

FEATURE: HUMAN DIMENSIONS

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Cooperative Research Program Goals in New England: Perceptions of Active Commercial Fishermen

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ABSTRACT: Cooperative fisheries research will continue to expand throughout the United States with the 2007 reauthorization of the Magnuson-Stevens Act, which called for the development of regionally-based cooperative research programs nationwide. We report on a survey of individuals actively engaged in commercial fishing in New England ($N = 295$) that asked how important and achievable cooperative research programmatic goals are and why. One goal, “the promotion of partnerships between fishermen and scientists,” was particularly important to fishermen because partnerships are believed to be in everyone’s interests, enhance the quality of the science, lead to better management decisions, improve the professional relationships between fishermen and scientists, and speak to a fishermen’s sense of professional duty. However, fewer respondents considered the partnership goal achievable because of a wide range of obstacles. Based upon the findings and published studies on the perceptions of scientists and managers, we discuss recommendations for cooperative research managers.

INTRODUCTION

Cooperative research is being conducted in many fields of research and development (e.g., education, physics, space science, materials research, computer science, clinical medicine) to leverage the resources and expertise of multiple researchers from many institutions, promote efficient use of labor, and enhance credibility (Maieschein 1993; Chompalov and Shrum 1999; Crossley and Holmes 2001). Since the late 1990s, cooperative research in fisheries science has been expanding in the United States (U.S. Commission on Ocean Policy 2004; NRC 2004) and particularly in New England (Hartley and Robertson 2006a), although recent federal funding constraints are threatening past gains. Cooperative research programs seek to directly involve the fishing industry and organizations in the design, planning, data gathering and analysis, and/or dissemination of findings from fisheries research. Further expansion is possible in spite of funding constraints—the 2007 reauthorization of the primary U.S. federal fisheries management statute, the Magnuson-Stevens Fishery Conservation and Management Act, added a section that establishes regionally-based cooperative research and management programs nationwide (see U.S. Public Law 109-479, Title II, §318).

Objetivos del Programa Cooperativo de Investigación en Nueva Inglaterra: percepciones de los Pescadores comerciales activos

RESUMEN: A partir de la re-autorización de la declaratoria Magnuson-Stevens en 2007, las sociedades cooperativas de producción pesquera han continuado expandiéndose a lo largo de los Estados Unidos de Norteamérica. La declaratoria es un llamado para el desarrollo de programas cooperativos de investigación a nivel regional. En este trabajo se reporta un sondeo realizado a todos aquellos individuos comprometidos activamente en la pesca comercial de Nueva Inglaterra ($N = 295$). En el sondeo se preguntó cuán importantes y asequibles son los objetivos de los programas cooperativos y por qué. El objetivo de “promover la sociedad entre pescadores y científicos” resultó ser de particular interés para los pescadores ya que tal asociación se asume de interés común, mejora la calidad de la ciencia, da como resultado mejores decisiones de manejo, enriquece las relaciones profesionales entre ambas partes y transmite el deber profesional al sentido común del pescador. Sin embargo, debido a un amplio rango de obstáculos, pocos encuestados consideraron que este objetivo fuera asequible. Sobre la base de estos resultados y otros estudios publicados acerca de la percepción de tienen científicos y manejadores, se discuten y dirigen recomendaciones a los directivos de investigaciones cooperativas.

In general, cooperative fisheries research is defined as fishermen-scientist partnerships that are classified along a spectrum from lower levels of engagement and cooperation with fishermen (e.g., log books, chartered vessels) to full “collaborative” research, with fishermen and scientists working closely in all aspects of the research process (NRC 2004; Taylor Singer 2006). Partnerships are central to cooperative research, although the degree of engagement of partners and integration of their knowledge and skills can vary. For the purpose of this article, we use the term “cooperative research” to mean all forms along the continuum from cooperative to collaborative.

Several models of cooperative research can be found in New England, including industry sectors setting aside a portion of their profits for research, competitively-awarded federal resources dedicated to cooperative fisheries research (both university and National Marine Fisheries Service [NMFS] administered programs), and non-profit community development loans with cooperative research contract conditions. Nationwide, certain areas of the United States are more active in cooperative fisheries research than others. Early ground-breaking cooperative research, particularly in the late 1980s on turtle excluder devices (TEDs) in shrimp trawling gear, emerged out of the southeastern United States through Sea Grant and a NMFS science center (NRC 2004; Graham 2006). However, since 2000, better funded and more institutionalized cooperative research programs have been established in the Northeast, Pacific Northwest, and Alaska (Karp et al. 2001; Harms and Sylvia 2000; Pautzke 2006). These regions have become the leaders in advancing cooperative research program designs (Read and Hartley 2006).

One example of a university-based, regional program is the Northeast Consortium, created in 1999. Four research institutions (Universities of New Hampshire and Maine, Massachusetts Institute of Technology, and Woods Hole Oceanographic Institution) work with a multi-stakeholder advisory panel to administer cooperative research outreach, education, competitive grant-making, and science and data management (www.northeastconsortium.org; Hartley and Robertson 2006a). The Northeast Consortium is a \$5 million annual program and as of January 2008 had underwritten 171 collaborative

research projects (nearly 90 projects were complete), involving over 355 fishing vessels captains/owners, 33 fishing industry organizations or businesses, and over 221 scientists from 55 research institutions or agencies on a wide array of fisheries, gear, ocean process, and socioeconomic topics within the Gulf of Maine and Georges Bank. The Northeast Consortium’s goals are to:

1. Develop partnerships between commercial fishermen and scientists, educators, and coastal managers;
2. Enable commercial fishermen and commercial fishing vessels to participate in cooperative research and develop selective gear technologies;
3. Help bring fishermen’s information, experience, and expertise into the scientific framework needed for fisheries management; and
4. Equip and utilize commercial fishing vessels as research and monitoring platforms.

These four goals were established through discussions of a 30-person multi-stakeholder Advisory Committee (Hartley and Robertson 2006a). Further, the Northeast Consortium has been recognized nationally and internationally as a model for effective cooperative research programming (Gallant 2005).

This article briefly reviews the current literature on the human, social, and institutional dimensions of cooperative fisheries research, followed by the presentation of a particular study in New England. We report on a survey of individuals actively engaged in commercial fishing in New England that examined the perceptions of this important set of industry leaders regarding how important and achievable the cooperative research programmatic goals of the Northeast Consortium are and why. Further, while research on fisheries scientists and managers was beyond the scope and funding of this study, past research and other data are presented from multiple sources to discuss fisheries scientists and managers’ attitudes toward the cooperative research goals. We conclude with a discussion of these findings relative to cooperative natural resource management and science and some recommendations for cooperative fisheries research managers.

To date, there has been limited but growing empirical research on the human, social, and/or institutional dimensions of cooperative research. However, a body of literature provides testimonies and case stories about cooperative research and perceptions about its human and social dimensions. For example, during the 1990s a fisheries resource crisis in Nova Scotia led to the creation of the Fishermen and Scientists Research Society (see www.fsrns.ca/), which emerged from a context of distrust among fishermen and scientists and limited use of fishermen’s knowledge or human resource capability in fisheries science (King 1999). Program leaders identified the building of trust among parties and the enhanced credibility of the scientific findings as outcomes of cooperative research, and particularly the frequent, joint activities leading to a “common language and...better understanding of each other” (King 1999:10). While maintaining frequent, direct communication, including feedback to fishermen about research results, the program still experienced a drop in motivation and participation among industry over time.

Science managers in NMFS have reported that they believe fishermen are interested in focused cooperative research on immediate concerns in fisheries resource management, and that cooperative research builds mutual understanding and respect between scientists and fishermen (Sissenwine 2001). Michael Sissenwine stated in Congressional testimony, “Our overwhelming experience has been that people working together learn to understand each other’s perspectives, regardless of personal backgrounds. Owing to this, I believe those who participate in cooperative research will be more responsible in fisheries and fisheries management for the rest of their careers, regardless of their roles” (2001:5).

Fishing gear research aimed at reducing bycatch of species of concern has expanded tremendously over the last few decades and it is a particularly active area for fishermen-scientist partnerships. Early bycatch research in Australia in the 1990s demonstrated that cooperative research strategies led to substantial bycatch reductions in prawn trawl fisheries. Reductions were achieved in large part because the

cooperative research placed industry in a publicly visible leadership role in solving the problem, and integrated fishermen's knowledge into the design of feasible gear technology designs (Kennelly and Broadhurst 1996). As a result, the research findings were more acceptable to the industry and adopted voluntarily (Kennelly and Broadhurst 1996).

In one of the early empirical reports on the human dimensions of cooperative research, Conway and Pomeroy (2006) surveyed 15 scientists, fishermen, and Sea Grant extension agents involved in a collaborative fisheries habitat research project. They identified four interests and motivations among participants: interest in the research topic, opportunity to learn from others, facilitation of the connection and communication between fishermen and scientists, and the importance of bringing fishermen's knowledge into scientific research. While there were specific challenges posed by the research project (time, funding, weather and seasonal conditions, and the communication challenges arising from limited face-to-face time), specific benefits were identified as well. The benefits included mutual learning, improvements in data collection methods, and the generation of high interest in continuing to collaborate on research. Further, Conway and Pomeroy reported the improvement of professional relationships among three partners, although one respondent reported a worsened relationship with a scientist. Bernstein and Iudicello (2000) also found complex social dynamics among partners in a review of seven cases in the U.S. fisheries. Specifically, they reported that the effective motivations to participate in cooperative research depend upon the culture of the individual fishery and the personal relationships that existed among participants.

The challenges of cooperative research have been well reported (NRC 2004; Conway and Pomeroy 2006; Read and Hartley 2006; Jones et al. 2007) and include, time, resources, staff capacity, information and data management, overcoming mistrust, and inadequate communication and coordination. The 2004 National Research Council (NRC) assessment of cooperative research in NMFS included a discussion of the social context of cooperative research. The NRC reported that the fishing industry had little confidence in science and used the political process to oppose regulations,

but improvements arose through cooperative research. Specifically, NRC heard examples of cooperative research leading to greater confidence in data, analysis of the data, and the resulting management recommendations.

Hartley and Robertson (2006a) linked the emergence of cooperative fisheries research in New England to the mid-to-late 1990s climate of socioeconomic hardship in fishing communities, depressed fish stocks, and intense distrust and debate between scientists and fishermen over fisheries science. In New England, a general lack of trust and respect remains between fishermen and scientists, although fishermen participating in cooperative research reported forming better partnerships with more trust in scientists and creating more credible science than they had expected (Hartley and Robertson 2006b). Both fishermen and scientists participating in cooperative research in New England report greater mutual understanding, trust, and likelihood of long-lasting partnerships; nonetheless, both remain skeptical that cooperative research findings will impact fisheries management (Hartley and Robertson 2006b).

In sum, past research has clearly demonstrated that the social context underlying the professional relationships between scientists and fishermen in cooperative research is multifaceted and presents substantial challenges to effective cooperative research. It is not yet clear if and how these factors differ between "cooperative" and "collaborative" forms of cooperative research. Nonetheless, it could be hypothesized that more collaborative forms require even greater attention to the factors underlying the partnerships. The benefits discussed in the literature appear to directly counter many obstacles—in other words, while distrust, lack of credibility, and misperception inhibit cooperative research, at the same time, cooperative research seems to improve levels of trust, credibility of science, and degree of mutual understanding and communication. Thus, understanding the human dimension of scientist-fishermen partnerships will very likely improve the design and implementation of cooperative research programs.

The research reported here focused on actively engaged commercial fishermen (i.e., currently fishing and not latent permit holders), a very important stakeholder group in New England's fishing industry. More specifically, the study

examined their beliefs in the importance and achievability of particular cooperative research goals, especially the perceived opportunities and challenges of promoting fishermen-scientist partnerships. We asked individuals engaged in commercial fishing how important and achievable specific cooperative research objectives were and why. A follow-up open-ended "why" question provided qualitative data insightful in assessing the perceived barriers to achieving these cooperative research objectives in New England, which in turn has informed and guided Northeast Consortium programming.

METHODS

The survey was designed and administered using standard data collection procedures and quality controls detailed in Dillman's Tailored Design Method (1999). Addresses were obtained via a mailing list provided by the New England Fishery Management Council in 2001, which had originally come from the NMFS fishing permit holders list. To ensure that the researchers and the research instrument did not bias the survey response, drafts were reviewed and pre-tested with an industry and scientist advisory group. The survey was administered to individuals who were actively engaged in federally-managed commercial fishing in New England in 2002–2003.

The first questionnaire mailing was sent to 1,204 individuals in fall 2002 and, after removing undeliverable addresses and returned surveys, there were four follow-up mailings of two different survey lengths until summer 2003. Respondent occupations for each returned survey were examined and questionnaires from non-commercial fishermen were eliminated from this analysis, leaving 295 respondents out of 420 commercial fishermen ($N = 295$, 70% response rate). The mean age for respondents was 52 years old with 27 years of fishing experience. Most owned or operated more than one vessel (1.45 mean) and employed a small crew (5.36 mean and 3 median). Fifty-five percent (55%) of respondents earned over three-quarters of their income from commercial fishing and the average respondent participated in nearly four (3.98) different fisheries (i.e., target species, gear types, inshore/offshore). Overall, the respondents were quite engaged in fisheries management activities: 72% attended fisheries management

council meetings, 69% contributed money to fishing causes, 67% called government officials, and 63% had commented on a fishery management plan. The commercial fishing industry in the Gulf of Maine and Georges Bank is a relatively small, self-selected population with only a few thousand participants and it is getting smaller through attrition and increasingly restrictive regulations (Hall Arber et al. 2001). It is generally difficult to obtain large sample sizes from this population.

Follow-up contacts were made with questionnaire non-respondents in order to better understand the response bias in this study. There were no significant differences across size or format of questionnaires, i.e., long versus shorter versions. There were significant differences across the states, Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (chi-square 13.73 – sig., 0.008). Specifically, Massachusetts fishermen were the most likely to be non-respondents. There were no significant response rate differences across all the fishing practices or behaviors (i.e., level of engagement, fishing sector, and attitudes towards and support for cooperative research) and demographic variables. Nonetheless, while we concluded that there is a potential for response bias between states and the sample list is biased toward more actively engaged commercial fishermen in northern New England, the focus of this article was not impacted by the non-response bias because we were more interested in the views of the engaged sub-sample than the broader population of commercial fishermen. The response bias and the study's focus on engaged fisheries leaders make it inappropriate to generalize about the broader commercial fishing industry in New England or beyond. Nonetheless, the 295 respondents reflects

one of the largest sample sizes of commercial fishermen in the published literature.

Further, the survey included open-ended questions asking why the fisherman answered the scaled (not, somewhat, very) importance and achievability questions for each Northeast Consortium goal the way they did. We present here an analysis of the comments made by 164 respondents regarding the importance and achievability of one of the Northeast Consortium's objectives, i.e., promoting partnerships. This reflects all answers from the 295 total respondents. No differences were observed in responses to quantitative measures of partnership importance and achievability among respondents of different fishing practices or behaviors or other demographic variables. We elected to present qualitative data on this single goal because partnerships are central to all forms of cooperative research, and the partnership goal exhibited one of the largest discrepancies between importance and achievability ratings. The qualitative data underwent standard content analysis and quality control protocols that identified themes and patterns in segments of text comments (Lofland and Lofland 1995 Miles and Huberman 1994). Two investigators independently coded samples of text responses for attributes of importance and achievability and then consulted on final coding protocols, before one investigator completed the coding. Subsequent coding and recoding was confirmed with the second investigator after approximately one-quarter, half, and three-quarters of the data coded. All 164 comments were coded and clustered into overarching themes.

RESULTS

Overall, active commercial fishermen respondents considered the cooperative research objectives to be very important, although not very achievable (see Table 1). The goal of integrating fishermen's knowledge into the scientific framework was considered the most important among the four goals. The most exact, yet narrow goal, i.e., equipping and utilizing commercial fishing vessels in research, was considered the most achievable among the goals, although it was also considered less important than the other objectives. Meanwhile, the broader partnership goal was considered less achievable than other goals. Nonetheless, overall the respondents remained somewhat optimistic, with between 88% and 93.5% believing that goals were either somewhat or very achievable.

A mix of chi-square and one-way analysis of variance was used to examine the relationship between demographic and attitude and opinion variables associated with the sample of commercial fishermen included in this study. A few significant differences were observed, although different demographic groups were more alike than different. For example, fishermen were significantly more likely to believe that the goal of integrating fishermen's information, experience, and expertise into the scientific framework was important if they had contributed money to fishing causes ($P = .002$), served on a plan development team ($P = .005$), contacted a government official ($P = .007$), or spoken at a fisheries management council meeting ($P = .07$). Fishermen who participated on a plan development team were also more likely to believe that the developing partnerships goal was important ($P = .005$).

Table 1. Importance and achievability of cooperative research goals in New England ($N = 295$).

Northeast Consortium Goal Statement	How important?	How achievable?
Develop partnerships between commercial fishermen and scientists, educators, and coastal managers	Very: 83.2% Somewhat: 14.8% Not: 2.0%	Very: 31.6% Somewhat: 58.6% Not: 9.8%
Enable commercial fishermen and commercial fishing vessels to participate in cooperative research and development of selective gear technologies	Very: 84.5% Somewhat: 12.7% Not: 2.8%	Very: 47.6% Somewhat: 44.7% Not: 7.7%
Help bring fishermen's information, experience, and expertise into the scientific framework needed for fisheries management	Very: 91.6% Somewhat: 7.6% Not: 0.8%	Very: 38.7% Somewhat: 49.4% Not: 11.9%
Equip and utilize commercial fishing vessels as research and monitoring platforms	Very: 78.1% Somewhat: 20.7% Not: 1.2%	Very: 54.5% Somewhat: 39.0% Not: 6.5%

Other demographic characteristics (e.g., gear type, home port, etc.) did not show statistical significance.

A content analysis of the qualitative data regarding why active fishermen respondents considered particular goals important revealed several motives and opportunities for cooperative research in New England, while the responses to why fishermen considered particular goals less achievable identified potential barriers (see Table 2 for a summary of themes). The themes do not reflect completely independent ideas, as there is overlap and a continuum of social factors at play. Rather, the themes identify underlying social phenomenon that influence beliefs, attitudes, and opinions about the partnership objective.

Many fishermen perceived that it is in everyone's interest to participate as a partner in cooperative research. The majority of qualitative responses to the "why partnership is important" question related to the perceived common interest in a healthy stock and its relationship to a healthy, viable fishing industry. Sample responses coded as this common interest in a healthy fish stock theme included, "Everyone wants to save the resource," and, "In order to survive, we'll all need to work together." Further, the second most often mentioned opinion was that partnerships are important because they enhanced the quality of the science and the resulting fisheries management decision. For example, fishermen wrote, "Better science = more effective management," and "Fisheries science and data [are] not always accurate." Active commercial fishermen in New England also mentioned that partnerships are important because they may improve the professional trust and mutual understanding among fishermen and scientists, e.g., "to build trust," and "we can learn

from research and they can learn from us." Further, fishermen expressed an expectation or sense of professional duty that they should be partnering and participating in cooperative research; fishermen noted, "Fishermen need to participate in all levels of the recovery," and "[Cooperative research partnerships] will become necessary in time."

In explaining why achieving the partnership goal may be more challenging, fishermen identified many obstacles, including the fishermen's mistrust and suspicion of scientists and managers (see Table 2). For example, fishermen noted that "trust has been broken too many times," referring to the perception that fishermen have been harmed by partnerships in the past. Another wrote, "Fishermen distrust scientists." The level of mistrust may extend to active suspicion among some, as one fishermen wrote, "NMFS wants us out of business," and another added, "Fisheries managers have preconceived answers, which they hire researchers to prove; if the information they gather is contrary, they discard it."

While active commercial fishermen from New England reported that a common interest between fishermen and scientists was a reason that partnerships were important, fishermen also reported that a lack of common interest with scientists inhibited partnerships and made partnerships less achievable. Fishermen wrote, for example, "Never the two shall meet!" and "Lines have been drawn, walls have been built." Another fisherman summed up elements of mistrust, suspicion of the managers' motives, and the lack of common ground by writing, "We give information on our business; they make a living with this and we get restricted!" Active commercial fishermen in New England feared

that cooperation would not be in their best interests.

Negative stereotypes about scientists were observed in the qualitative data, e.g., perceptions of arrogance and disrespect among scientists toward fishermen. Fishermen wrote, "No one respects fishermen," and, "Scientists view fishermen as the enemy." Other fishermen noted, "NMFS scientists think they are better than fishermen. They look down on us." Still a fourth fisherman added, "Scientists think they have all the answers." Finally, fishermen acknowledged poor communication and little mutual understanding between fishermen and scientists. One fisherman stated, "Academia and managers do not listen!" Another added, "No one listens to fishermen," and a third said, "Researchers never listen to fishermen." At the same time, one fisherman acknowledged "fishermen lack fisheries education."

The twenty-three quotes reported above were from different respondents and represents a small fraction (14%) of the total 164 qualitative responses coded and clustered into the motivation and obstacle themes summarized in Table 2.

DISCUSSION

Based upon the quantitative analysis alone, there was clearly substantial support for cooperative research objectives among active New England commercial fishermen, with > 97% rating the goals as very important and > 88% rating them as somewhat or very achievable. While a strong belief in the importance and the somewhat less strongly held belief in the achievability of goals was universally held across the active commercial fishing industry respondents in New England, fishermen who participated on plan development teams were among the most adamant in

Table 2. Motivations and obstacles to scientists-fishermen partnerships in New England.

Why it is important to form partnerships?	Why it is hard to achieve partnership goal?
Address common interest among fishermen, scientists, and managers.	Mistrust of scientists. Suspicious of scientists' and managers' opinions and interests.
Best interest of commercial fishing industry.	No common ground or interest with scientists. Not in the best interest of the commercial fishing industry.
Enhance the quality of science and the management decisions. Improve the professional trust and mutual understanding among fishermen, scientists, and managers.	Negative attitude among scientists toward fishermen. Scientists do not respect fishermen. Arrogance of scientists.
Address desire, duty, and expectation to participate as a member of the fishing profession.	Poor communication and mutual understanding with scientists.

their belief in the importance of partnerships and integrating knowledge. This group, along with participants on other management committees (e.g., advisory panels, technical panels, council research steering committees, etc.), likely may be strong advocates for cooperative research. Further, they are better positioned to influence policy and management than the other respondents who stood out among the sample (i.e., fishermen who contributed money to fishing causes, contacted government officials, and/or spoke at a fisheries management council meeting). In fact, the level of management engagement was a better predictor of strong support for integrating fishermen and scientific knowledge and importance of partnerships than gear type, sector, fishery, home state, or other fishing industry demographic. These management-active fishermen may be benefiting more directly from additional cooperative research-derived information and could be in a position to advance the science-to-management impacts of cooperative research. Consequently, tailoring programmatic communication and outreach activities to this important sub-set of commercial fishermen could enhance impact and program effectiveness.

Fishermen mentioned that a sense of professional duty contributed to why it is important to form cooperative research partnerships. In a nationwide review, Read and Hartley (2006) reported that cooperative research promotes a sense of stewardship among the fishing industry. This suggests that there may be an emerging professional norm among commercial fishermen—an expectation that to be a fisherman, they should participate in research and monitor the health of the ecosystem and the fish stocks. Research on common property resources has suggested that it is critical to have the resource users actively involved in monitoring the health of the resource in order to achieve sustainability (Ostrom 1990). Future research could examine whether the sense of professional duty reflects the beginning of the integration of research into a stewardship ethic among fishermen. If this human dimension of cooperative research is real, the institutional integration of cooperative research into management regimes, including co-management, ecosystem-based management, etc., could be critical to achieve sustainability of the resource.

A belief in a common interest among fishermen, scientists, and managers was a

frequently mentioned reason among active New England fishermen for the importance of forming cooperative fisheries research partnerships; however, it also proved to be an obstacle. On one hand, there was a perception that “everyone wants to save the resource,” as one fishermen stated; while on the other, there was fear that another fishermen articulated as “whenever fishermen help with data, it slaps them in the face.” Fishermen thought there ought to be a common interest among fishermen and scientists (particularly an interest in healthy, viable ecosystems, fish stocks and fishing communities), although in practice they did not often see common ground (see Dobbs 2000; Hartley and Robertson 2006a). This scale difference between general, broad common interests in a resource, and more narrow interests in specific fisheries or fishermen is substantial and the divide between fishermen and scientist on this issue remains wide. The phenomenon of the same individual holding different attitudes toward the same interest when applied at different scales (public good versus individual interests) has been seen in other resource and environmental management contexts, e.g., water resource management (Bruvold 1988), land use planning (Schively 2007), and waste management (Rabe 1994; Sjöberg and Drottz-Sjöberg 2001). Nonetheless, interest in participating in cooperative research in New England continues to grow (Northeast Consortium 2007), in spite of the perceived risk among fishermen. Cooperative research managers cannot deny that the fishermen’s perceived risk from partnerships is real.

Last, given that mistrust, as an obstacle to achieving partnerships goals, is so strong among fishermen that some suspect that scientists and managers are out to harm them, NMFS and cooperative research program managers should not expect that simply denying the perceived vengeful interest will eliminate this concern among fishermen. Trust is earned and not granted (Lewicki and Bunker 1995); thus, overcoming this suspicion will take time and a consistent pattern of constructive scientist-fishermen partnerships. Much of the previous literature on the human dimension of cooperative research identifies the importance of trust; it can be needed to permit cooperation and at the same time, trust can grow with cooperation. However, trust is a large, complex, social construct that needs further research in the context

of cooperative research. Further, Hartley and Read (2006) reported that inconsistent funding can undermine the ability of cooperative research programs to demonstrate the pattern of commitment necessary to build trust. Consequently, the funding shortfall emerging in cooperative research today could seriously set back the trust built since 2000 in New England.

SCIENTISTS AND MANAGERS

The findings reported here provide insights into the beliefs of a critical stakeholder in cooperative research and fisheries managers, i.e., the actively engaged commercial fishermen, particularly in New England. At the same time, the attitudes of participating scientists and managers, particularly toward the importance and achievability of cooperative research goals, is an important question too, although beyond the scope of this research project and funding. Do scientists and managers share the views of fishermen or are their attitudes, opinions, and perceptions different?

Past research has provided some indication of the substantial differences between fishermen and scientists. For example, the Kennelly and Broadhurst (1996) case examples discussed above include insights on stakeholder differences in the diffusion process of cooperatively-derived gear technologies. While scientists and engineers were convinced of the effectiveness of the gear designs by the data analysis and graphical interpretations, fishermen who did not directly participate were more convinced by photographs, videos, and meetings with the scientists and fishermen who did participate in the research. These participating fishermen helped other fishermen make and use the gear modifications and the grapevine among fishermen lead to adoption of the gear in other ports throughout eastern Australia. So scientists and fishermen may find very different types of information and data convincing and may disseminate their knowledge differently.

For their part, scientists are generally unfamiliar with collaborative processes and can be reluctant to participate (Hinkey et al. 2005; NAS 1995). Conway and Pomeroy (2006) reported that scientists, fishermen, and university extension staff perceived their involvement on the same cooperative research project differently. Scientists viewed the project as

more cooperative (joint activities and tasks) versus collaborative (more intellectually integrated) than fishermen and extension partners, as defined by Conway and Pomeroy. Extension staff considered the same project as more collaborative than cooperative, when compared to participating scientists and fishermen. Hinkey et al. (2005) reported that scientists struggle to understand and accept a collaborative process. Thus, scientists and fishermen likely experience the same event differently.

Nonetheless, Hartley and Robertson (2006b) have reported some similar outcomes among 60 fishermen and 37 scientists from their act of participation in cooperative research. Fishermen and scientists both claim that they are more likely to enter long-lasting partnerships as a result of cooperative research; a similar finding was reported by Conway and Pomeroy. Fishermen and scientists (to a lesser extent) are more engaged in fisheries management after participating in cooperative research, although they both remain skeptical about cooperative research's impact on management. Finally, fishermen and scientists both report achieving greater mutual understanding and trust than expected from participating in cooperative research.

Further, Hartley and Robertson (in press) also examined whether knowledge integration was important and achievable and whether and how fishermen and scientists learned about the scientific process or fishing practices, respectively from participating in cooperative research. They found that active commercial fishermen believed that scientists did not respect or value their information. Nonetheless, scientists who participated in cooperative research reported learning from fishermen and did not express the level of distrust and disrespect for fishermen or fishermen's knowledge that the active commercial fishermen perceived. While this could be due in part to those electing to participate being pre-disposed to collaboration and learning about other's perspectives, knowledge integration resulting from the act of participating in cooperative research also appeared to be occurring in participating fishermen and scientists.

While this past research and the forthcoming publication of data from participating scientists in Northeast Consortium-funded cooperative research

provides some insights into the perceptions of scientists, they do not answer the question about scientist's perceived importance and achievability of partnerships discussed in this article. Further, data on manager's perceptions are lacking in the literature. These remain important future research questions.

CONCLUSIONS

New England cooperative research program managers need to work to overcome mistrust and suspicion, a lack of mutual understanding about each other's interests, misperceptions and negative attitudes, and poor communication. Cooperative research provides a venue for communication, addressing these underlying human dimensions of cooperative research and management.

These data also suggest very high expectations among active New England fishermen for what should be achieved from cooperative research. Since high expectations may decline significantly if results are not clearly demonstrated in a reasonable amount of time, it could be critical for cooperative research program managers to understand what the motivations, opportunities, and obstacles are to achieving program goals. New England fishermen who are actively fishing today seem to think cooperative research is important, but they are less convinced it will make a difference. This fact, in part, contributed to a set of Northeast Consortium adaptations that expanded science-to-management activities—specifically, Northeast Consortium staff administer scientific peer reviews of each cooperative research project's final reports and data. Project final reports and accompanying peer-review reports are then presented by Northeast Consortium staff, sometimes in conjunction with the project's principal investigators, to the New England Fisheries Management Council through its Research Steering Committee. Further, the Northeast Consortium sponsors a web page with a map-based interface that serves all peer-reviewed data from Northeast Consortium-funded projects. Additional research on the science-to-management process would provide further insights into helpful programmatic adaptations.

It has already been noted that cooperative research provides important new communication venues for fishermen and

scientists; however, additional communication opportunities should be sought. Cooperative research managers should design and host safe, secure places for communication between fishermen, scientists, and managers (e.g., regular project participant meetings, symposia and panels at scientific conferences and professional trade shows, cooperative research workshops, and community celebrations).

Finally, effective cooperative research programs need to be tailored to the regional context (Read and Hartley 2006). At the same time, lessons learned and experiences from active regions (e.g., New England, Alaska and the Pacific Northwest), such as those reported here, should also be shared with other regional initiatives so that programs can be successful and meet high expectations as quickly as possible. A network of regional initiatives and dialogue within professional associations, such as the American Fisheries Society, could more rapidly share, advance, and coordinate the successes and best practices of cooperative research. The U.S. Commission on Ocean Policy (2004) recommended a network of regional initiatives; however, given the need to balance local- and region-specific effectiveness with communication and information sharing nationally, Glass (2006) suggested a network of regionally-tailored, university-based initiatives. The re-authorized Magnuson-Stevens Act states that the federal government "shall establish a cooperative research and management program... implemented on a regional basis and shall be developed and conducted through partnerships among federal, state, and tribal managers and scientists (including interstate fishery commissions), fishing industry participants (including use of commercial charter or recreational vessels for gathering data) and educational institutions"—see U.S. Public Law 109-479, Title II, §318(a). However, for the regionally-tailored, national network to be most effective, it should be an active learning organizational network that shares information and lessons learned, and systematically monitors the effectiveness of cooperative research programming. Understanding the perceptions of active commercial fishermen and their attitudes toward cooperative research, along with other human dimensions of cooperative research, will be critical to achieve these national goals.

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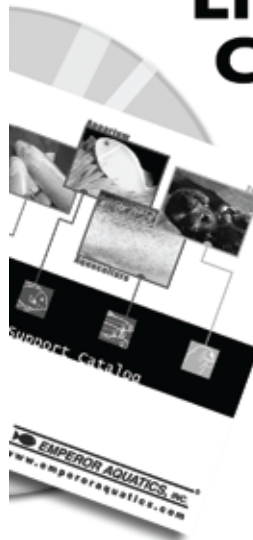
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