit organization, called

FIGURE 3
Cumulative landings for permit category A

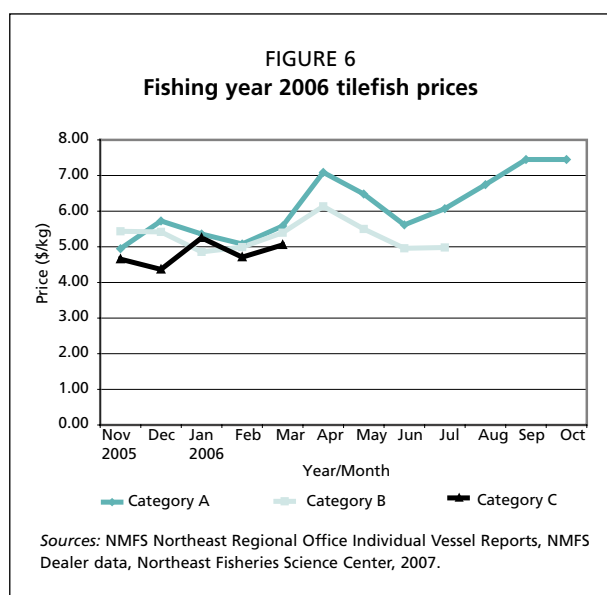
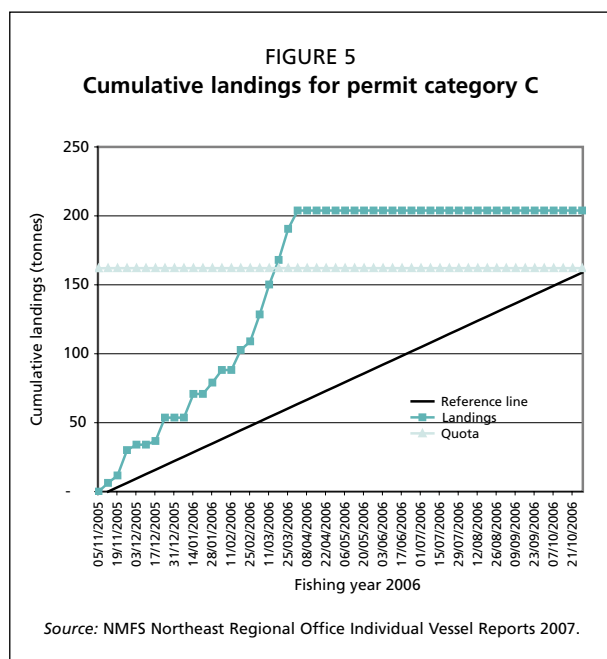


Source: NMFS Northeast Regional Office Individual Vessel Reports 2007.

FIGURE 4
Cumulative landings for permit category B



Source: NMFS Northeast Regional Office Individual Vessel Reports 2007.



the Montauk Tilefish Association, whose objective is to provide an organizational structure for making collective decisions for its members. The MTA also provides members legal protection under the *Fishermen's Collective Marketing Act* against possible antitrust issues (Kitts and Edwards, 2003). Members share association costs equally, not according to quota share. The collective decisions made by the MTA are intended to enhance the performance of all member businesses.

The Montauk Tilefish Association was formed so that its members would have a common voice in the development of the FMP. The group supported the introduction of IFQs in the tilefish fishery but this option was unavailable due to the national moratorium. With IFQs unavailable, the MTA felt that if they could be grouped into one permit category they could collaborate with each other to achieve a similar outcome. All four members were grouped into Category A.

While being grouped into the same category was important, group characteristics were also important for fostering collaboration. For example, all members live and fish out of Montauk, NY, use the same dock and packing facilities and have known each other and each other's families for many years. Close social and business ties coupled with the Category A allocation of the majority of the TAL (66 percent) provide MTA members with a unique foundation for collaboration.

The FMP did not include any restrictions on how Category A members could fish their quota. The MTA had many options on how to collectively harvest their allocation

of the TAL. The key element in the strategy of MTA's four members was the division of the Category A allocation among the four members on the basis of the same 11-year period (1988–1998) used in the FMP. The members with the highest historical landings conceded some allocation in favour of those with the lowest landing history, resulting in shares that ranged from 20 percent to 29 percent of the total Category A catch quota. In 2004, subsequent to the implementation of this agreement, one of the MTA members decided to sell his vessel. Two of the three remaining MTA members formed a corporation and purchased the vessel and its Category A landings history. The corporation then sold the vessel and divided the vessel's share of the Category A quota between the vessels of the two corporation members.

Given the close relationship among MTA members, agreements were made expeditiously and without the aid and cost of a lawyer. Decisions concerning allocations of quota were reached via consensus as are all decisions made by the group. Members signed an allocation agreement more as a formality than a necessity. There is no formal mechanism (e.g. based on business contract law) in the MTA agreement with which to

enforce the share agreement or to apply sanctions if a member exceeds his agreed share of the quota. To track their landings, MTA fishers call in their trip totals to one of the members who coordinates the Association's fishing activities. Given the small size of the MTA, members feel they "are either all in or all out". Formal internal enforcement and monitoring of the group is not considered necessary.

MTA members coordinate their landing patterns to ensure that multiple vessels do not land within the same week and so ensure a stable flow of product. Members also try to stay aware of Category B and C vessel activity. Since Category C and to a lesser extent Category B, vessels have continued to derby fish under the FMP, the landings from these fleets generally occur in the early part of the fishing year. Because each permit category has a separate annual allocation, there is no incentive to race for fish between categories. The relationship between the MTA and its primary dealer in the Fulton Fish Market is also important. Fishing trips are scheduled so that deliveries to Fulton can be made on Mondays to enable the dealer to hold fish in cold storage and thus have supply available over the course of a week.

MTA members have not considered pooling their revenues and expenses, as is done, for example, in the Chignik Alaskan salmon fishery (see Knapp, this volume). Although MTA fishers enjoy the benefits of cooperation, they wish to continue to maintain their separate businesses. While members make collective decisions on many levels, some decisions are made independent of the group. For example, though members have traditionally used the same delivery service, one of the MTA members recently decided to work with another company. This same member, who has the smallest share of the Category A quota, has temporarily re-rigged his vessel to participate in other fisheries for part of the fishing year.

Cooperation among MTA members has resulted in improved product quality and a more stable operating environment. A steady supply of fresh product benefits fish dealers, since they can be more confident about future supplies, can avoid market gluts, can make longer range business plans and can explore new market niches. Fresher fish translates into higher prices. The higher prices do not result from withholding product from the market, since the MTA annually lands the entire Category A quota. The higher prices result from meeting consumer needs and providing a higher quality product.

Fishing has become safer for MTA members. If the weather is bad or a piece of equipment is broken, a trip can be postponed until weather improves or repairs made without fear of 'losing' catch to someone else. MTA fishers no longer need to invest in equipment or fishing power that is necessary only to catch fish faster.

Category A permit holders are hoping for the implementation of an IFQ program that would formalize their cooperative agreement. Members of the Category A feel that IFQs will provide them with more security, flexibility and control, and will protect their future fishing rights. While MTA members can currently trade their internal catch quotas within their agreement, it is unclear how this might affect a vessel's landings history in any future IFQ allocation decisions. IFQs may also allow the MTA to purchase quota from vessel owners in the other two permit categories, which is currently not possible. The MTA also feels that IFQs would help avoid some of the uncertainties that would arise if one of their members wanted to leave or decided to break the internal agreement. While this particular issue might be resolved through the use of private business contracts, IFQs achieve the same result without additional expense, planning and negotiations. The two MTA members who bought out the fourth member are concerned about the status of the fishing history associated with the purchased vessel. Even though NMFS provided them official documentation confirming their ownership of the vessel's fishing history, the new owners are uncertain how tenable that history is if the vessel is no longer fishing for tilefish. IFQs would resolve a number of uncertainties for MTA members.

5.3 Collaboration in Category B

While Figure 6 shows that Category B's landings pattern is similar to Category A's, the level of cooperation is not as high. The three active members of this category have tried to make verbal agreements to share the TAL, but these have not always been honoured. The evenly distributed landings pattern is a function of both cooperation and individual efforts to spread the landings. That is, even though one member has caught more than agreed, there is evidence that those landings are spread over the fishing year.

Not all Category B vessels are from the same dock, port or even state, so communication and within-category monitoring of landings is more difficult. Nor are all members of this category active tilefish fishers. Even among active participants, some are fishing more than others. The disproportionate landings increases the level of uncertainty among those actively fishing. There is also some risk that inactive vessels will re-enter the fishery, which makes it hard to maintain verbal agreements and trust.

All Category B vessels have permits in other fisheries. Some have distinct seasonal rounds determined by the stock abundance of other fisheries or regulations in other fisheries. Although Category B vessels depend on tilefish for much of their income, when the TAL is reached, they shift to other fisheries.

Although several permit holders in Category B are long-time tilefish fishers with established landings records (either historic or recent), they differ in terms of the years in which their landings occurred. This has created mixed opinions within the group about the adoption of IFQs. Positions depend on which time frame is used to determine initial shares and on the status of the inactive fishers. Even those who are currently inactive believe that since they developed the fishery, they should have some long term rights, especially when the stock recovers.

5.4 Collaboration in Category C

Sub-groups of Category C fishers have attempted to establish an agreement to stop the race to fish in this category but have faced a number of challenges. Although this category has the largest number of potential participants (22), only six vessels actually fished during fishing year 2006 (1 November 2005 – 31 October 2006). Communication and coordination with other vessels is therefore possible. While not all Category C vessels currently fish out of Barnegat Light, NJ many have a long history and strong ties to this community. In some cases, fishers are long time friends and even brothers, sons and fathers – all characteristics that could provide a strong basis for cooperation (as it did in Category A). However, other factors facing this group create barriers for collaboration and divisions within this Category.

Category C is made up of active and inactive (or less active) vessels. The active Category C vessels, like Category B vessels, are not entirely dependant on tilefish. All active vessels in Category C are diversified and engage in multiple fisheries (such as swordfish, tuna, scallops and groundfish). Some vessels in this category leave the region entirely during the winter months to take advantage of better conditions and stocks in the South Atlantic. Diversification strategies reduce exposure to drastic fluctuations in stocks or market prices of certain species. The seasons of these alternative fisheries are often short and therefore one fishery alone would not be sufficient to support the vessel year-round. In almost every case, interviewees stated that tilefish represent an essential component of their seasonal round – one that if interrupted would have significant consequences on their fishing businesses.

Although diversification can be a risk-minimizing strategy, engaging in multiple fisheries limits participation in fisheries management. Multiple fisheries require involvement in and awareness of multiple management plans. Interviews indicate that part-time and inactive tilefish permit holders are much less likely to know what is at stake and how they can affect the outcome of the Amendment 1 process, even though IFQs may seriously limit their future in the tilefish industry.

Active tilefish vessels in Category C are more involved and aware of what is at stake. Some fishers see it in their best interest to build as much fishing history as possible (i.e. to race) so they may maximize any future quota allocated to them. This uncertain and dynamic regulatory environment creates perverse incentives for fishers to race against each other. One result is that successful cooperation in this category has been constrained by those engaged in the race to fish.

Vessel size has also created barriers to cooperation in this category. The 1 November start date of the tilefish fishing year has inadvertently created a distinct advantage for larger vessels as the quota for this group may end before the winter is over (as happened in fishing year 2007). This starting date effectively excludes smaller vessels that are unable to reach the fishing grounds due to safety reasons during the winter. This feature of the FMP was never debated or publicly considered; the 1 November start date was defined not by vote but as a consequence of an administrative process.

The initial allocation of IFQs in Category C would clearly benefit some individuals more than others. By reducing the incentive to race, IFQs would allow individual fishers flexibility to schedule tilefish fishing into their seasonal rounds. Once the difficult decisions about initial allocations are made, Category C fishers may find that coordinating the timing of their landings would bring better prices.

6. CONCLUSIONS AND POLICY IMPLICATIONS

Prior to the introduction of the FMP, the tilefish fishery was overfished under open access. Fishers were seeing diminishing returns from their efforts and experiencing other negative impacts (e.g. longer hours and longer trips) as a result of the continuing degradation of the resource. Vessel owners reacted in different ways, with some continuing to fish while others looked to other fisheries to make up for losses in catch and (many argue) to let the tilefish resource rebuild.

The FMP introduced regulations (TAL and limited access) to prevent and halt overfishing and to rebuild the tilefish resource. Landings were reduced, generating social and economic costs to fishery participants and their families. Not only could fewer fish be harvested, but also the new measures did not in themselves change the relationship among harvesters that had led to the suboptimal outcomes of derby fishing and market flooding. Limiting access and creating a system of permit categories (a proposal initiated by participants) did provide Category A fishers with an essential foundation upon which to build by introducing additional, informal, cooperative management measures.

Category A members eliminated incentives to race to fish and helped their fishing businesses stay viable under the new regulations. Their informal agreement enabled participants to tailor fisheries management to help secure their livelihoods. Since the introduction of the FMP and their informal management measures, Category A fishers have gone from being a threat to the resource to being stewards and managers of the resource. They now see a direct connection between their actions and the quality of the resource and their livelihoods, and they have the means to control these outcomes. The development of these informal institutions has also created a different relationship to the management process, which most fishers do not enjoy. They are now proactive participants in the process of designing relevant management institutions and helping to rebuild the resource.

Category A benefited from a number of social characteristics that facilitated cooperation, including social capital and trust between members and small group size. Their early involvement and participation in the development of the Tilefish FMP improved their chances of success. Although the other two tilefish categories exhibited some of these same characteristics, they have not succeeded to the same degree in avoiding sub-optimal outcomes (i.e. derby fishing, lower prices and shorter fishing seasons).

With few exceptions, Category B and C vessel owners have not been active in the management process (a fact that likely influenced the outcome of the FMP to be so favourable to Category A). Many are unaware of even the most basic statistics related to their fishing businesses (such as their yearly landings) that are essential in understanding their role in the fishery, as well as what is at stake with the potential introduction of IFQs. This lack of awareness is a fundamental block to their ability to influence the management process to produce benefits for themselves. The potential introduction of IFQs has exacerbated the race as some vessel owners attempt to build their landings history. Much is at stake in this decision and it is no surprise that this will influence vessel owner behaviour.

Successes and failures of cooperation depend on the time frame and perspective taken. In the short term, Category A vessels are clearly making the best of the current regulatory structure. However, if IFQs are implemented, the strategy some members of Category B and C have taken may result in a larger share within their category than if they would have cooperated. With the differences in group composition, it is difficult to determine the reason for the breakdown of the Category B's and C's agreements. Explanations may include the incentives to pursue a strategy to build history for an eventual IFQ; the desire to increase current revenues through increased landings or simply group dynamics.

These examples of cooperative and non-cooperative behaviour are unintentional (and previously poorly understood) consequences of the Tilefish FMP. While quota management within a limited access fishery is a necessary condition for collaboration, it is not sufficient. If management councils are interested and serious about formalizing opportunities for more collaborative structures to emerge, this case study provides some issues to consider in the planning process.

- i. How management measures will impact relationships between and among fishers and incentives (or disincentives) to cooperate?
- ii. That incentives for stewardship and rational use should be embedded in management measures (e.g. there should not be incentives to race).
- iii. How an atmosphere of ever-evolving regulations impacts fisher's ability to enter into long-standing and stable agreements.
- iv. That permit holders should be encouraged to stay informed about their landings history, as this may influence the degree and quality of participation in the management process.
- v. The differential impacts/incentives created for part-time fishers pursuing a diversified fishing strategy may need special consideration so they are not disproportionately impacted by management measures.
- vi. The characteristics of fishery participants (including group dynamics) may affect the design of management measures that promote cooperative behaviour.

The introduction of IFQs into a fishery is a major management shift. Many of the objectives of individual quota management may also be obtained by cooperative arrangements. Whichever direction is taken, fishery stakeholders should be aware of what they may gain and lose. In the course of carrying out this research, some interviewees have learned more about these issues and so may play a larger role in the development of policies that affect their livelihoods.

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