

# Resistance to alternative management in fisheries

## *Economic and cultural considerations of North Carolina's commercial fishers*

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**ABSTRACT.** Research in recent decades has shown that although conventional fisheries management strategies such as fishing seasons, size limits, or gear restrictions can provide sufficient biological protection to fisheries stocks, they do not necessarily lead to satisfactory social or economic outcomes. In their stead, the merits and shortcomings of a variety of alternate management systems, including individual transferable quotas, have been proposed, implemented, and analyzed. Few investigations, however, have examined actual fishers' preferences for different management systems. Integrating results from a mail survey of North Carolina commercial fishers with their individual harvest histories and sociodemographic profiles shows that economic and cultural variables both play a significant role in management system preference. The analysis introduces the use of the Herfindahl-Hirschman Index (HHI), a measure of investment diversity, as a measure of diversity in fisheries harvests and demonstrates an association with management preferences. Social and family factors are also notable indicators.

Key words: Community-based management, fisheries management, individual transferable quotas (ITQs), market-based management, North Carolina, harvest diversity

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Overfishing is a commonly cited example of Hardin's "tragedy of the commons."<sup>1</sup> Collectively, fishers have an interest in the continuing health of fish populations (and hence an incentive to not "fish down" stocks over time), but individual fishers have a personal interest in harvesting as many fish as possible in order to maximize profits, which in turn may lead to a decline in stock.<sup>2</sup> The primary task of fisheries policy is to address this underlying issue. Conventional fisheries management approaches, such as fishing seasons, size limits, and gear restrictions, are at least partially designed to restrict fishers from fishing behavior that might otherwise cause a decline in stocks.<sup>3,4</sup> In industrial

countries, this may be thought of as the default solution for preventing overfishing.<sup>5</sup>

Research in recent decades has shown that although this approach can provide sufficient biological protection to stocks, it does not necessarily lead to satisfactory social or economic outcomes; for the latter, institutions that lead individual fishers to act in their own self-interests in ways that promote general conservation may be necessary.<sup>6</sup> Such alternate management systems may include auctioning off annual rights to the fisheries harvest, setting individual or community-based quota systems, or designating marine-protected areas where stocks can naturally replenish free from fishing pressures.<sup>7,8,9,10,11,12,13,14,15</sup> The relative merits of these different systems and the conditions on which they are best applied have inspired considerable debate.<sup>16,17</sup>

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There have been few investigations, however, of fishers' attitudes between different management systems. Among actual fishers, it is recognized that cultural barriers may exist against privatizing resources that are considered common property and that the terms of the social contract under which fishers access public resources are not quite settled. But actual surveys on the topic of management preferences have generally been ex-post studies of systems that have already been implemented, or referenda on specific proposals among affected parties.<sup>18,19,20,21</sup> In this study, fishers' attitudes towards conventional management measures and individual transferable quota systems (ITQs) for managing commercial fisheries are examined. The analysis is based on a large scale mail survey of commercial fishers in North Carolina about these two alternate systems of regulation, with a specific focus on the social and economic attributes that are correlated with regulatory preferences.

## Research design

North Carolina has one of the most diverse sets of fisheries in the United States. The state is a member of both the Mid-Atlantic Fisheries Management Council, which manages temperate-water ocean fisheries such as flounder from New York down to Cape Hatteras, and the South Atlantic Fisheries Management Council, which manages tropical water species like groupers and mahi-mahi down to the Florida Keys. Both of these areas are under federal jurisdiction as part of the Exclusive Economic Zone (EEZ) of the United States. The nearshore and estuarine waters of the state include Albemarle and Pamlico Sounds—together, the second largest water body on the Atlantic Coast after the Chesapeake Bay—and are managed directly by the state (see Figure 1).

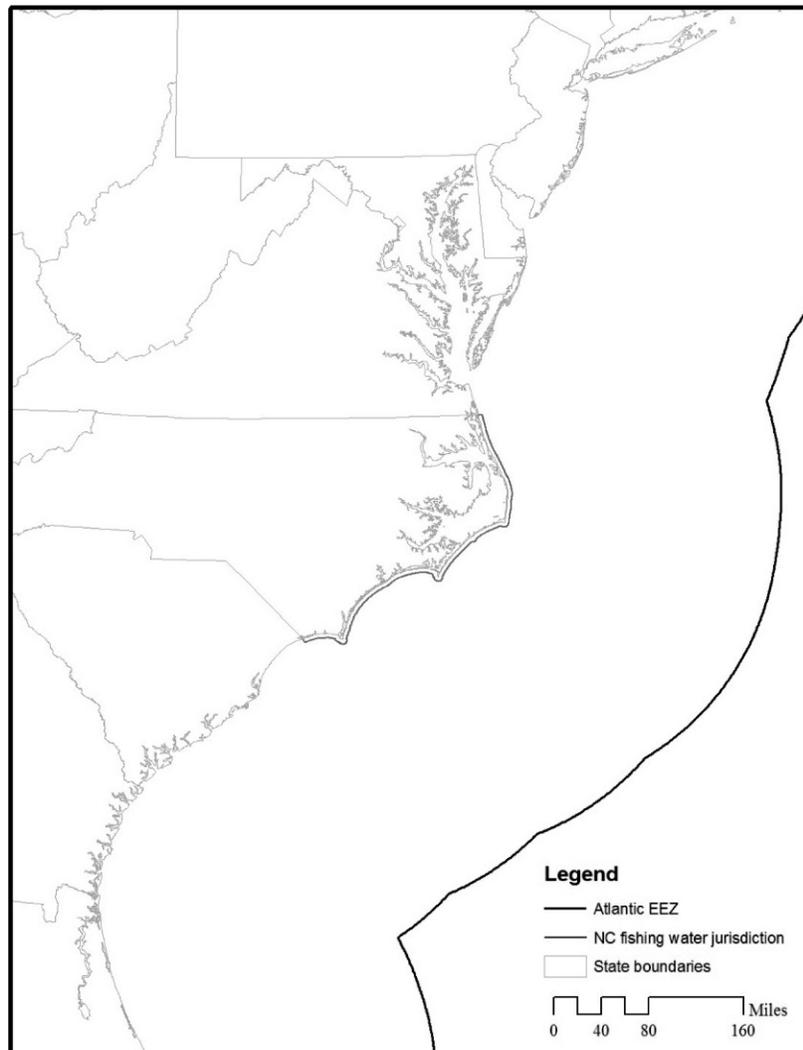
All commercial fisheries in North Carolina are regulated through conventional management measures such as seasons and size limits. State laws do not allow for community-based or individually-based quota systems, although there is a cap on the number of commercial fishing licenses.<sup>22</sup> Federal law (applicable to the fisheries of the EEZ) is more flexible, but the two longstanding ITQ programs managed by the Mid-Atlantic Fisheries Management Council and South Atlantic Fisheries Management Council (surf clam

and wreckfish) do not involve North Carolina fishers and these species are seldom landed in state ports.<sup>23,24</sup>

In 2007, the South Atlantic Fisheries Management Council began to consider the development of ITQs to manage stressed stocks in the snapper and grouper fisheries under its jurisdiction.<sup>25</sup> Simultaneously, the state of North Carolina began to investigate alternate methods for managing the nearshore striped bass ocean fishery off the northeastern coast of the state, which was restricted to very short seasons and correspondingly low prices. The state requested a series of analyses on the general applicability of replacement of fishing seasons with individual fishing quotas for select fisheries, although any such shift would require eventual legislative change.<sup>26</sup> A statewide survey of commercial fishers was part of this process.

During the year of the survey (2007), North Carolina's commercial fisheries were arguably under duress. The state had last rewritten its fisheries laws a decade prior, and since that change in law renewals of state-issued commercial fishing licenses had fallen consistently.<sup>27</sup> The value of commercial landings statewide was approximately 75 percent of what it had been in 1997, and the state lost a third of its small, rural "fish houses" (where fishers landed catches) in the six years prior to the study.<sup>28</sup> In some areas, the industry had partially collapsed, with the value of landings and the number of active fishers down as much as 50 percent.<sup>29</sup> Fewer fishers were reporting profitable businesses due to the combined effects of stressed stocks, stressed commercial infrastructure, and rising fuel prices.<sup>30</sup> The primary purpose of the survey was to provide immediate feedback to the state on fishers' preferences for current management and willingness to try an alternate management system. The state's intent was to use this information to inform potential changes in fisheries law, fisheries policy, and voting choices on statewide and regional fishing bodies.

The topic of ITQs was considered highly controversial at the time of the survey, and the state's primary commercial fishers' organization took a stance against the use of ITQs in state or federal waters, lambasting them as a threat to the fishing communities scattered along the state's coast and urging complete opposition to state deliberation of the topic.<sup>31</sup> The survey was hence administered by mail without advance notice, processed by a very small group of individuals, and designed to be completed as quickly as possible to minimize the influence of social pressures. The time



Source: North Carolina Division of Marine Fisheries

Figure 1. Federal Exclusive Economic Zone (EEZ) and North Carolina (NC) fishing jurisdictions.

period between the conceptualization of the survey and actual administration was measured in weeks, not months. Consultation with state officials led to the following themes and questions:

1. *Sensibility/reasonableness*: Did fishers believe that ITQs could be a more sensible way to regulate fisheries than using conventional management tools like seasons and size lengths?
2. *Fairness*: Did fishers believe that trading among themselves would be a fair way of allocating fishing quotas?
3. *Species*: Which fisheries did the fishers believe might be better managed under ITQs than under conventional management policies?
4. *Investment*: Did the fishers believe that ITQs would simplify personal business decisions?
5. *Restrictions*: If a fishery needed to be scaled back, would the fishers prefer for it to be done through a conventional management tool (reduced season) or through ITQs?
6. *Governance*: Did fishers want the state to continue investigating ITQs for fisheries?

The fifth and sixth questions were framed for the effect that restrictions and ITQs would have on individual fisher's business, while the remainder addressed more general questions about fishers' preferences in the regulatory process. Every selected fisherman received a two-page narrative in a question-and-answer format explaining how an ITQ (referred to as a Limited Access Privilege Program in the form, a legal term) works and comparing it to the conventional regulatory measures utilized in the state, such as fishing seasons and size limits (see Appendix I). A short survey was also included, along with a postage-paid envelope. Survey forms were individually numbered and could be tracked to individual fishers, although this was not obvious on the form and the survey letter included the guarantee that only aggregated data would be presented.

A total of 2,499 licensees met the required minimum landings value of \$1,000 in the state the previous year (2006) and were mailed the quota system narrative and associated survey. Of these, 493 completed questionnaires were returned, for a return rate of about 20 percent. By referencing a licensing database, the distributions of fishing income, race and age variables were compared between respondents and nonrespondents to search for potential respondent bias. No significant differences were found, but because response to the survey was voluntary, it is possible that fishers who chose to return the questionnaire felt more passionately about the issue of regulation than those who did not. Response data was eventually merged with information on the age, race, and sex of the respondents from a licensing database as well as information on each fisherman's previous five years of landings.

Although not part of the initial analysis, the results of this survey provide an opportunity to connect patterns of support for (and opposition to) conventional management and ITQ systems to the economic and social characteristics of individual fishers. Fishers within a state pursue a variety of different business models, and fisheries vary widely throughout the United States and around the world.<sup>32</sup> It is therefore unlikely that one specific model of regulation would appeal to resource users regardless of their personal histories or utilization of the resource.<sup>33</sup> Because ITQs are often framed as a "fish grab" by the larger boats, the expectation at the time of the research was that fishers with the largest landings histories would

anticipate reaping large distributions of wealth from the allocation of individual fisheries quotas, and would be most likely to support shifting to an ITQ from a conventional management system. It was also expected that there would be a larger diversity of opinion on the topic of regulation than was being captured in public debate, and that a confidential mail survey would allow fishermen to express their views free from the social pressures of a public setting.

## Results

A majority of fishers preferred existing management to ITQs on all questions asked (see Table 1). Still, 42 percent of fishers felt that individual quotas made more sense than the current regulatory system that uses seasons and size limits, 35 percent believed that fishers buying and selling quota from one another was a fair way of allocating catch for a species, and 40 percent thought that owning quota shares would allow them to make long-term decisions and investments more easily than under the conventional management system. Fishermen were specifically asked whether certain species might be better managed under an individual quota system than under current regulations. No species gathered a majority of support for considering a change, although the fishery with the clearest derby pattern in the state, striped bass, gathered the highest amount of overall support (38 percent), followed by summer flounder (30 percent) and then snappers and groupers (27 percent).

Respondents were generally split when asked to choose between a shortened season or individual quotas, if increased restrictions had to be put in place. Fishers were also split when asked whether the state's fisheries commission should continue to investigate catch share programs. (The eventual outcome of that investigation was a proposal to consider individual quotas for the striped bass fishery.)<sup>34</sup>

The respondents approached the questions cohesively, with clear and unified preferences for conventional regulations or individual quotas. Ninety percent of the fishers who did not believe individual quotas made more sense than conventional regulations, for example, also did not believe individual quotas were not a fair way of distributing catch, and preferred a conventional regulatory environment for making long-term business

## Alternative management in fisheries

**Table 1.** Results of North Carolina fishers' survey showing mean landings, prices, and HHI scores.

Question			Mean landings (lbs.)	SD	p	Mean price	SD	p	HHI	SD	p
1. Do you think LAPPs make more sense than the current regulations as a way to manage some fisheries?	Yes	42%	104,225	194,520	0.05	\$2.18	\$1.88	0.01	0.60	0.27	0.01
	No	58%	239,719	1,088,842		\$1.71	\$1.37		0.54	0.27	
2. Do you think the idea of fishers buying and selling quota shares from each other would be a fair way to allocate the Total Allowable Catch (TAC) for a species?	Yes	35%	101,217	198,655	0.05	\$2.31	\$2.02	0.001	0.62	0.27	0.001
	No	62%	230,213	1,056,240		\$1.75	\$1.41		0.53	0.27	
4. Do you think owning quota shares would make it easier to make long term decisions and investments in your business than the current system allows?	Yes	40%	110,322	201,606	0.10	\$2.10	\$1.81		0.59	0.27	
	No	60%	233,058	1,085,388		\$1.84	\$1.53		0.55	0.27	
5. If given a choice between a shortened season and a LAPP, which would be preferable?	LAPPs	48%	103,707	189,841	0.10	\$2.15	\$1.86		0.59	0.27	
	SS	52%	216,935	921,686		\$1.89	\$1.51		0.56	0.27	
6. Should the Marine Fisheries Commission continue to investigate whether LAPPs could be used in North Carolina?	Yes	50%	111,191	224,433	0.10	\$2.18	\$1.94	0.01	0.60	0.27	0.01
	No	50%	256,063	1,174,005		\$1.73	\$1.35		0.53	0.26	

HHI: Herfindahl-Hirschman Index; LAPP: Limited Access Privilege Program.

plans. Among the binary choice issue questions, fishers responded consistently within a given preference for either conventional or alternative management. The responses were bimodally distributed: 45 percent of fishers preferred existing management systems, while 29 percent expressed a preference for an individual quota system. The correlation between answers for all pairs of questions was significant, Pearson's  $r$  (493) exceeded .74,  $p < .001$ .

Testing subsets of the data revealed that a majority of one group of fishers did display slightly more favorable attitudes towards individual quotas. Among those who had fished in the ocean for striped bass ( $n = 38$ ), a majority (58 percent) thought that fishery might be better served under individual quotas than under the current derby inducing regulatory system, and 54 percent thought the state should continue to investigate alternative approaches. Fishers with a federal Snapper Grouper permit, on the other hand, were mostly opposed to individual quotas, and 56 percent of them would have preferred a conventional management approach if further restrictions on fishing were necessary.

The state of North Carolina permits a select number of endorsements on state commercial fishing vessels, which allows boats to fish for North Carolina's summer flounder quota. The state has conventionally

managed that fishery by opening and closing time periods for harvest during the winter months, with set (but equal) vessel quotas for each window. Only 36 percent of these vessel owners in the respondent pool indicated a preference to move away from that arrangement—although it could be argued that the current system relies on individual vessel quotas and hence avoids many of the market distortions caused by fishing seasons. The endorsements themselves are transferable between vessels and carry wealth, with market prices informally estimated at over \$20,000 apiece.

An open-ended question asked fishers for any additional comments on the topic of catch share programs. More of the comments were against individual quotas than in favor of them. The most common concern expressed was a loss of control of the fishery to larger players. As one respondent put it, "[ITQs] a way for the big fishing companies to control the fishing industry in N.C." Worries about "outside" interests were also frequent: "[ITQs] will hasten the decline in the number of commercial fishers...buying and selling quota seems okay on the surface, but I believe it will be detrimental to the commercial community in the long term." Even those fishers more inclined towards catch share programs had caveats: "If [everything] was taken into consideration in a fair way

to allocate [ITQs] I would be fine with that. Otherwise the small skiff fisherman would not have a chance.”

The most common themes prevalent in the open-ended responses were, in descending order: larger boats would end up with most of the shares in an individual quota system (48 percent of open-ended responses included a variation on this theme); the existing management system allows fishers to move between fisheries more easily than an individual quota system (14 percent of open-ended responses); it is impossible to make broad choices between regulatory systems without specific proposals (13 percent); individual quotas just add more regulations to the current system (10 percent); and, individual ownership of quotas is morally wrong (8 percent).

#### *Influence of age, race, and sex*

One critique of individual quota systems is that they tend to favor older, established fishers but make it more difficult for younger fishers to enter the business.<sup>35,36</sup> Nonetheless, there were no statistically significant differences in age between fishers who supported ITQs and those who preferred conventional management in this survey, and hence no evidence that younger fishers tended to favor the latter or older fishers the former. Information on race and sex was also available in the licensing database. These variables also did not demonstrate a meaningful influence on results, although there were very few minorities ( $n = 8$ ) or women ( $n = 16$ ) in the respondent pool.

#### *Influence of landings history*

Fishers were informed in the question-and-answer page that accompanied the survey that “usually quota shares are based on historical landings.” Fishers with higher historical landings should therefore expect to gain larger amounts of wealth in the initial distribution of individual quotas and are less likely to be excluded altogether if a minimum poundage floor is established.<sup>37</sup> Landings histories were characterized by the total number of pounds landed over the 5 years prior to the survey (2002–2006) for each of the respondents. Fishers who preferred the existing management system had average landing histories more than double those who did not (see Table 1).

The wide standard deviations, though, make it clear that the significance of these findings is likely the result of the influence of a small subset with disproportionate

landings from the majority of the respondents. Indeed, that is the case. As in other geographic areas, landings are not evenly distributed among the fishing population.<sup>38</sup> In this case, the top fifth of fishers (as measured by pounds landed) strongly preferred conventional management. The high liners in North Carolina are almost exclusively located in Dare County, which generates the largest commercial landings value in the state and is home to the only large-scale fleets in North Carolina. These fishers would presumably receive the lion’s share of any quota allocations based on historical landings, as 70 percent of the state landings by weight were caught by this group over the previous five years. But they were largely opposed to moving away from the system under which they had been most successful.

The mean price of landings was calculated by dividing total revenues (as recorded by the trip ticket program) by total pounds landed for individual fishers, again for the 5 years prior to the survey. There was considerable diversity in mean prices, from a low of \$0.28/lb. to a high of \$10.10/lb. The overall mean prices were \$1.94/lb. and the average price of the median fisherman’s catch was \$1.43/lb. Fishers who preferred individual quotas generated between 13 and 31 percent more revenue per pound for the fish they caught than those who preferred conventional management, depending on the question asked. The differences for questions 1 (reasonableness of management systems), 2 (fairness of management systems), and 6 (preferences for state action) were significant (see Table 2).

#### *Influence of harvest diversity*

Fishers who specialize in a single or select few species may realize significant advantages in production via increased experience and gear design.<sup>39</sup> However, they are also more susceptible to natural and market fluctuations in individual stocks. Fishers are also at the mercy of weather conditions for harvest, especially high winds. If available days to fish are missed because of poor weather, fishers with individual quotas are more adaptable than those subject to fishing seasons.<sup>40</sup>

Diversity in landings can be characterized in different ways. For the purposes of this study, it was necessary to generate an index that could be quantified based on landings data. Given the limitations of the

Table 2. Results of mail survey classified by time in community and generation of commercial fishing.

Question		Mean time in community (years)	SD	p	First generation	Not first generation	Chi-square	df	p
1. Do you think LAPPs make more sense than the current regulations as a way to manage some fisheries?	Yes	26.9	16.8	.05	67%	45%	5.59	1	0.05
	No	36.3	17.0		33%	55%			
2. Do you think the idea of fishers buying and selling quota shares from each other would be a fair way to allocate the Total Allowable Catch (TAC) for a species?	Yes	29.5	16.5	.05	59%	40%	3.88	1	0.05
	No	36.4	17.2		41%	60%			
4. Do you think owning quota shares would make it easier to make long term decisions and investments in your business than the current system allows?	Yes	30.7	16.5	.10	60%	44%	2.76	1	0.10
	No	35.2	17.8		40%	56%			
5. If given a choice between a shortened season and a LAPP, which would be preferable?	LAPPs	30.4	15.8		71%	51%	4.38	1	0.05
	SS	34.4	17.0		29%	49%			
6. Should the Marine Fisheries Commission continue to investigate whether LAPPs could be used in North Carolina?	Yes	30.7	16.5		69%	49%	4.26	1	0.05
	No	35.3	17.8		31%	51%			

LAPP: Limited Access Privilege Program.

data, the Herfindahl-Hirschman Index (HHI) was selected.<sup>41</sup> Although best known as an index of diversity inside an industry sector (and used in studies of fisheries consolidation following the introduction of individual quota systems), the HHI can also be used to measure the diversity of concentration of individual investment portfolios.<sup>42,43,44,45,46</sup> If choosing to operate in a particular fishery is seen as an investment with an expected reward, then the diversity of a fisherman’s catch can be calculated by squaring the fraction of total landings value contributed by each species, then summing. The resulting variable ranges from 0 to 1, with 1 representing an individual fisherman’s choice to pursue only one species. As with an investment portfolio, the decision to concentrate in one area alone at the exclusion of other areas represents a choice between the potential rewards in profitability and the risk inherent in fluctuations—in a fishery, the fluctuations in the stock available for harvest resulting from natural or regulatory events. As with the previous tests, the HHI reflects landings for the 5 years prior to the survey. Individual fishers registered a “fishing” HHI from a low of .10 to a high of 1, with a mean of .57 and median of .52.

Fishers who favored individual quotas to conventional management registered HHIs between 3 and 7 percentage points higher than those who preferred conventional management (see Table 1). The higher HHI number indicates reliance on fewer species for fishing income and a corresponding susceptibility to landings fluctuations for any single species.

## Discussion

The results of this study of North Carolina fishers suggest that the volume of individual fishers’ landings is not necessarily associated with a preference for individual quotas over conventional management systems. The commentary of other fishers notwithstanding, the primary supporters of individual quotas in the state were not the top group of harvesters. One potential explanation for the preference of the “high liners” for conventional management is that those fishers with the largest landings are the most effective at maneuvering through the current system of regulations and extracting significant rent from it. Johnson and Libecap argue that these fishers will support management measures that allow them to capture more fish by limiting the number of entrants overall, but not individual caps that penalize their more efficient (in comparison to those of competitors) operations.<sup>47</sup> The 79 fishers in the respondent pool known to own limited entry permits to federal fisheries follow this prediction, with 10 to 15 percent more of them preferring their current system of limited permits, but not individual quotas, compared to fishers without those permits. Many of the high liners are also processors, and processors may not benefit from catch share systems.<sup>48</sup>

Fishing “generalists” were more likely to prefer conventional management systems to individualized fishing quotas as well. Many fishers choose to pursue

multiple species during their fishing careers and depend on that diversity in catch to get them through shortages in any particular species that may occur in a given season. Once that business model has been developed, it is imperative to *not* be excluded from fisheries one might eventually participate in, even if one has no history in them. In contrast, “specialists” are more susceptible to fluctuations in individual stocks, and can increase their fishing income by maximizing the price per pound. Specialists were significantly more likely to prefer individual quotas in this study, believing they would increase the ability to plan their business futures in comparison to conventional management measures.

Cultural variables were not specifically measured in this survey, but fishers should be understood as part of larger fishing communities. Extensive demographic characteristics are not available in the licensing and landings databases and were not asked as part of the catch share survey. Fortunately, the state has been collecting socioeconomic data on its commercial fishing fleet since 1999. Profiles of the different fishing areas of the state are produced on an annual or nearly annual basis by rotating the areas of study each year, with the goal of returning to any particular area at least once every five years. The state completed three socioeconomic surveys in the years adjacent to and including the year of the catch share survey.<sup>49</sup> A comparison of the management preference survey results to the databases for the 2006, 2007, and 2008 socioeconomic surveys revealed that 121 fishers were present in both datasets. Although the administration of the surveys was not concurrent, the profiles provide a variety of independent descriptors of respondents that were measured without an obvious connection to the sensitive, “hot button” issue of individual quotas.

Two variables from the socioeconomic surveys emerged as indicators of fishers’ preferences in the management survey: *time lived in community* and *family histories of commercial fishing*. Fishers who preferred ITQs over conventional management had lived in their communities for five to seven years less than those opposed. More importantly, majorities of fishers who were the first generation in their families to work the water preferred individual quotas to conventional management across all of the questions, while those with a fishing ancestry did nearly the opposite. Although this analysis includes only a subset of all of

the fishers who answered the catch share survey, it appears that family history of commercial fishing may have a substantial influence on a fisherman’s preference for different systems of regulation (see Table 2).

Anecdotally, worries about the effects of privatization on fishing communities and fishing cultures appear to be prevalent in discussions over catch share proposals. As one commercial fisherman put it to the author during a discussion, individual quotas

sound like a good idea in theory, but what of my neighbor down the road? What if he needs to get back in this fishery in a few years? Am I supposed to support a system that won’t let him back in when he needs it most?

Individual quota systems do not recognize the importance of historical ties between commercial fishers and their communities. Even fishers involved in more problematic (from an economic viewpoint) fisheries, such as the striped bass derby, only mustered a bare majority in favor of investigating individual share systems, despite the knowledge of a decade-long individual catch share system for that same fishery in bordering Virginia.<sup>50</sup> This is at least partially due to the ability of fishers to use those family and community ties to work around the existing fishing regulations: while the state strictly enforces a 10 fish per trip striped bass limit for part of the striped bass derby, it is well known that commercial fishers typically recruit family members and friends to help “land” additional fish by meeting at the local fish house and turning in a boat’s overages under their own commercial licenses. The striped bass fishery is also a classic case of a fishery that a generalist uses as part of a portfolio—it is only available for a very short window, so no fisherman can afford to depend on it heavily, but the season takes place in the beginning of winter when fewer other stocks are available for harvest.

## Conclusion

North Carolina does not have an existing system of management that could lead quickly to individual quotas. The state does not manage its estuarine fisheries using “hard” catch targets, which would be a necessary predecessor to any community or ITQs.<sup>51</sup> This is changing for fishers active in federal waters, however, due to changes in federal law.<sup>52</sup>

Fishing management systems work best when they take into consideration “the economic and social circumstances of the fishery” (p. 1662).<sup>32</sup> In the case of the North Carolina commercial fishing communities, most fishermen did not support moving from conventional fisheries management to individual catch share programs, for several reasons.

For most of the commercial fishers in the state, moving between different fisheries as the seasons change and stocks rise or decline appears to be the normal method of being in the business. For these fishing generalists, past history in fishing is not necessarily indicative of future activity, and the right to involve oneself in future fisheries is paramount. The positive relationship between high scores on the fishing diversity variable and a preference for conventional management tools demonstrates that the generalist approach is still an important indicator of support for nonexclusive fishing access in the state and perhaps elsewhere.

Given the relationship many fishers appear to have with their fishing communities, it might be appropriate to further investigate the applicability of community fishing organizations as a potential remedy to economic decline in the commercial fishing industry. Community-based management could allow fishers to move between stocks throughout the seasons, which North Carolina fishers placed a high priority on in the survey. The results of this study indicate that areas with fishers with highly diverse catches might be more receptive to such management versus individualized quota systems. Areas with strong community and family ties might also prefer a localized quota system. The high levels of sociocultural homogeneity may allow these fishers to manage local resources better than conventional management systems but without the economic disruptions of ITQs.<sup>53,54</sup>

## Note

Scott Crosson is a commercial fisheries economist at NOAA’s Southeast Fisheries Science Center with a particular interest in fisheries governance issues. At the time this survey was administered, he was the Socioeconomics Program Manager for the North Carolina Division of Marine Fisheries. He would like to thank Dee Lupton and the entire License and Statistics Program from the Division of Marine Fisheries for

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## Appendix

### Question and answer narrative for the mail survey

#### What is a LAPP?

The easiest way to explain Limited Access Privilege Programs (LAPPs), also known as Individual Transferable Quotas (ITQs) or Individual Fishing Quotas (IFQs), is to compare it to the current system we use in North Carolina. To be a commercial fisherman right now, you buy or earn a commercial license, then renew it every year. Fishermen with commercial licenses are allowed to catch fish with commercial gear and sell fish to dealers. The state and federal governments put in regulations such as minimum length, seasons, and trip limits to make sure that we don't go over the Total Allowable Catch (TAC) and deplete the fishery. Individual fishermen who follow those rules harvest as many fish as they can catch.

A LAPP is a different way of regulating a fishery. Under a LAPP, a fishery is run so that each fisherman gets a portion of the TAC called a “quota share.” The fisherman may use that quota share to catch those fish (but no more) or sell it to another fisherman. He or she can also buy more quota shares from another fisherman if they want to catch more of that type of fish. Since the total number of quota shares is the same as the TAC, sometimes size regulations, gear restrictions, trip limits, and limited seasons can be lessened or gotten rid of altogether.

*How have LAPPs worked elsewhere?*

LAPPs already exist for a number of fisheries in Alaska and British Columbia. Most of these fisheries had a large number of boats chasing the same fish during a very short season that sometimes only lasted for a day. The LAPPs gradually reduced the number of boats in the water by up to half as some owners sold their shares. Seasons are now about 35 weeks longer than before, and per-boat catches have risen by 75%. There are far fewer accidents, and more of the fish is sold fresh so the fishermen get a higher price per pound. And LAPP fisheries almost never exceed the TAC.

*What are the benefits of a LAPP?*

- It increases the flexibility of fishermen by lessening gear, size, and trip restrictions on fishing activities. This also reduces discards.
- It ends “derby fishing” where the season is very short. This is safer because fishermen don’t have to go out in bad weather before the season closes.
- Fishermen can choose when to catch their quota share of fish, waiting for higher prices.
- LAPPs are better at making sure we don’t exceed the TAC.

*What are the drawbacks of a LAPP?*

- As fishermen sell shares to each other, you may end up with fewer overall fishermen, which can affect fishing communities.
- It can make it difficult for new fishermen to get involved in a fishery.
- You can end with most of the shares in the hands of a very small number of owners, although there are ways to prevent this.

- You can’t catch fish you don’t have a quota share for, unless you buy more shares.

*How is the quota share distributed?*

There is no single formula for setting up a LAPP and deciding the initial allocation of quota shares. Usually quota shares are based on historical landings, with some set aside for new entrants. Once the LAPP is up and running, quota shares are reallocated by fishermen as they buy and sell shares to each other. Fishermen may choose to put a limit on how many shares a single fisherman can own.

*Why is North Carolina looking at LAPPs?*

The federal government will be tightening restrictions on many federally managed species (including snapper, grouper, king mackerel, and summer flounder). LAPPs offer an alternative to shortening or closing seasons, so NC fisheries managers believe it should at least be investigated.

*Should there be a LAPP for every fishery?*

No. LAPPs do not make sense for fisheries where allocation of the catch is not an issue, such as shrimp.

*How would all of this affect me?*

If you don’t pursue species that are currently managed with a TAC, it wouldn’t affect you at all. If you do catch TAC-managed species in a directed fishery such as summer flounder, groupers or king mackerel, a LAPP would mean you would buy and sell quota shares depending on how many fish you wish to catch. Owning quota shares would vest you in the fishery, guaranteeing you the right to a portion of the catch even if the TAC goes down.