2 Introduction

This report presents the results of an in-depth evaluation of seven case studies of cooperative research and data gathering efforts involving the National Marine Fisheries Service (NMFS) and the sport and commercial fishing industries. The evaluation was motivated by NMFS' desire to improve the design and implementation of such efforts in order to improve the information base for stock assessments and management decisions. In particular, we desired to:

- better understand why cooperative data gathering efforts succeed or fail;
- develop recommendations to increase future chances of success; and
- improve expectations about what cooperative data gathering can and cannot accomplish.

Starting with a list of seven representative case studies provided by NMFS, we gathered and evaluated written material such as reports, correspondence, legal and regulatory filings, emails, and scientific publications. We also carried out extensive interviews with from six to 20 contacts per case. Using the methods detailed in the following section, we assessed the relative degree of success of each cooperative effort, analyzed the role of several critical factors in determining the degree of success, and considered how the lessons learned from each case study might be more broadly applied to other cooperative efforts in the future.

This report summarizes the evaluation's objectives and the methods we used to address these. It reviews the history of each case study, presents our conclusions and the evidence that documents them, and makes recommendations for the future.

3 Methods

This section describes analytical methods used to obtain and organize background information on each case study, assess the relative degree of success of each, and analyze the influence of key determinants of success or failure.

3.1 Core questions

Within the overall context of NMFS' desire to improve the design and implementation of cooperative research and data gathering programs, our evaluation of the seven case studies focused on three distinct questions intended to help achieve this goal:

- What was the degree of success achieved in each case study?
- What were the factors that determined the degree of success?
- How applicable to other circumstances are the lessons learned from each case study?

We defined "success" as the degree to which the effort met its original objectives, both explicit and implicit, and the presence of unintended consequences, both positive and negative. We did not use the level of conflict as a measure of success (i.e., less conflict equals more success) because conflict is often an inherent part of attempts to collaborate and because the absence of conflict may merely mean that crucial issues were avoided.

We included among the "factors" the larger management context, particularly changes in quotas and other regulatory constraints; lawsuits and/or the threat of lawsuits against one or more of the parties; the history of relationships, professional and personal, among the participants; the level of supervisory support, both within NMFS and industry organizations; leadership on a personal level; and the problem-solving method(s) used by the participants.

By "applicability to other circumstances" we mean the extent to which the approaches taken and the lessons learned from each case study are potentially useful to participants in other, similar efforts. In the narrowest terms, lessons learned from a particular case would only be applicable to situations where the key factors were identical. At the other extreme, some lessons may be applicable across a broad range of key factors.

3.2 Methods used to gather information

NMFS initially identified seven case studies, briefly described the main issues in each, and provided a preliminary list of contacts as sources of information (see Appendix 1).

We gathered raw material through interviews and review of documents, including reports, scientific and technical articles, newspaper articles, administrative records (e.g., memos, faxes, emails), and regulatory notices. The amount and nature of such material varied from case to case, depending on the nature of the case. For example, cases involving complex regulatory proceedings (pingers, BRDs) had more associated written material than the more purely research oriented cases (e.g., tagging). We made a significant, but not exhaustive, effort to obtain as much of the written record as possible.

An initial list of contacts was provided by NMFS and we expanded this with referrals from individuals on the original list and with our individual contacts in a variety of organizations. As the list of interviewees in each chapter shows, we attempted to interview the majority of direct

participants in each case study as well as knowledgeable observers who could provide an outside perspective. We continued interviewing new contacts until we had thoroughly cross-checked the important elements of each case and had begun to hear the same material repeated. This required as few as nine contacts with the less complex cases and as many as eighteen with more complicated ones.

The interviews for each case study progressed through three stages: first, outlining the story and the main issues; second, deeper investigation of the factors influencing each case; and, third, fact checking and review by key contacts. Interviews were loosely structured around the core questions listed above. In our experience, giving interviewees the opportunity to set the tone and direction of the conversation, rather than using a highly structured survey instrument, provides more useful data. Once conversations were underway, we branched out from the original direction of the interview by asking additional questions based on the specific evaluation criteria.

In some cases, we challenged one contact with information obtained from another to probe their depth of understanding, their relative objectivity, or to develop a different perspective. We also carried out follow-up interviews with some contacts to pursue material from an earlier interview or to address questions raised by other contacts. We also utilized a few knowledgeable individuals, with whom we had long-standing prior relationships, as fact checkers and to provide us greater insight into the history and underlying motivations of particular groups. All interviewees were given the option of placing all or part of their interview off the record; however, this option was rarely exercised. We made detailed, and in most cases verbatim, notes of all interviews.

3.3 Methods used for addressing the core questions

We used somewhat different methods for addressing each of the three core questions listed above.

For assessing the degree of success, we searched for objective measures to document the outcome(s) of each case. These included the implementation of new policies or procedures, acquisition and use of new data, and improvements in management methods or decisions. Where possible, we compared such measures to each effort's original objectives. We also searched for subjective measures such as participants' assessment of success; whether potential gains were left unrealized; whether the case involved unnecessary effort, time, or conflict; and our own subjective judgment of effectiveness by comparison to analogous efforts. We also searched for evidence of unintended consequences, both positive and negative. These included evidence of altered working relationships, lawsuits avoided or filed, and attempts to apply a particular case's methods in other analogous situations.

We identified the potential key factors listed above at the beginning of the project based on our past experience, relevant literature, and the suggestions of the project advisors and added other factors during the process of building the story for each case study. We then reviewed each story and systematically cross referenced the list of key factors to ensure we had considered the possible influence of each. We then asked ourselves whether and how each story might have turned out differently if each factor, in turn, had been excluded, and also examined evidence that suggested how factors interacted in each case. Where this process raised new questions, we returned to the raw material or carried out additional interviews.

Assessing the applicability to other circumstances of lessons learned in each case was an entirely subjective process, based on the extent to which key prerequisites of success were present across a range of cases.

3.4 Methods used to validate findings and avoid bias

We used a range of techniques to help us avoid bias in the data gathering and analysis and to verify our conclusions. These techniques are described in more detail in Chapter VII of Qualitative Data Analysis by Miles and Huberman (Sage Publications, Beverly Hills, 1984).

We guarded against interviewing non-representative contacts, generalizing from non-representative events, and relying to too great an extent on accessible and/or elite contacts by:

- systematically interviewing a broad range of contacts with a variety of relationships to each case study
- following up on suggestions from all sources for additional interview candidates
- searching for objective information on the outcomes of each case study
- using the different case studies as contrasts to test the plausibility of our emerging conclusions.

We guarded against influencing interviewees by asking open-ended questions, making it clear how interview results would be used, and allowing contacts to speak off the record. Where interviewees' positions were known through their previous speeches, writings, or other activities, we used this knowledge as a rough check on the internal consistency of their statements. We used the advisory panel as a check on the possibility of subtle influences on our own perceptions. The panel reviewed an earlier draft of the report from a more objective and skeptical perspective. The three panel members have distinctive backgrounds and were not directly involved in performing the evaluation.

Given the inherently non-quantitative nature of much of the information we gathered, we attempted to corroborate findings and conclusions by comparing several different sources and kinds of evidence. For example, we cross checked exceptionally passionate interviews with more objective sources and compared claims to the written record where possible. Where we found that interviewees were distorting the record, we tried to understand their motivations and to use this as a basis for further investigation. Our goal was to ensure that our findings were based on several different lines of evidence that were mutually supportive, a process called "triangulation."

While we used as wide a range of information sources as possible, we did not necessarily always take these at face value, but weighted them in terms of their relative validity. For example, we gave more credence to sources who had been directly involved in events, who had a long-standing base of experience in the topic being discussed, whose statements could be validated through cross checks with other sources, who provided a thoughtful description and analysis of events, and who responded directly and knowledgeably to challenging or probing questions. We also gave more weight to interviewees we knew from previous interactions were more likely to be objective and balanced.

Finally, we used the seven case studies as contrasts and replicates wherever possible to test the plausibility of our conclusions. First, we identified what we believed to be essential features of any successful cooperative data gathering effort and assumed that such features should appear consistently in all the case studies. Second, where we concluded that the role of certain key

factors was influenced by the circumstances of an individual case, we specified "if – then" hypotheses and tested these, with follow-up data gathering if needed.

4 Summary Findings and Lessons Learned

This section summarizes the main findings of the case studies and describes approaches to help ensure the success of cooperative data gathering efforts. The individual chapters provide additional, specific detail and we recommend that these be read to provide background and context for the brief summary here.

4.1 Success is possible

The set of case studies clearly shows that cooperative data gathering efforts can achieve their goals. To differing degrees, each case presents a story of success and provides lessons for other similar efforts. In some cases (combined logbook, pingers), clearly defined goals, once achieved, can be embodied in revised regulations and procedures and maintained with little further effort. In other cases (BRDs, tagging) more fluid situations require that the data gathering effort be periodically adjusted. In the tagging programs, for example, shifting management approaches and more restrictive quotas have eroded the historical reservoir of goodwill among participants, highlighting the need for renewed commitment to an updated set of goals.

Despite the generally optimistic picture presented by the cases we examined, there is no guarantee of success. The case studies underline pitfalls that can hamper an already difficult process and there are many examples from all coasts of cooperative efforts that have failed, for a variety of reasons, at all stages of development.

4.2 Each case is unique

Each cooperative data gathering effort is a unique response to a specific problem and a distinctive set of circumstances. For example, the implementation of an ITQ system in the Alaska sablefish fishery significantly raised each fisherman's stake in the accuracy of the stock assessment and the quota based on it. With fixed ITQ shares, fishermen's catch and income now rise and fall with the quota. This increased economic incentive led to a sustained effort to improve the information going into the stock assessment, by improving the mechanics of the survey, incorporating biological data into the logbook, and lobbying for funding for additional biological studies. In contrast, the development and adoption of pingers in the New England gillnet fishery was directly motivated by the fear that continued porpoise mortality would lead to severe cutbacks on fishing activity. In yet another instance, the two tagging programs were largely the result of a broad agreement that improved data would be beneficial in the long term, rather than an immediate response to a crisis or changed economic circumstances. These programs are encountering difficulty because this goal is no longer as relevant. In the case of bycatch reduction devices (BRDs) in the Gulf of Mexico and the South Atlantic, participation in cooperative research was industry's way of trying to ensure that an inevitable regulatory requirement would be as palatable as possible. The history of the bitter controversy over turtle excluder devices (TEDs) was still fresh in everyone's minds and no one wanted to repeat that history.

We believe this fact – that each cooperative data gathering effort has unique characteristics – means that a single design or design approach to such efforts is not feasible. This is not surprising, given the diversity of fisheries, fleets and ownership structures, gear types, histories, and ecological conditions. Each effort, to a large extent, must be custom designed and, as the following paragraphs strongly suggest, allowed to develop organically from the motivations, knowledge, and experience of the participants.

4.3 Strong motivation is necessary

At present, cooperative data gathering efforts represent a change from the status quo, in which NMFS has the principal responsibility for data collection, analysis, and interpretation. They require that industry, NMFS, and sometimes academia or conservation organizations work together in unfamiliar ways, often in the face of mistrust and resentment over past history and present circumstances. These efforts are risky, and face significant practical and psychological impediments. Overcoming these impediments, and changing the risk / reward balance, usually requires strong motivation (either positive or negative) to energize action. Participants in successful cooperative efforts must have more to lose by sticking with the status quo than by trying to change it. Effective motivations can be threats (such as pending lawsuits, e.g., pingers), fear of loss (such as a potential closure or quota reduction, e.g., Oregon trawls), or an opportunity for a useful gain that cannot be achieved any other way (e.g., scallops). The ideal motivation is some combination of both negative (fear of loss) and positive (opportunity for gain) elements. Motivations will necessarily vary among participants because of their differing circumstances and perspectives, but all should have some clear stake in a successful outcome.

Motivations for participants in the case studies differed from case to case, as the previous subsection and Table 4.1 show. Whatever it is, however, our research strongly suggests that powerful motivations to change the status quo are an essential ingredient in successful cooperative data gathering efforts. The BRD case study shows that these motivations may not extend to the changes in fishing practices or management regimes that arise from the data gathering effort itself. In that case, widespread cooperation broke down as resistance developed to the actual implementation of BRDs in the Gulf of Mexico.

Table 4.1. Negative and positive incentives that motivated participants in each of the case studies.

Case study	Fear	Potential reward
Sablefish survey	unnecessary quota reductions loss of income	improved stock assessment increased quota and income
Sablefish logbook	unnecessary quota reductions inefficient record keeping	reduced record keeping costs improved stock assessment increased quota and income
Oregon trawl	loss of livelihood	more sustainable livelihood improved stock assessment increased quota and income
BRDs	ineffective and overly costly BRDs costly litigation and conflict	involvement in decision making better BRDs limit on shrimp loss to BRDs reduced economic pressure
Tagging		improved knowledge expanded fishery fun
Scallops	loss of income expanded closures	reduce threat of closures increased quota and income

Case study	Fear	Potential reward
Pingers	closures	remove ESA problem from table
	loss of income	remove threat of closures
	ESA listing and increased uncertainty	increased predictability

4.4 Culture and personal relationships dominate

By definition, cooperative data gathering efforts involve participants from groups (NMFS, other management agencies, industry, academia, conservation organizations) with different priorities, histories, and traditions and standards of behavior. In many instances, these cultural differences have contributed to miscommunication and misunderstanding, mistrust, conflict, delay, and the ultimate failure of cooperative efforts. The case studies clearly show that cultural differences must be recognized, understood, and dealt with for cooperative efforts to succeed. This is not unique to fisheries, but is widely recognized among management and organization specialists. For example, a majority of business mergers fail to achieve their original goals, not for economic reasons but because of unresolved cultural differences between the two organizations. Evidence from the case studies, and from other research into cooperative behavior, shows that the best way to address cultural issues is to develop effective and trustworthy working relationships among individual participants working face to face.

Cooperative data gathering efforts are much more than simple agreements to share the logistical burden of data gathering. They are instead cooperative problem solving efforts and the data gathering happens successfully only if and when problems are successfully solved. The story of each case study illustrates the key role played by personal relationships in this process. Personal relationships provide confidence that others can be counted on to fulfill their commitments, confidence that cannot readily be created in any other way.

For example, Arne Fuglvog, a commercial sablefish longliner, invested time in talking directly with scientists at NMFS's Auke Bay Laboratory about shortcomings in the sablefish stock assessment. His resulting appreciation of the lab's funding constraints and of the biologist's need for improved information was instrumental in generating essential industry support for administrative changes and increased research funding. Conversely, Mike Sigler, the longline survey Project Leader, has made himself readily available for discussion with fishermen and has spent significant time at sea because, "The way you establish credibility with fishermen in Alaska is to spend time at sea."

In the early stages of both tagging programs, far-sighted scientists spent significant amounts of time meeting with fishermen on the docks to advocate the benefits of long-term tagging programs. These early relationships were a primary reason for the successful expansion of these programs and had surprising staying power, even after these scientists retired. However, these relationships have not been sufficiently renewed over time and, as new challenges arise, there are insufficient avenues of communication to maintain industry commitment and participation. In the scallop survey, pre-existing relationships were enhanced by the process of designing and implementing the field program. The substantial economic payoff that resulted has also strengthened these connections.

In the pinger case, preexisting relationships among core members of the Harbor Porpoise Working Group (Dave Wiley of the International Wildlife Coalition, Bob MacKinnon of the Massachusetts Gillnetters' Association, Sharon Young of the Humane Society, and Karen Steuer of the Center for Coastal Studies) were sufficient to get the Working Group started and attract a

larger group of participants. By all accounts, however, it required a year's worth of confrontive meetings to develop enough trust among this larger group for them to move forward with problem solving. This level of overt mistrust and conflict contrasts with the majority of the other cases and it was only the threat of severe restrictions on fishing activity and a desire to avoid litigation that kept participants involved.

The BRD development effort in the Gulf of Mexico and the South Atlantic was unique among the case studies we examined in its combination of wide geographic scale, large numbers of participants, high potential for conflict, and far-reaching regulatory implications. These factors made it impractical to depend completely on the development of personal relationships in an informal or ad hoc setting. Creating confidence among participants that alternative BRD designs would be evaluated consistently and fairly required creating a more formal structure with detailed written procedures. This structure also brought participants together in an organized system of committees and workgroups, promoting the development of working relationships. At the state level in the South Atlantic, long-term relationships among shrimpers, Sea Grant or marine extension staff, and state agency personnel helped create a less contentious environment for BRD development and implementation.

4.5 Larger contexts influence results

None of the cooperative data gathering efforts we examined occurred in isolation. They were not simply data gathering or research efforts. They were conscious attempts to influence management decisions and the processes by which these are made, and were therefore strongly influenced by their larger management, ecological, and sociological contexts. The tagging programs at one time were exceptions to this generalization but they are rapidly losing their ability to remain separate from larger issues. In fact, the most concrete suggestion we heard for revitalizing the tagging programs involved linking them even more closely to management issues.

The motivation for cooperative efforts often stems from outside events – the creation of an ITQ fishery for sablefish, cuts in west coast groundfish quotas, or the threat of an ESA lawsuit over harbor porpoises in New England. In addition to such direct influences, there are factors that are indirectly related to cooperative efforts but are nevertheless important. For example, the history of TEDs in the Gulf of Mexico and the South Atlantic dominated the attitude toward BRDs of nearly everyone we interviewed in this case study. As another example, the pinger solution in New England was developed against the backdrop of impending large-scale groundfish closures that significantly raised the stakes for finding a solution to this bycatch problem. The effort to improve the quality of data collected on the Oregon trawl fishery must be seen in the context of severe cutbacks in groundfish quotas and rising concerns about the status of groundfish stocks.

Industry structure in a particular case can also influence the outcome of cooperative efforts. In New England, the ability of Maine gillnetters to readily move into a healthy lobster fishery made it less attractive for them to implement the pinger solution than for gillnetters in other areas. Differences in shrimp distribution mean that shrimp fisheries in the Gulf of Mexico are predominantly federal fisheries and those in the South Atlantic are state fisheries. As the BRD case study describes, this had an important influence on the somewhat divergent history of BRD development and implementation in these two regions.

Because of their influence, these and other elements of the larger context should be explicitly considered in the design of cooperative efforts. They provide opportunities for developing useful

goals, sharpening motivations (both positive and negative), recruiting participants, and creating leverage that magnifies the motivations described in Table 4.1.

4.6 Bureaucracy must be dealt with

Fisheries management is an unavoidably bureaucratic system and all the cooperative data gathering efforts we examined became enmeshed in bureaucracy at some point in their history. (By "bureaucracy" we mean formally defined procedures for decision making. We intend this as a neutral description without inherent negative connotations.) For example, adjustments to the sablefish logbook, which in and of themselves were relatively straightforward, ran afoul of cost issues related to the Paperwork Reduction Act and legal concerns about confidentiality of collected information. In the pinger case, the Harbor Porpoise Working Group was an ad hoc effort that operated outside of the formal fisheries management structure, a position that gave it important flexibility. However, actually implementing the pinger solution required action through the formal processes of the New England Fisheries Management Council and the Mammal Protection Act's Take Reduction Team. Because of its broad geographic scale and its large numbers of participants, the BRD development effort in the Gulf of Mexico and the South Atlantic was unable to depend on informal structures and was necessarily bureaucratic from its inception.

The two tagging programs, in their earlier phases, were relatively unaffected by bureaucratic issues. More recently, however, they have been impacted by management decisions to reduce quotas, despite their best efforts to keep their scientific activities distinct from management issues. The Cooperative Tagging Center has recently experienced budget cutbacks that have limited its ability to supply tags to participants and process data.

These examples show that remaining outside the bureaucratic management process for as long as possible can increase the efficiency and flexibility of cooperative data gathering efforts. Ways of accomplishing this include organizing ad hoc working groups, obtaining funding from non-governmental sources, and focusing on aspects of the system that are not yet covered by regulation. However, at the point that the results of such efforts must enter the formal management process, patience, staying power, and the ability to navigate the bureaucracy can be key parts of successful cooperative efforts.

4.7 Link NMFS's science and management roles

Participants in several case studies argued forcefully that NMFS's regulatory and enforcement responsibilities invariably infiltrate and undermine cooperative data gathering efforts in several ways. Where industry mistrust of NMFS runs deep, proposals to cooperate may immediately and suspiciously be viewed as maneuvers to promote a predetermined policy. Attempts to circumvent this problem by creating a clear distinction between the gathering and preliminary analysis of research data and the eventual use of that data in management decisions run the risk of leaving industry participants resentful and feeling "out of the loop" when these decisions restrict fishing effort. NMFS's need to rigorously substantiate the effectiveness of new methods before revising regulations can frustrate fishers who are more accustomed to ad hoc experimentation and empirical decision making. In other situations, the constraints and requirements of the regulatory system as a whole can complicate, delay, and defeat cooperative efforts. Despite the fact that industry is directly involved in the design and implementation of many cooperative efforts, a consistent thread running through our interviews was the concern that the data from such efforts would be used "against" them because industry has little if any voice in data interpretation.

Whatever the relevance or justification for such concerns, they are an unavoidable part of cooperative efforts. The case studies strongly suggest that NMFS cannot escape its dual nature – that its regulatory and enforcement role infiltrates even pure research efforts like tagging. For example, enforcement issues became a sticking point in the development of revisions to the sablefish logbook; the shrimp industry in the Gulf of Mexico eventually responded to regulatory decisions about BRDs with a lawsuit; and resentment about quota reductions affected participation in the tagging programs.

There are strategies that attempt to postpone or circumvent this issue. Working through contractors, Sea Grant staff, or advocacy organizations can temporarily insulate data gathering efforts. Strictly dividing responsibilities between scientific and management staff within NMFS can also work temporarily. However, if data are worth gathering, they will invariably be used to make management decisions and, at that point, such temporary barriers will crumble and conflict is likely to ensue.

We believe it is fruitless to attempt to keep science and management separate in cooperative data gathering efforts. Key decisions facing a wide range of fisheries demand improved information about bycatch reduction, habitat protection, stock assessment, catch levels, ecological interactions, and socioeconomic impacts. Well-accepted study design principles assert that this information will be collected more efficiently and will be of higher quality if data gathering programs, beginning with their initial design, are targeted specifically at management information needs. In other words, data should be collected keeping in mind how they will eventually be used. This may well require extending the partnership with industry beyond the design and implementation of fieldwork to the design of data analysis and interpretation approaches and to specifying how data will be used in decision making. Nelson Beideman, Executive Director of Blue Water Fishermen's Association, talking about how to revive interest in the tagging programs, suggested:

> There needs to be a plan that everybody is a part of so they can see what's necessary [in terms of knowledge and additional data] for each of the highly migratory species and lay out a plan for how to get there.

This is, of course, likely to lead to conflict. However, we believe that conflicts over specific management decisions, and over the interpretation of data used in these decisions, could be healthy if structured carefully. Such conflicts could provide a starting point for determining what information is needed to resolve disagreements and what specific data gathering activities are needed to fill these information gaps. Soliciting fishers' involvement in defining knowledge gaps and identifying how these relate to management decisions that directly affect them could more deeply engage them in data gathering efforts and increase acceptance of even painful management decisions. For example, there is good evidence that people are more willing to accept negative outcomes if they have been directly involved in the decision-making process (refs). Fishers' past involvement in data gathering has already given them some sense of ownership about the data and this has actually been fostered by many cooperative programs. The down side of this sense of ownership is the feeling of betrayal that "our data is being used against us." However, the potential up side is that this sense of ownership can also provide the leverage needed to encourage greater participation in the decision-making process, and more willing acceptance of its results.

4.8 Essential requirements for success

The themes described above, and discussed in more detail in the individual case studies, suggest a set of requirements for successful cooperative data gathering efforts:

- Ensure that strong motivations (both positive and negative) exist that give all participants a substantial stake in the success of the effort; avoid projects that lack such motivations.
- Clearly specify how the data produced will be used in management decisions.
- Involve fishers in discussions about the overall study design process (i.e., the basic links between management decisions, the information needed to make those decisions, the analyses required to develop that information, and the data gathering design needed to support those analyses).
- Encourage the development of personal relationships among the participants by structuring the process appropriately and allowing time for them to develop.
- Keep the effort outside bureaucracy as long as possible.
- Include participants with expertise at navigating the bureaucracy when the outcome is likely to result in new regulations.
- Let the project's design emerge from the priorities and experience of the participants.
- Provide training for NMFS staff and interested fishers in communication, relationship building, and conflict resolution.