AN ABSTRACT OF THE PROJECT REPORT OF

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Title: A Study of Participant Perspectives Regarding Cooperative Fisheries Research on the US West Coast

Cooperative marine fisheries research—the practice of involving the expertise of fishermen and scientists in conducting studies of ocean fishes—has increased gradually over the past 50 years on the US west coast. However, few studies have systematically collected and analyzed the experiences and perceptions of numerous cooperative marine fisheries research project participants. I examined past and present US west coast cooperative fisheries research projects by reviewing existing records of projects, conducting a survey and interviews that investigated the experiences and perceptions of fisherman and scientist participants in cooperative marine fisheries research. In particular, I focused my study on the differences in the experiences and evaluations of research projects by fishermen and scientists. Both fishermen and scientists indicated that conducting good scientific research and producing useful data were major motivations for participating in their cooperative fisheries research projects. During interviews fishermen indicated that the transfer of information between the two groups was unsatisfactory to them. Survey results also suggest that, on average, fishermen are not equal research partners with scientists during their cooperative research projects. This inequality was found even while fishermen, as a group, were found to have participated in a broad range of project activities. This research also found that communication between fishermen and scientists is complex and that fishermen and scientists view the balance of power during their cooperative efforts in different ways. My research also demonstrates what information can be obtained, and lessons learned, through the use of a standardized research methodology to study and evaluate cooperative fisheries projects over an entire region. Future cooperative fisheries research participants on the US west coast and beyond can use the findings of this study to anticipate challenges and maximize the strengths of their cooperative fisheries research projects.

A Study of Participant Experience and Perspectives Regarding Cooperative Fisheries Research on the US West Coast

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Introduction

Throughout the previous century, fisheries researchers have worked with fishermen to conduct and improve fisheries research (NRC 2004). And yet, the relationships between fishermen and scientists – so important to the success of these cooperative efforts – are just beginning to receive consideration. These cooperative efforts to involve fishermen and their expertise in fisheries research have the potential to increase our understanding of the Oceans' ecosystems (NRC 2004). These ocean ecosystems are of critical importance to the plants and animals that live there, as well as the human populations that rely on them for food, recreation, and other ecosystems services such as water purification and carbon sequestration.

Marine fisheries science faces increasing pressure to provide detailed information to fisheries managers. Fisheries policy makers rely on scientific information when confronting management challenges that include the alteration of estuarine and marine fish habitats, increasing demand for fisheries resources, and the input of terrestrial nutrients and toxins into marine ecosystems systems. With a focus on the Exclusive Economic Zone of the United States, the US Commission on Ocean Policy (USCOP 2004) and the PEW Oceans Commission (PEW 2003) found that increased scientific data and understanding of ocean ecosystems will be a critical part of managing the US's marine resources. These reports note that a number of marine fish stocks, a critical component of ocean ecosystems, are declining or have declined below the target levels set by fisheries managers. These studies encourage fisheries managers to consider entire ecosystems in their harvest rules and guidelines for rebuilding these depressed fish stocks, and for managing stocks that are currently healthy. As fisheries disasters such as the 2000 West Coast Groundfish Disaster (WCGD) illustrate, in the absence of adequate science the populations of certain species of fish can rapidly fall well below target levels. These reduced populations of fish can disrupt multiple sectors of the fishing industry. Fisheries management regulations have mandated the use of aggressive species protection and rebuilding plans for depleted fish stocks, which in turn have led to large-scale closures of previously productive fishing grounds and other Habitat Conservation Areas (USOFR 2004).

The practice of involving fishermen in fisheries research projects, also known as Cooperative Fisheries Research (CFR), has been suggested as a way to enhance marine fisheries research efforts (NRC 2004). Harms and Sylvia (1999) found that nearly nine out of ten west coast groundfish fishermen and west coast fisheries scientists believed that cooperation between scientists and the commercial fishing industry can improve the science used to manage some marine fisheries. According to these studies and others (Conway and Pomeroy 2006, Read and Hartley 2006), marine fisheries research efforts can be improved and enhanced by involving fishermen and their experiential knowledge.

Outcomes of CFR projects have been documented by several studies, which have found that cooperative projects are having a positive impact on fisheries research efforts by incorporating the knowledge and experience of fishermen into the fisheries research process (Read and Hartley 2006). Studies have also found that successful working relationships are often formed during CFR projects (Conway and Pomeroy 2006, Read and Hartley 2006). Beyond improving relationships between fishermen and scientists several studies suggest that CFR can even help increase fishermen's confidence in the findings of fisheries research (Hartley and Robertson 2006, Kaplan and McCay 2004).

Cooperative Fisheries Research can take many different forms and examples of CFR are scattered throughout the last century. Cooperative Fisheries Research occurs around the globe in different ways and for varying reasons. In New Zealand for example, industry has become a major contributor to fisheries research. Industry involvement in research has arisen spontaneously in response to incentives contained within New Zealand's fisheries management regime (Harte 2000). For example, in New Zealand's Chatham Rise Hoki fishery, crew members were trained to New Zealand Qualification Authority standards and now undertake sampling the Hoki themselves. These industry-led sampling efforts have spatial and temporal coverage orders of magnitude greater than government run surveys (Harte 2000).

Cooperative Fisheries Research can also be used to study the effectiveness of fishing gear and the impact of changes in gear requirements on catch composition. A study on the US west coast was undertaken to determine if an increase in mesh size would reduce the amount of discarded fish in bottom trawl fisheries (NRC 2004). This

study used commercial fishing vessels operating under ordinary fishing conditions to increase applicability of results to management decisions. Another benefit of using commercial fishing vessels in the mesh size study was the reduced cost of the project relative to the use of a government research vessel (NRC 2004). In addition to reducing the cost of conducting research, CFR projects have developed and tested modifications to fishing gear that have reduced the incidental catch of non-target fish species. Examples of these gear modifications include; specially designed trawl nets (Hannah, Parker, and Buell 2005), the impact on catch rate of specially designed hooks used in Atlantic tuna fisheries (Kerstetter and Graves 2006), and even sea turtle exclusion devices (NRC 2004).

Cooperative Fisheries Research is not confined to on-the-water data collection or experimentation. Several studies have demonstrated that interviewing fishermen can provide information which can support research and improve scientific understanding regarding fisheries. A study in which fishermen throughout the US were surveyed and interviewed regarding their knowledge of marine habitat and gear impacts found that interviews with fishermen could support a variety of habitat related research efforts, such as developing high resolution sediment maps (Hall-Arber and Pederson 1999). In the Mid 1990's, interviews with Norwegian fishermen regarding fish species "presence and absence" and "catch per-unit effort" were conducted in support of a series of stock assessments if fisheries located in Norway's fjords and near shore waters (Maurstad 2002). The information collected from fishermen was analyzed and placed on charts. The resulting information on species ranges and assemblages was then used by fisheries managers to help inform policy decisions.

Cooperative Fisheries Research still faces many challenges in addition to it's accomplishments in recent decades. Conflicts between participants have been found to negatively impact CFR projects (Conway and Pomeroy 2006). Challenges can arise from the diverse perspectives of the various participants and disagreements over preferred research and fishing methods that fishermen and scientists may have (Harms and Sylvia 1999). Fishermen and scientists may even view CFR projects in different ways given the perspective gained from their different careers and unique motivations for participating

(NRC 2004). Along with conflicts related to the tasks at hand, CFR projects can also suffer from the history of conflict that fishermen and scientists have. These conflicts include fishermen's perceptions that management decisions lack proper justification, and fishermen's belief that fisheries scientists have a direct influence over management decisions. Conversely, scientists have perceptions that fishermen only care about their bottom line, and have little interest in the long-term health of the fisheries resource (Gilden and Conway 2002, Harms and Sylvia 1999). Past conflicts between fishermen and scientists and the animosity that may still exist can make communication between fishermen and scientists difficult. Communication between fishermen and scientists is critical to the success of cooperative projects, although it may be difficult (Conway and Pomeroy 2006, NRC 2004, Bernstein and Iudicello 2000).

Trust between fishermen and scientists participating in CFR projects becomes particularly important when the vulnerability of fishermen is considered. In some CFR projects, fishermen are in a position to share sensitive professional information with researchers. In one study the potential negative consequences of the misuse of fishermen's knowledge were so great that a social scientist was compelled to write a paper focusing on the complex and some times conflicting objectives and responsibilities of project participants (Maurstad 2002). This study and others (Gilden and Conway 2002) illustrate that fishermen have good reason to be concerned with how scientists will use information that fishermen share, and work preferentially scientists whom they trust.

Although the previously described studies are informative and insightful they are either too broad or too narrow to be well suited for finding trends throughout a management region. The importance of fish stocks to local communities, the varying sizes of many CFR projects, and the regional nature of the management councils have not been adequately addressed by the size and resolution of these previous studies. Therefore, past research therefore lacks direct applicability to regional management agencies and to researchers attempting to inform the decisions of regional or state fisheries management entities. Given the regional scope at which fisheries are managed in the US, a study of numerous CFR projects across a management region could have great value and utility.

The US west coast has a history of fishermen and scientists working together to support and participate in CFR projects. Some examples of this West Coast Cooperative Fisheries Research (WCCFR) history are:

- In 1983 Captain R. Barry Fisher became president of the Midwater Trawlers Cooperative. He was a strong advocate for fishermen's involvement in fisheries research. (COMES 2001)
- In 1988 the University of Washington and Oregon State University, in a partnership with Oregon Trawl Commission, Fisherman's Marketing Association and commercial fishermen conducted a trawl-mesh size study funded by the National Marine Fisheries Service (NMFS) and the Alaska Fisheries Science Center in which large scale cooperative research results were directly applied to a management decision to increase allowable trawl cod-end mesh size (NRC 2004, Wallace 1996).
- In 1996 the Magnuson-Stevens Act was reauthorized, stating that federal strategic plans for fisheries research shall provide a role for industry in researching fisheries resources (USC 16, 1881, Section 404 (b)(3)).
- In July of 1998 approximately 100 fishermen, scientists, representatives of state and regional government agencies, members of conservation and environmental organizations, and other members of the fishing industry met in Portland Oregon. The conference goals were to summarize, identify and prioritize cooperative research projects to address the developing groundfish crisis on the US west coast. Their efforts yielded a list of five priority projects, one for each of five research areas, and discussions regarding next steps (Hosie 1999).
- In 1998 groundfish trawlers and the Northwest Fisheries Science Center (NWFSC) began conducting a cooperative biennial trawl survey to assess groundfish stocks on the US west coast (NWFSC 2007).
- In 1998 the Pacific Whiting Conservation Cooperative initiated a cooperative pre-recruit survey to monitor the abundance of juvenile whiting and rockfish off the coasts of Washington, Oregon, and California (personal communication: Vidar Westeped).

- In 1999 the national Cooperative Research Program was created within NMFS. From 1999 to 2007 the program has provided more than $120 million in funding to CFR projects across the nation from 1999 to 2007 (NMFS 2007).
- In 1999 research was conducted to examine opportunities for industry-scientist cooperative research. This research found that fishermen had a strong interested in CFR. The study identified fishermen' and scientists' preferred methods of conducting research and working together (Harms and Sylvia 1999).
- In 2000 the Port Liaison Project was created to help bring US west coast fisheries researchers together with fishermen interested in conducting research. The Port Liaison Project also distributed money to fishermen working on CFR projects to ensure that their time and experience was given fair value (PMCC 2003).
- In 2004 the Pacific States Marine Fisheries Commission began making formal requests for proposals to address research needs identified by the National Marine Fisheries' Northwest Fisheries Science Center (PSMFC 2006).

Despite this history, no systematic analysis of WCCFR projects has yet been conducted to help answer critical questions such as: What motivates and deters the involvement of fisherman and scientist in WCCFR projects? How do fishermen and scientists perceive their project data being used? How does the prospect of working together motivate participants of diverse backgrounds? How effective is communication between project participants? How are fishermen and scientists working together and what roles do they play in their projects? The dearth of analysis of WCCFR projects has led to a lack of understanding of the opportunities and challenges facing these projects in this region. Studying the experiences and perspectives of past and present WCCFR project participants will help prospective participants to better understand the challenges and strengths of WCCFR, and learn from the experiences of prior participants. Using the information gained from such a study, future participants will be in a better position to conduct successful WCCFR projects.

My study addressed this need by examining WCCFR projects from Washington, Oregon, and California. Although this is a large area with numerous fishing communities, these communities share several attributes that connect them in ways that make them

interesting to study as a whole. First, the fisheries in these states target fish resources within the California Current Ecosystem (Pew 2003), and therefore they have many species in common, although the relative commercial value of each fishery may vary from state to state. Second, the federal waters are all managed by the Pacific Fisheries Management Council (PFMC). Fisheries in state waters are managed cooperatively by state and federal agencies. Third, fishing boats frequently fish in the waters of several states and transit among various ports and states. Finally, each state has a large coastline and with the exceptions of Southern California, the San Francisco Bay area, and the Puget Sound region, a relatively low coastal population density. These common attributes among others, led me to study WCCFR projects ranging from Canada to Mexico.

In this study I used mail surveys and interviews to collect information from fishermen and scientists who have participated in WCCFR projects. Surveys and interviews focused on participants' experiences and perceptions of past and present WCCFR projects. This focus allowed the data to reflect fishermen and scientists' thoughts, and draw upon their experiences and knowledge.

I utilized the concept of a cooperative-collaborative continuum (NRC 2004) in my surveys and interviews to describe the balance of power between different groups of participants. The continuum assigns narrow definitions to the two familiar words that describe the continuum. A purely cooperative project is one that has very limited roles and influence for one group of participants. In contrast, a purely collaborative project has equal roles for all participants in all phases of the research process.

This research has several broad goals: (a) determine how and why fishermen and scientists are getting involved in WCCFR projects; (b) compare how US west coast CFR project outcomes relate to the expectations and objectives of their fishermen and scientists participants; and (c) identify lessons from past WCCFR projects that can guide the efforts of future CFR initiators and participants. By addressing the questions posed earlier and putting them in the context of our broader goals, this research provides a better understanding of CFR which could lead to more effectively conducted WCCFR projects.

Methods

I began my research by collecting information about past and current WCCFR projects on the US west coast. I collected data from fisherman and scientist participants in these projects by using mail surveys and ethnographic interviews. The fishermen selected were participants in diverse fisheries and used differing gear types. The scientists worked for a broad range of institutions including universities and academia, state and federal agencies, and even private contractors.

With regard to WCCFR projects, my initial search for projects produced information regarding 60 projects (Appendix C). Of those 60 originally identified projects I was able to find contact information for participants in 41 of the projects. The identified participants in the 41 projects were sent a copy of the mail survey I had developed. Responses were received from participants in 37 projects. Of those 37 projects whose participants returned mail surveys, 6 projects were eventually selected for use in the ethnographic interview phase.

With regard to the participants in those various WCCFR projects, I sent out 260 mail surveys to fishermen and scientists and received 111 (43%) surveys back. The ethnographic interviews were conducted with 24 participants, 15 fishermen and 9 scientists. The focus of the surveys and the interviews was on the individual participants.

The mail survey methodology and the ethnographic interview methodology had different strengths and were used in conjunction in order to address the weaknesses of the other. The surveys provided a broad perspective from over a hundred WCCFR participants, and the interviews provided detailed information obtained from a small yet diverse group of participants. The results from the two methodologies are at times in agreement and at other times in disagreement. These disagreements between data types provide opportunities for further discussion.

Survey

The mail survey instrument was four pages long and consisted of several types of questions: yes/no, select all options that apply, and rate the importance of certain project attributes (Appendix A). I created the survey by drawing from the literature, conferences that focused on CFR (Harms and Sylvia 1999, NRC 2004, Reed and Hartley 2006), and

advice from scientists and fishermen involved in WCCFR. The literature suggested five areas of interest: incentives to participation, level of involvement, participant expectations and project outcomes, and communication.

Included in the survey was a description of the idea of a "cooperative-collaborative continuum" (Conway and Pomeroy 2006, Harms and Sylvia 1999, NRC 2004). This continuum was described in my survey as:

> "Cooperation and collaboration are not the same thing. Cooperative research involves *limited roles for some* partners. Collaborative research, in contrast, involves partners *equally in all phases* of the research process"

This continuum concept can be an effective way to describe the degree to which control of a project is shared among participants.

A master list of 60 WCCFR projects was generated through the use of snowball sampling (Henry 1990). Snowball sampling is a useful technique for accessing hard-to-reach populations (Berg 2001, Roboson 2002), and involves the identification of knowledgeable primary contacts through a search of the literature or persons known by the investigator to be familiar with the community being studied. These primary contacts lead to other contacts. From my small initial group of contacts I discovered a large number of subsequent contacts who provided further information about other contacts and their projects. Of those 60 identified projects, information regarding participants was found for 41 of them.

Following the mail survey process (Salant and Dillman 1994) the initial mailing contained a cover letter explaining the purpose and impact of the study, an informed consent form, the survey, and a return addressed postage paid envelope. Approximately 3 weeks later a reminder postcard was sent out to non respondents requesting their responses and offering an extra copy of the initial mailing if needed. The surveys were then scored and responses tallied and queried using the Microsoft Access, and Excel programs. Relationships within and between community group (fisherman or scientist) were analyzed and compared.

<u>Interviews</u>

Six projects were selected for ethnographic interviews based on the availability of multiple participants from a single project and the perceived willingness of the participants to participate in the interviews. The six projects were selected based on their diversity across several project attributes:

- project duration (1 to 49 years)
- the type of research question addressed by the project (bycatch, life history, monitoring, methodological improvement)
- general size of the project and how many people it had included (3 to 20+)
- geographic location and range of the project (near shore estuary, to coast wide focus)
- fishery and gear type (from pots, to trollers, to trawlers, to divers)
- number of known funding sources (1 to 5+)

This purposive sampling ensured that the participants interviewed reflected the diversity of WCCFR projects. The inclusion of at least one representative from the fisherman and scientist group provided a more diverse range of perspectives than a single group could have.

To collect interview data from participants in WCCFR projects, ethnographic interviews were conducted (Spradley 1979). Interviews were based on a set of predetermined questions, and follow up questions or "probes" were used to gain further information (Robson 2002). Ethnographic interviews allow the interviewee to help shape the interview and raise topics that may not have otherwise emerged.

Interviews were conducted with 3 to 5 participants from each of the six projects, for a total of 24 participant interviews (15 fishermen and 9 scientists). Interviews were conducted in person when possible (or over the phone when necessary) and took between 0.75 hours and 1.5 hours to complete. All interviews were tape recorded and transcribed verbatim from the original tape recordings.

The interview transcripts were analyzed by using an iterative content analysis (Van Riper 2003). This is a process where similarities between statements made in interviews are grouped together repeatedly at increasing levels of generality/abstraction, to create themes that reflect ways in which the participants had described a common topic or issue

in a similar way (Patterson and Williams 1998). Themes are then organized within each community group; some themes arose among both community groups. The analysis process consisted of transcribing and re-reading the interviews, then creating 12 topic categories which were used to separate out the interview text relating to a specific topic. Each topic category was then re-read and specific statements were grouped together based on according to their similarities into collections called threads. All resulting threads were then compared and similar threads were grouped together to create themes (Tables 1-4, 6, 7). Themes that emerged among one group but not the other may indicate that one group considers that theme to be more important than the other group.

Results and Discussion

Projects studied by my research were diverse in many ways, and correspondingly so were the participants. Geographically their projects ranged from Northern Washington to Southern California, and numerous locations in between. The projects differed greatly in the research methods used, the species studied, the type of fishing gear used, the habitats included, the amount of area encompassed, the number of people involved, the duration and frequency of activity, and the sources of funding (see Appendix C). In many of the ways that the projects differed, so to did the participants. The diversity of projects and participants gives my study a broad perspective that may make it useful to a diverse range of future WCCFR participants.

Along with the strengths of this research there are some weaknesses. Fifty-Seven percent of participants didn't respond to the mail survey. These non-respondents may be similar in some way and their absence from the data set may complicate the interpretation the mail survey results. These limitations could have been reduced by offering a material incentive to complete the study, or a concerted attempt to contact and sample non-respondents. These remedies were not employed given the limited resources available to conduct this research and the likelihood that non-respondents could not be reliably sampled due to their busy and unpredictable schedules, their desire to remain anonymous and abstain from participation in my study. Given the dearth of information regarding

WCCFR projects this study still has a great deal of insight to offer regarding WCCFR, despite its gaps in the sampling methodology.

Motivations for Participation, and Involvement of Participants

Factors Influencing Initial Involvement

The surveys showed that fishermen and scientists were often motivated by similar incentives. The most often cited reason for becoming involved was "interest in the research topic" (Figure 1). Two other frequently indicated reasons by both fishermen and scientists were an interest in the current quality of available data related to the research topic and an interest in the availability of data related to the research topic. These three commonly cited reasons for participation center on the topic of data and data collection, and indicate that fishermen and scientists have an interest in research products and data when they join WCCFR projects.

Among fishermen the third most frequently cited reason for involvement in a project was the request of a researcher. This finding that fishermen participants viewed requests from scientists as an incentive to participate is also supported by interview data (Table 1). The indication that some fishermen were strongly influenced to participate by being asked, may also indicate that some fishermen respond to contact with researchers. The difference between fishermen and scientists regarding an opportunity to teach others what they know (Figure 1), seems to indicate that fishermen are also interested in passing along information to researchers. This data may support the contention that some fishermen feel they have useful knowledge to contribute to the scientific process (Harms and Sylvia 1999).

The survey data show that the most highly influential benefit motivating fishermen and scientist involvement was that of producing needed data (Figure 2). Fishermen and scientists were in agreement that "collecting data in a cost effective manner" was the second most influential benefit that WCCFR offered (Figure 2). The survey data regarding reason for involvement data (Figure 1), and the incentive that benefits played in participation data (Figure 2) indicate that both groups of participants are interested in producing data.

The mail surveys indicated that the three main deterrents to WCCFR participation were cost of time required, uncertainty of project goals and likely outcomes, and resource needs. The time cost of WCCFR participation was the most influential of these three deterrents identified by the surveys among fishermen and scientists. Interview data from scientists indicated that the complex logistical and legal requirements that come with managing their WCCFR projects were major obstacles (Table 2). In interviews, fishermen did not elaborate on time costs posed by WCCFR project participation.

During interviews fishermen spoke about another deterrent, uncertainty (Table 3). This fisherman uncertainty included the goals of their projects, the motivations of the scientists, and the impacts of detrimental management decisions resulting from a project (Tables 1 and 3). The deterrents of uncertainty and lack of trust can impact project initiation and a fisherman's choice to participate, as well as create a social environment that impedes project success (Conway and Pomeroy 2006).

Involvement and Roles Played by Project Participants

Participants played diverse roles in their respective CFR projects. The survey data showed that fishermen were involved with varying frequencies in all eight of the project aspects offered as choices on the survey (Figure 3). Scientists were also involved in all project aspect options provided, and for every aspect were involved at a greater frequency than were fishermen. The mean number of project aspects in which scientists participated was 5.1 (294 aspects participated in by 54 scientists) project aspects, while the mean number of project aspects for fishermen was in 2.7 (147 aspects participated in by 57 fishermen).

In interviews, scientists provided more descriptions of the roles played by both groups of participants than did fishermen. Seven out of nine scientists stated that the fishermen had participated in project start up (Table 4). Four out of nine Scientists also indicated that fishermen had also been involved in decision making (Table 4). Fishermen spoke less frequently about roles that they or scientists played in the project, although eight out of fifteen fishermen did describe the scientists sharing of power with fishermen as a challenge that their projects faced (Table 2). Scientist's interview descriptions of

fishermen involvement in the decision making process is supported by the survey data in which fishermen indicated that they had participated in every project aspect option provided (Figure 3). However the nearly two to one discrepancy between scientist and fishermen participation supports the fishermen's description of sharing power as an obstacle (Table 2).

Cooperation Versus Collaboration

The mail survey contained a definition of the cooperative-collaborative continuum, and participants were asked to indicate their project's location on the continuum (Figure 4). Responses to this question indicated that fishermen and scientists, on average, saw CFR projects as more cooperative than collaborative; with ratings of 62% and 58% cooperative respectively. When asked if they were comfortable with their projects' location on the continuum (Table 5) 79% (45/57) of fishermen and 85% (46/54) of scientists indicated that they were. Despite this large majority, more than one third of fishermen (35%, 16/46) and nearly one quarter of scientists (23%, 12/52) responded that they would have preferred that their project was more collaborative (Table 5). This may indicate that comfort with a project's cooperative nature, and a desire for more collaboration, are not mutually exclusive, as at least 20% of fishermen and 10% of scientists responded affirmatively to both questions. Alternatively it may also indicate that fishermen and scientists perceived the questions in different ways.

During interviews, project location on the cooperative-collaborative continuum was discussed differently by each group. Among scientists interviewed, all but one of them described changes in the cooperative or collaborative status of a project during the course of the project (Table 4). Fishermen on the other hand, spoke directly about their influence over the project, the fate of their input, and the difficulty of scientists in sharing power with fishermen (Table 2).

Scientist's statements that a project's location on the cooperative-collaborative continuum is not static are supported by the different rates of project aspect participation reported in their surveys (Figure 3). These different rates of project aspect participation suggest that a participants' level of involvement changes over the course of a project.

This shifting level of influence by fishermen and scientists may be exacerbating fishermen's frustration regarding sharing power with scientists if at times their input is welcomed and at others it is not. Fishermen's frustration with this shift in influence and a shifting acceptance of their input may be exacerbated even further by poor communication between fishermen and scientists, as described by fishermen in interviews (Table 2)

In general, it appeared that nearly one quarter of scientists surveyed would prefer more collaborative projects, and several indicators suggested that fishermen would prefer more collaborative projects as well. As one fisherman participant who had been involved in numerous aspects of their project said during their interview "I don't want to criticize the projects that are cooperative because they need to be cooperative for a reason. And I always thought that cooperative was the first step of getting in the door and some cooperation is good but collaborative, that's the ideal, that's better."

Participant Expectations and Project Outcomes

There are several relationship dynamics at play in most CFR projects, but the relationships that my study focused on were those between fishermen and scientists. The subject of project outcomes is certainly an interesting topic because many of these WCCFR projects have not received much wide spread attention or documentation. The topic of participant expectations is no less important as it is through the comparison of participant expectations and project outcomes that a participant evaluates the success or failure of a project. Incentive data is used again here in the context of expectations because in many cases an incentive or deterrent is directly related to an expectation.

Scientific Expectations

It is clear from the previous discussion of reasons participants were interested in projects that data collection and research were top incentives of both fishermen and scientists to join a WCCFR project (Figures 1 and 2). As indicated before, 54% (31/57) of fishermen indicated that they were asked to participate in their WCCFR project by a scientist. Fishermen who were specifically asked to participate by a scientist may have

joined a project expecting that they would have a good opportunity to contribute to the project because a direct communication was made. Survey data also indicated that 44% (25/57) of fishermen became involved in their WCCFR projects because of the opportunity to teach others what they know (Figure 1). This finding indicates that a little less than half of fishermen participating in WCCFR projects expected that they would have an opportunity to share their knowledge with others. Given the two expectations of fishermen stated here, it is likely that a large percentage of fishermen expected to contribute meaningfully to their scientific projects. Fishermen spoke to a theme of uncertainty about what to expect regarding data usage and project goals emerged during interviews (Table 2).

Scientific Outcomes

When scientist and fisherman survey results are considered together (Figure 5), the five most common products of WCCFR projects were, in descending order: new data, written reports, generally accessible information useful to many, improved data, and presentations. Of these five products, three of them (reports, presentations, and generally accessible information useful to many) lend themselves to conveying the results of the research to the marine fishing community at large. The other two types of products (new data, and improved data) lend themselves to informing managers and other researchers, and may indirectly impact fisheries policy, but may not be useful to the marine fishing community at large.

When the responses from each group are evaluated separately fishermen and scientists do not seem to be equally aware of all types of products. Survey results (Figure 5) showed that for three products (written reports, presentations, and advanced information useful to a few) the responses given by fishermen and scientists were quite different. Why fishermen are less aware of these three products is unclear, but other survey results (Figure 3) show that fishermen have low participation rates in presenting, and analyzing data. Survey results from Figure 5 and Figure 3, when considered together, may indicate that if fishermen are not included in an aspect of a project they are either not told about it or do not find it memorable. The fact that fishermen expressed an interest in

both the value and quality of project data would suggest that they would find the creation of reports and presentations memorable. For this reason it seems more likely that fishermen are not being made aware of certain WCCFR products, or they are not being made aware of WCCFR products in meaningful ways.

Fishermen and scientists both report a fairly high rate of data products being shared with the science community, fishing industry, and management communities (Figure 6). The survey data indicate that a range of data products are being generated. However, the differences in answers between fishermen and scientist (Figure 5), and fishermen's wide ranging uncertainty (Table 3) suggests that they are not receiving or remembering information about how data is being used. This is information that scientists appear to have. Similarly, when asked "Was the resulting science of this research used by other projects, and/or in the management process?" fishermen answered "don't know" nearly twice as often as scientists (Figure 7). This appears to be another indicator that fishermen are not receiving information regarding project outcomes and data uses, which my research suggests would interest fishermen. This uncertainty and apparent lack of information being given to fishermen may indicate that fishermen face the difficult task of judging the success of a project with incomplete information.

Relationship Expectations

Fishermen and scientists consistently indicate that research and data issues are more important factors for choosing their projects and represent more influential benefits than relationship or social aspects of projects (Figures 1 and 2). Interviews supported this by finding that five out of fifteen (33%) of fishermen and three out of nine (33%) scientists described relationships as an incentive to their participation in their WCCFR project (Table 1). Again, similar to the surveys, the interviews found that six out of nine (67%) scientists, and twelve out of fifteen (80%) fishermen described gathering data as an incentive to participate (Table 1). The results indicate that while a subset of fishermen and scientists feel that relationships are important, only a third of participants see WCCFR as an opportunity to repair the troubled relationships between fishermen and scientists, two groups that have historically been in conflict.

Relationship Outcomes

Survey data regarding project success in terms of people, partnership, and relationship goals indicates that 87% (46/53) of fishermen and 83% (44/53) of scientists believed that their project had been successful. Only 6% (5/53) of fishermen and 4% (2/53) of scientists indicated that the project had not been successful in terms of its relationship objectives. The interviews supported the surveys and found that nine out of fifteen (60%) fishermen and five out of nine (56%) scientists said that relationships were formed or strengthened during their respective WCCFR projects (Table 6). Also the interview data found that six out of sixteen (38%) participants that didn't say improving relationships (Table 1) was an incentive to participate did indicate that relationships had been improved (Table 6). This finding indicates that many participants found that by working together, stronger relationships between fishermen and scientists were developed.

Although both groups indicated that their projects had been successful in meeting relationship goals, each group had their own perspective regarding the evolution of relationships between fishermen and scientists. In the interviews, fishermen described uncertainty about the projects and some mistrust of the scientific/management process (Table 3). When this mistrust is combined with the finding of fishermen's attention to sharing power and an interest in the fate of their input (Table 4) they may see themselves entering into situations where much information is unknown. These unknowns include what the specific goals of the project are, how data will be collected, and eventually be used. Given this uncertainty it is not surprising that fishermen's struggles to influence their project were mentioned by 53% (8/15) of fishermen during interviews (Table 2).

Communication is a critical aspect of relationships, and so a discussion of communication related findings follows. Although one survey result suggested communication between fishermen and scientists was good several other indicators suggest that the exchange of information between fishermen and scientists is poor. Survey results found that 95% (106/111) of participant evaluations of communication between groups was good or okay, with a small fraction (4% (4/111)) of communication

evaluations indicating that communication had been “not good”, and one respondent not answering the question. Despite these large “communication is good” survey results, other survey results and interview results seem to identify challenges. The survey found that fishermen appeared to be less aware of several types of WCCFR project products than scientists were (Figure 5). In interviews fishermen expressed uncertainty regarding a wide range of project aspects (Table 3), and suggested that communication between fishermen and scientists could be improved (Table 6).

These conflicting findings may suggest that communication is more complex than either “good” or “bad”. Taken together these pieces of data may indicate that the “communication is good” survey response referred to the tone and quality of respondents interactions with other participants. It may have been that the absence of conflict was equated with an interaction being good and, therefore, communication was indicated as being good. Fishermen’s beliefs that communication was an obstacle, as well as the persistence of fisherman’s uncertainty regarding basic elements of their CFR projects, qualify this finding and suggest that while communication between fishermen and scientists is generally amicable, the exchange of project information and scientific motivations may not be adequate. This poor exchange of information has implications for WCCFR. Efforts to provide fishermen with information about scientific objectives and outcomes may need to be reevaluated and improved. At the very least the finding of wide spread fishermen uncertainty supports the fishermen’s statements that communication could be improved.

Recommendations

Challenges of WCCFR

Our research found three main challenge areas; working together, uncertainty, and contributions expected of participants. With regard to working together there were two main challenges identified by this research: sharing power, and communication. During interviews 53% (8/15) of fishermen stated that sharing power with scientists was also a challenge, and 66% of fishermen (10/15) stated that communicating with scientists was a challenge they faced during their CFR project (Table 2). Scientists described changes in

the cooperative-collaborative nature of their projects over the course of a project. These changes in the cooperative-collaborative nature of the project may make judging how power is being shared more difficult for participants. Future cooperative researchers may want to consider addressing these challenges by discussing anticipated shifts in influence and control of the project. Efforts could also be made to outline which aspects of the project are able to be changed and which are not, and where input is encouraged.

Fishermen frequently mentioned their uncertainty about projects that they had been involved in. This uncertainty poses nebulous but critical challenge. Fishermen were often uncertain of their projects scientific objectives, how the project data would be used, and mistrusted the scientific/management process. To address the troubling uncertainty of fishermen, project managers may want to be more responsive and encourage participants to ask questions regarding their projects. Project managers may also want to prepare information sheets outlining project logistics as well as project goals and expectations.

Contributions necessary for the project were seen as a challenge by each group. Scientists described the task of managing their projects as a deterrent to participating in WCCFR. More specifically, difficulties in finding reliable funding, obtaining vessel insurance, scheduling meetings, travel time, and were all mentioned as challenging project management tasks. Building flexibility or extra time into project schedules can also help stop setbacks from becoming major disruptions to projects.

Fishermen also stated that the resources they would be expected to contribute were large enough to pose a deterrent to their involvement (Table 1). Fishermen's belief that a lot would be expected of them may indicate a reason why other fishermen have chosen not to participate in these types of projects. Project organizers may consider providing greater compensation to fishermen for their participation, and give more recognition for their contribution in resulting reports and presentations. Given the issues of trust, and difficulties seen regarding communication, it would likely be detrimental to down play or gloss over the amount of work that fishermen would be expect to contribute to their projects.

Despite this deterrent, fishermen interviewed for this project did obviously decide to participate in their respective WCCFR projects.

Benefits of WCCFR

A wide range of potential benefits of CFR are often mentioned in the literature and include the use of fishermen's knowledge in conducting research, lower costs of conducting research than conventional methods, increased acceptance of research findings by fishermen (Reed and Hartley 2006, Harms and Sylvia 1999, Conway and Pomeroy 2006). My research found a high occurrence of two positive outcomes of WCCFR projects.

The first benefit found was the involvement of fishermen with a strong interest in conducting good science. During interviews, 73% (11/15) of fishermen cited interest in their projects area of research as a primary reason for becoming involved, and described data quality and value as criteria for project success. To fully take advantage of the benefit of fishermen's interest in data quality and value, when opportunities for participants to contribute to a CFR project arise, project managers may want to make those opportunities well known to participants and solicit input from all partners. Many of these opportunities to contribute arise early in the research design process, suggesting that there is utility in including fishermen in the early stages of the research process.

The second benefit that was found through this research was the creation or strengthening of relationships. Fishermen and scientists indicated that relationships were formed or improved during CFR projects in surveys and interviews. Several participants even cited opportunities to improve relationships as an incentive to participating. To fully take advantage of this benefit, opportunities for fishermen and scientists to interact should be encouraged during the initiation and after completion of a CFR project.

Finally, when participants were asked which had been greater during the project, costs or benefits, 82% (91/111) participants surveyed indicated that the benefits of their participation were greater than the costs of their participation. Given the amount of work that goes into CFR, this response is encouraging. Addressing the challenges outlined in this section may increase these positive ratings by CFR participants.

Communication

This study has found that that communication is a common thread running through many of the challenges and benefits of WCCFR. This observation is supported by the

findings of another study identifying communication as an important aspect of CFR. In its report to NMFS the NRC found that "Communication is critical in all stages of cooperative research" (2002:117).

While some survey data directly focusing on communication between fishermen and scientists may indicate it is generally good, other data from surveys and interviews, indicates that there is progress yet to be made. To help CFR projects achieve their full potential, strong lines of communication and information exchange, as well as insightful plans to develop those exchanges, should be an integral part of all CFR projects. Given the busy and often inflexible timelines that fisheries research projects follow, the best time to develop these plans may be before project research has begun.

Conclusions

My review of the literature found no studies of WCCFR similar to the one I conducted. The regional geographic scope, the broad base of participants surveyed, and the consistent methods of data collection used in my study of WCCFR give it a unique level of breadth and depth. The findings of this research can help supporters and practitioners of WCCFR better understand the outcomes of these projects at a time when awareness of CFR is high but knowledge of the CFR process and outcomes is not widely available. It is my hope that this research will serve to improve existing and future WCCFR projects by gathering and describing the experiences of past participants in WCCFR projects. Furthermore, I believe that improved WCCFR efforts and improved partnerships between fishermen and scientists have the potential to increase understanding of our oceans' natural resources, improve their management, and better sustain marine fisheries and the communities that rely on those resources.

The data gathered by this study offers special insights into several aspects of WCCFR projects:

- *Generating quality data* was the primary motivator of fisherman and scientist involvement in WCCFR.
- *Uncertainty regarding motivations for, and outcomes of, their projects* was the major deterrent to fishermen involvement.

- *Complex logistical challenges of managing their projects* were the major deterrent to scientist involvement.
- *Belief that their project's data was well distributed and used* was shared by both fishermen and scientists, although fishermen had a higher level of uncertainty about data distribution and project goals and results than did scientists.
- *Improved relationships* cited by both fishermen and scientists as a positive outcome, even though only a minority of participants mentioned relationships as a motivation to participate. This suggests that while many participants join their projects with an interest in the data, they leave with an awareness of their improved relationships.
- *Widespread uncertainty by fishermen regarding various project aspects* suggests that despite positive communication ratings, the exchange of information between participants remains a challenge.
- *Involvement by scientists in WCCFR projects appears to be almost twice that of fishermen*, suggesting that WCCFR projects are a blend of collaboration and cooperation.

This study also provides insight into how WCCFR projects are experiencing the general challenges outlined by previous studies CFR efforts. The specific challenges described by previous studies of CFR , which my study of WCCFR describes in greater detail, are; the diverse perspectives of fishermen and scientists, communication between fishermen and scientists, and trust between fishermen and scientists. Regarding the challenge of diverse perspectives of various participants, my data indicates that fishermen and scientists seem to view projects benefits similarly, but differ in how they describe project challenges. Regarding the general challenge of communication my study found that although communication between fishermen and scientists seems to be proceed amicably, the exchange of information remains problematic. Regarding the general challenge of trust among participants my study found that it was primarily expressed in the form of fishermen uncertainty regarding WCCFR project goals and outcomes. These

results of my study can help future participants in WCCFR projects better address these and other challenges presented by WCCFR.

Along with providing useful insight into WCCFR projects for future participants, this study has also raised questions that other researchers may wish to address. Several future research questions raised by this study include:

- What is inhibiting the flow of project information from scientists to fishermen?
- What are the possible correlational and causal factors between participant demographics and the responses of participants?
- What motivated participants to prefer more or less collaboration?
- How does conflict, and the concern that conflicts may arise, disrupt WCCFR projects?
- What are effective methods for delivering the type of information gathered by this study to perspective participants?
- Are past, present and prospective WCCFR participants interested in creating a community of practice, and a forum in which they can share their experiences with others?

Insight gained by addressing these and other questions will benefit WCCFR and CFR in general.

My research has shown how fishermen and scientist are working together in WCCFR projects, and how their work can be improved. Scientists can be better prepared to study marine fish stocks and ecosystems by utilizing the valuable resources that fishermen possess. As fisheries scientists and fishermen on the US west coast work to maintain healthy marine fish stocks and the industries and coastal communities that these fisheries support, it seems clear that they should continue to work together. As mandated by National Standard for Fishery Conservation and Management #2 of the Magnuson-Stevens Act (USC 16 1851, Section 301 (a) (2)) science will play a central role in fisheries management policies. More effective WCCFR projects can lead to a greater quantity and higher quality of fisheries data, which is a critical ingredient to managing our west coast fisheries and ecosystems. Our own fate as a region, a nation, and a planet

are closely tied to these fisheries and marine ecosystems, which we depend on for food, employment, recreation, scenic beauty, and innumerable ecosystem services.

Figures

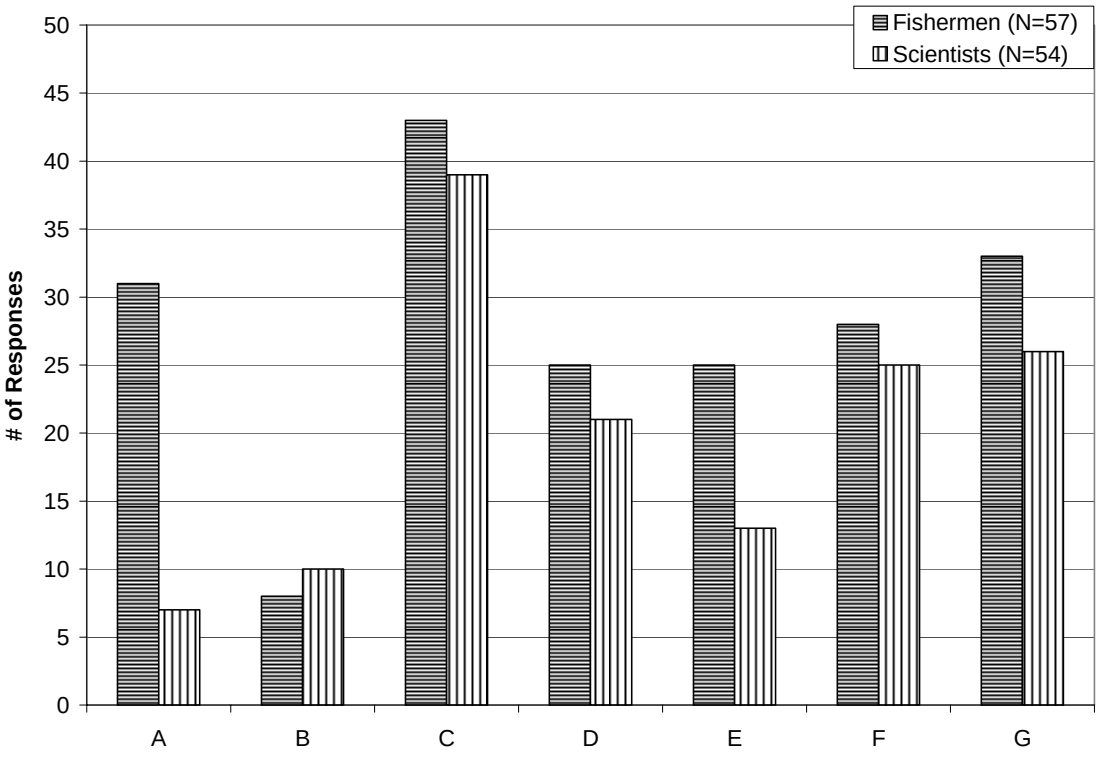


Figure 1-Survey Data: Participants' Reasons for Involvement in Their Projects
A. I was asked to be an industry cooperator by a researcher
B. I was asked to be a research cooperator by a fisherman or other industry professional
C. I was interested in this research topic
D. I was interested in participating in an opportunity to learn from others
E. I was interested in participating in an opportunity to teach others what I know
F. I am interested in the availability of data related to the topic of this research
G. I am interested in the quality of available data related to the topic of this research

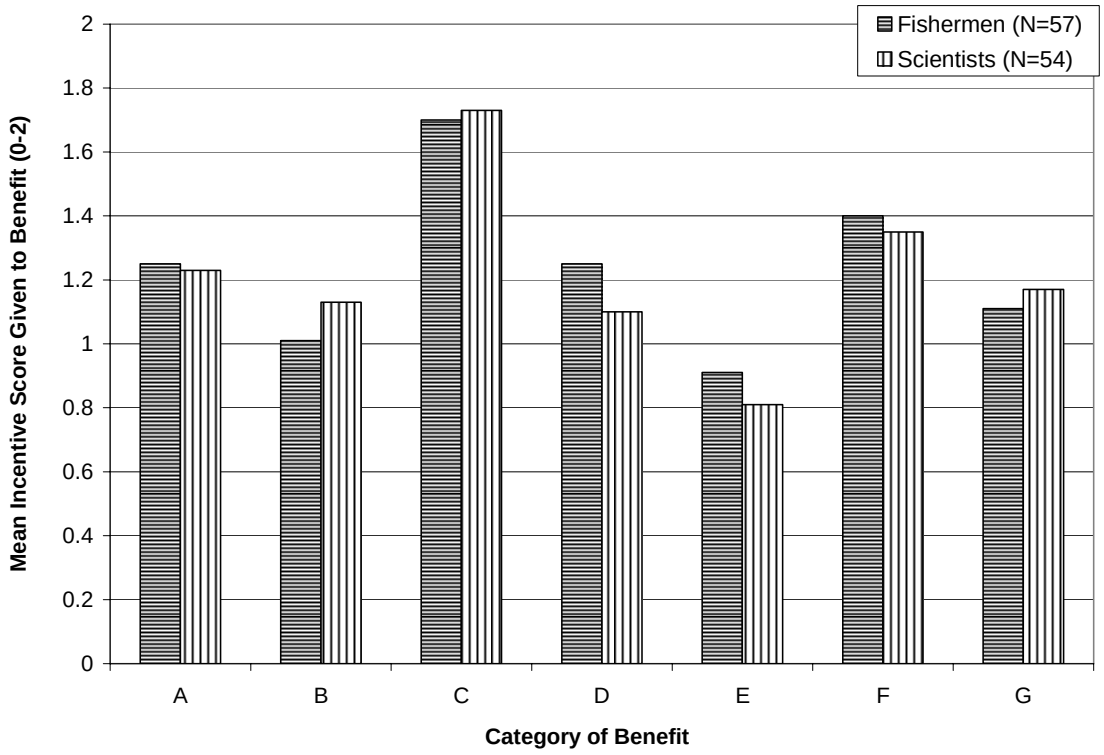


Figure 2- Survey data: Participants rating of the incentives that various benefits played in their decision to participate in their WCCFR project (A score of 0 indicates that a participant believed that a benefit was not influential, a score of 1 meant somewhat influential, and a score of 2 indicates a very influential benefit)

A. Learning from each other
B. Increased trust
C. Producing needed data
D. Increased communication
E. Working through difficulties or obstacles together
F. Collecting data in a cost-effective manner
G. Working towards common goals

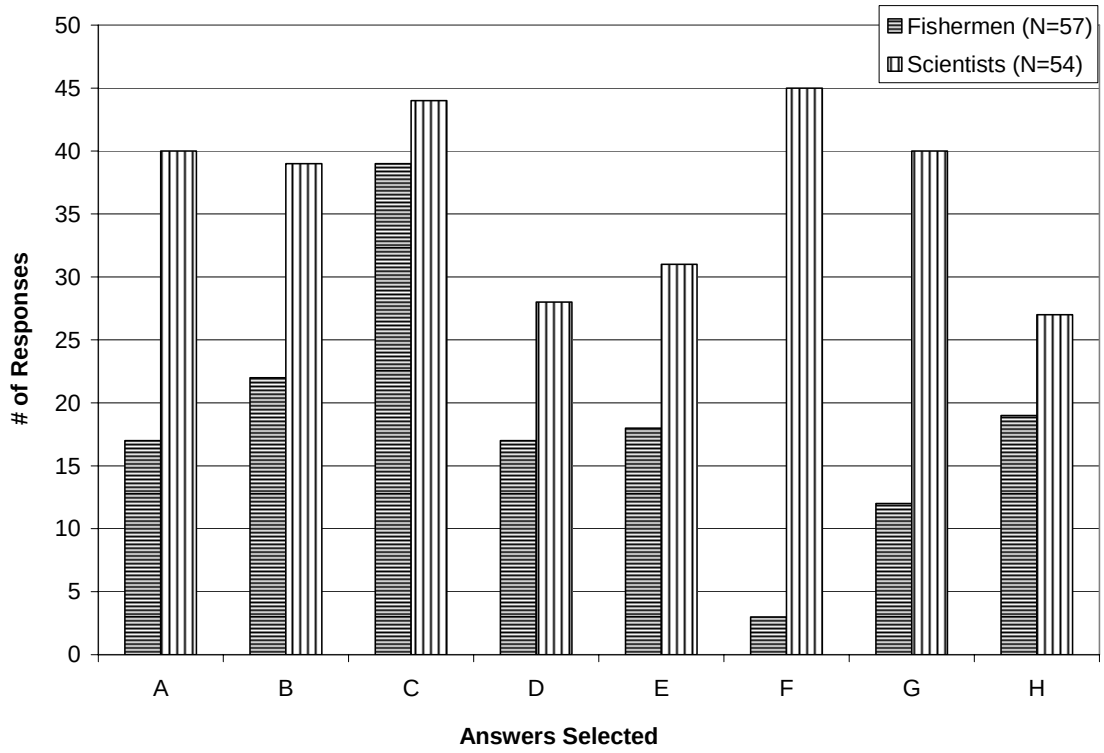


Figure 3- Survey Data: Participants' Involvement in Components of the Project
A. Designing the research project
B. Starting the project / pulling together the partners
C. Information/data gathering at sea
D. Information/data gathering on shore via an interview, meeting, workshop, conference
E. Consulting/reviewing scientific plans or proposals
F. Analyzing data
G. Reporting results / research project promotion
H. Problem solving

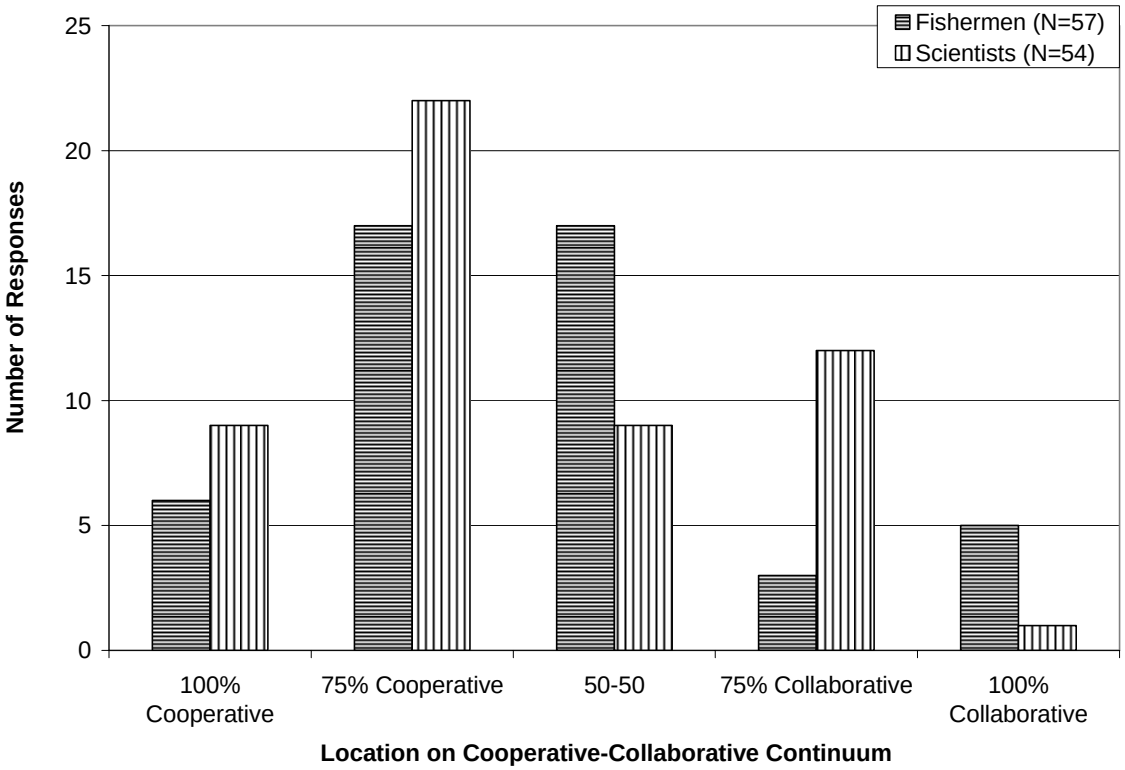


Figure 4- Survey Data: Project location on the Cooperative-Collaborative Continuum

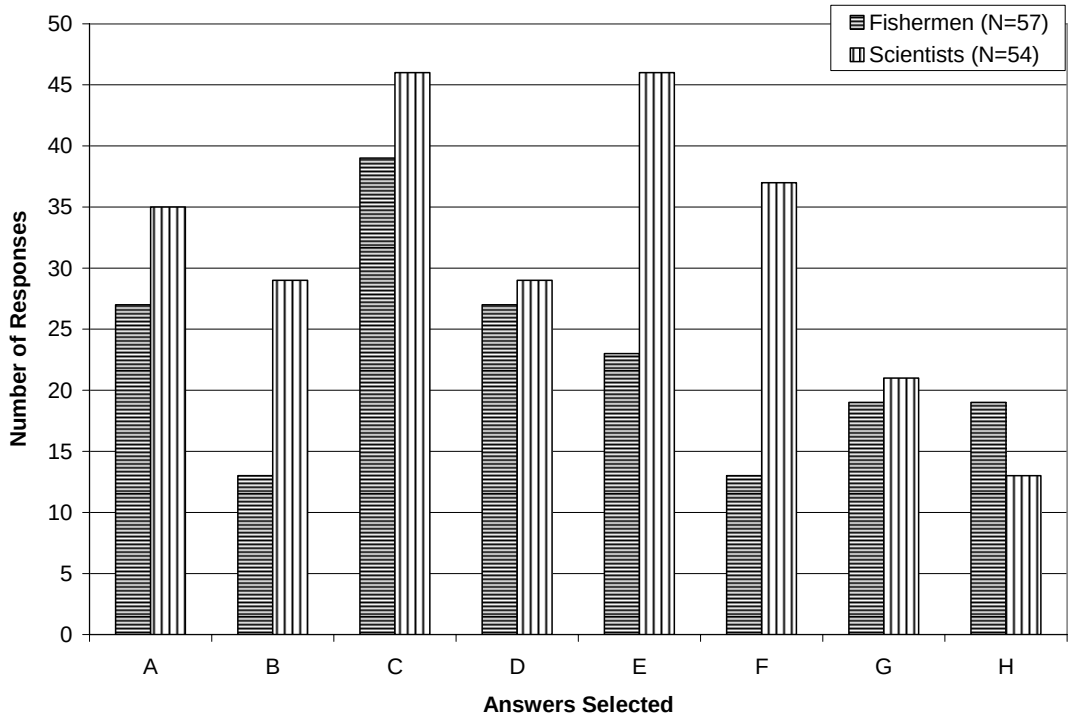


Figure 5- Survey Data: Products resulting from WCCFR projects
A. Generally accessible information useful to many
B. Advanced information useful to a few
C. New data
D. Improved data
E. Written report(s)
F. Presentation(s)
G. New technology/skill/approach to fisheries
H. New management/policy decision(s)

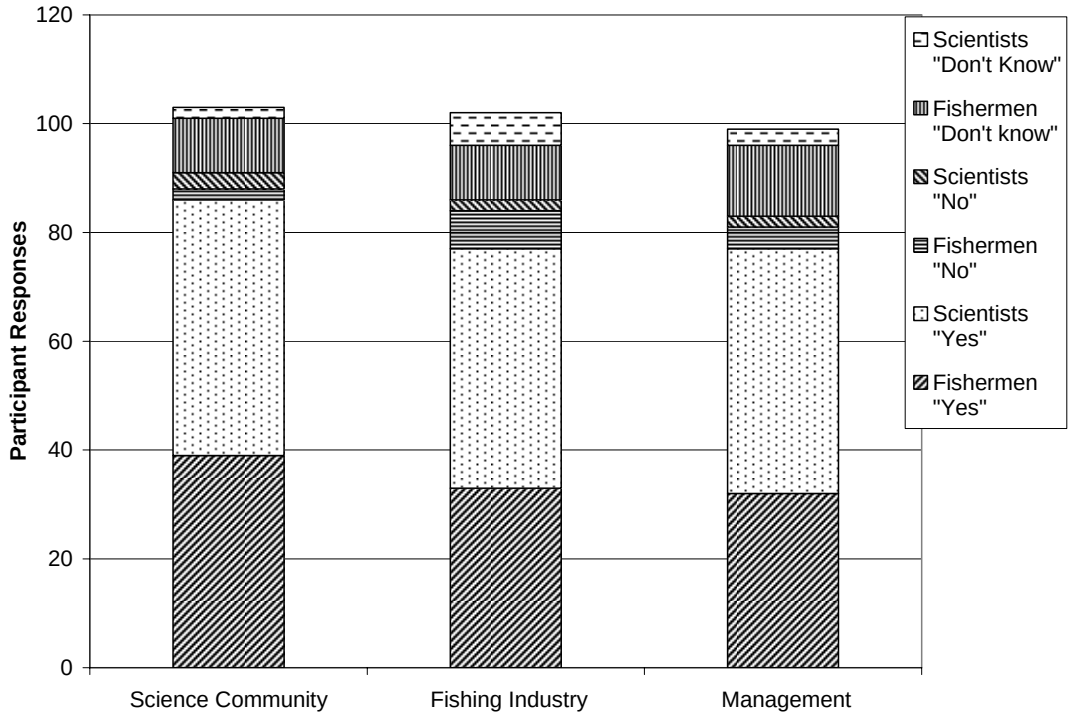


Figure 6- Survey Data: Participant responses to which groups project data was shared with (N=111)

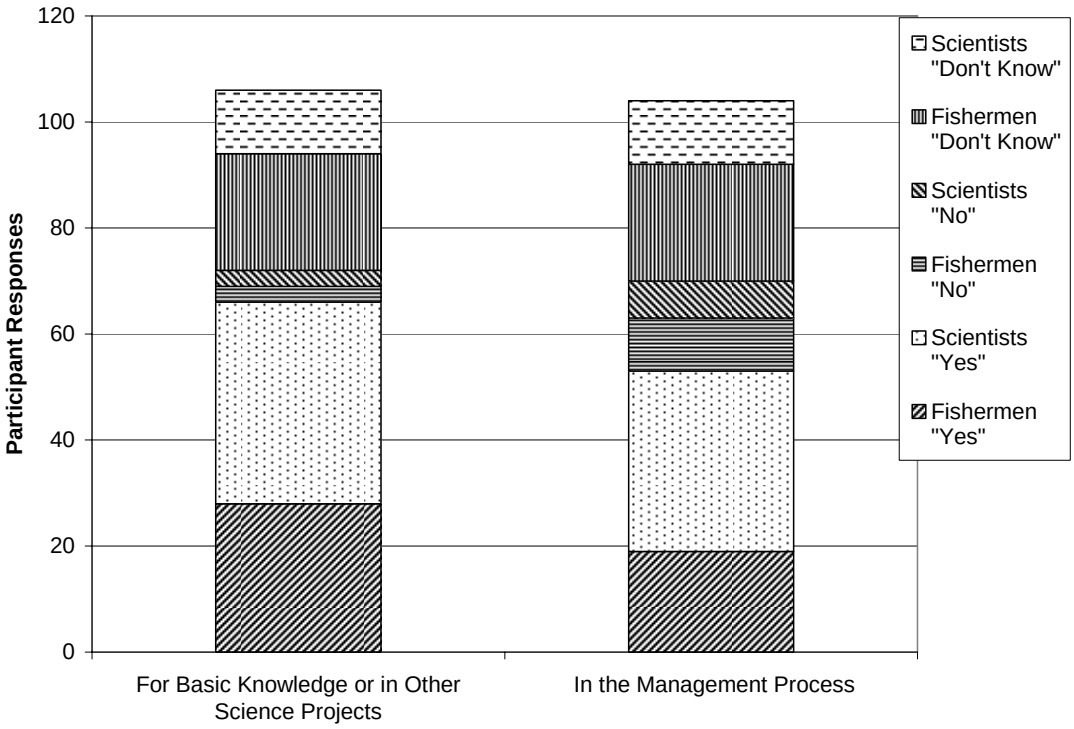


Figure 7- Survey Data: Participant responses to what areas they believed their research data was used in

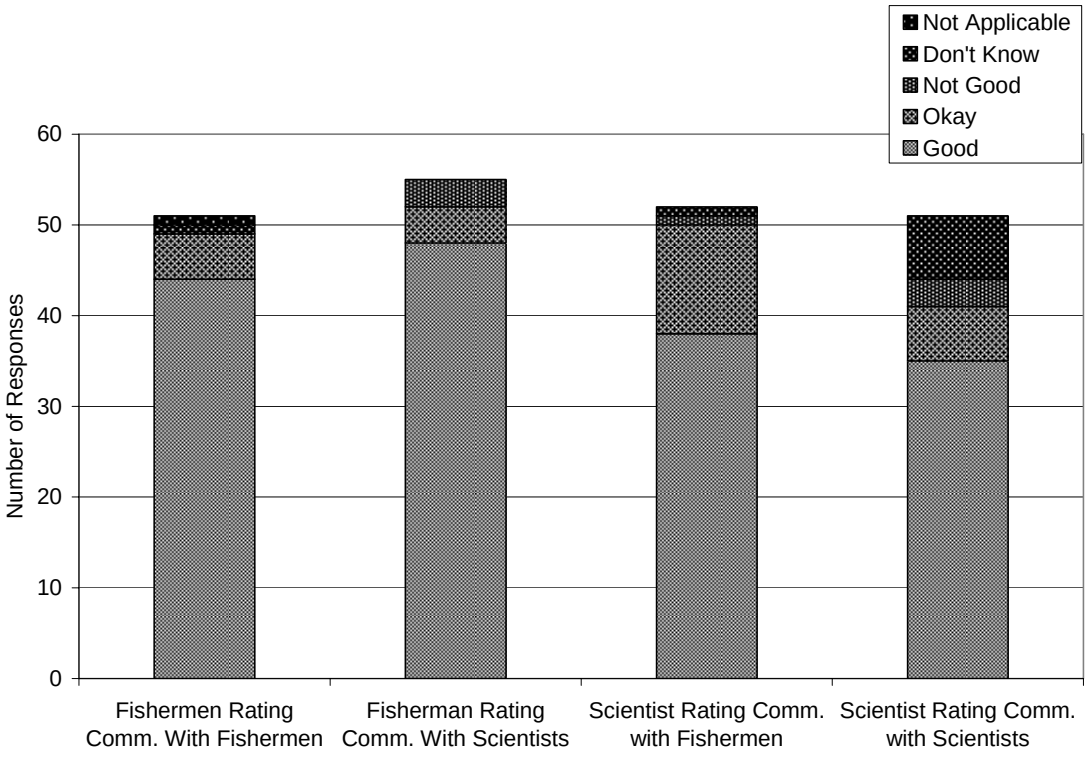


Figure 8- Survey Data: Participant characterization of communication with various groups

Tables

Table 1. Interview Themes: Influences on Involvement	Fishermen (N=15)	Scientists (N=9)
Incentives		
Opportunity to improve relationships between participants	33% (5)	33% (3)
The individual was specifically asked to participate	33% (5)	0% (0)
The opportunity to collect sound and useful data	80% (12)	67% (6)
Deterrents		
Project outcomes negatively impacting industry	40% (6)	0% (0)
Amount of resources required was large	33% (5)	44% (4)

Table 2. Interview Themes: Obstacles Encountered During Project	Fishermen (N=15)	Scientists (N=9)
Difficulties securing funding for project	0% (0)	78% (7)
Insurance requirements and procurement was difficult	0% (0)	44% (4)
Lack of confidence in science and management process	53% (8)	0% (0)
Scientists sharing power with fishermen was difficult	53% (8)	0% (0)
Communication between groups was difficult	47% (7)	0% (0)

Table 3. Interview Themes: Uncertainty	Fishermen (N=15)	Scientists (N=9)
Uncertain regarding science management process	60% (9)	0% (0)
Lacked confidence in Science and Management process	53% (8)	0%
Uncertainty about project goals/results	47% (7)	0%
Uncertain about exact usage of project data	47% (7)	0%

Table 4. Interview Themes: Fishermen and Scientists Working Together	Fishermen (N=15)	Scientists (N=9)
Location on Col.-Coop. Continuum		
Shift in level of cooperation vs. collaboration during the project	0% (0)	89% (8)
Fishermen had participated with startup of cooperative project	0% (0)	78% (7)
Descriptions of Fishermen's influence over project	53% (8)	0% (0)
Contributions made to project		
Fishermen were involved in decision making aspects of project	0% (0)	44% (4)
Description of participant actions that supported project	0% (0)	56% (5)
Descriptions of material contributions of participants	40% (6)	0% (0)

Table 5. Survey Data: Participant's comfort regarding their project's location on the Cooperative-Collaborative continuum

Fishermen N=57 Scientists N=54	Fshmn. "Yes"	Sctst. "Yes"	Fshmn. "No"	Sctst. "No"	Fshmn. "Don't Know"	Sctst. "Don't Know"	Fshmn. No Answer	Sctst. No Answer
Are you comfortable with how cooperative or collaborative this project was?	79% (45)	85% (46)	11% (6)	7% (4)	4% (2)	6% (3)	7% (4)	2% (1)
Would you prefer it to have been more collaborative?	28% (16)	22% (12)	37% (21)	67% (36)	16% (9)	7% (4)	19% (11)	4% (2)

Table 6. Interview Themes: Relationships Between Participants	Fishermen (N=15)	Scientists (N=9)
Evolution of relationships		
Participants were uncertain of science-policy process	60% (9)	0% (0)
Relationships were created or improved during project	60% (9)	56% (5)
Relationships aided or enhanced projects and outcomes	40% (6)	0% (0)
Participants described working together as beneficial	53% (8)	44% (4)
Communication between participants could be improved	47% (7)	0% (0)
Efforts were made to aid communication during the project	0% (0)	44% (4)
Efforts made to include industry in scientific process	0% (0)	44% (4)
Impacts of Pre-existing relationships		
Pre-existing Relationships Aided Project Formation	80% (12)	78% (7)
Pre-existing Relationships aided in the distributing Data	0% (0)	44% (4)

Table 7. Interview Themes: Assessments of Success	Fishermen (N=15)	Scientists (N=9)
Relative to Resources Invested		
Cooperative project generated Good and Accurate Data	0% (0)	56% (5)
Cooperative project contributed to managing the resource	60% (9)	0% (0)
Relative to Scientific Objectives		
Dissemination and publication of project data	0% (0)	33% (3)
Scientific understanding was advanced by project results	73% (11)	78% (7)
Individual was uncertain about project goals and results	47% (7)	0% (0)

Table 8. Interview Themes: Use of Project Data	Fishermen (N=15)	Scientists (N=9)
Project data was or will be used	33% (5)	67% (6)
Project data or results used by other projects or researchers	0% (0)	56% (5)
Project results have been or will be widely distributed	0% (0)	44% (4)
Participant uncertain about exact data usage	47% (7)	0% (0)

References:

Berg, B. L. 2001. Qualitative research methods for the social sciences. Allyn and Bacon Publishing, Boston, Massachusetts.

Bernstein, B. B., S. Iudicello, 2000. National evaluation of cooperative data gathering efforts in fisheries. National Fisheries Conservation Center. National Marine Fisheries Service, Silver Spring, Maryland.

COMES (Coastal Oregon Marine Experiment Station), 2001. Newsletter- July 2001. http://marineresearch.oregonstate.edu/assets/ page_folders/about_us/july2001.pdf (accessed September 10, 2007).

Conway, F. D. L., Pomeroy, 2006. Evaluating the human—as well as the biological—objectives of Cooperative Fisheries Research; *Fisheries*; 31:447-454.

Gilden, J., F. D. L. Conway, 2002. An investment in trust, Communication in the commercial fishing and fisheries management communities. Oregon Sea Grant, Corvallis, Oregon.

Hall-Arber, M., J. Pederson, 1999. Habitat observed from the decks of fishing vessels, *Fisheries*. 24 (6): 6-13.

Hannah, R. W., S. J. Parker, T. V. Buell, 2005. Evaluation of a selective flatfish trawl and diel variation in rockfish catchability as bycatch reduction tools in the deepwater complex fishery off the U.S. west coast, *North American Journal of Fisheries Management*. 25:581-593.

Harms, J., G. Sylvia, 1999. Industry-scientist cooperative research: Application to the west coast groundfish fishery. Master's Thesis. Oregon State University, Corvallis, Oregon.

Harte, M., 2000. Collaborative Research: Innovations and challenges for fisheries management in New Zealand; IIFET 2000 Proceedings

Hartley, T. W., R. A. Robertson, 2006. Emergence of multi-stakeholder-driven cooperative research in the Northwest Atlantic: the case of the Northeast Consortium. *Marine Policy*. 30:580-592.

Henry, G. T., 1990. Practical sampling. Sage Publications, Newbury Park, California.

Hosie, M. [ed.] 1998. Proceedings of working together for West Coast Groundfish: developing solutions to research needs in 1998, 1999, 2000, and beyond. Portland, OR.

Kaplan, I. M., E. T. McCay. 2004. Cooperative research, co-management and the social dimension of fisheries science and management. *Marine Policy* 28:257-258.

Kerstetter, D. W., J. E. Graves, 2006. Effects of circle versus J-style hooks on target and non-target species in a pelagic longline fishery. *Fisheries Research*. 80:239-250

Maurstad, A., 2002. Fishing in murky waters—ethics and politics of research on fisher knowledge. *Marine Policy*. 26:159-166.

NMFS (National Marine Fisheries Service) 2007. Overview of regional cooperative research programs. http://www.st.nmfs.noaa.gov/st4/documents/cr/General_Program _Summary_2007.pdf (accessed September 12, 2007).

National Research Council (NRC), 2004. Cooperative research in the National Marine Fisheries Service. Report, National Academies Press. Washington, DC.

NWFSC (Northwest Fisheries Science Center) 2007. Fishery resource analysis and monitoring division. http://www.nwfsc.noaa.gov/research/divisions/fram/index.cfm. (accessed September 12, 2007).

Patterson, M. E., D. R. Williams, 1998. Paradigms and Problems: The Practice of Social Science in Natural Resource Management. *Society and Natural Resources* 11:279-295.

PEW (Pew Oceans Commission), 2003. America's living oceans: Charting a course for sea change. A Report to the Nation, Pew Oceans Commission. Arlington, Virginia

PMCC (Pacific Marine Conservation Council), 2003. Fish Research: Funded projects – Port Liaison Project. http://www.fishresearchwest.org/funded_projects/ ProjectReport_Home.asp?id=156 (accessed September 12, 2007).

PSMFC (Pacific States Marine Fisheries Commission), 2006. The pacific states marine fisheries commission – funded RFPs. http://www.psmfc.org/funded-rfps.html (accessed September 12, 2007)

Read, A. N., T. W. Hartley, 2006. The future of partnerships for a common purpose: Cooperative fisheries research and management. Pages 251-255 in Read, A. N., Hartley, T. W., Partnerships for a common purpose: cooperative fisheries research and management. American Fisheries Society, symposium 52, Bethesda, Maryland.

Robson, C., 2002. Real world research: a resource for social scientists and practitioner-researchers. Blackwell Publishing, Ames, Iowa.

Salant, P., D. A. Dillman, 1994. How to conduct your own survey. John Wiley and Sons, Inc., New York, New York.

Spradley, J. P., 1979. The ethnographic interview. Holt, Rinehart and Winston, Inc.. Orlando, Florida

USCOP (US Commission on Ocean Policy), 2004. Final Report of the US Commission on Ocean Policy: An ocean blueprint for the 21st century. USCOP Report, Washington, D.C.

USOFR (U.S. Office of the Federal Register), 2004. Wildlife and Fisheries. Code of Federal Regulations, Title 50, Part 660. U.S. Government Printing Office, Washington D.C.

Van Riper, L., 2003. Can agency-led initiatives conform to collaborative principles? Evaluating and reshaping an interagency program through participatory research. Doctoral dissertation. University of Montana, Missoula, Montana.

Wallace, J. R., E. K. Pikitch, D. L. Erickson. 1996. Can Changing Cod End Mesh Size and Mesh Shape Affect the Nearshore Trawl Fishery of the West Coast of the United States?. *North American Journal of Fisheries Management*. 16:530-539

Appendix A:

Survey Tool

The History and Management Implications of West Coast Cooperative Fisheries Research

The focal point of this research is summarizing the history of cooperative fisheries research over the last 20 years, the current status of cooperative research efforts, and the potential of these efforts to impact the research and management of West Coast fisheries. We are conducting a mail survey to gain a better understanding of a cooperative fisheries research project you have participated in –
the _____ research project. ***Please help me gain a better understanding by completing this brief survey. Thank you!***

1. Are you a *(Please check one)*
___ Industry professional (fisherman, processor, shoreside support, etc.)
___ Research Scientist (NGO, academic, agency scientist or grad student, etc.)
___ Other (please indicate):

2. What were your reasons for becoming involved in this project? *(Please check all that apply)*
___ A. I was asked to be an industry cooperator by a researcher
___ B. I was asked to be a research cooperator by a fisherman or other industry professional
___ C. I was interested in this research topic
___ D. I was interested in participating in an opportunity to learn from others
___ E. I was interested in participating in an opportunity to teach others what I know
___ F. I am interested in the availability of data related to the topic of this research
___ G. I am interested in the quality of available data related to the topic of this research
___ H. Other (please indicate):

3. What aspects of the project have you been involved in? *(Please check all that apply)*
___ A. Designing the research project
___ B. Starting the project / pulling together the partners
___ C. Information/data gathering at sea
___ D. Information/data gathering on shore via an interview, meeting, workshop, conference
___ E. Consulting/reviewing scientific plans or proposals
___ F. Analyzing data
___ G. Reporting results / research project promotion
___ H. Problem solving (please give an example):
___ I. Other (please indicate):

4. What benefits and costs played a role in your choice to become involved in this project?

(for the factors below, please rate them 0, 1, or 2, with 0 as not influential, 1 as influential, and 2 as very influential. Please use the <u>blank spaces</u> to write in and rate any other benefits or costs not listed)

Benefits	**Costs**
___ Learning from each other	___ Economic
___ Increased trust	___ Time
___ Producing needed data	___ Social
___ Increased communication	___ Physical
___ Working through difficulties or obstacles together	___
___ Collecting data in a cost-effective manner	___
___ Working towards common goals	___
___	___
___	

5. Which has been greater in this project, the benefits of your involvement in this project or the costs of your involvement in this project?

_____Benefits _____Costs _____don't know/hard to say

Please explain:

For Questions 6-8, we are interested in the communication you have had with other project partners.

6. How was communication/coordination for the project maintained among the partners? *(Please check all that apply)*

___ A. Phone and/or conference calls
___ B. Meetings or other face-to-face interactions
___ C. Email / listserve
___ D. Mail / newsletters
___ E. A central organizing group took the lead
___ F. Other (please indicate):

7. Which methods listed in Question 6 would have been most effective in maintaining communication/coordination in this project? *(Please check all that apply)*

___ A. Phone and/or conference calls
___ B. Meetings or other face-to-face interactions
___ C. Email / listserve
___ D. Mail / newsletters
___ E. A central organizing group taking the lead
___ F. Other (please indicate):

8. How would you characterize the communication between you and the

A. Research scientist(s) participating in the project?

____good ____ okay ____not good ____don't know/not sure ____n/a

B. Industry professional(s) participating in the project?

____good ____ okay ____not good ____don't know/not sure ____n/a

C. How could communication with either or both be improved? ***(Please be specific in your explanation)***

For Questions 9-11, we are interested in your thoughts and perspectives on the products of the project.

9. What products came out of this project? ***(Please check all that apply.)***

___ A. Generally accessible information useful to many
___ B. Advanced information useful to a few
___ C. New data
___ D. Improved data
___ E. Written report(s)
___ F. Presentation(s)
___ G. New technology/skill/approach to fisheries
___ H. New management/policy decision(s)
___ I. Other (please indicate):

10. Were you involved in creating or delivering any of the products mentioned in Question 9? If so, please list and share specific comments about your involvement.

11. Were any of these products shared with

A. The science community?

_____yes _____no _____don't know/not sure
Please explain:

B. The fishing industry?

_____yes _____no _____don't know/not sure
Please explain:

C. The management community?

_____yes _____no _____don't know/not sure
Please explain:

For Questions 12-15, we are interested in your thoughts and perspectives about the value of fishermen – scientists partnerships in fisheries research.

12. Do you believe this project was successful in terms of

A. Reaching its scientific objectives?

_____yes _____no _____don't know/not sure
Please explain:

B. The people/partnership/relationship aspects?

_____yes _____no _____don't know/not sure
Please explain:

13. Was the resulting science of this research used

A. For basic knowledge or in other science projects?

_____yes _____no _____don't know/not sure
Please explain:

B. In the management process?

_____yes _____no _____don't know/not sure
Please explain:

14. **There is growing interest in cooperative and collaborative fisheries research. Cooperation and collaboration are not the same thing. Cooperative research involves *limited roles for some* partners. Collaborative research, in contrast, involves partners *equally in all phases* of the research process (idea generation, design, implementation, decision-making, reporting). In reality, research projects fall somewhere along a continuum, from 100% cooperative to 100% collaborative.**
Given your experience with this project, please circle where you feel this project falls along this continuum:

100% Cooperative 75% Cooperative 50/50 75% Collaborative 100% Collaborative

A. Are you comfortable with how cooperative or collaborative this project was?
_____yes _____no _____don't know/not sure
Please explain:

B. Would you prefer it to have been more *cooperative*?
_____yes _____no _____don't know/not sure
Please explain:

C. Would you prefer it to have been more *collaborative*?
_____yes _____no _____don't know/not sure
Please explain:

15. **How many cooperative fisheries research projects have you participated in including this project? *(Please write in the number.)* _____**

Feel free to use this space or additional pages to write any further comments you would like to share with us.

Thank you. I will send you a copy of any reports resulting from this project.

Interview Tool

Interview Protocol for History and Management Implications of West Coast Cooperative Fisheries Research

- Please tell me more about your project. What was the focus, activities, objectives, geographic region/reach, etc.?
- Please tell me about incentives, and deterrents to your involvement in this project.
- Where does this project fall within the continuum of cooperative (limited roles of some partners) to collaborative (partners involved equally in all roles)?
- Please tell me more about the resources invested into the project. Was the project a success based on the resources invested?
- Was this project a success or failure – based on the science/objectives aspects and/or based on the people/cooperation aspect?
- Please tell me about the resulting science of this research and how it was used (in other science or in the management process).
- What kind of impact did pre-existing relationships between participants in this project have on the overall project atmosphere?
- How does this project compare with other research projects you've been involved in?

IRB Approved Survey Cover Letter

Date (Sent Out)

Dear (Prospective Participant):

I am a graduate student at Oregon State University in the Marine Resource Management program focusing my Master's research on West Coast cooperative fisheries research. The focal point of this research is summarizing the history of this type of research over the last 20 years, the current status of cooperative research efforts, and the potential of these efforts to impact the research and management of West Coast fisheries.

As someone who has participated in a cooperative fisheries research project, I am asking for your help in gaining a better understanding the history and management implications of West Coast cooperative fisheries research. I would appreciate it if you would take about 20-30 minutes to respond to the enclosed survey and return it in the self-addressed, postage paid envelop provided. Your responses will be added together with others and recorded as a group. If the results of this study are published your identity will not be made public. **Your participation in this study is voluntary and your may refuse to answer any question(s) for any reason.**

The answers you provide will be kept confidential to the extent permitted by law. Special precautions have been established to protect the confidentiality of your responses. The numbers on the survey will be removed once it has been received. (The number is used to contact those who have not returned their survey, so those who have responded are not burdened with additional mailings.)

Your survey will be destroyed once your responses have been tallied. Results will be reported in a summarized manner in such a way that you cannot be identified. There are no foreseeable risks to you as a participant in this project; nor are there any direct benefits. However, **your participation is extremely valuable.**

The purpose of this letter is also to give you the information you will need to decide whether to participate in the study. This process is called "informed consent." Please read this letter carefully. Feel free to contact me with any questions you may have about this research, the survey, the possible risks and benefits, your rights as a volunteer, and anything else that is not clear. When all of your questions have been answered, you can decide if you would like to proceed with the survey. **If you agree, simply fill in the short form at the end of this letter and return it with your survey (in the postage paid envelope).**

Thank you for your willingness and time to participate in this study. If you have any further questions about the study please don't hesitate to get in touch with me or the principal investigator, Flaxen Conway, at 541-737-1418; flaxen.conway@oregonstate.edu. If you have any questions about your rights as a research participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator at (541) 737-4933 or IRB@oregonstate.edu.

Respectfully,

Jed Moore

Candidate, M.S. Marine Resource Management
College of Oceanic and Atmospheric Sciences, 104 Ocean Admin,
Oregon State University
Corvallis, OR 97331
jed.moore@gmail.com

OSU IRB Approval Date: 3-2-06
Approval Expiration Date: 3-1-07

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study.

Participant's Name (printed):
_____

_____ _____
(Signature of Participant) (Date)

IRB Approved Interview Cover Letter

INFORMED CONSENT DOCUMENT (Interviews)

Project Title: **The History and Management Implications of West Coast Cooperative Fisheries Research**
Principal Investigator: **Flaxen D.L. Conway, Oregon Sea Grant / Dept. of Sociology**
Co-Investigator: **Jed Moore, Marine Resource Management**

WHAT IS THE PURPOSE OF THIS STUDY?
You are being invited to participate in a research study designed to gain a better understanding of the history and management implications of West Coast cooperative fisheries research. The focal point of this research is summarizing the history of this type of research over the last 20 years, the current status of cooperative research efforts, and the potential of these efforts to impact the research and management of West Coast fisheries.

WHAT IS THE PURPOSE OF THIS FORM
This consent form gives you the information you will need to help you decide whether to participate in the study or not. Please read this form carefully. You may ask any question about this research, what you will be asked to do, the possible risks and benefits, your rights as a volunteer, and anything else that is not clear. When all of your questions have been answered, you can decide if you would like to proceed with the interview or not.

WHY AM I BEING INVITED TO TAKE PART IN THIS STUDY?
You are being invited to participate in this study because you have participated in West Coast cooperative fisheries research and have valuable perceptions and experiences of the cooperative fisheries research project(s) you have participated in. The goal of this study is to gain a better understanding of the history and management implications of West Coast cooperative fisheries research. You have a lot to offer and we hope that you will participate.

WHAT WILL HAPPEN DURING THIS STUDY AND HOW LONG WILL IT TAKE?
You are being asked to participate in an informal interview that will take anywhere from 30 to 90 minutes.

WHAT ARE THE RISKS AND BENEFITS OF THIS STUDY?
The possible risks and/or discomforts associated with your participation in this project are minor since the information I am requesting refers to your professional experience only. You incur no costs for participating in this research project. One potential benefit of your participation in this study is a copy of the resulting report.

WILL I BE PAID FOR PARTICIPATING?
You will not be paid to participate.

WHO WILL SEE THE INFORMATION I GIVE?

The information you provide during this interview will be kept confidential to the extent permitted by law. To help protect your confidentiality, we will report results in a summarized manner in such a way that you cannot be identified. In the event of any report or publication from this study, your identity will not be disclosed. It would be helpful to me to use an audio tape recorder in our interview. Rest assured that these recordings help me to capture the richness of your comments. The only people who will have access to the recordings are the principal investigator, a paid transcriptionist, or me. These recordings and transcriptions will be stored until the research is complete, and then destroyed.

DO I HAVE A CHOICE TO BE IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop any time during the interview and still keep the benefits and right you had before volunteering. You will not be treated differently if you decide to stop taking part in the study. If you choose to withdraw from this project before it ends, data collected prior to your withdrawal will be destroyed. You are also free to skip any of the questions you prefer not to answer. You may ask questions as well.

WHAT IF I HAVE QUESITONS?

Thank you for your willingness and time to participate in this study. If you have any further questions about the study please don't hesitate to get in touch with the Principal Investigator, Flaxen Conway (541-737-1418; flaxen.conway@oregonstate.edu) or me, Jed Moore, Candidate, M.S. Marine Resource Management (503-502-9079; jed.mooore@gmail.com).

If you have any questions about your rights as a research participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator at (541) 737-4933 or IRB@oregonstate.edu.

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

OSU IRB Approval Date: 3-2-06
Approval Expiration Date: 3-1-07

Participant's Name (printed):

_____

_____ _____

(Signature of Participant) (Date)

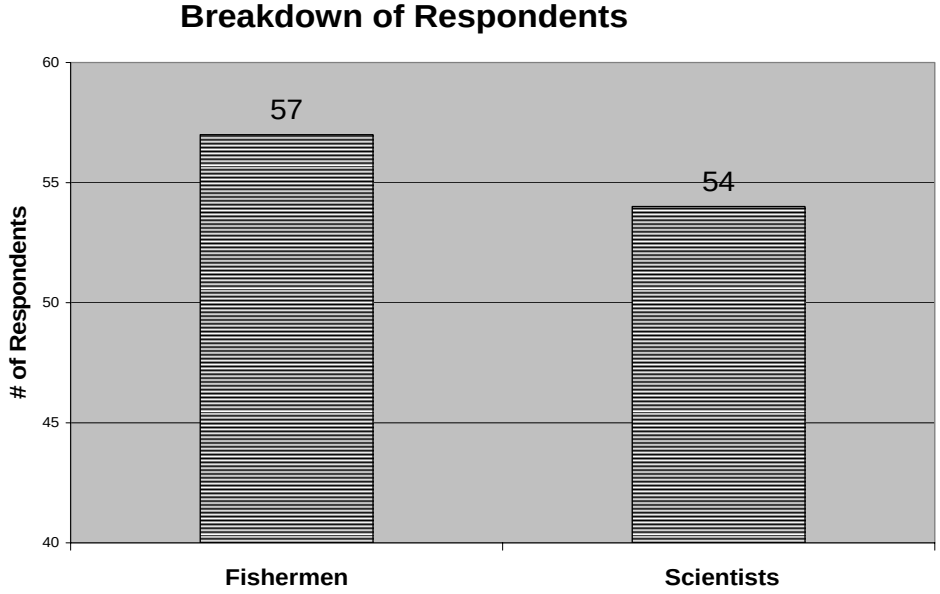
Appendix B:
Raw Survey Results

The History and Management Implications of West Coast Cooperative Fisheries Research

The focal point of this research is summarizing the history of cooperative fisheries research over the last 20 years, the current status of cooperative research efforts, and the potential of these efforts to impact the research and management of West Coast fisheries. We are conducting a mail survey to gain a better understanding of a cooperative fisheries research project you have participated in –
the _____research project. ***Please help me gain a better understanding by completing this brief survey. Thank you!***

1. **Are you a** ***(Please check one)***

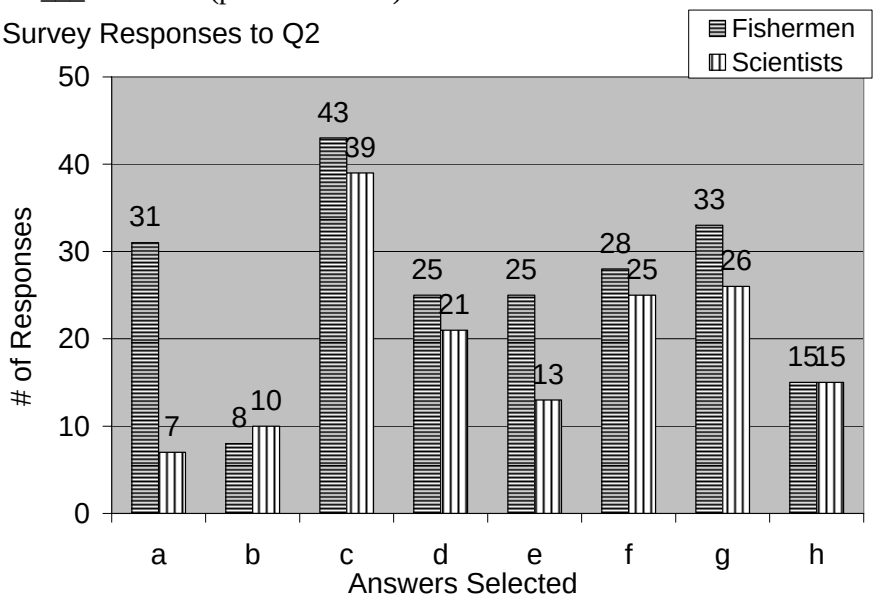
___ Industry professional (fisherman, processor, shoreside support, etc.)
___ Research Scientist (NGO, academic, agency scientist or grad student, etc.)
___ Other (please indicate):



2. **What were your reasons for becoming involved in this project?** ***(Please check all that apply)***

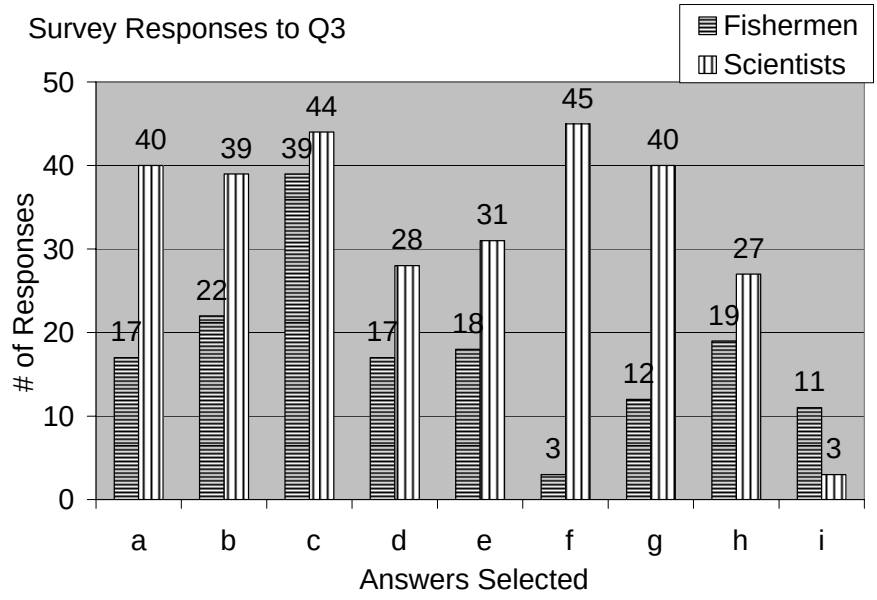
___ A. I was asked to be an industry cooperator by a researcher
___ B. I was asked to be a research cooperator by a fisherman or other industry professional
___ C. I was interested in this research topic
___ D. I was interested in participating in an opportunity to learn from others
___ E. I was interested in participating in an opportunity to teach others what I know
___ F. I am interested in the availability of data related to the topic of this research
___ G. I am interested in the quality of available data related to the topic of this research

___ H. Other (please indicate):



3. What aspects of the project have you been involved in? ***(Please check all that apply)***

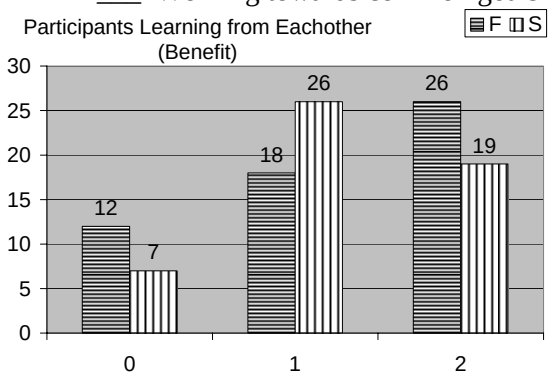
___ A. Designing the research project
___ B. Starting the project / pulling together the partners
___ C. Information/data gathering at sea
___ D. Information/data gathering on shore via an interview, meeting, workshop, conference
___ E. Consulting/reviewing scientific plans or proposals
___ F. Analyzing data
___ G. Reporting results / research project promotion
___ H. Problem solving (please give an example):
___ I. Other (please indicate):

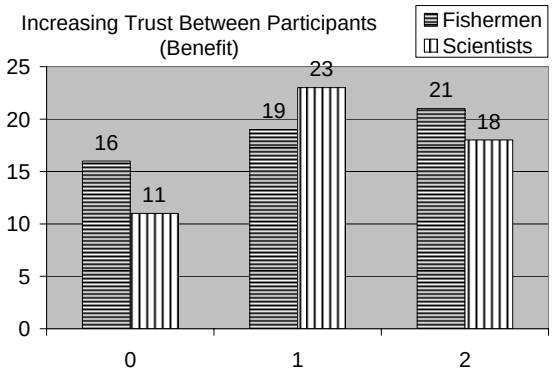


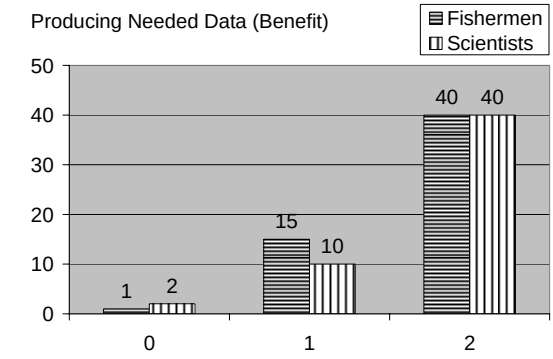
4. What benefits and costs played a role in your choice to become involved in this project?

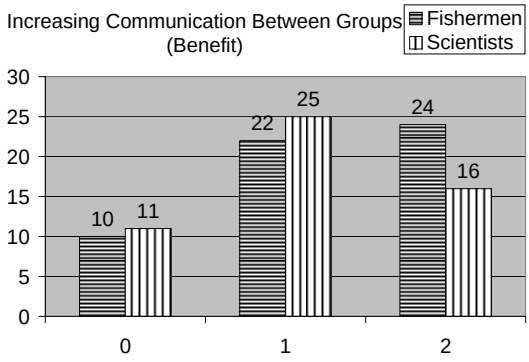
(for the factors below, please rate them 0, 1, or 2, with 0 as not influential, 1 as influential, and 2 as very influential. Please use the <u>blank spaces</u> to write in and rate any other benefits or costs not listed)

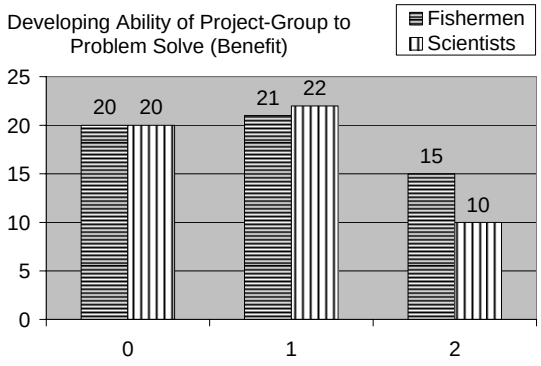
Benefits	**Costs**
___ Learning from each other	___ Economic
___ Increased trust	___ Time
___ Producing needed data	___ Social
___ Increased communication	___ Physical
___ Working through difficulties or obstacles together	
___ Collecting data in a cost-effective manner	
___ Working towards common goals	

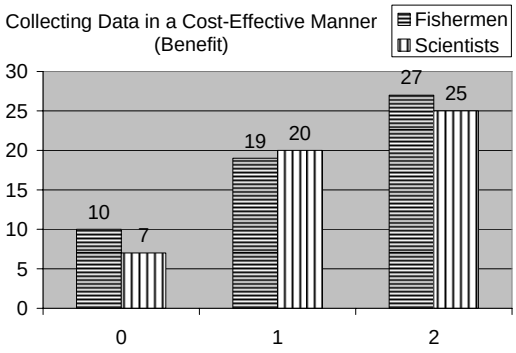


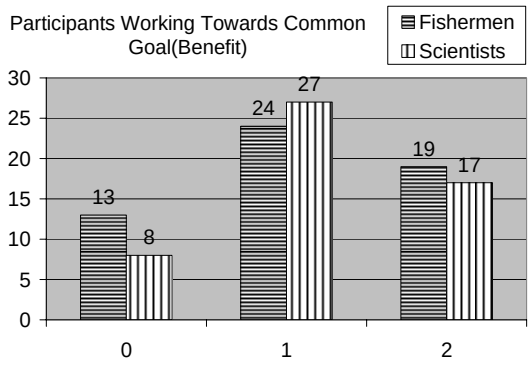


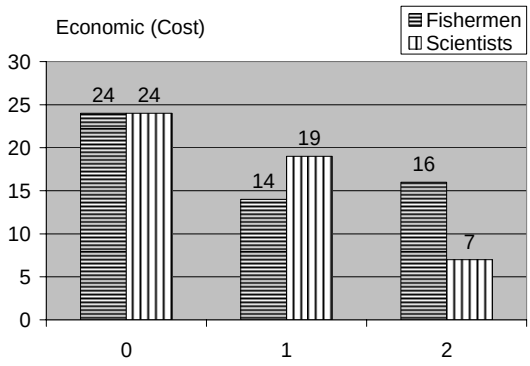


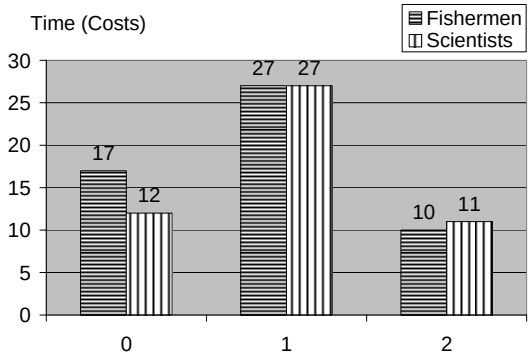


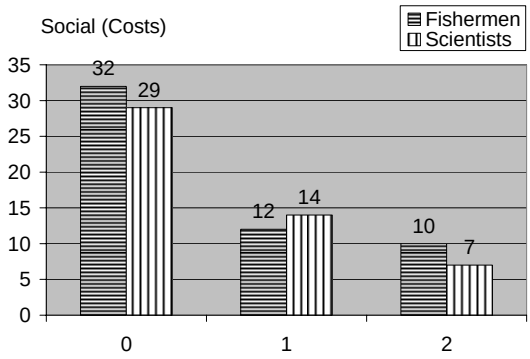


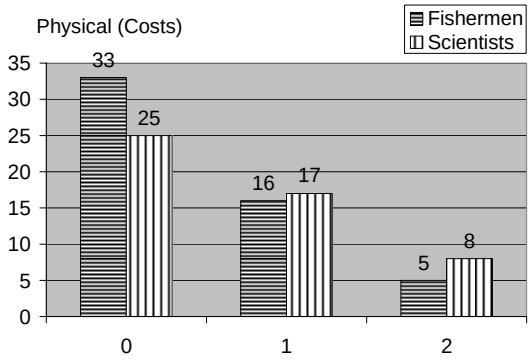



Participants Working Towards Common Goal(Benefit)
Fishermen
Scientists
30
25
20
15
10
5
0
13
8
24
27
19
17
0
1
2


Economic (Cost)
Fishermen
Scientists
30
25
20
15
10
5
0
24
24
14
19
16
7
0
1
2


Time (Costs)
Fishermen
Scientists
30
25
20
15
10
5
0
17
12
27
27
10
11
0
1
2

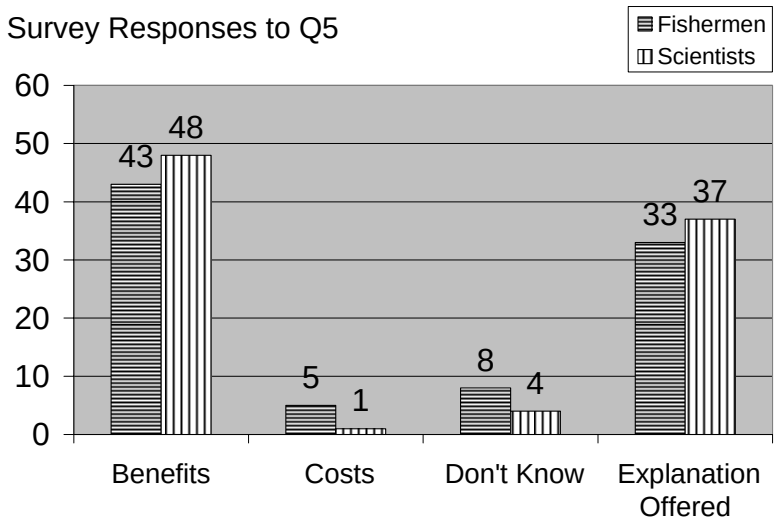

Social (Costs)
Fishermen
Scientists
35
30
25
20
15
10
5
0
32
29
12
14
10
7
0
1
2


Physical (Costs)
Fishermen
Scientists
35
30
25
20
15
10
5
0
33
25
16
17
5
8
0
1
2

5. **Which has been greater in this project, the benefits of your involvement in this project or the costs of your involvement in this project?**

_____Benefits _____Costs _____don't know/hard to say

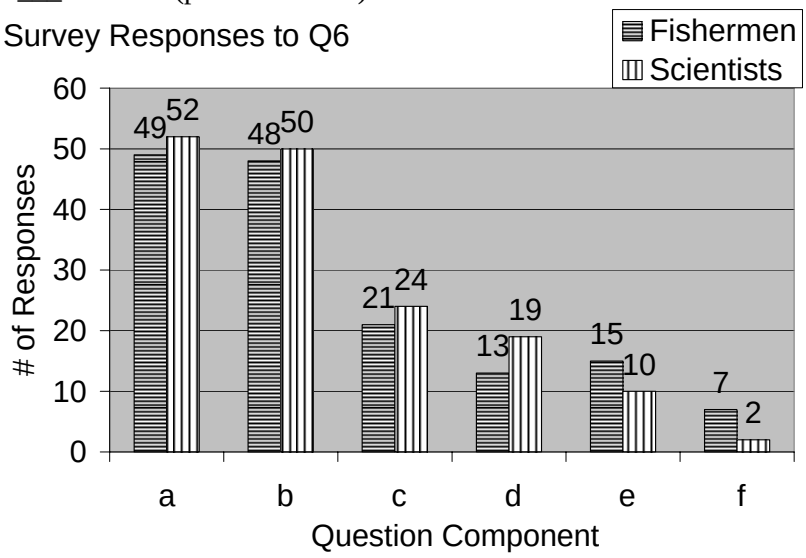
Please explain:



For Questions 6-8, we are interested in the communication you have had with other project partners.

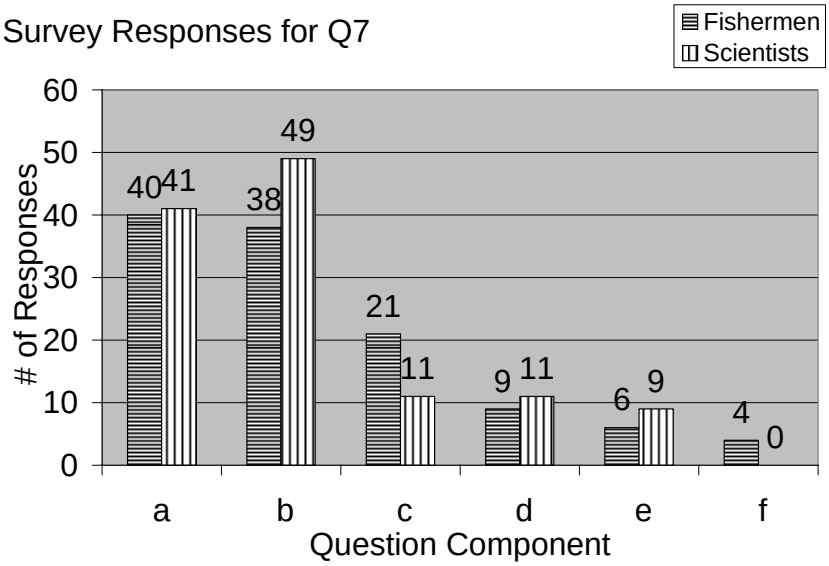
6. **How was communication/coordination for the project maintained among the partners? *(Please check all that apply)***

___ A. Phone and/or conference calls
___ B. Meetings or other face-to-face interactions
___ C. Email / listserve
___ D. Mail / newsletters
___ E. A central organizing group took the lead
___ F. Other (please indicate):



7. Which methods listed in Question 6 would have been most effective in maintaining communication/coordination in this project? *(Please check all that apply)*

___ A. Phone and/or conference calls
___ B. Meetings or other face-to-face interactions
___ C. Email / listserve
___ D. Mail / newsletters
___ E. A central organizing group taking the lead
___ F. Other (please indicate):

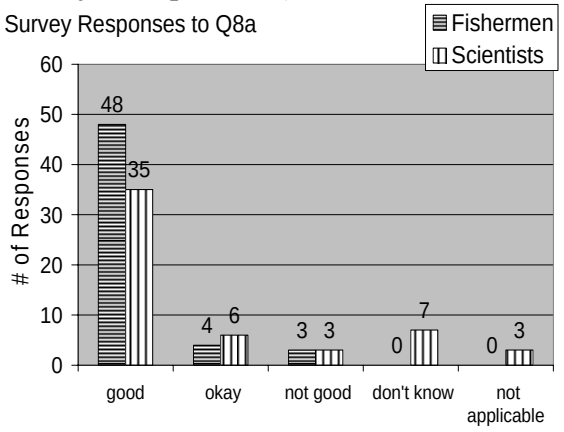


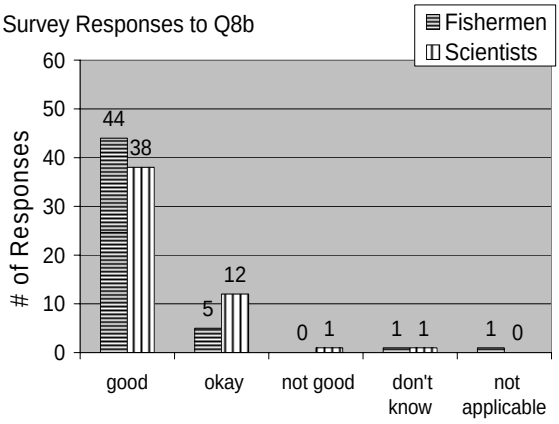
8. How would you characterize the communication between you and the

A. Research scientist(s) participating in the project?
____good ____ okay ____not good ____don't know/not sure ____n/a

B. Industry professional(s) participating in the project?
____good ____ okay ____not good ____don't know/not sure ____n/a

C. How could communication with either or both be improved? ***(Please be specific in your explanation)***

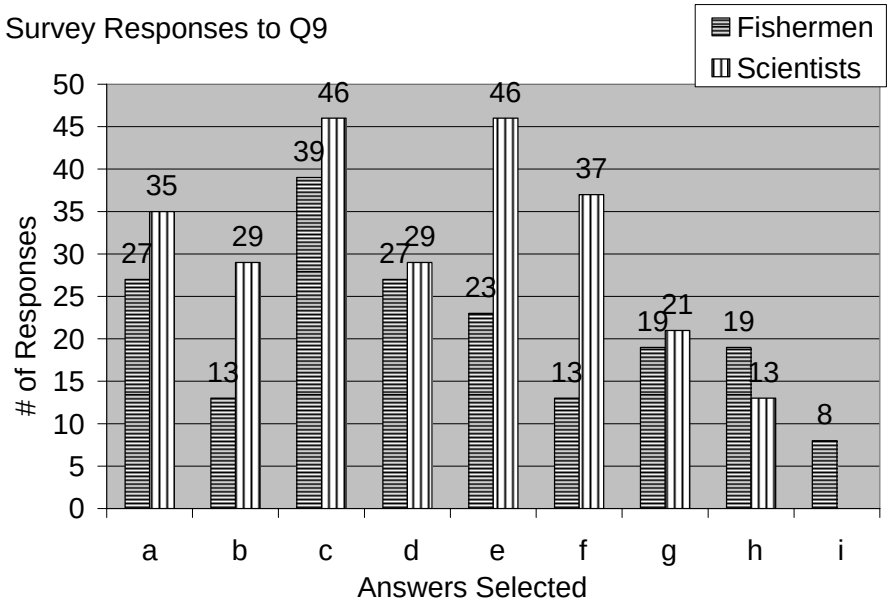




For Questions 9-11, we are interested in your thoughts and perspectives on the products of the project.

9. What products came out of this project? *(Please check all that apply.)*

___ A. Generally accessible information useful to many
___ B. Advanced information useful to a few
___ C. New data
___ D. Improved data
___ E. Written report(s)
___ F. Presentation(s)
___ G. New technology/skill/approach to fisheries
___ H. New management/policy decision(s)
___ I. Other (please indicate):



10. Were you involved in creating or delivering any of the products mentioned in Question 9? If so, please list and share specific comments about your involvement.

11. Were any of these products shared with

A. The science community?

_____yes _____no _____don't know/not sure

Please explain:

B. The fishing industry?

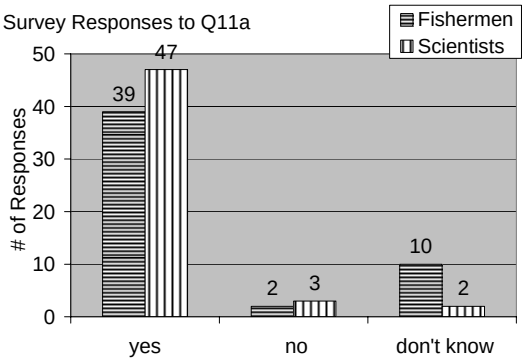
_____yes _____no _____don't know/not sure

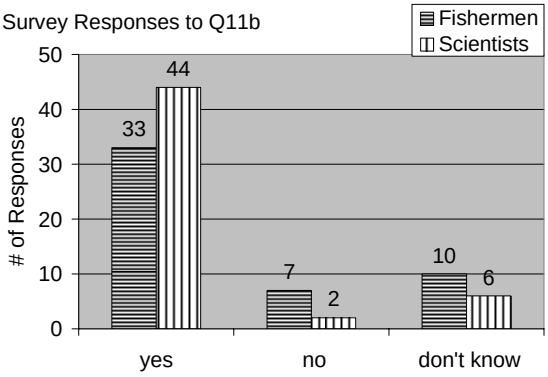
Please explain:

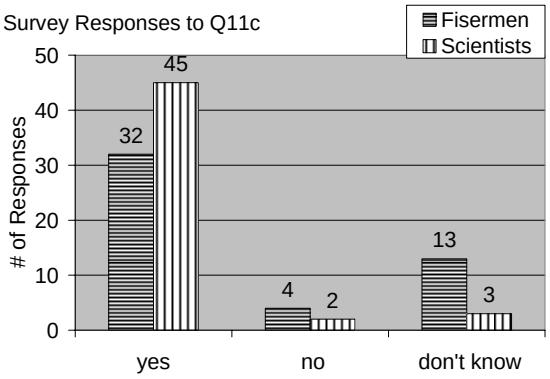
C. The management community?

_____yes _____no _____don't know/not sure

Please explain:







For Questions 12-15, we are interested in your thoughts and perspectives about the value of fishermen – scientists partnerships in fisheries research.

12. Do you believe this project was successful in terms of

A. Reaching its scientific objectives?

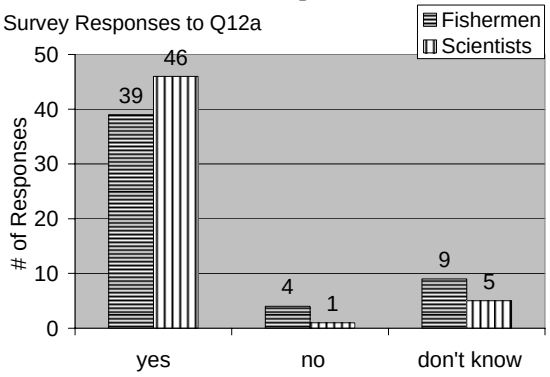
_____yes _____no _____don't know/not sure

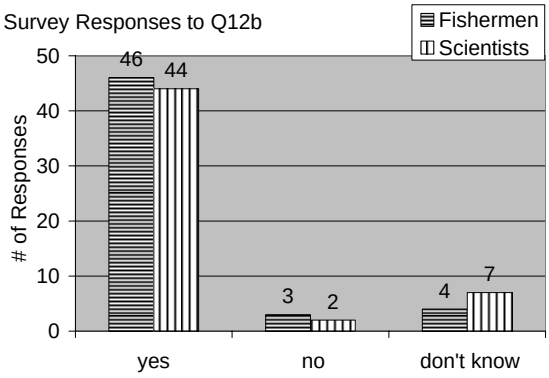
Please explain:

B. The people/partnership/relationship aspects?

_____yes _____no _____don't know/not sure

Please explain:





13. Was the resulting science of this research used

A. For basic knowledge or in other science projects?

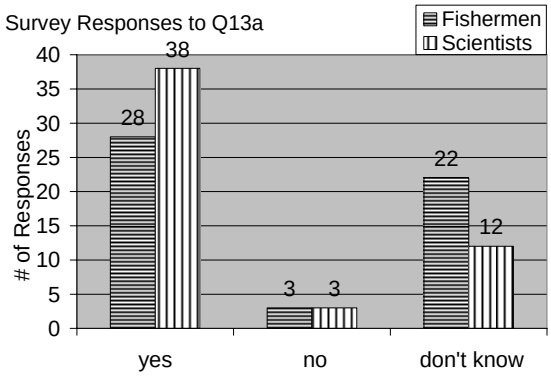
_____yes _____no _____don't know/not sure

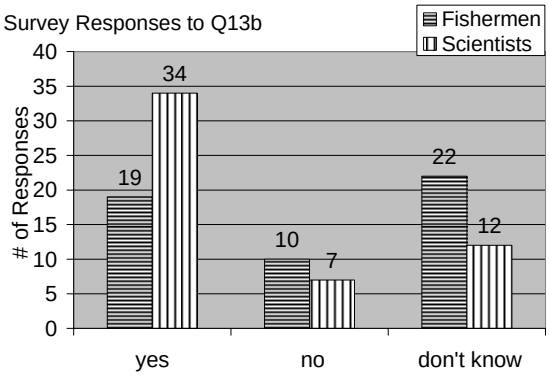
Please explain:

B. In the management process?

_____yes _____no _____don't know/not sure

Please explain:

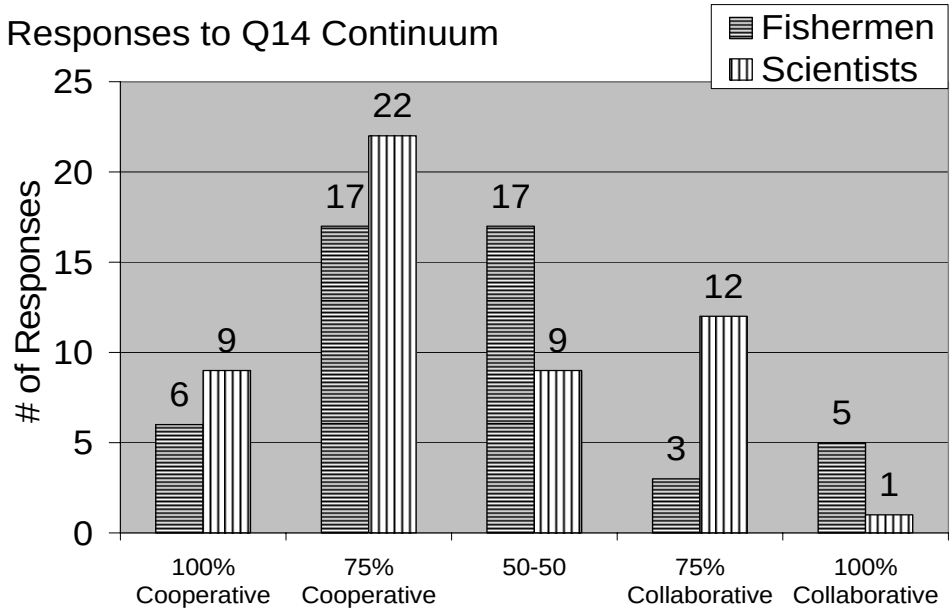




14. There is growing interest in cooperative and collaborative fisheries research. Cooperation and collaboration are not the same thing. Cooperative research involves *limited roles for some* partners. Collaborative research, in contrast, involves partners *equally in all phases* of the research process (idea generation, design, implementation, decision-making, reporting). In reality, research projects fall somewhere along a continuum, from 100% cooperative to 100% collaborative.

Given your experience with this project, please circle where you feel this project falls along this continuum:

100% Cooperative 75% Cooperative 50/50 75% Collaborative 100% Collaborative



A. Are you comfortable with how cooperative or collaborative this project was?

_____yes _____no _____don't know/not sure

Please explain:

B. Would you prefer it to have been more *cooperative*?

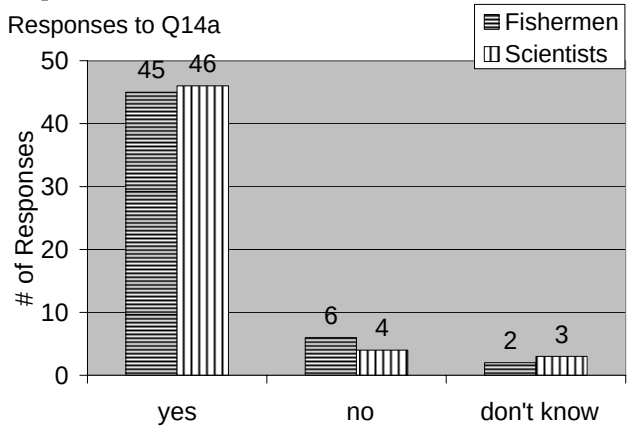
_____yes _____no _____don't know/not sure

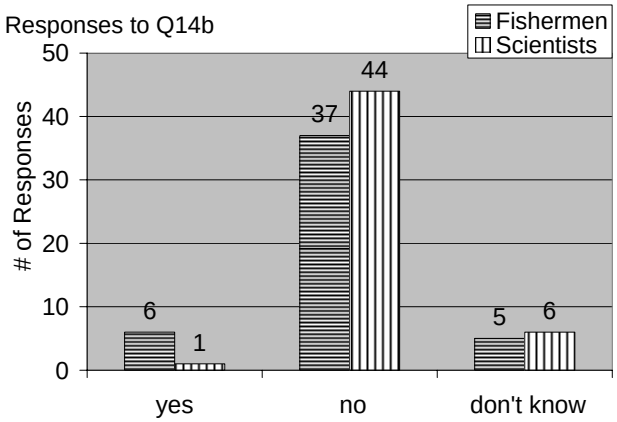
Please explain:

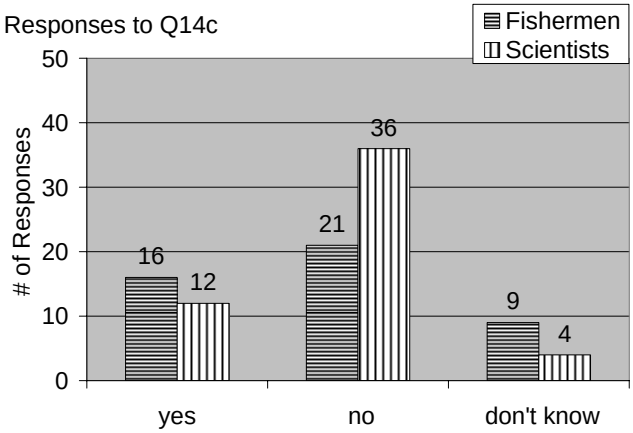
C. Would you prefer it to have been more *collaborative*?

_____yes _____no _____don't know/not sure

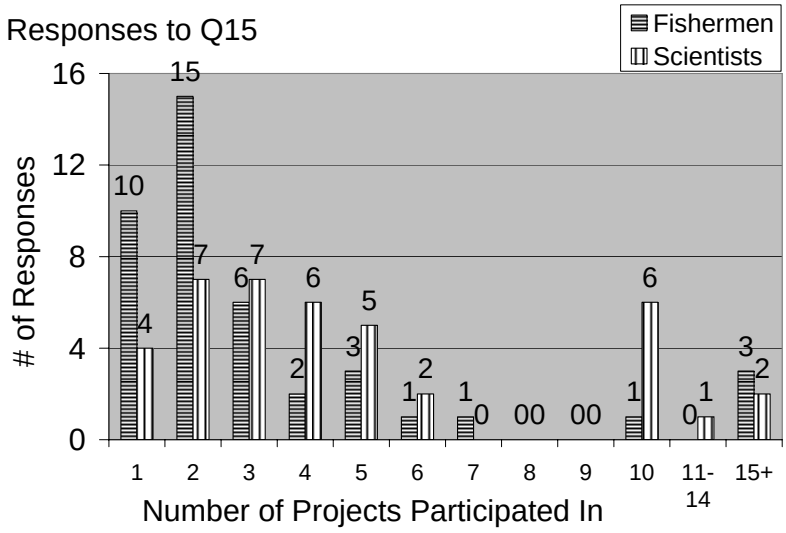
Please explain:







15. How many cooperative fisheries research projects have you participated in including this project? *(Please write in the number.)* _____



Feel free to use this space or additional pages to write any further comments you would like to share with us.

Thank you. I will send you a copy of any reports resulting from this project.

Appendix C:

Broad Level Information Regarding West Coast Cooperative Fisheries Research Projects

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1958-present	Monitoring- catch: What is the impact of spear fishing on near shore fish stocks? Also What have the trends in spear fishing catch been?	California	Central California Council of Diving Clubs, California Dept. of Fish and Game	Sport Fish Restoration Act	California Department of Fish and Game	The Sportfish Restoration act of 1950 created funds and mandated that the fisheries resource should be monitored and options for enhancement should be explored	Determine changes in species composition, catch per unit effort, and length frequency of important nearshore recreational fish species in areas of infrequent but long-term use by free-divers	Near shore finfish species	Spear fishing gear/ Free-dive spear fishery	The data has been compiled into an access database, suitable for analysis by the public and researchers
1959-1994	Monitoring- catch, stock structure: What are the trends in size and species comp. of recreationally caught fish, and what are the implications for recruitment?	California-Monterey Bay	California Dept. of Fish and Game, National Marine Fisheries Service	National Marine Fisheries Service	National Marine Fisheries Service	Anglers were concerned that size of fish being caught was decreasing	Determine long term changes in the species composition and size of recreationally caught rockfish in Monterey Bay	Blue Rockfish, Chilipepper Rockfish, Bocaccio Rockfish, Yellowtail and Canary Rockfish	Recreational Fishery	????
1974	Other- Commercial Utilization: Can the valuable resource represented by Sea Urchins be beneficially utilized commercially as opposed to just being destroyed in order to preserve kelp forests?	California - Central and Southern	National Marine Fisheries Service, Commercial Dive fishermen, Processors, Japanese fisheries and seafood technicians	National Marine Fisheries Service	National Marine Fisheries Service	National Marine Fisheries Service, Tiburon Laboratory	To try and effectively catch, process and sell Sea Urchins from California	*Strongylocent-rotus franciscanus*	Dive Fishery using "hookah" gear	Assistance in managing the urchin fishery, adoption of limited entry permits and generation of funds with which to do monitor the Urchin fishery
1979-ongoing	Monitoring- catch, abundance, stock structure: What is the impact of recreational fishing on marine fish stocks?	California	National Marine Fisheries Service, Pacific States Marine Fisheries Commission, California Department of Fish and Game, Commercial Party Fishing Vessels	National Marine Fisheries Service	Pacific States Marine Fisheries Commission (Request For Proposals)	Developed to collect information regarding catch	Establish a reliable database for estimating the impact of marine recreational fishing on marine resources using both an intercept (creel) survey and a telephone survey.	Various recreationally caught species	recreational gear	???

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1980-1981	Monitoring- abundance, catch, Life History- biological characteristics: What fishing levels and other management measures will best sustain Spot Prawn and Ridgeback prawn stocks?	California- Point Conception to Los Angeles	California Department of Fish and Game Biologists, Santa Barbara Channel Trawl Fishermen, CA Sea Grant, University Scientists, Seafood buyers and processors	California Department of Fish and Game, University of California Sea Grant Extension, SB Trawlers, Processors, CA Sea Grant grad funding University of California-Davis	California Department of Fish and Game and University scientists coordinated, University of California Sea Grant acted as liaison between all groups	Com. Fishermen and a local processor sought Sea Grant Marine Advisor to help organize the project	Develop biological, life history and fishery information on spot prawns and ridgeback prawns to improve management for sustainable trawl fisheries for these species	spot prawns (*Pandalus platyceros*), Ridgeback Prawns (Sicyonia ingentis)	Shrimp Trawl, Spot and Ridgeback prawns	An industry supported seasonal management plan for both shrimp species, a PhD thesis and several peer reviewed papers
1985-1987	Bycatch- assessment, Monitoring- regulatory impacts: What is the catch and bycatch by Oregon trawl fisheries, both midwater and bottom? What are the impacts of trip limits to bycatch?	Washington, Oregon ~5 fathoms - 300 fathoms	Oregon State University, Commercial Fishermen, Oregon Trawl Commission, Oregon Department of Fish and Wildlife, National Marine Fisheries Service Alaska Fisheries Science Center, Oregon Sea Grant	Oregon Sea Grant, National Marine Fisheries Service, Oregon Department of Fish and Wildlife	A member of the Oregon State University faculty was the primary coordinator, Oregon Department of Fish and Wildlife personnel also assisted with coordination	The question was developed among participants, including the commercial fishing industry and managers.	Bycatch assessment: determine the catch and bycatch of Nearshore, deepwater, bottom rockfish and midwater trawl fisheries on Oregon and Washington	Targeted: Flatfish, cod, Dover sole, sablefish, thornyheads, various rockfish species	Bottom and Midwater trawls/ Nearshore, Deepwater, hard bottom, and midwater trawl fisheries	Numerous reports and manuscripts, Data were used by management to estimate discard by trawl fisheries which were included in stock assessments and for setting quotas, information also used to plan other projects by other researchers.
1987-1998	Monitoring- catch, stock structure, abundance: What is the impact of Commercial Party Fishing Vessels fishing on marine fish stocks?	California	Commercial Party Fishing Vessels operators, California Department of Fish and Game, National Marine Fisheries Service, Rockfish	Sport Fish Restoration Act	California Department of Fish and Game	???	1)determine total catch estimates of groundfish species taken by non salmon CPFV anglers on observed trips. 2)Determine fishing effort for each sampled trip and estimate CPUE. 3) determine annual trends in size composition for certain species.	Various Commercial passenger fishing vessel caught species	Commercial passenger Fishing Vessels	???

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1987-88	Monitoring- catch: What is the weight change of shrimp over time, in a ship's hold while being iced?	OR-Newport	Oregon Department of Fish and Wildlife/ Shrimp Fishermen	Ride along trips, no charter, Oregon Department of Fish and Wildlife payroll was only cost	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife and fishermen were both interested in accurate enforcement of size/weight landing laws	Determine the extent to which the weight of the shrimp changed so that the law could be more successfully applied	*Pandallus jordani* AKA Oregon Pink shrimp	Shrimp fishery	several reports, peer reviewed paper, and count per pound estimates
1988-1990	Monitoring- effort, regulatory impacts: What is the size and species selectivity of various mesh sizes and mesh shapes for trawl codends. Estimate short and long term impacts of regulated changes in codend mesh size and shape for West coast trawl fisheries.	Washington, Oregon, California coast (5 Fathoms to >300 Fathoms depth)	University of Washington, Oregon State University, Commercial Fishermen, Oregon Trawl Commission, Fishermen's Marketing Association	National Marine Fisheries Service Alaska Fisheries Science Center, Saltonstall-Kennedy Grant program	West Coast Fisheries Development Foundation (San Francisco)	Discussions between an Oregon State University researcher, fishery managers and the fishing industry	Bycatch reduction, recording/determining of the effects of different mesh sizes and mesh shapes on the selectivity of the trawls.	many species caught in trawls, intentionally and unintentionally	Bottom Trawls/ Nearshore mixed fishery, deepwater Dover fishery, Bottom Rockfish fishery, midwater trawl fishery	Many reports, manuscripts, and presentations. Data was also used by management to set minimum mesh size regulations. Information from this work was used to plan other projects.
1988-1992, 1998-Ongoing	Monitoring- catch, regulatory impacts: What is the catch and mortality of the recreational Black Rockfish "Rod and' Reel" fishery?	WA- Cape Elizabeth to West Port	Charter Boat Captains/ Washington Department of Fish and Wildlife, National Marine Fisheries Service, volunteers from Pacific Marine Conservation Council	Washington Department of Fish and Wildlife	Washington Department of Fish and Wildlife	A Washington Department of Fish and Wildlife researcher	Determine fishing mortality of black rockfish population in the area sampled	Black Rockfish	Rod and Reel Recreational fishery	Used each year to determine fishery mortality, which is used to inform fishery managers in Washington

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1989-1990	Monitoring- abundance, regulatory impacts: What are the basic biological parameters by which the fishery should be managed?	Santa Barbara Channel Region	California Department of Fish and Game/ Commercial fishing industry/ Seafood processor & retailer/ University of California at Santa Barbara/ California Sea Grant	California Sea Grant/ California Department of Fish and Game (a funding match contribution)	University of California at Santa Barbara coordinated	Sea Grant advisor saw need for project encouraged University of California at Santa Barbara researcher to apply for funds	Obtain information on basic biology of sheep crab to develop a management plan for the unregulated fishery	California Spider crab (*Loxorhynchus grandis)*	Whole body= traps/ Claw= gill nets	Masters thesis/ Publication/ numerous presentations
1990-ongoing	Monitoring- abundance, Life History- biological characteristics: What are the mechanisms responsible for variation in Sea Urchin settlements that can be used to predict recruitment trends?	Fort Bragg CA, to San Diego CA	Sea Urchin Advisory Committee, University of California at Santa Barbara, California Sea Grant	California Sea Urchin Commission, University of California Sea Grant, California Department of Fish and Game, Marine Science Institute, University of California Santa Barbara, Commercial Urchin Divers	A researcher at the University of California at Santa Barbara Marine Sciences Institute is primary administrator, A California Sea Grant Extension agent coordinates Santa Barbara channel work, California Department of Fish and Game coordinate Fort Bragg work	Industry initially sought an enhancement project, which evolved into the monitoring project	Provide information on mechanisms responsible for variation in sear urchin settlement that can be used in predicting recruitment trends	Red Sea Urchins, Blue Sea Urchins	Dive Fishery using "hookah" gear	predictors of Sea Urchin recruitment trends and peer reviewed scientific papers are written every few years

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1990-1991	Methodological- development: How can Remotely Operated Vehicles be used in fisheries operations and studies?	Santa Barbara Channel Region	Commercial Fishing industry/ University Professors and grad students	Santa Barbara Chamber of Commerce, Santa Barbara County Fisheries Enhancement fund	A University Professor	Commercial Fishermen (researchers contracted afterward)	Evaluate usefulness of Remotely Operated Vehicles for: fisheries research/ locating trawl damaging snags/ searching for lost gear/ examining effects of bottom trawls on seafloor/ survey potential fishing sites/ observing how nets work/ documenting lobster and crab behavior around traps	Sheep Crab/ Pacific hagfish/ lobster and rock crab	Trawl Gear	Final report was provided to funding agency
1991	Life History- habitat: What is the nature of shrimp habitat and environment?	OR and Crescent City CA	Oregon Department of Fish and Wildlife/ Shrimp Fishermen	Ride Along, Oregon Department of Fish and Wildlife Payroll for employees	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Measure light at shrimp trawling depth from the headrope of a trawl	environmental exploration	Shrimp Trawl Fishery	A small unpublished Oregon Department of Fish and Wildlife report
1994	Monitoring- effort: What gear were Shrimpers using, and what were excluders were being used also?	Oregon (sample of Fishermen)	Oregon Department of Fish and Wildlife/ Shrimp Fishermen	Oregon Department of Fish and Wildlife employees conducted the survey/assessment	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Assess and record types of trawl gear being used for use in regulating Shrimpers, imposing a rule on mesh size	Pandallus jordani AKA Oregon Pink shrimp	Shrimp Trawl Fishery	Informal Report of the gear being used, has been very useful in experimenting with new types of gear.
1994-95	By Catch- reduction: How well do the various types of fish excluders work?	Oregon	Oregon Department of Fish and Wildlife/ Shrimp Fishermen (with support from the International Pacific Halibut Commission and Oregon Trawl Commission)	Saltnostal-Kennedy Grant	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife, Shrimpers, Halibut commission	evaluate effectiveness of 3 soft panel and one nordmore (solid) grate excluders	Pandallus jordani (Oregon Pink shrimp)	Shrimp Trawl Fishery	A report in 1995, with follow up studies for fish eye excluders, regulation that allowed fishermen to experiment with the design

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1997 (July) 1999 (June)	Monitoring- abundance, regulatory impacts: What are the fish stock densities in and adjacent to the reserve?	California- Big Creek Ecological Reserve (BCER)	California Department of Fish and Game, Cal. State Univ. Monterey Bay, CPFV, commercial skiff industries	Cal Sea Grant Marine Ecological Reserve Research Program, Sportfish Restoration Act and the California Gillnet Initiative (proposition 132)1980	CA Prop. 132 money was channeled through the Pacific States Marine Fisheries Commission, coordination was done by them.	Survey and monitoring work had already been happening at California Department of Fish and Game, and when CA Proposition 132 passed it had a need that was served by the existing study efforts	Assess baseline abundance, densities size frequencies within and adjacent to the reserve. Document species comp, size, and CPUE of present skiff and Commercial Party Fishing Vessels fisheries adjacent to BCER. Compare current BCER data to previous local data and data from other sites.	Nearshore fish species of California	Recreational and commercial gear types/ Nearshore fishery in Big Creek area	Several reports were written for the Marine Conservation Series Run by NOAA, as well as a paper for the California Sea Grant College Program.
1997	Methodological- development: How can Commercial Trawl logbooks be best used to generate relative abundance estimates?	California, Oregon and Washington	Northwest Fishery Science Center/Washington Department of Fish and Wildlife/Oregon Department of Fish and Wildlife/California Department of Fish and Game	National Marine Fisheries Service Fisheries Resource Analysis and Monitoring	Northwest Fishery Science Center	A review of stock assessments recommended evaluating trawl data as a potential stock index	Develop relative abundance indices for the deepwater complex from commercial trawl fishery logbook data in order to evaluate optimal approaches for selecting fishery data	Deep-water complex: Dover Sole, Sablefish and Thornyheads	Commercial Trawl Fishery / Deep water complex	The product was an analysis of the catch records given various assumptions. The project results were used for Dover Sole and sablefish stock assessments in 1998, 2001 and 2005.
1997-1999	Monitoring- catch: What is the composition of catches by the commercial groundfish fishery and recreational fishery?	Oregon	National Marine Fisheries Service scientists, Industry, Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife sought to provide basic elements of fishery information needed for management	Provide a day to day industry liaison and communicator regarding sampling efforts and field investigations, obtain information about catch by area, effort gear type, estimate species composition, age, length, sex and maturity of selected groundfish species.	Marine finfish	Bottom Trawl and recreational gear	????

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1997-1999	Bycatch- assessment: What are the bycatch and discard rates in the WC groundfish fishery?	Oregon, California, Washington	Oregon Trawl Commission, Oregon Department of Fish and Wildlife, National Marine Fisheries Service, Pacific States Marine Fisheries Commission, West Coast Seafood Processors Assoc., Northwest Food Strategies, Trawl vessels and crews	OTC, Oregon Department of Fish and Wildlife, National Marine Fisheries Service, West Coast Seafood Processors Association	Oregon Department of Fish and Wildlife	The Oregon Trawl Commission suggested that a program be developed to collect more information with larger sample sizes regarding total catch and biological information for the Deep-Water Trawl complex species	Determination of and the reasons for current rates, species composition of discard, and rates of halibut survival in WC groundfish fishery. Also to explore utilizing bycatch shoreside through low cost processing and distribution to hunger relief agencies	Groundfish species, specifically Dover Sole, Thornyheads and Sablefish	Bottom trawl/ Groundfish	????
1998	Bycatch- reduction, Methodological-assessment: What is the effectiveness of existing shrimp/fish separator technology?	Southern California	University of Washington, Northwest Fishery Science Center	Northwest Fishery Science Center (FRAM)	A University of Washington graduate Student	Reducing bycatch was a mandated goal of National Marine Fisheries Service, and funding was available and Nick was a grad student with experience in shrimp bycatch reduction	Determine which methods are the most effective and practical for reducing bycatch, especially groundfish w/o significant loss of targeted catch.	Spot Prawns, Pink Shrimp (targets) with various finfish (bycatch)	Trawl/ Shrimp fishery	A paper was written for the National Marine Fisheries Service in fulfillment the product requirement
1998	Bycatch- frequency: What is the bycatch of Coho Salmon, other prohibited species, and selected groundfish?	Washington, Oregon, California	Industry, National Marine Fisheries Service, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, California Department of Fish and Game	Shoreside Processing Plants, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, California Department of Fish and Game, National Marine Fisheries Service	Oregon Department of Fish and Wildlife	Research stemmed from listing of Coho, and grew to include other Groundfish species	Enumerate the bycatch associated with the shoreside whiting fishery as well as take biological samples from bycatch species for use in stock assessments.	Coho Salmon, Pacific Whiting, Widow and Yellowtail rockfish, jack and Pacific Mackerel and Sablefish	Midwater trawl/ Whiting fishery (shoreside)	???

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1998 - ongoing (done each year)	Monitoring- abundance: what is the abundance of the slope and shelf various groundfish species	Washington, Oregon and California marine waters from 60-1400 meters	Limited Entry commercial groundfish fishery permit holders, National Marine Fisheries Service scientists and volunteer biologists from universities, NGO's etc.	Line Item on the annual Federal Budget for monitoring fish populations along the West Coast	It is all handled internally by the government	Commercial fishermen lobbied congress in the mid 90's to establish a cooperative fisheries survey, once it got started fishermen were instrumental in working with Scientists	Create a long term time series and monitor relative abundance and trends in species of fish inhabiting the demersal shelf and slope off the coast.	Demersal shelf and slope species	Aberdeen bottom trawl	Survey data is primarily used for stock assessments of groundfish that have management plans. A technical memorandum is also produced each year that summarizes the data collected.
1998-1999	Bycatch- mortality: What is the survival rate of trawl-caught sablefish?	within the range of Sablefish	University of Washington (fisheries research institute), National Marine Fisheries Service- Fisheries Resource Analysis and Monitoring Division	University of Washington	University of Washington	????	Measure survival of trawl-caught and discarded sablefish over a wide range of fishing and handling conditions.	Sablefish	Trawl/ Groundfish fishery	???
1998-1999	Monitoring- catch: What is the fishing mortality of the commercial and recreational hook and line fishery in northern CA	California (Shelter Cove to Crescent City)	Recreational skiff anglers, commercial hook and line industry	Sport Fish Restoration Act	????	California Department of Fish and Game	Monitoring: Through the use of port sampling, determine catch of nearshore rockfish.	Near shore non-Salmonid finfishes	Hook and line (both recreational and commercial)/ Nearshore non-Salmonid finfish	???

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1998-2000	Life History- Biological Characteristics, habitat, species assemblages: What is the relationship between depth, season, size, maturity and sex of fish?	Washington (southern), Oregon, California (northern) from the start of the slope to 12,000 feet	Northwest Fishery Science Center/Commercial fishers and Oregon Department of Fish and Wildlife	National Marine Fisheries Service/ Fisheries Resource Analysis and Monitoring	Northwest Fishery Science Center	Need for more detailed data regarding the deep-water complex species for management purposes.	Obtain More detailed fishery-related data than are currently available. (A pilot study to inform the creation of a larger monitoring effort)	Deep-water complex: Dover Sole, Sablefish and Thornyheads	Commercial Trawl Fishery / Deep water complex	A Report for NOAA describing the results
1998-2000	Bycatch- reduction: What are the factors contributing to the bycatch of Pacific Salmon and Rockfish?	Washington, Oregon , California	Pacific Whiting Conservation Cooperative, Scientific Fishery Systems (Anchorage, AK)	Pacific Whiting Conservation Cooperative (Pacific Whiting Conservation Cooperative)	Pacific Whiting Conservation Cooperative	Pacific Whiting Conservation Cooperative	Develop techniques to further minimize the bycatch of these sensitive stocks. Determine the usefulness of temperature directed fishing	Pacific salmon and Rockfish	Midwater trawl/ Whiting fishery	A report was anticipated by 1999, status uncertain
1998-2000	Methodological- development: What are fishermen observing while fishing that can assist in determining stock trends for assessments ?	Washington, Oregon, California	Northwest Fishery Science Center, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, California Department of Fish and Game and volunteer fishermen	Agency Staff paid regular salary, compensation for the time of Trawl fishermen uncertain	National Marine Fisheries Service	National Marine Fisheries Service	Utilize trawl fishermen to collect observational data at sea for coordinating with logbook records, by using quarterly structured interviews and quickly providing data stock assessors and other analysts.	Species caught using trawl gear	Trawl gear (midwater and bottom trawls)	????
1998-2001	Life History- Monitoring- stock structure: What are the biological characteristics and stock age structure of nearshore groundfish?	California (northern and central)	Fort Bragg Salmon Trollers Marketing Assn. Pacific States Marine Fisheries Commission, Steinhart Aquarium	Federal/Local Sportfish restoration Act/ Dept Commerce grant	???	???	Determine Blue Rockfish age Structure, Lingcod Tag Retention, and Movement patterns of mature Nearshore fish	Blue Rockfish, Lingcod, other nearshore Rockfish	Recreational Near Shore fishery	???

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
1998-ongoing	Monitoring-abundance, Life History- species assemblages: 1.What is the annual abundance of pre-recruit whiting? 2.what is the abundance of pelagic groundfish larvae?	Washington, Oregon, California	Pacific Whiting Conservation Cooperative and Northwest Fishery Science Center and Southwest Fishery Science Center	Pacific Whiting Conservation Cooperative for the equipment and National Marine Fisheries Service for the charter funds	Pacific Whiting Conservation Cooperative with help from Northwest Fishery Science Center and Southwest Fishery Science Center	Pacific Whiting Conservation Cooperative (Southwest Fishery Science Center has a similar program for rockfish but area covered is limited)	Monitoring and assessment: develop a time series of pre-recruit pacific whiting relative abundance to estimate the individual year-classes	Pacific Whiting, and other groundfish species with pelagic larval stages	Midwater Trawl/ Whiting fishery	A report is generated every year outlining survey data.
1999	Monitoring-abundance: What is the abundance of whiting during the years between surveys?	Washington, Oregon, California	Pacific Whiting Conservation Cooperative and National Marine Fisheries Service	Pacific Whiting Conservation Cooperative and Possibly Saltonstal-Kenedy funds	????	Pacific Whiting Conservation Cooperative	Measure the spawning biomass of pacific whiting using intense effort on pre spawning aggregations in a relatively short period.	Pacific Whiting	Midwater trawl/ Whiting fishery	??????
1999-2000	Methodological-development: Can sablefish be sampled reliably during their pelagic juvenile stage?	Washington (Westport), Oregon, to California (Monterey)	Coastal marine Experiment Station, Midwater Trawlers Cooperative, Oregon Trawl Commission, Fishermen's Marketing Association	Northwest Fishery Science Center	Northwest Fishery Science Center	Pelagic juvenile collection trips found abundant Sablefish juveniles and it seemed like a simple survey could have served as an index of abundance.	Determine feasibility of annual survey of pelagic juvenile sablefish to determine year class strength.	Sablefish	Pots, hook and line/Sablefish fishery	A data rich final report was submitted to the National Marine Fisheries Service Northwest Fishery Science Center
1999-2000, 2003-2004 2006-2009)	Life history-biological characteristics, Bycatch- assessment: Attributes of prawns, bycatch/Spot prawns/pot traps	Washington-Off-Shore shrimp grounds	Washington Department of Fish and Wildlife staff and Commercial Fishers	Washington Department of Fish and Wildlife, operating budgets	Washington Department of Fish and Wildlife	Fishermen are interested in learning about the structure of spot prawn life history and how to sustain catch	Determine juvenile prawn location (do they co-exists with adults), level of bycatch of the spot prawn fishery	Washington Spot Prawns	Pot Traps/ Spot Prawn fishery	A ban of the prawn trawl, greater understanding of Spot prawn biology

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2000	Bycatch- frequency, mortality, Life History- biological characteristics: What it the mortality rate of discarded trawl caught lingcod?	Oregon (Newport)	Oregon Department of Fish and Wildlife, Trawl Boat Captain	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Determine the mortality of trawl caught lingcod in relation to tow duration and time on deck.	Lingcod (*Opheodon elongatus*)	Bottom Trawl	Report
2000	Bycatch- frequency, mortality: How does a square mesh panel in the belly of a trawl impact bycatch?	Oregon (Newport)	Oregon Department of Fish and Wildlife, Trawl Boat Captain	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Determine the catch differences between standard nets and those with square panels.	Various groundfish species	Bottom Trawl	Information collected by Oregon Department of Fish and Wildlife that guided future work.
2000-2004	Bycatch- frequency: What was the impact of bycatch on species of concern?	Washington, Oregon (northern) >25 miles off the coast.	Washington Department of Fish and Wildlife, Sardine Fishermen	Sardine Fishermen	Washington Department of Fish and Wildlife	Before the sardine fishery could become a commercial Washington fishery it had to establish a monitoring system	Record catch and bycatch associated with the purse seine sardine fishermen in Washington (particularly Chinook Salmon)	Sardines (as well as bycatch species)	Purse seine Sardine fishery	Washington Department of Fish and Wildlife data
2001-2002	Life History- movement, Monitoring- stock structure :What are the patterns of movement? What are some of the basic life history parameters of target species	Santa Cruz Island, Anacapa Island	Commercial Fishermen/ Channel Island National Marine Sanctuary Foundation/ University of California Santa Barbara	Channel Islands Collaborative Marine Research Program	University of CA Scientist, fishermen paid through Channel Island National Marine Sanctuary Foundation	University researcher, with significant input from fishermen in developing procedures	Contribute to the draft of CA Nearshore Management Plan/ contribute to design and monitoring of MPA's/ Assist in development of a fishermen-scientist collaborative research program	Sheephead, Kelp Bass, Black Surfperch and Cabezon	Nearshore fishes, hook and line used	Information to be used by various CA management regulations, a report was prepared by the researcher and, fishermen's comments were attached
2001-2002	Bycatch- reduction, Methodological- refinement/assessment: What is the effectiveness of a new type of trawl at reducing bycatch in the flatfish trawl fishery?	Oregon	Oregon Department of Fish and Wildlife, Trawl Boat Captain, Oregon State University grad student, National Marine Fisheries Service	Oregon Department of Fish and Wildlife, National Marine Fisheries Service, Oregon State University	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Compare the catch of important (target or low abundance species)	Flatfish Bottom Trawl fishery	Bottom Trawl	Report, Student masters Project, adoption of a requirement to use new trawl net in flatfish fishery.

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2001-2004	Bycatch- frequency, Life History- species assemblages: What would the impact of a directed arrowtooth flounder fishery be on constraining rockfish species?	Washington (northern)	National Marine Fisheries Service, Washington Department of Fish and Wildlife, Fishermen	Fishermen and the Federal Disaster Relief grant from groundfish disaster appropriation	Washington Department of Fish and Wildlife (contracts), National Marine Fisheries Service (exempted fishing permits)	There was a desire to study the viability of an arrowtooth flounder fishery in Washington so the project was set in motion.	Measure the impact of a directed arrowtooth fishery on rockfish (particularly yelloweye and canary). Experiment with different gear excluder types	Arrowtooth flounder (with attention to constraining rockfish species)	Bottom Trawl/ Arrowtooth flounder fishery	???
2001-present	Monitoring- abundance: What is the recruitment of Red Abalone? Monitor the recruitment/ Red Abalone/ SCUBA surveys	California Channel Islands National Park (San Miguel)	California Abalone Association/National Park Service	County of Santa Barbara Fisheries Enhancement fund, California Abalone Association, Sea Urchin harvesters Association, California Department of Fish and Game	California Department of Fish and Game staff	The California Abalone Association had a great interest in monitoring Red Abalone stock better and worked to establish this current monitoring effort to help inform managers	Install and collect data to assess effectiveness of Red Abalone fishery closure	Red Abalone	Dive fishery/ Red Abalone	Information reported to management agencies, Recommendations to California Department of Fish and Game, Channel Island National Marine Sanctuary
2002	Life History- movement, Monitoring- stock structure: What are movement patterns and population trends in Black Rockfish?	Oregon, Newport/ Depoe Bay	Charter Boat Captains/ Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Idea of Oregon Department of Fish and Wildlife Researcher to develop the project and estimate population size, explained to industry and they bought in.	Collect data that may indicate population level trends in fish abundance	Black Rockfish	Recreational Hook and line	An estimate of the fishing mortality and other data on the status of Black Rockfish Stock that inform management decisions

start date- end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2002 (Nov.)- 2004 (Jul.) tags returning for several years	Monitoring- catch, Life History- movement, habitat, biological characteristics What are growth, migration and exploitation rates for Near Shore groundfish species: rockfish, California Halibut and Lingcod	California Point Conception to Mexico Border	Fishermen returning the tags, and others	Federal Groundfish Disaster Relief Program	Commercial Party Fishing Vessels/ Hanan and Assoc.	conversations between scientists and fishermen about lack of nearshore groundfish data	obtain reliable data on fish growth, migration patterns and fishery exploitation rates for nearshore groundfish by species and location	Near Shore Groundfish (rockfish, California Halibut, Lingcod)	Recreational Near shore groundfish Fishery	data on biology of nearshore groundfish for stock assessment authors, biologists, and fisheries scientists
2002- 2005	Bycatch- reduction, frequency, mortality, Methodological- development: What is the affect does recompression have on mortality of Rockfish brought up from depth	Oregon (Newport)	Oregon Department of Fish and Wildlife, Charter Boat Captains	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife	Determine if recompression/release devices can play a role in reducing Rockfish mortality/ mitigating decompression damage.	Rockfish (various species)	Hook and line/ Charter boats	Information can help reduce barotrauma mortality of rockfish, Presentation at 2006 West Coast Groundfish Conference
2003	Bycatch- reduction, Methodological- refinement/assessment Devices for ridgeback shrimp, what's their effectiveness?	CA- Santa Barbara Channel	Channel Island Marine Sanctuary Foundation - University of California Santa Barbara/ Southern CA Trawlers Association	Pacific States Marine Fisheries Commission (Request For Proposals)	???	???	Evaluate alternative bycatch reduction devices, and document levels of bycatch	Ridgeback Shrimp	Bottom Trawls /Ridgeback Shrimp Trawl fishery	Measurement of net modification effectiveness or benefit relative to other modifications
2003 with tags returning for >6 years	Bycatch- mortality: How does temp. and depth effect sablefish discard mortality	Oregon	Pacific States Marine Fisheries Commission, University of California Santa Cruz, commercial fishermen	National Marine Fisheries Service, through the Pacific States Marine Fisheries Commission (Request For Proposals)	Pacific States Marine Fisheries Commission	Commercial fisherman considering impacts of new management structure on highgrading and discard mortality in summer vs. winter contacted science partner for project	Reduce mortality of Pot-caught sablefish, measure mortality with a tag-release and recover study.	Sablefish, *Anaplopoma fimbria*	Pot fishery	National Marine Fisheries Service and Pacific States Marine Fisheries Commission usually require a report for this work

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2003-2004	Methodological-refinement, Monitoring-abundance: How does fishery Catch Per Unit Effort and fishery independent estimates of fish abundance relate to each other	California-Fort Bragg	Marine Life Management Act, California Department of Fish and Game, San Jose State University, Salmon Trawlers & Marketing Assoc., Commercial fishermen	National Marine Fisheries Service, through the Pacific States Marine Fisheries Commission (Request For Proposals)	Project Run through Moss Landing Marine Laboratories,	California Department of Fish and Game, federal agencies working to measure fisheries impacts, Cooperative Research and Assessment of Nearshore Ecosystems were involved in designing project methods	survey both in a marine reserve and heavily fished areas in the near, estimate density for calibration of SCUBA and ROV surveys, and compare abundance indicated by both surveys, determine how best to measure fish abundance	Central CA groundfish	Gear type not specified / Groundfish	Report, run in cooperation/parallel to study by Richard Starr of CA Monterey
2003-2005	Life History- habitat: What are links between juvenile rockfish and habitat?	California-Morrow Bay to OR-Newport	Many Commercial	Pacific States Marine Fisheries Commission (Request For Proposals) and Sea Grant	Pacific States Marine Fishery Commission	California Sea Grant Researcher was the lead but fishermen were involved in project design	complete multi species survey of juvenile, nearshore Rockfish, Link habitat and juvenile. Rockfish distribution, enhance collaboration with fishermen	Rockfish, Cabezon, Greenling	Pots, and hooks gear used in the Nearshore groundfish fishery	Quarterly data to managers, better collaboration, report on habitat and distribution of juvenile fish
2003-ongoing (estimates by 12/2005)	Monitoring-abundance, stock structure: What are the characteristics of red and purple Sea Urchin stocks from year to year in California?	California coast wide	Sea Urchin Advisory Committee	Sea Urchin Advisory Committee	Barefoot Ecologist Program	Presentation by Ray Hillborn and Jeremy Prince to the Sea Urchin Harvesters Association regarding present necessity for fisheries information and generated interest	Develop Capacity within industry to provide information for stock assessments	Sea Urchins; Red Urchins and Purple Urchins	Urchin fishery (divers)	Estimates of Sea Urchin Biomass and stock assessment data

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2004 (early)-ongoing	Life History- habitat, Monitoring- stock structure: Are there differences in age and sex ratios between trawlable and untrawlable areas?	Washington Oregon and California	Pacific Groundfish Conservation Trust	Pacific Groundfish Conservation Trust, Port Liaison Project, Pacific States Marine Fisheries Commission, Oregon Fishermen's Cable Committee	Pacific Groundfish Conservation Trust	Pacific Groundfish Conservation Trust was interested in a way to survey rockfish other than the trawl survey, and the canary stock assessment became the focus.	determine sex ratio of Canary Rockfish in untrawlable areas.	Canary Rockfish	Fish were caught using a hook and line	A report detailing the measured sex ratio and age structure of Canary Rockfish in untrawlable areas
2004-2005	Monitoring- regulatory impacts, catch, effort, cost: Did closures reduce the catch of rebuilding Groundfish species? How large was the fleet displacement and what was the Soc.Econ. Impact? Do these effects differ by gear, sectors or region? How has the Groundfish fishery changed in light of Shelf Closures?	Washington-Port Townsend to CA-Eureka	Commercial Fishermen/ Pacific Marine Conservation Council/ Ecotrust/ Port Orford Ocean Resource Team/ Oregon Sea Grant/ Port Liaison Project	Bullit Foundation, Packard Foundation, Port Liaison Project	Pacific Marine Conservation Council	Pacific Marine Conservation Council	Inform and Enhance the use of Area Management through evaluation of the impacts using social science information	Groundfish fishery	All gear types in groundfish fishery	Results presented at Pacific Fishery Management Council Meeting in June of 2005, Data has also informed development of other projects

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2004-2005	Life History- biological characteristics: What is the length to weight ratio, age at maturity, fecundity and genetic makeup of several live fish species?	Cape Blanco to Humbug Mountain	Oregon Department of Fish and Wildlife, Pacific Marine Conservation Council, Port Liaison Project, Nor-Cal Fisheries, Port Orford Ocean Resource Team, National Marine Fisheries Service, Local Fishermen, Oregon State University Sea Grant Extension	National Marine Fisheries Service, Port Liaison Project	Port Orford Ocean Resources Team (with assistance from other participating groups)	This project was developed by the fishing community using Port Orford Ocean Resource Team as a coordinating entity and consulting with Port Orford Ocean Resource Team's Scientific Advisory Committee.	1.Fishermen and Scientists develop clear goals for research work 2)train 3 fishermen for port sampling and fish research work for the future 3)expand logbook, and compare species with habitat types 4)encourage fishing community to visit worksite and view sampling work 5)connect with wider Port Orford community and raise awareness about "where fish come from"	China Rockfish, Kelp Greenling and Cabezon	Hook and Line/ Live fish fishery	The sampled fish has been delivered to Oregon Department of Fish and Wildlife to be worked up and analyzed.
2004-2005	Monitoring- catch, abundance, regulatory impacts, Life History- movement, biological characteristics: What are fishery exploitation Rates, relative abundance, growth and migration patterns of NS Groundfish, and are effects of MPAs detectable?	California- Eight So Cal bight Islands in depths of <25fath. In/out of Marine Protected Areas	Commercial Party Fishing Vessel operators, California Department of Fish and Game, National Marine Fisheries Service	Pacific States Marine Fisheries Commission (Request For Proposals)	Private Consulting Firm	a desire to provide stock assessors with more information and better understand the near shore fish resource	Obtain reliable data to answer fishery questions for groundfish around 8 California Bight Islands in <25 fathoms	16 federally managed nearshore groundfish Species	Commercial Passenger Fishing Vessels	Two reports submitted to Pacific States Marine Fisheries Commission, data bases have been made available to National Marine Fisheries Service, Pacific States Marine Fisheries Commission and California Department of Fish and Game.

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2004-Ongoing	Monitoring-abundance, Methodological-development: What is the abundance and distribution of Widow Rockfish	Oregon-Newport to Coosbay	Pacific Whiting Conservation Cooperative and NOAA-Northwest Fishery Science Center-Fishery Resource Analysis and Monitoring, Midwater Trawlers	National Marine Fisheries Service money administered by Pacific States Marine Fisheries Commission	Northwest Fishery Science Center	Pacific Whiting Conservation Cooperative	Develop a commercial stock assessment survey methodology	Widow Rockfish (Hake fishery)	Midwater Trawl	Descriptions of aggregations, eventually a commercial stock assessment methodology
2005	Methodological-assessment, Monitoring-abundance: Do statistical correlations between CPUE of fishing gear and diver surveys improve with increased sampling in a given area?	California - Carmel Bay	Golden Gate Fisherman's assoc./ University of California Sea Grant/ charter boat captains	Pacific States Marine Fisheries Commission	Grad students organized permits, schedules, volunteers etc. Scientists: chose which boats to use and dealt with insurance	???	Gather more data to compare estimates of CPUE from surface based fishing with scuba density estimates/ use tag-recapture techniques to compare abundance estimates of each technique.	Near Shore species, midwater and bottom	Recreational Gear	???
2005 (Feb-May)	Bycatch- reduction: What is the impact of bait on bycatch of yelloweye and canary rockfish?	Washington-North West	Makaha Tribe and Treaty long liners	Pacific States Marine Fisheries Commission (Request For Proposals)	Makaha Tribes	Makaha Tribes	Document and Quantify bait selectivity for canary and yelloweye rockfish	Yelloweye and Canary Rockfish	Halibut Long line fishery	???
2005 - 2006	Methodological-refinement/assessment: Do correlations between CPUE of gear and SCUBA surveys increase with sampling effort in an area? Do fishing gear surveys or diver surveys more accurately describe abundance in a mark-recapture experiment?	California-Carmel Bay	Local Fishermen, California Department of Fish and Game, University of California scientists, and Commonwealth	Commonwealth Ocean Policy Program, University of California Santa Cruz and Santa Barbara., Pacific States Marine Fisheries Commission	University of California professors/ scientists	University of California Scientists, local fishermen, California Department of Fish and Game, and Commonwealth	compare different sampling effort levels and methods of sampling fish, Catch Per Unit Effort (various catch methods, and SCUBA Surveys)	near shore reef groundfish and kelp bed species	Hook and line, traps, and T-Bar	presentation at 2006 Western Groundfish Conference, a report to Pacific States Marine Fisheries Commission

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2005, late summer early fall	Methodological-refinement, Life History- habitat (range): What is effectiveness of non-lethal sampling methods and what is the range of some of the Southern California rockfish stocks?	California-Southern bite region (from Mendecino to Mexico)	Sportfishing Association of California (SAC)/ National Marine Fisheries Service/ Pacific States Marine Fisheries Commission	National Marine Fisheries Service, through the Pacific States Marine Fisheries Commission	Pacific States Marine Fisheries Commission (Request For Proposals)	The Boccacio guideline for 2003 was so low it cut out any fishing with significant Boccacio bycatch at a lot of depths, big economic impact and when PFMC put a paper on research needs, delineation of Northern and Southern stocks was listed, money was then made available.	1.Provide catch rate and biological data for rockfish 2. Use camera sled to record information on the habitat types 3. Compare hook and line catch information with habitat types 4. Correlate hook and line catch data with catch data from other National Marine Fisheries Service projects 5. Conduct additional ancillary experiments like genetic “mark-recapture” projects	Southern California Bite Sport Groundfish (especially focusing on Boccacio)	Hook and line/ Sport-Recreational fishery	Data for setting harvest guidelines, and guiding further studies.
2006	Monitoring-abundance: of Cabezon, Tagging study, Comparison of CPUE for Cabezon in the four regions of California	California	California Department of Fish and Game, University of California at Santa Barbara, California Sea Grant, Fishermen, NOAA, CalPoly	Pacific States Marine Fisheries Commission, Groundfish Cooperative Research Project	National Marine Fisheries Service will supervise the technical aspects of the project	At a STARR panel meeting for Cabezon there was a discussion of data gaps and the question was asked "what do you need?" A meeting was then held and the project was developed at that meeting.	Organize a planning meeting to support development and completion of a survey design for a trap and/or Hook and line cooperative research project to analyze Cabezon CPUE.	Cabezon	Commercial nearshore fishery	hook and line/trap survey of Cabezon in California
2006-ongoing	Life History: What are the locations of Klamath river Coho during the fishing season	Oregon and California	Coastal Oregon Marine Experiment Station, Salmon fishermen, disaster relief	Disaster relief funds? Others?	Coastal Oregon Marine Experiment Station	????	determine if it's possible to track the movements of specific subspecies (location based) of salmon and avoid them during normal fishing operations to avoid impacts to that specific stock of fish	salmon	Predominantly Troll gear	????

start date-end date	Research Question	Location	Participating groups	Funding Source(s)	Coordination	Question Generation	Project Objectives	Species	Gear Type/Fishery	Product
2006 Spring	Monitoring- abundance, Life History- habitat: what are the general fish assemblages and geographic features of Orford Reef	Oregon, Orford Reef	Commercial Fishermen, Oregon Department of Fish and Wildlife Scientists	Department of Land Conservation and Development (Grant)	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife initiated the project	Conduct a Pilot ROV survey of Oregon's Orford Reef	Nearshore Groundfish of Orford Reef	mostly hook and line/ Nearshore Orford Reef fishery	an initial estimate of fish densities based on habitat strata

Appendix D:

An exploration of changes in West Coast Cooperative Fisheries Research: project support, and participant perspectives before and after the 2000 West Coast Groundfish Fisheries Disaster

Introduction

Many types of factors, including social, economic, environmental, and scientific played a role in creating the West Coast Groundfish Disaster (WCGD). The focus of this discussion will be on two of the prominent scientific factors that played a role in the declaration of this disaster. Two causes of the 2000 WCGD were the slow detection of the decline of various groundfish stocks, and an inadequate understanding of the biology and population dynamics of those same groundfish stocks (US Senate 2001). The realization that current fisheries data was not adequate to manage the groundfish fishery lead to a reevaluation of the science used to manage West Coast fish stocks, especially the scientific data and assumptions used to manage groundfish.

The disaster declaration also triggered the disbursal of disaster relief funds to benefit west coast fishermen, and help improve understanding of West coast groundfish species and stocks (Shaw 2005). The wide ranging impacts of the 2000 WCGD disaster, in which inadequate understanding of fish stocks played a large role, likely had a great impact on West Coast CFR. January 2000, therefore, seems like an appropriate point for separating CFR projects of the past from CFR projects of the present. These two groups are compared here in order to gain a better understanding of changes in CFR on the West Coast.

The WCGD impacted West Coast Cooperative Fisheries Research (WCCFR) in at least three ways. First the WCGD generated broad awareness and attention to the difficulties of managing fisheries on the US West Coast. Secondly, the WCGD exposed

many of the shortcomings of the existing science used to manage West Coast groundfish. Thirdly the WCGD mobilized significant relief and research funding to both help retrain fishermen impacted by the disaster, and more germane to this discussion, improve scientific understanding of the reduced stocks while involving the remaining fishermen in the research, and compensating them for their participation. It may be that previous efforts to support WCCFR had made progress but the declaration of the WCGD provided WCCFR projects with increased public awareness of the distressed coast-wide fishery, a clear need to improve the science, and research and relief funding. West Coast Cooperative Fisheries Research may have been impacted by these and other changes which may have taken place at the turn of the millennium. While other forces in support of WCCFR may have been building prior to the WCGD, the disaster may have served as the spark that ignited change.

This exploration of WCCFR before and after the WCGD used general data about cooperative projects, surveys given to participants in WCCFR projects, and interviews with a smaller number of WCCFR participants. This exploration attempts to describe several general attributes of WCCFR projects, and draw upon the interviews and surveys to better understand the perspectives of the participants. Participant responses are discussed in terms of why participants initiated and joined a project, and how projects were carried out and how fishermen and scientists worked together. Evidence of changes in WCCFR projects may help project funders, supporters, and participants better understand their own projects by providing some perspective. Insight into how projects have changed may also guide the use of cooperative research in the future.

Methods

I collected data, using several different methods. To collect general project data I called participants and acquired information through discussions. For the more complicated data regarding experiences and perceptions I used surveys and interviews to collect information from participants in past and current projects. The fishermen came from diverse fisheries and gear types, and the scientists came from a broad range of institutions including universities and academia, state and federal agencies, and even

private contractors. Data collection on CFR projects across the US west coast was a daunting task, so I approached the challenge by starting broad and narrowing my focus as I progressed. I began with a mail survey I had created to obtain a data from a broad range of WCCFR participants. In order to gain a deeper understanding of the perspectives of WCCFR participants than the surveys could provide, I conducted interviews with a subset of the survey recipients. In the results section, when both data collection methodologies obtained information regarding a certain subject or issue, survey results are discussed first and interview results are used to give added detail. The survey data was obtained from over one hundred participants and offers a perspective derived from the answers of those numerous respondents. The interview data was obtained from 24 participants and goes into further detail regarding subjects similar to those covered by the survey. The surveys gave a broad perspective, and often the interviews were able to fill in gaps or ambiguities left unanswered by the survey data. At times the results from the two methodologies are in disagreement. These disagreements provide opportunities for further discussion.

Gathering Information Regarding Projects

The identification of past and current projects along the West Coast depended on either finding records of them from various compiled lists, or through conversations with sources familiar with past and present CFR projects. These conversations and searching for projects is often described as snowball sampling (Henry 1990). I generated a master list of 60 WCCFR projects was generated through the use of snowball sampling (Henry 1990). Snowball sampling is a useful technique for accessing hard-to-reach populations (Berg 2001, Roboson 2002), and involves the identification of knowledgeable primary contacts through searches of the literature or persons known the investigator to be familiar with a community. These primary contacts led me to other contacts. From my small initial group of contacts I discovered a large number of subsequent contacts who provided further information about other contacts and their projects. Of the 60 projects identified 33 of them began before January 1, 2000, and the remaining 27 projects began after that date.

Survey

The survey instrument was four pages long and consisted of several types of questions, including yes/no, to select all options that apply, and rate the importance of certain project attributes (Appendix A). I created the survey by drawing from the literature, conferences that focused on CFR (Harms and Sylvia 1999, NRC 2004, Reed and Hartley 2006), and advice from scientists and fishermen involved in WCCFR. The literature suggested five areas of interest: incentives to participation, level of involvement, participant expectations and project outcomes, and communication. This final overarching theme is an integral part of each of the previous areas of interest.

Included in the survey was a description of the idea of a "cooperative-collaborative continuum" (Conway and Pomeroy 2006, Harms and Sylvia 1999, NRC 2004). This concept has been discussed in previous work regarding CFR, and was described in my survey as:

> "Cooperation and collaboration are not the same thing. Cooperative research involves *limited roles for some* partners. Collaborative research, in contrast, involves partners *equally in all phases* of the research process"

This continuum concept can be an effective way to describe the degree to which control of a project is shared among participants.

Of the 60 projects identified by snowball sampling, information regarding participants was found for 41 of them. The initial mailing envelopes contained: a cover letter explaining the purpose and impact of the study, an informed consent form, surveys, and a return addressed envelope with postage. Approximately 3 weeks later a reminder postcard was sent out to non respondents requesting their responses and offering an extra copy of the initial mailing if needed (Salant and Dillman, 1994). Of the 260 participants, in the 41 CFR projects identified, 111 (43%: 57 fishermen and 54 scientists) sent back completed surveys. The surveys were then scored and responses tallied and queried using the Microsoft Access Database, and Excel programs. Relationships between community group, fisherman or scientist, and answers to other survey questions were analyzed and compared.

Interviews

The six projects were selected for in-depth interviews from the 41 WCCFR projects included in the survey research. Twelve candidate projects were selected based on the availability of multiple participants from a single project, and the perceived willingness of the participants to participate in the interviews. The final six projects were selected based on their diversity across several project attributes:

- project duration (1 to 49 years)
- the type of question addressed by the project (bycatch, life history, monitoring, methodological improvement)
- general size of the project and how many people it had included (3 to 20+)
- geographic location and range of the project (Near shore estuaries to Coast Wide)
- fishery and gear type (from pots, to trollers, to trawlers, to divers)
- number of known funding sources (1 to 5+)

Semistructured interviews were conducted using standard ethnographic interviewing principles (Spradley 1979). Interviews were conducted with 3 to 5 participants from each of the projects, for a total of 24 participant interviews (15 fishermen and 9 scientists). Interviews were conducted in person when possible (or over the phone when necessary) and took between 0.75 hours and 1.5 hours to complete. All interviews were tape recorded and transcribed verbatim from the original tape recordings.

The interview transcripts were analyzed by using an iterative content analysis (Van Riper 2003) process where similarities between statements made in interviews are grouped together repeatedly at increasing levels of generality/abstraction, to create themes that reflect ways in which the participants had described a common topic or issue in a similar way (Peterson 1998). Themes are then organized within each community group; some themes arose among both community groups. The analysis process consisted of transcribing and re-reading the interviews, then creating 12 topic categories which were used to separate out the interview text relating to a specific topic. Each category was then re-read and statements were grouped according to their similarities into collections called threads. Those threads were then compared and grouped across the 12 topic categories and, threads with similar content or subject matter were grouped together to

create themes (see Table 1 for descriptions of themes). Themes that emerged among one group but not the other may indicate that one group considers that theme to be more important than the other group.

Results

Results related to shifts in the focus of projects, their sources of funding, and entities taking a lead role in project coordination will be first presented.

Project Focus

Some CFR projects had more than one area of focus, for example, both life history data and abundance were often measured during a single project. The 4 areas of project focus were

- Monitoring- stock sizes, population structure, general stock monitoring
- Life History- age/size at maturity, spawning time, habitat associations
- Methodology testing- testing the effectiveness of new or old research methods
- Bycatch- measuring, reducing the incidental catch of discarded species

Figure 9 shows that that monitoring projects were the most common area of project focus, followed by life history, bycatch related studies, and methodology testing. While monitoring decreased by 10% it still maintained its status as the most common focus of CFR projects. The 20% increase in life history projects represented a near doubling and made it nearly as common a focus as monitoring in post 2000 projects. Bycatch and Methodological testing also increased by 9% and 8% respectively. If the percent decrease in monitoring projects (10%) is much smaller than the net increases in the other three focus areas (37%). This difference indicates that, on average, WCCFR projects are increasing their number of focus areas.

Project Funding

The term Government Fisheries Research Entity (GFRE) refers to the National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), and the California, Oregon, and Washington Sea Grant programs. Over all CFR projects it is clear that as a single GFRE, NMFS, has contributed funding to

the largest number of CFR projects (Figure 10). When the time periods are combined, GFRE have contributed funding to a greater number of projects than the Other Sources (Table 8). When comparing funding sources between the two time periods, pre and post-2000 (Figure 10) there are large decreases among the CDFG, WDFW, the Sea Grant programs, and ODFW, although the decrease in the case of ODFW is quite small. There is also an increase in the number of projects funded by the Other Funders group of 9.4%, for a post-2000 funding of rate of 85.2%. Among GFRE the funding frequency decreased by nearly 25%, for a post-2000 funding rate of 81.2%, which put "Other Sources" and GFRE only 4% apart. The reason why the percentages of the funders data adds up to more than 100%, is that projects frequently had more than one source of funding. The average number of funders per project can thus be found for a specific time period. So in addition to the shifts in sources of funding, the average funders per project decreased by 9.1%, or from a pre-2000 level of 1.82 funders per project, and a post-2000 level of 1.67 funders per project. These trends indicate that NMFS and Other Funders have increased the relative number of CFR projects they fund. These increases have not offset the decrease in the number projects funded by state fish and wildlife agencies and state Sea Grant programs.

Project Coordination

During interviews with scientist participants, project coordination and management, including finding project funding and satisfying institutional requirements for insurance, was described as a very challenging and difficult aspect of their CFR projects (Table 4). The project level data regarding who the primary coordinator(s) was associated with is shown in Figure 11. The coordination role taken on by employees of GFRE decreased by nearly 25.3%, while the "other" group, which had coordinated no projects pre-2000, coordinated 25.9% of the post-2000 projects. The "other" group consists of Meanwhile the "University Partnerships" and "Industry Partnerships" participation in project coordination changed very little.

Starting and Joining a Project

Initiating a project and gathering participants is a critical stage for many projects, because this type of research does ask so much of its participants. Data regarding why

participants become involved was gathered by both the interviews, and surveys. In interviews fishermen described an interest in the science and concerns regarding the quality of the available fisheries data (Table 1) as an incentive to become involved. Fishermen also described the opportunity to improve industry relationships with other groups (Table 1) as an incentive to their participation. The scientists also mentioned improving relationships as an incentive to participate (Table 1) during their interviews.

The most commonly selected answer given regarding participant's reasons for becoming involved in their CFR projects for both groups, as indicated by surveys data (Figure 1), was "interest in this research topic". On the same question "interest in the quality of available data", "and interest in the availability of data related to the research topic", were selected second and third most frequently. Figure 12 shows that the largest increase of a reason for becoming involved was that of fishermen being asked by a scientist to participate. Survey data regarding what incentives had played a large role in their choice to participate in their CFR project (Figure 13) indicated that the benefit of "producing needed data" was the most influential incentive among all participants. Figure 13 also indicates an increase over time in the influence of benefits in scientist decision to participate in their CFR Projects, although this increase is quite small for some benefits. Indeed, scientists went from the lowest to the highest incentive response in all but one category.

Our data indicates that fishermen and scientists are most strongly motivated to participate in CFR by the prospect of producing needed data. In both survey questions regarding reasons for becoming involved and incentives to become involved, fishermen and scientists selected data related answers more frequently than any other answer. This interest in science and data came out in interviews with fishermen as well. In the interviews both fishermen and scientists indicated that improving relationships was also an incentive, although in the survey data relationship related benefits were a rated less important than the producing needed data incentive.

Project execution and methods used

The extent to which various CFR participants work together is a meaningful feature that we measured to gain a better understanding of the nature of the CFR projects that I

studied. When dealing with individual assessments of a project some variation in responses is expected, but as more participants are surveyed a coherent picture may emerge. With this goal of a broad perspective I examine the multiple sources of information gathered regarding how participants worked together.

In the interviews fishermen and scientists did not directly contradict each other but did seem to be coming from different perspectives. A frequently mentioned interview theme among fishermen was that of their influence and involvement in their respective project (Tables 3 and 4). This theme was brought up in several different contexts. The two most notable contexts were the description by fishermen of the obstacle of scientists sharing power over project decisions with the fisherman, and fishermen's regular reference to a project's location on the cooperative-collaborative continuum. Together these contexts suggest that fishermen pay close attention and readily quantify their influence regarding project decisions, and often see these interactions as obstacles. The perspective of scientists seemed to be a bit different with scientists speaking about a theme regarding fishermen's participation in decision making, indicating that fishermen had been involved in decision making processes (Table 3). In this same theme scientists also indicated that there were shifts in the cooperative-collaborative nature of the project, and that fishermen and scientist's influence over the project was a changing feature of their project. The final theme relevant to this discussion was the fishermen's description of communication being an obstacle (Table 4). It seems likely that inadequate communication could play a role in fishermen's attentiveness to issues like control, and the fact that fishermen and scientists seem to be on different sides of the same issue. That issue being sharing power, where scientists describe the participation of fishermen in decision making processes and shifts in influence over the course of a project, while fishermen are describing the struggles that scientists have regarding sharing power with them.

The survey question regarding project aspects participated in gives insight into the areas of the projects that participants were involved in. The graph of this data shows that there was not a consistent increase in number of projects participated by either group, indicating that the areas in which participants were involved did not change much over

time. Figure 6 indicates that scientists were involved in more project aspects than fishermen. Indeed, if the time periods are taken together for figure 6, it appears that there are large discrepancies between fishermen and scientist participation in project aspects A, B, F, G. These differences indicate that fishermen are less involved in designing the research project, starting the project, analyzing data, and reporting results than their scientist counterparts. Indeed, if an average of all aspects participated in per respondent is taken, scientists participate more than twice as many project aspects as fishermen, 5.1 and 2.7 respectively (Figure 3). The Between the two time periods the level of level of collaboration increased substantially, from 0.28 to 0.5 on the cooperative-collaborative continuum (Figure 15). Since a distribution of responses was created through this categorical measure it was possible to test the likelihood of the null hypothesis that the two curves were generated by chance and that the participant's responses were not different using a K-S test (Conover, 1971). With sample sizes of 48 participants for the Pre-2000 group, and 53 participants for the Post-2000 group, the test statistic for rejecting the Null hypothesis with P= .99 certainty was T= .325 (Conover, 1971). Using the method for performing the Kolmogorov-Smirnov test on ordinal group data (Siegel, 1956) the value obtained was .390, indicating with greater than 99% certainty that the differences between the two samples were not arrived at by chance and do in fact represent the responses of different populations.

Discussion

The cooperative-collaborative continuum shift is a strong indicator, generated by responses from fishermen and scientists, that on average CFR projects initiated after January 1, 2000 were more collaborative than projects initiated prior to that date. Put another way, fishermen and scientists are now initiating projects in which they work together more closely and share power more equally than they did before the year 2000. This increase in collaboration may represent an increase in awareness of the significant role that fishermen can play during the course of a CFR project, beyond that of a consultant or contractor. This increase in collaboration is also likely linked to the increased role that the benefits of CFR played in the decision of scientists to participate in

their projects (Figure 13). The apparent increase in scientist's awareness of the benefits of CFR may have a positive feedback relationship with the increase in project collaboration.

The level of fishermen and scientist involvement in various project aspects did not appear to change (Figure 14), and yet the level of collaboration was found to have changed significantly (Figure 15). This seems to suggest that while fishermen are not necessarily expanding the range of aspects they are involved in, they are more given larger roles in the project aspects that they have traditionally had. These findings may also indicate that even as scientists see more benefit to CFR they may only be willing to increase the level of fishermen involvement with project aspects fishermen have previously participated in. While the merits of these decisions are not the subject of this paper, this continuing trend may indicate scientists are not prepared to involve fishermen in all aspects of WCCFR projects, fishermen may not be prepared or interested in participating in all aspects of WCCFR projects, or both.

Aside from the cooperative-collaborative continuum shift there appeared to be other differences between the two time periods, for example WCCFR project focus. The significance of these shifts to WCCFR, and likelihood that these other shifts influenced, or were influenced by the cooperative-collaborative continuum shift is discussed as well. The shift in the focus of projects may have interacted with the increase in collaboration in several ways. First the decrease in monitoring may have increased collaboration because many types of fish stock monitoring involve sampling of catch, or other established sampling methods in which the discretion of scientists to involve fishermen may be limited, as well as the opportunities for fishermen to provide their input. The increase in life history studies, methodological testing, and bycatch research all seem likely to draw upon fishermen's expertise and experience, and an increase in those types of projects may have led to the creation and execution of more collaborative projects. Furthermore, the decrease in monitoring projects and the relatively large increase in life history projects may reflect a new research interest in ecosystem based processes in which habitat usage, reproductive traits, and species interactions of commercially less valuable species, are of increasing importance to managers and researchers.

The apparent decrease in the rate at which projects funded by the smaller state GFRE and the increase of the rate at which NMFS funds projects indicates that NMFS role as the primary, and most centralized, source of funding available to West Coast CFR projects may be increasing. The increased rate at which projects were funded by "Other Sources" was also interesting and may indicate a growing awareness of the role that CFR can play in providing information, and the need for private dollars to support fisheries research. This shift in funding likely also reflects budget pressures within the smaller Government Fisheries Research Entities. Given the difficulties that WCCFR projects have finding funding (Table 4) it seems unlikely in most cases that available money would be turned down in order to keep a project more collaborative, so it seems unlikely that the shift in funding was influenced by shift towards more collaboration. It even seems possible for the opposite to be true, that given less centralized government sources of funding, new or less obvious sources had to be found and this search for funding could have involved fishermen in projects from the beginning and lead to their greater degree of involvement overall.

Data indicates that coordination of WCCFR project by Other Groups has increased. Regarding project coordination these Other Groups include NGO's, private contractors, and even Native American Tribes. Project coordination, including the management of payment schedules, contracts, and helping the various participants keep in contact, plays an important role in the success of CFR projects (NRC 2004). This shift in coordination may have increased fishermen involvement in project coordination increased the collaboration level of WCCFR projects. The GFRE frequently have administrative capacity and expertise that can facilitate or participate in the coordination of WCCFR projects. The shift away from GFRE coordination has likely put participants who would otherwise not have had many administrative responsibilities in more demanding positions of greater authority and power.

Interviews with fishermen found that they had a great deal of uncertainty about the objectives and outcomes of their projects. The uncertainty described by fishermen included what were their project's goals, and even how the resulting data had been used (Table 2). This uncertainty is likely a disappointment to fishermen who, in interviews,

expressed an interest in their project's contribution to fisheries management, as well as describing project outcomes as important in their personal evaluations of the success or failure of a project. How this uncertainty among fishermen can persist despite interest by fishermen is probably related to the description, by fishermen, of communication between fishermen and scientists as both a problem and an area that could be improved. Scientists on the, other hand, failed to describe communication as a problem with WCCFR, which may show that scientists believe communication between fishermen and scientists is a just fine. The solution indicated by this data is for scientists to share their knowledge of how the fishermen participants had influenced their projects and how the project data were been used with their fisherman counterparts.

Interview and survey data also suggest that fishermen participating in CFR projects are extremely interested in fisheries science research and data, and specifically data quality and value. Scientists also indicated that they were very interested in the data and science coming from CFR projects. Survey and interview data, when taken together, also indicate that developing relationships between fishermen and scientists is important to both groups as well. However, in general data and research are viewed as more important than developing relationships. This may indicate that if the quality of the research and consequently the scientific data is compromised it may negatively impact the relationships created during the project. This suggests that the success of a project's scientific aspects is likely very important for the successful formation of meaningful relationships.

Conclusions

Our study looked for indicators of the scientific and social outcomes of past and present WCCFR projects, and shifts in those indicators over time. I found that relationships between fishermen and scientists are being formed, and production of data is a top priority. I found that WCCFR projects have become more collaborative since the turn of the century. I also found that despite the improvement of relationships between fishermen and scientists, communication problems between the two groups keep fishermen less informed than they'd like to be and uncertain of their projects goals and

outcomes. This uncertainty makes it difficult for fishermen to know exactly what they're getting into at the beginning of a project, and exactly what their efforts have contributed to once a project is completed.

Cooperative Fisheries Research often succeeds in producing and sharing needed scientific data with scientists, fishermen, and fisheries managers who can use that information. Participants in CFR projects agree on many of the goals and achievements of their projects, but they don't seem to be as equally aware of some of its problems. Increasing communication between fishermen and scientist participants regarding their perceptions of the projects has been identified as an important component of increasing awareness and solving some of those problems.

Cooperative Fisheries Research projects exist in a changing and challenging funding environment and a sometimes contentious social environment, and while some fundamental aspects of these projects are changing, many projects face the same challenges. Hopefully this research has made clearer the ways in which CFR projects are similar and what participants can learn from previous CFR efforts, as well as diversity of projects being attempted and how projects developed today differ from projects initiated a little less than a decade ago in 1999.

Future studies may wish to examine whether the increase in collaboration in WCCFR projects analyzed, is unique, or if similar projects in other areas of the US have undergone similar shifts as well. If this collaborative increase is not seen over the same time period in other areas, other studies may wish to examine fisheries disasters like the West Coast Groundfish Fishery Disaster of 2000 in which limited data was implicated as a major cause, which may also have triggered similar shifts in collaboration in other areas.

Our hope is that the lessons learned from this research will encourage the further collection of CFR project information. All too often CFR projects, like those in my study, take place in relative obscurity, and records of them are never shared, or even created. I hope that this research and the project data it has collected are a first step in bringing CFR participants into more frequent contact with each other. Through increased communication between CFR participants in different projects, it is my hope that a larger

CFR community of learning can be created. The lessons learned and taught by past participants can provide future participants with real experiences from similar efforts that have preceded their own.

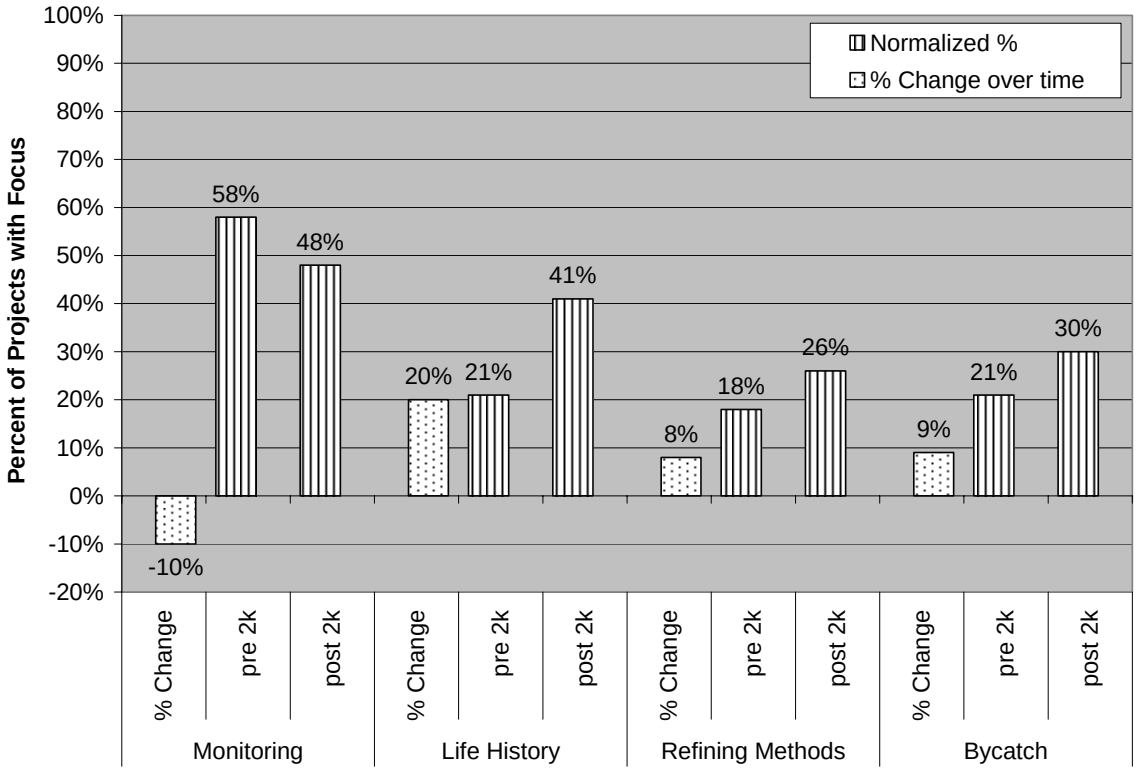


Figure 9- General Project Data: WCCFR project focus before and after January 2000

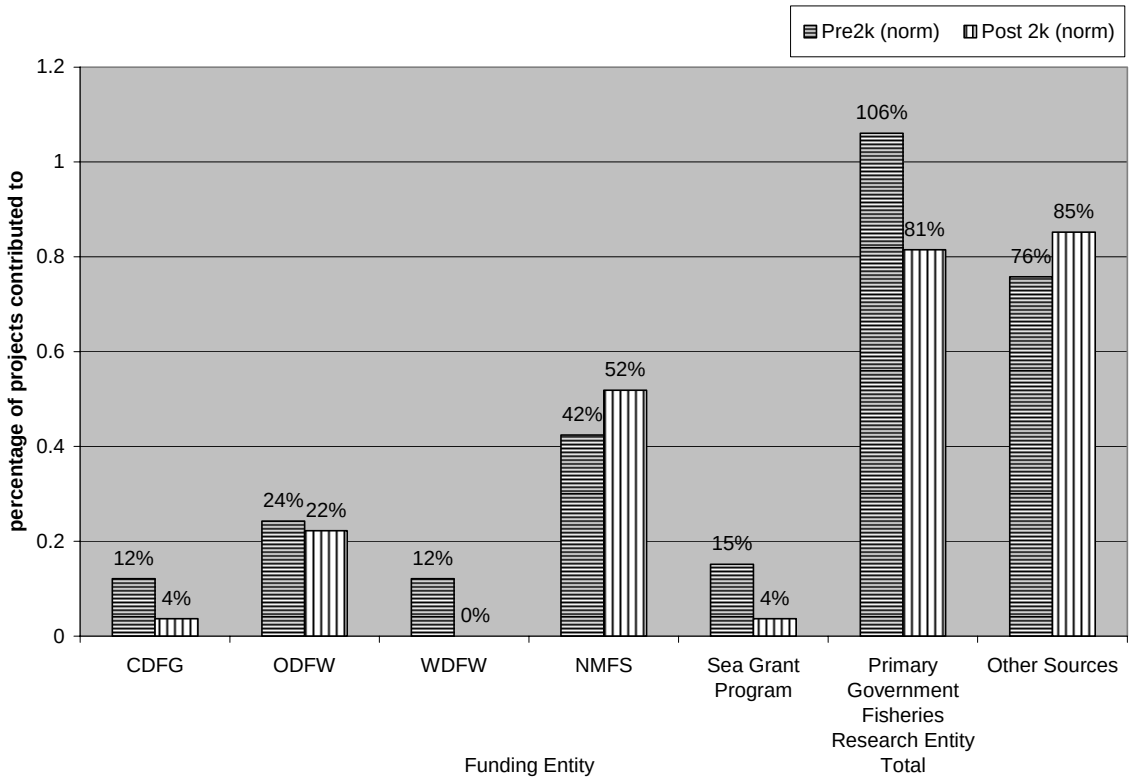


Figure 10- General Project Data: Funders of WCCFR (For a description of other sources of funding see Table 8

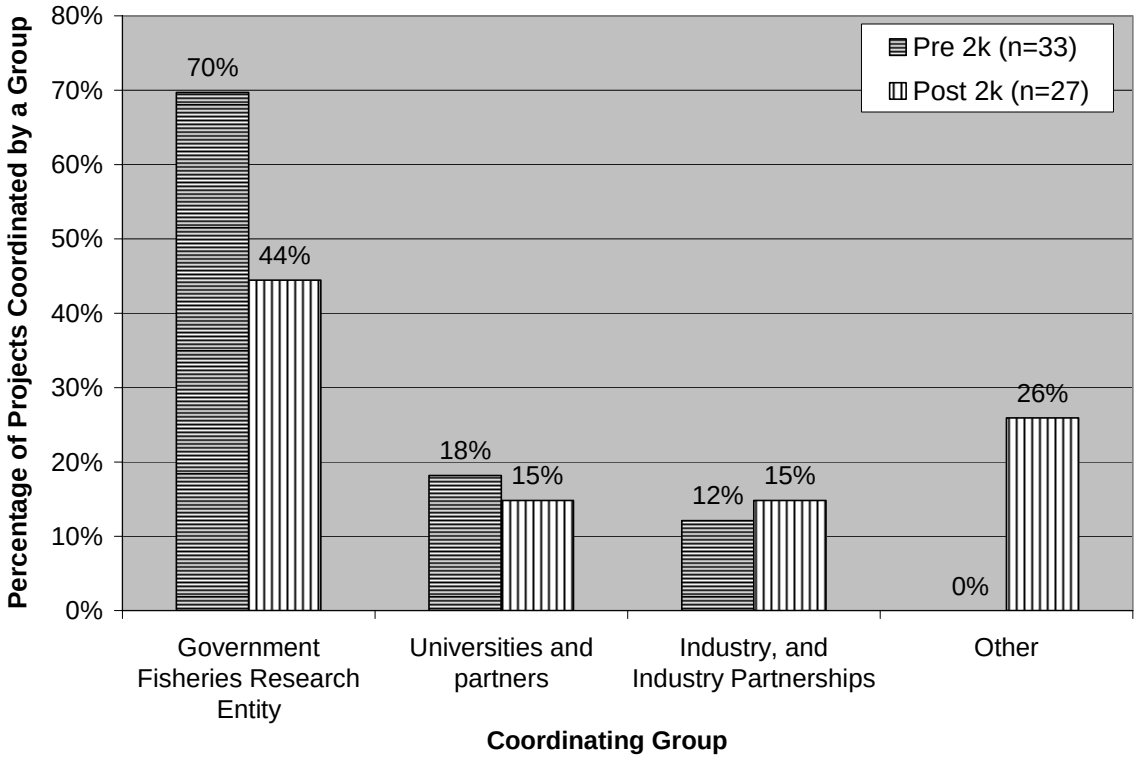


Figure 11- General Project Data: Groups that took a role in coordinating WCCFR projects

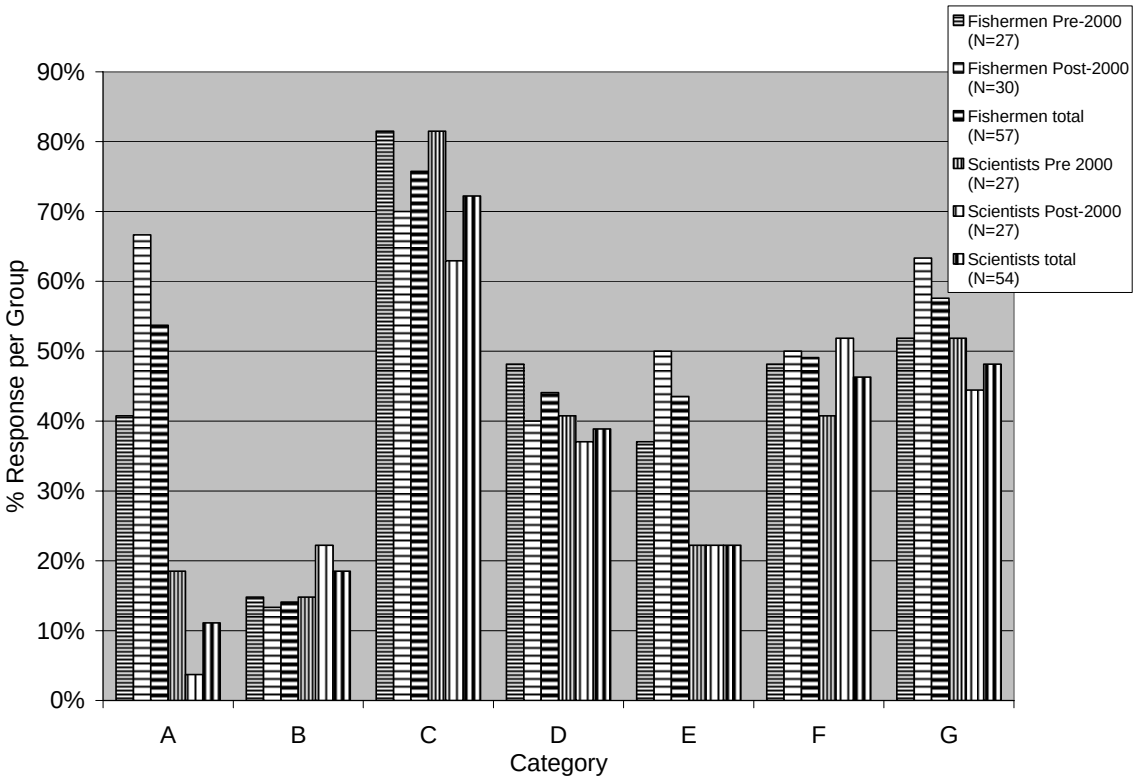


Figure 12- Survey Data: Participant reasons for becoming involved before and after January 2000

A. I was asked to be an industry cooperator by a researcher
B. I was asked to be a research cooperator by a fisherman or other industry professional
C. I was interested in this research topic
D. I was interested in participating in an opportunity to learn from others
E. I was interested in participating in an opportunity to teach others what I know
F. I am interested in the availability of data related to the topic of this research
G. I am interested in the quality of available data related to the topic of this research

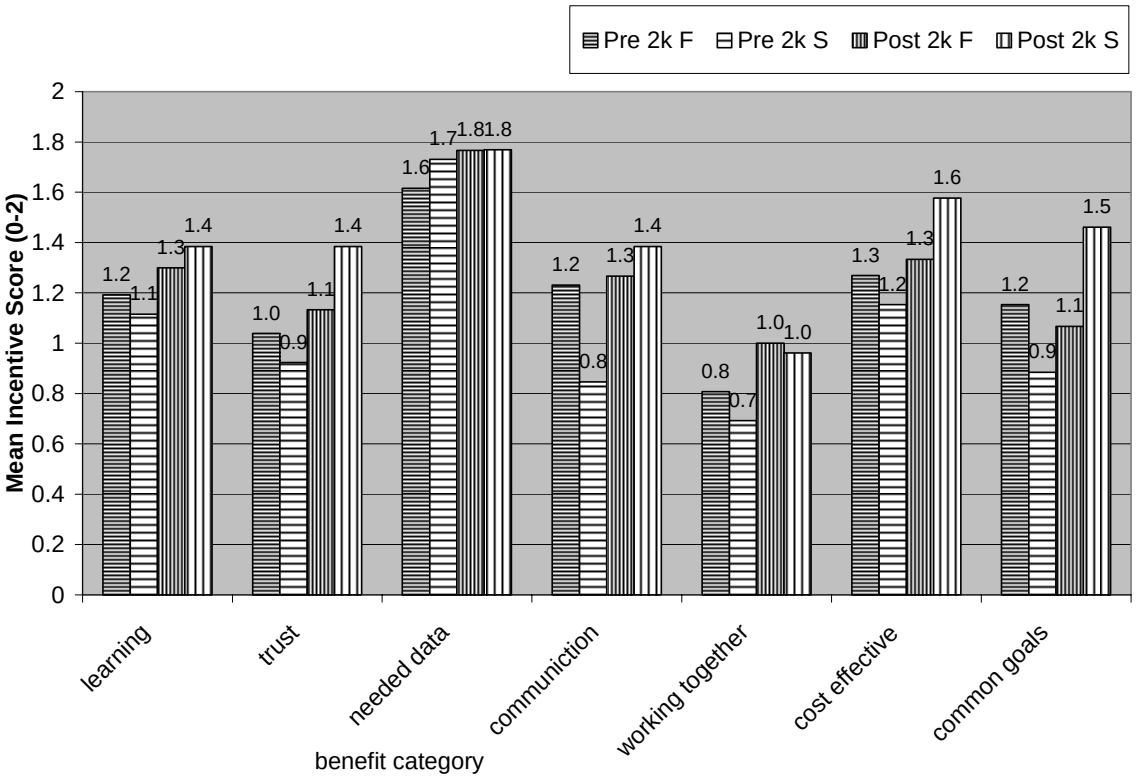


Figure 13- Survey Data: Participants rating of the incentives that various benefits of their projects played in their decision to participate in their projects

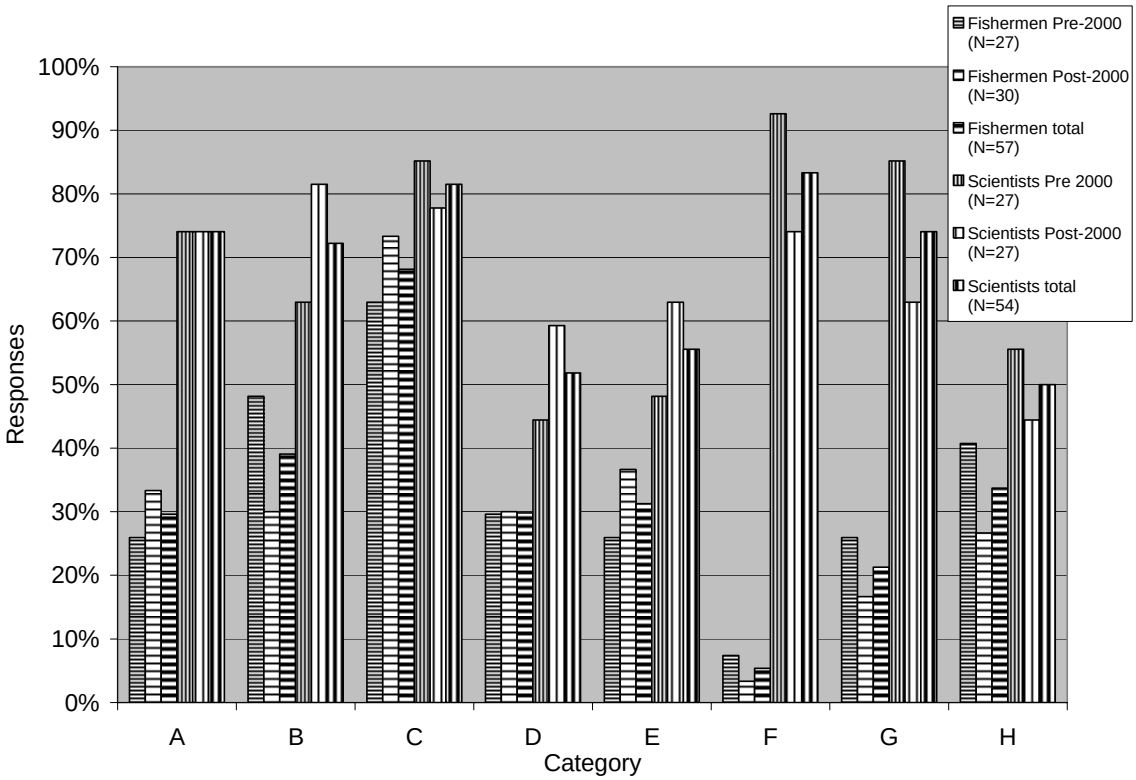


Figure 14- Survey Data: Aspects of WCCFR projects that participants were involved in for projects initiated before and after 2000

A. Designing the research project
B. Starting the project / pulling together the partners
C. Information/data gathering at sea
D. Information/data gathering on shore via an interview, meeting, workshop, conference
E. Consulting/reviewing scientific plans or proposals
F. Analyzing data
G. Reporting results / research project promotion
H. Problem solving

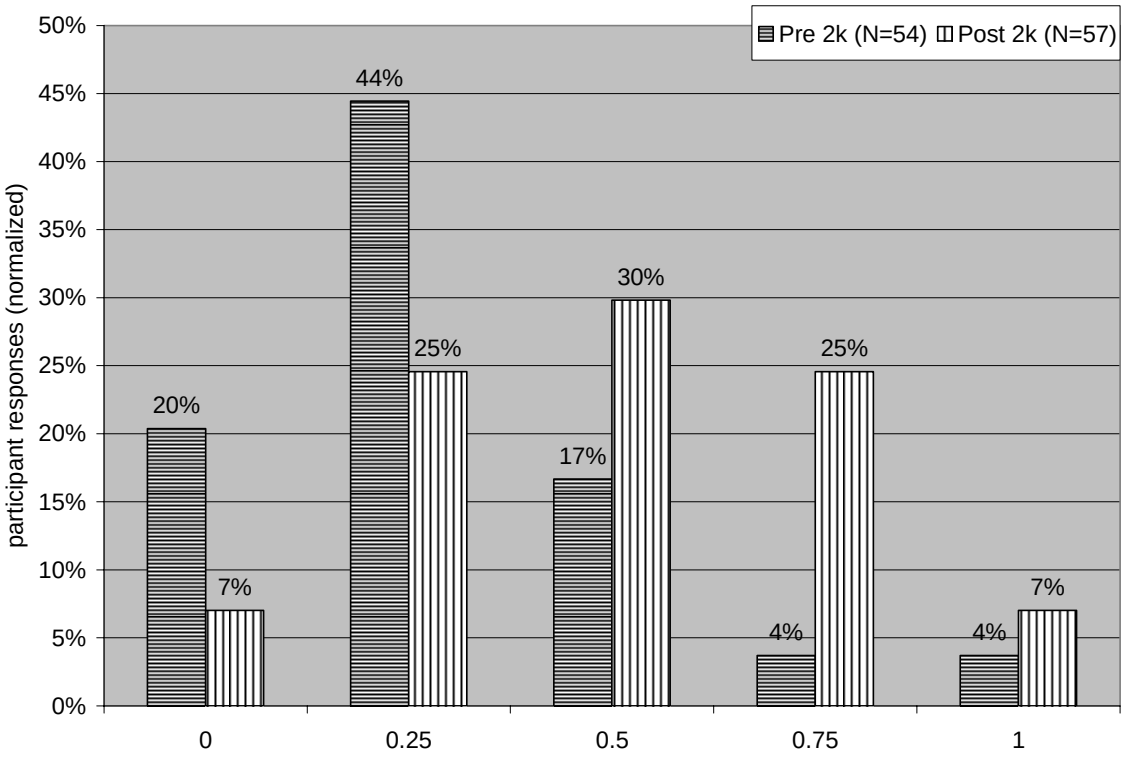


Figure 15- Survey Data: Project location on the Cooperative-Collaborative continuum for projects initiated before and after January 2000 (fishermen and scientists answers are combined in this table)

Table 8- General Project Data: Other Funders

Pre 2k funders- Non "primary fisheries science" Agencies **(25)**	Post 2k funders- Non "primary fisheries science" Agencies **(23)**
Industry Groups (10)	**Industry Groups (7)**
Commercial Urchin Divers	Fishermen
West Coast Seafood Processors Association	Sea Urchin Advisory Committee
Shoreside Processing Plants	Sea Urchin Harvesters Association
Santa Barbara Trawlers	Sardine Fishermen
Oregon Trawl Commission	CA Abalone Association
California Sea Urchin Commission	Oregon Fishermen's Cable Committee
Sea Food Processors	PGCT
Pacific Whiting Conservation Cooperative (PWCC) **(3)**	
	Programs or Efforts Promoting CFR (5)
Local Research/Enhancement efforts (2)	Port Liaison Project **(3)**
Santa Barbara Chamber of Comm. Fisheries enhancement fund	Groundfish Cooperative Research Project
	Channel Islands Collaborative Marine
Marine Science Institute	Research Program
Universities (2)	**Universities (2)**
University of California at Santa Barbara	Oregon State University
University of Washington	UC Dept. of Ag and Natural Resources
State or Fed. Government Money not tied to an Agency	**Secondarily involved Management Agencies (4)**
Federal Budget line item (congressional appropriations)	Oregon DLCD (grant)
	Channel Island National Park/Kelp Forest
CA Gillnet Initiative (prop 32) 1980	Management Plan
Grant from Dept of Commerce	Commonwealth Ocean Policy Program

	Santa Barbara Chamber of Commerce
Saltonstall-Kennedy Grant Program **(3)**	Fisheries enhancement fund
CA Sportfish Restoration Act **(5)**	
	Federal Disaster Relief Funds (3)
	Federal Groundfish Disaster relief program **(2)**
	Federal Klamath Salmon Disaster Relief Funds
	Charitable Foundations (2)
	Packard Foundation
	Bullit Foundation

References for Appendix D

Conover, W. J., 1971. Practical nonparametric statistics. John Wiley and Sons Inc., New York, New York.

Conway, F. D. L., Pomeroy, 2006. Evaluating the human—as well as the biological—objectives of Cooperative Fisheries Research; *Fisheries*; 31:447-454.

Harms, J., G. Sylvia, 1999. Industry-scientist cooperative research: Application to the west coast groundfish fishery. Master's Thesis. Oregon State University, Corvallis, Oregon.

Henry, G. T., 1990. Practical sampling. Sage Publications, Newbury Park, California.

NRC (National Research Council), 2004. Cooperative research in the National Marine Fisheries Service. Report. National Academies Press, Washington, DC.

Patterson, M. E., D. R. Williams, 1998. Paradigms and Problems: The Practice of Social Science in Natural Resource Management. *Society and Natural Resources* 11:279-295.

Read, A. N., T. W. Hartley, 2006. The future of partnerships for a common purpose: Cooperative fisheries research and management. Pages 251-255 in Read, A. N., Hartley, T. W., Partnerships for a common purpose: cooperative fisheries research and management. American Fisheries Society, symposium 52, Bethesda, Maryland.

Salant, P., D. A. Dillman, 1994. How to conduct your own survey. John Wiley and Sons, Inc., New York.

Shaw, W. D., 2005. Case study examination of programs designed to help individuals and communities through fishery disasters. Master's Project. Oregon State University, Corvallis, Oregon.

Siegel, S., 1956. Nonparametric statistics for the behavioral sciences. McGraw-Hill Book Company, New York, New York.

U.S. Senate, 2001. Subcommittee on oceans and fisheries. Newport, Oregon field hearing: Testimony of Donna Darm, acting regional administrator, Northwest region, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce on the Pacific coast groundfish Fishery. 107th Cong., 1st sess. 16 January. http://commerce.senate.gov/hearings/0116dar.pdf. (accessed August 25, 2007)

Van Riper, L., 2003. Can agency-led initiatives conform to collaborative principles? Evaluating and reshaping an interagency program through participatory research. Doctoral dissertation. University of Montana, Missoula, Montana.