Gearing up for Improved Collaboration

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- Defines fishermen's knowledge as anecdotal and localized, since it is the qualitative observations and views gained through the experience of fishing.
- Scientific knowledge is based upon research methods and has been more readily accepted in the science and policy process.
- Cooperative research presents the opportunity to integrate fisheries-based and research-based knowledge and produce a new kind of data or new knowledge.
- Cooperative research may be a means to bring these two types of knowledge together, although to realize its full integrative potential more varied participants and fishermen and additional opportunities beyond chartered vessels might be needed.
- Incorporation of cooperative research results into management has lagged behind the number of cooperative research projects undertaken.
- Fishery management councils are working on procedures to incorporate results into the management process, peer review remains critical.

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search and comanagement are very democratic processes, although "sometimes fishermen are independent to their demise." The panel's and audience's struggle with the representation issue reflected the tussle between desirable ideals and pragmatic needs. Other panelists concurred-it is important to "aim high" and provide opportunities to participate, along with doing things to get buy-in to the cooperative process:

Provide purpose and incentives for participation, including resources, a clear opportunity to be heard and make a difference, and salience to participants.

Involve as many perspectives as possible in defining the problems and issues at hand; this will help ensure that those interested stakeholders will participate.

Clearly present meeting goals, publish purpose, agenda, and location of meetings well in advance, and ensure that meetings are comfortable and not intimidating.

Invest time on building understanding and reaching consensus.

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Gearing up for Improved Collaboration: The Potentials and Limits of Cooperative Research for Incorporating Fishermen's Knowledge

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Cooperative research provides a mechanism to renew trust and good faith in the management process, and contributes a sound methodological tool. In addition, it recognizes the expertise of different stakeholders. Cooperative research efforts also open the research process to greater scrutiny and increased transparency of the entire research process. Such programs can provide the key to improved relationships among marine stakeholders as well as more effective marine policy that is based on improved research design methodologies and appropriate data collection techniques in other words, "the best science available." [Kaplan and McCay 2004]

Is cooperative research (CR) *a way* that fishermen's knowledge can be mean ngfully integrated with scientific knowledge to improve fisheries science and management? Does CR improve conditions for mutual understanding and trust? Our research suggests that the answer is yes, qualified by the conclusion that it depends on the kind of cooperative research, the kind of knowledge, and the kinds of science and management questions.' Another condition is who actually participates.

Of particular importance, we argue, is developing mechanisms for the review of knowledge that comes from fishermen and out of cooperative research. Both peer review and relevancy review are critical to the actual use of such knowledge. We know from our own experiences, as well as from a large literature in the sociology of science, that scientists, like all good professionals, create boundaries around their work-boundaries that in the case of agency science are also influenced by legislative mandates.

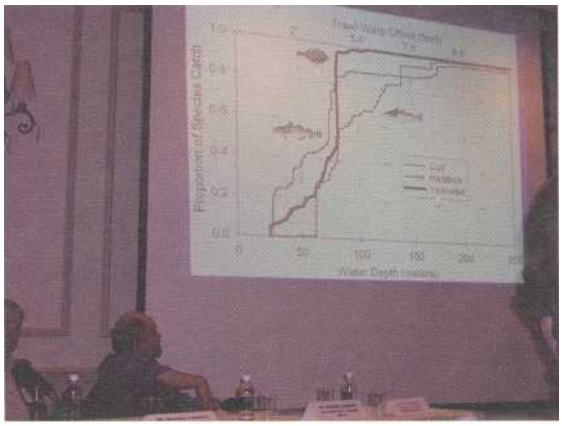

Photo 1. Steven Murawski, National Oceanic and Atmospheric Administration (NOAA)/Northeast Fisheries Science Center, reporting on the survey trawl problem at the Maine Fishermen's Forum, February 2003, explaining the problem of trawl warp offset in the NOAA trawl survey as part of cooperative work with members of the fishing industry to fix and improve the fishery-independent survey gear. Photo by B. McCay.

Cooperative research challenges the boundary-maintenance work of scientists, whose responses a important in determining what happens next.

Preliminary Research Findings

Here are some of the preliminary findings of our research to date, mainly based on interview conducted by Teresa Johnson and Kevin St. Martin with people in the New England and mic Atlantic fisheries and fisheries sciences:

1. There are three general kinds of fishery-oriented cooperative research: gear studies, stock as sessment-related research, and ecological research.' Fishermen's experience-based knowledg (FEBK) can play a role in all three kinds.
2. Despite a history of limiting interaction to the use of the fishermen's vessel as a research plat form, CR in the northeast has reached the point where it is expected that fishermen will have input to everything from project design to interpretation of the data. The implementation o these expectations is another story.
3. The fishermen and scientists involved greatly value the opportunity CR gives for improvinj their relationships, including changing attitudes and the ability to communicate, and this car take precedence over scientific outcomes.
4. *The fishermen involved appear to prefer gear studies most of all, and the scientists and technicians involved seen to feel that is the kind of cooperative research that is most useful.'* In gear studies, the experience-based knowledge of fishermen is more likely to be integrated with that of scientists and to be valued by scientists and managers than in collaborative research studies oriented toward stock assess- ment or ecological questions.
5. Consequently, the experience-based knowledge contributed by fishermen is more likely of the technical and operational type, rather than biological or ecological. *CK has notyet become a good way for the integration of fishermen's biological and ecological expertise, although there are exceptions and high hopes.*
6. More meaningful involvement of fishermen in stock assessment-related research is slowly tak- ing place. One example may be the industry based surveys (IBSs) for Atlantic cod *Gadus morhua* and yellovvtail flounder *Limanda ferruginea,* where half of the fixed sampling stations were se- lected by commercial fishermen.' Another such example is the Trawl Survey Advisory Panel, which includes fishermen and scientists working to improve the Northeast Fisheries Science Center bottom trawl survey.
7. In the northeast, very little FEBK used in cooperative research is ecological or environmental beyond not-at-all-trivial knowledge of how and where to find fish. Some of the projects that involve fishermen in environmental monitoring appear to be primarily "for-hire" type collabo- rations, where fishermen's contribution is primarily their vessels.
8. *Communication is a critical aspect of the working relationships central to cooperative research.* One of the reasons that gear CR seems to work so well is that the fishermen and the technical experts have training and experience in fishing gear and technology that enables them to "talk the same language."
9. In stock assessment CR aimed at improving fishery-independent or fishery-dependent data, the success of the CR effort sometimes depends on *the participation of academic scientists,* who are able to communicate with government scientists about technical matters concerning stock assess- ments, but who are also better able to communicate with fishermen, in part because they are not associated with the regulatory agency.
10. The issue of how cooperative research findings are used in fisheries management decision making is very challenging to all involved, given Data Quality Act, "best available science," and other legal mandates. Institutional factors such as legal mandates can continue to pose chal- lenges to effective collaboration.'

11. Other challenges include unanticipated delays and a learning curve in getting many of the CR projects completed in ways that meet basic scientific requirements. Peer review is being handled within the National Marine Fisheries Service (NMFS). The New England Fishery Management Council and the Northeast Consortium are also engaged in implementing a process of relevancy review.
12. Culture is not necessarily the barrier between fishermen and scientists. Both fishermen and scientists often rely on anecdotal information to come to conclusions, and both recognize the value of objectivity and careful observation, although they usually use different tools and have different objectives. Cooperative research brings the objectives closer together and also can result in shared use of at least some aspects of scientific methods.
13. As CR develops, some scientists and fishermen have become very experienced and better prepared for it, improving the chances that it will be useful in the management process.
14. At the same time, though, participation in CR remains very narrow and *may* become more selective, reducing the value of CR in improving communication and trust between scientists, managers, and members of fishing communities.

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We conclude this brief essay with thoughts and comments on gear studies and boundary issues.

Gear studies do not really challenge traditional practices in the production of scientific knowledge. They especially do not challenge the authority of fisheries science done by NMFS scientists. This is probably because gear studies are not often done routinely by *NMFS* scientists anyway. *For* example, the infamous "trawl gate" could be blamed on the lack of expertise on the research vessel about gear technology and vessel operations.

In addition, gear studies have a long history and really cannot be done without industry boats. Examples of older industry-science collaborative gear studies include the Nordmore grate in the shrimp fishery and various studies to reduce the take of marine mammals. Many of the "collaborative" studies in the past did not fully involve fishermen in all phases of the research program, treating them mainly as owners and operators of "for-hire" vessels. Gear scientists doing collaborative research today emphasize

Photo 2. Rutgers University and National Fisheries Institute conduct collaborative gear selectivity research to reduce discards of scup *Stenotomus chrysops* **in the longfin inshore squid** ***Loligo*** **paleiifishery, Photo: Sarah King, Rutgers University, Haskin Shellfish Research Laboratory.**

the difference. So in this way, the boundary between fishermen and science has been opened slightly in that the fishermen involved are now active participants in all aspects of the research projects.

Despite the fact that gear studies have been around a while and do actively involve fishermen and their knowledge, science still has the final say as to whether the results of the effort are determined to be of sufficient quality to be considered by management. The results of collaborative gear studies are sent for peer review just like other scientific projects. Science is viewed as a necessary instrument with which to gauge the validity of the outcome of gear studies. When asked what scientists bring to these collaborative gear studies, one participating independent scientist emphasized the need for scientific credibility in these studies to make them acceptable to management.

Many gear studies have been done and not used in management.' However, ideally, collaborative gear studies function to translate FEBK into something useable in the science policy process. In some cases, these gear studies are used to "prove" what fishermen already know about existing gear-either that it does or does not catch a certain fish species-or that fishing can occur with traditional or adjusted gear during certain times of the year in specific places with minimal bycatch of species of concern. Again, FEBK must be "proven" or validated by science in order to be useful for science or management. Otherwise, it is simply dismissed as anecdotal or as not widely applicable.

By and large, gear studies do not produce results that could be used to challenge stock assessments done by NMFS scientists and are therefore less likely to elicit boundary-maintenance responses.

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Gear studies do not collect information that would clarify total biomass removals (landings and discards), relative abundances, or life history characteristics of species. These are the kinds of informanon used in the stock assessment process. The objectives, methods of data collection, and types of data collected by gear studies are fundamentally different than what is needed to produce stock assessments. The stock assessment process is where federal fisheries science interacts most with fisheries management. Stock assessment advice really sets the grounds for what fisheries managers can do. Results of gear studies simply provide tools to meet management goals determined by stock assessment advice.

References

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Wilson, D. C., and P. Degnbol. 2002. The effects of legal mandates on fisheries science deliberations: the case of Atlantic bluefish in the United States. Fisheries Research 58:1-14.

Footnotes

' These remarks are based on an ongoing research project, funded by the National Science Foundation, on the relationships between "experience-based" and "research-based" knowledge in fisheries science and policy: 2004-2007, Experience based knowledge in a science policy context, National Science Foundation, NSF 01-152, Societal Dimensions of Engineering, Science, and Technology (SDEST), Award no. SES-0349907. March 15, 2004-February 28, 2007. PI: Bonnie J. McCay; Co-PI: Kevin St. Martin; Graduate Research Assistant: Teresa Johnson. Douglas Wilson of the Institute for Fisheries Management in Hirtshals, Denmark is a consultant to the project, which involves comparisons with similar matters in Europe. Our study is not entirely about cooperative research, but cooperative research quickly emerged as the place where these relationships come to the fore, and thus, it has turned out to be the major focus.

[2] A large literature in the sociology of science is relevant. References to literature on the sociology of science are available from the lead author.

' For a good description of the cooperative research programs from a NOAA perspective, see "Overview of Regional Cooperative Research Programs, April 2005," http://www.st.nmfs.gov/st4/documents/cr/general_program summary'_2005.pdf. Also, see the Cooperative Research Partners Initiative Web site of NOAA, http://coopresearch.nero.noaa.gov/studv.htm. Useful information on specific projects is available for the mid-Atlantic region at the Mid-Atlantic Fishery Management Council's Web site (w-, w.mafmc.org) as "2002-2005 RSA Project Status as of 2004-10-01," http://www.mafmc.org/mid-atlantic/rsa/2002-2005 RSA_ProjectStatus as of 2004-10-01.pdf. http://wwvv.northeastconsortium.org is the Web site for the Northeast Consortium, which manages many of the cooperative research projects of New England. ulew.fishresearch. org is a northeast Web site intended to be interactive between fishermen and scientists but apparently has not been updated since 2003.

' Gear studies seem to be the most popular of the collaborative research projects. The majority of the collaborative research projects funded through the Northeast Consortium and NOAA's Cooperative Research Partners Initiative program have been gear technology studies. In fact, one of the issues often raised about cooperative research in the region is that there are not enough gear technicians or experts available to work with all of the fishermen interested in doing collaborative gear work.

Why do fishermen and scientists collaborate so much on gear studies? One reason is that fishermen do contribute their expertise to these projects. A scientist explained that fishermen are a natural fit for gear studies because the\- are inherently testing gear as part of their livelihood. As is true with other types of collaborative research, fishermen who participate in gear studies receive financial benefits. The boats used in these studies are chartered. With increasingly restrictive regulations, fishermen are fishing fewer days a year. Collaborative gear studies keep their boat active for more of the year. These studies provide significant supplemental income to fishermen when they are not able to go fishing. There is another side to this, however. In some instances, participation in collaborative research may result in the loss of fishing revenue-this has to be balanced. Another example is that now fishermen in New I?ngland are being forced to utilize their individual A' Days-at-Sea (DAS) allocations, which are more valuable than their "B" DAS because of concerns about additional mortality caused by research.

Fishermen also support gear studies because they have obvious benefits to management, as described above. These studies are very results oriented, and fishermen will likely see results more quickly compared to other studies that require long-term time series of data. Gear studies provide potential immediate opportunities for fishermen to harvest fish stocks that are otherwise closed to them because of bycatch concerns. For example, collaborative gear work provided fishermen with a new fishing opportunity in the whiting fishery, which otherwise would have been closed to them due to the need to rebuild groundfish stocks.

' In the Cooperative Research Partners Initiative cod and yellowtail TBSs, the industry selected about half of the stations, which are considered fixed. In some instances, the captains of the IBS are given flexibility in towing in a defined area around what is otherwise a station's randomly chosen location. One of the criticisms of NMFS surveys is that because of the random stratified design of the survey, the research vessel often tows in places where fishermen know that there are no fish. Allowing fishermen to contribute by selecting fixed stations or where to tow once in a place is important to addressing this concern of the industry.

'In an earlier project funded by the National Science Foundation, Science and Citizen Participation in Fisheries Management (Award No. 9810100, Bonnie J. McCay PI; Douglas Wilson co-PI), which ran from 07/1998 through 02/2001, we found the following: legal mandates about scientific issues affect the use of scientific data and claims about credibility. We found this to be true to a degree that challenged a common assumption in the literature that breakdowns in communication caused by a gap between training and experience, expressed as differing "world views" or knowledge cultures, were the primary obstacles to making use of experience-based knowledge (EBK) in fisheries management. Although these differences exist, the rules and institutions appeared to be the major blocks. This was particularly true in the case of bluefish *Pomatomus saltatn · management* where the use of EBK was blocked despite the fact that many of the scientists involved actually agreed with the substance of the EBK. The emphasis on processes in the present proposal is built on this finding and the need to explore its implications in other contexts. See Wilson and Degnbol 2002.

' Examples we have found thus far of northeast gear studies used in management include Nordmore grate research, research for the raised footrope whiting fishery, gear work concerning access to a closed area for yellowtail flounder, research to allow haddock *Melansyrammus aeglefznus* hook fishing as a "special access program" (SAP), and possibly a haddock separator trawl study.