

## AN ABSTRACT OF THE THESIS OF

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Title: Fishermen Versus Managers: Perceptions and Conflicts in the Salmon Fishery.

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David Sampson

Fishermen's and managers' perceptions of fishery issues are an important factor to consider when studying conflicts between the two groups. According to theories of conflict management, differences in perceptions may cause situations to be characterized by misunderstanding and mistrust, and may add to the difficulties in managing the conflict.

A questionnaire was developed to determine whether there were differences in perceptions between fishermen and managers. Both groups responded to the same questions. Questions were included to determine each individual's involvement in the decision-making process and to test the hypothesis that fishermen and managers who are involved in the decision-making process have perceptions that are less polarized.

A total of 47 commercial salmon fishermen, who fish primarily out of Oregon ports were interviewed. A total of 36 managers, who were either members of the Pacific Fishery Management Council, Salmon Technical Team, Oregon Department of Fish and Wildlife, or non-agency managers, responded to the questionnaire. Most fishermen were interviewed in person and most managers were interviewed over the telephone.

Chi-square analyses were used to measure the differences in the responses of fishermen and managers, as well as the responses of decision-makers and non-decision-makers. The results support the hypothesis that fishermen and managers have different perceptions on certain issues. However, the hypothesis that

decision-makers have more similar perceptions than non-decision-makers was not strongly supported.

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Fishermen Versus Managers:  
Perceptions and Conflicts in the Salmon Fishery

by

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# FISHERMEN VERSUS MANAGERS: PERCEPTIONS AND CONFLICTS IN THE SALMON FISHERY

## INTRODUCTION

### Statement of the problem

Conflict can be defined as the interaction of people who perceive incompatible goals and are dependent on each other to achieve those goals (Folger and Poole, 1984). Conflict is not necessarily a negative experience, although some people might apply destructive meanings to conflict, such as "war", "struggle", "fight", etc. "Contrary to what one might think, conflict has many positive functions. It prevents stagnation, it stimulates interest and curiosity, it is the medium through which problems can be aired and solutions arrived at, it is the root of personal and social change" (Deutsch, 1973).

A conflict can be destructive or constructive. A conflict is destructive if the participants are dissatisfied with the outcome and feel they have lost as a result of the conflict. Similarly, a conflict has constructive consequences if the participants are satisfied with the outcome and feel that they have benefited as a result of the conflict.

Conflict can occur in any working environment. The fishing industry is no exception. There has been a long history of destructive fishery conflicts. This is due in part because of the diversity of users of the ocean resources, including commercial and recreational groups, environmentalists, and state and local government. It is also due in part because the parties cannot achieve a common solution that will benefit all involved. The uncertainty in predicting changes in regulations, prices, resource abundance, and environment adds to the difficulties faced by resources users and managers.

The present scarcity of salmon stocks in the Pacific Northwest is the cause of a "true conflict" (Deutsch, 1973). The multiple water users and salmon harvesters need the habitat and/or the resource for their subsistence. This type of conflict is difficult to resolve amicably unless there is cooperation from the parties involved. According to Deutsch (1973), conflicts about control over resources are difficult to resolve constructively when there is a rigid fixation on the particular resource at issue and little possibility of finding a satisfactory substitute for it. This is the case of the salmon resource.

I recognize the complexity of the conflicts involved in the salmon industry. For example, because of the fixed amount of fish available, what one group gets another one does not get. Allocation conflicts are common between commercial and recreational users, Native Americans and non-treaty recreational fishermen, and fixed gear and trawl gear (Hanna and Smith, 1992). However, to make this research workable, I decided to focus on the conflicts between commercial fishermen (also referred to as fishers, men or women who utilize the resource for livelihoods) and managers, and their differing perceptions.

Conflicts between fishermen and managers are about resources, power, values, and beliefs. For example, while fishermen want to be able to use the resource, managers want to protect it. While fishermen want more power in making the decisions about the resource, managers have the power of making the decisions.

Many times there is discord between the perceptions of managers and fishermen. Because of their different characteristics, such as language, values, culture, and knowledge, fishermen and managers are likely to perceive the same issues in very different ways; therefore, conflicts between fishermen and managers become characterized by mistrust, misunderstanding, and frustration on both sides.

Conflicts between fishermen and managers could be described also as "perceived conflicts" (Deutsch, 1973), because the existence of the conflict may be caused by a misunderstanding of or misinformation about the same issue. Therefore, neither the

occurrence nor the outcome of conflict is completely determined by objective circumstances.

Conflicts between fishermen and managers could also be called "impersonal conflicts" (Deutsch, 1973) since the fishermen are usually in conflict with the whole decision-making process and not in conflict with a specific manager. Impersonal conflicts are more difficult to manage because party A does not identify the other party as a person, but as a group, and the group may not perceive that it has a conflict with party A. As a result, party A may feel powerless because the conflict may become too overwhelming.

### **Purpose of the study and hypothesis**

My intention with this research was to understand better the perceptions of fishery conflicts by commercial fishermen and fishery managers and to examine possible reasons why they agree or disagree on certain issues. I hoped that this research would suggest why conflicts in fisheries are so complex and difficult to manage. If perceptions of fishermen and managers differ about the same issues, then the conflict will be more difficult to manage because they will not agree on what are the important issues, or the ways to resolve them.

I also wanted to determine whether there are differences in perceptions between fishermen and managers who participate in the decision-making process versus fishermen and managers who do not. According to Deutsch (1973), a cooperative process tends to increase sensitivity to similarities and common interests while minimizing the differences in perceptions. If fishery conflicts were cooperative processes, then I expected the people involved in the process to have more similar perceptions. According to theories of conflict, the constant exchanging of information and interaction between the parties can lead to productive management because the parties begin to appreciate the perspectives of the other parties. If this phenomenon happens during fishery management, I expect

fishermen and managers to start with opposite perceptions, but the more they become involved in the decision-making process and interact with each other, the more similar their perceptions would become.

My main hypothesis was that managers and fishermen have different perceptions about the same issues in fisheries. However, if they are involved in the decision-making process, their perceptions are less polarized because of the exchange of information and exposure to the other points of view. The idea that decision-makers have more similar perceptions than non-decision-makers can be summarized by the diagram on Table 1.

In theory, one would find the most disagreement between non-decision-making fishermen (NF) and non-decision-making managers (NM) because these groups are least likely to exchange views. The least disagreement would be found between the decision-making fishermen (DF) and the decision-making managers (DM), because they have the most opportunity to exchange ideas and perceptions. The disagreement would be intermediate when comparing decision-making fishermen (DF) with non-decision-making managers (NM) or non-decision-making fishermen (NF) with decision-making managers (DM). Because the decision-maker has the opportunity to interact, his/her perceptions are less polarized from the other group, but the non-decision-maker does not interact and does not try to understand the other points of view.

## Thesis overview

The organization of this thesis is as follows. In the remainder of the Introduction I review some literature to clarify the issues discussed in the remainder of the thesis.

In the methods section, I describe the methods used for data collection and analyses. The subsections are arranged according to the chronology of the research. Stage 1 was the preliminary field research. Stage 2 was the development of the questionnaire. Stage

Table 1: Expected degrees of disagreement between fishermen and managers.

Fishermen Managers	Decision-making fishermen (DF)	Non-decision-making fishermen (NF)
	Decision-making managers (DM)	Intermediate disagreement
Non-decision-making managers (NM)	Least disagreement	Most disagreement

3 was the interviews with fishermen and managers. The subsection "data analyses" describes the tools used to analyze the responses to the questionnaire.

In the Results section I present my findings. The subsection "Characteristics of the samples" describes the demographic characteristics of the interviewees and examines whether the samples are representative of the populations from which they were extracted. The first three subsections in the Results section discuss the questions used to test the hypothesis. The last subsection is a summary of the responses to the open-ended questions.

A summary of the thesis, recommendations to improve future studies, and general conclusions are presented in the last section.

## Conflict management

Conflict was one of the central issues of the study. If fishermen and managers have different perceptions it is important to know how they perceive the conflict and what are their likely attitudes or styles in a conflict situation. In this subsection I also



discuss some alternative strategies for conflict management that allow constructive management of resources.

Fishermen and managers may act in predictable ways when faced with a fisheries conflict. Their attitude towards conflict can influence the direction and the outcome of the conflict. According to Hocker and Wilmot (1985), people develop characteristic styles that they typically use in conflict situations. These styles can change depending on the situation and as a result of personal growth. There are five styles identified by the conflict literature: competition, collaboration, compromise, avoidance, and accommodation.

The competitive style is characterized by assertive behavior, aggressiveness and opposition. People who demonstrate this style attempt to gain power by direct confrontation, and their primary goal is winning. A person who presents this style would probably agree with the statement, "I am firm in pursuing my goals" (Thomas and Killmann, 1974).

When a person is assertive at reaching his/her goals and combines this assertiveness with the concern for the other person, he/she is said to have the collaboration style (Hocker and Wilmot, 1985). The parties work collaboratively when they try to find solutions that will maximize goals for all. These people would agree with the statement, "I attempt to get all concerns and issues immediately out in the open" (Thomas and Killmann, 1974). Through this style people explore the disagreement in order to learn from the other's insights.

Compromise is an intermediate style between assertiveness and cooperation. It is characterized by the statement, "I propose a middle ground" (Thomas and Killmann, 1974). A person who presents this style tries to split the difference and exchange equal concessions with the other party. Compromise usually takes less effort than collaboration, but people might sometimes give in too easily and fail to seek a solution that gives significant gains to either party as a result of compromise.

Avoidance is a non-assertive or passive style. It is characterized by people refusing to engage openly in the conflict, by

changing the topic, withdrawing from the situation, or postponing the discussion of the matter. A person who presents this style would probably agree with the statement, "I try to do what is necessary to avoid useless tensions" (Thomas and Killmann, 1974). This style can be used to benefit oneself by not recognizing the existence of the conflict or the party that initiated it. However, avoidance does not prevent the conflict.

Accommodation is the opposite style from competition. The person who presents this style puts aside his/her own goals in order to satisfy the other party. This person would probably agree with the statement, "I sacrifice my own wishes for the wishes of the other person" (Thomas and Killmann, 1974).

There has been considerable research on the resolution of environmental disputes (Cormick 1980 and 1987, Crowfoot 1988, and Wondolleck 1988). Fishery conflicts are both resource conflicts and environmental conflicts.

For ocean resource conflicts in the United States, legislation is frequently vague and transfers ambitious goals to regulatory agencies, which promulgate standards that are then usually challenged in extended litigation (Nyhart, 1985). One consequence of relying on litigation to solve conflicts is that often neither side is satisfied with the outcome. The costs of lengthy and expensive confrontation have been high to the immediate litigants and to society as a whole.

Susskind and McCreary (1985) examined four coastal zone disputes. One of them was between the fishing industry and the oil industry of Southern California. The resolution of this dispute was assisted by staff from the Mediation Institute of Hidden Hills, California, whose job was to keep the negotiations moving towards consensus. In mediation the parties generate the solutions; the mediator encourages constructive conflict resolution while maintaining neutrality and impartiality (Moore, 1988). The process used to resolve this dispute involved identifying interests, generating options (or alternatives), explaining commitments, jointly evaluating the uncertainties and the scientific evidence available, and framing written agreements. As a result of adopting

mediation, the two industries avoided expensive litigation, improved relationships, and are currently working together on a study of the impacts of seismic testing.

Susskind and McCreary (1985) list seven criteria for evaluating outcomes of conflicts. A good outcome should: 1) satisfy the interests of all the parties involved; 2) insure that all possible joint gains have been secured, which usually requires joint problem-solving; 3) produce a set of implementable commitments; 4) insure legitimacy in the eyes of all those affected by a decision; 5) deal wisely with uncertainty and what is known about the natural and technical systems involved; 6) be reached as quickly as possible, which requires efficient communication; 7) improve relationships and leave the parties in a better position to deal with their differences in the future.

Unfortunately, fishery conflicts rarely produce outcomes that would be considered good by the standards of Susskind and McCreary (1985). Very frequently the management of conflicts produces decisions that require further legal action to implement, or that encourage the escalation of adversarial behavior and compromise the state of future conflicts.

### **The human factor**

This subsection illustrates the importance of studying fishermen and managers. With my research I stress the importance of understanding the human beings behind the regulations because the perceptions of fishermen and managers of each other and of themselves have direct effect on the outcome of fishery conflicts. The studies of biology, statistics, and population dynamics are crucial in determining the regulations, but people are also involved in the decision-making process.

The following authors have done extensive research on the attitudes and/or the behavior of fishermen and managers. Their

papers demonstrate how fishermen's and managers' attitudes can affect the management of fisheries.

The importance of understanding the "human side" of the fisheries is presented by Wilen (1979) when he discusses fishing effort and ways to predict efficient fishery regulation programs by analyzing fishermen's behavior. He points out that effort is multidimensional because it is dependent on many variables. Simple one-input models are not rich enough to provide policy guidelines that are flexible to changing fishery technology. Wilen suggests a system that produces incentive to the owner to fish efficiently, such as individual fixed quotas. He bases his conclusion on the behavior often observed in fisheries where the total catch is limited and divided between many participants; "each fisherman will be share conscious and hence driven, as a prisoner's dilemma game, towards inefficiency and rent dissipation" (Wilen, 1979).

Deweese and Hawkes (1988) examined the adoption of technical innovations in the Pacific Coast trawl fishery using a model with three groups of variables: fishermen's personal characteristics and situation, their attitudes about fishing, and their perceptions of different technical innovations. The results of their study confirmed the expectation that the effects of the variables vary across innovations. Their work was not only important for giving insight about adoption of technical innovations, but also added important information about fishermen's personal characteristics and attitudes, which are essential for the good management of the resource.

Healey (1985) agrees with the previously cited authors on the need to analyze the behavior of the fishermen and how they choose among alternative courses of action. The author used a population model of the Gulf of Maine herring (*Clupea harengus*) to determine whether the fishermen preferred short or long-term returns. Usually, when stocks are low and recruitment is poor, a long-term yield policy is adopted to allow the rebuilding of the stock. He discovered, for example, that the appearance of a good year class, caused the fishermen to reject stock rebuilding in favor of good catches. "By knowing about fishermen's preferences, the

management regime possibly could have been adjusted by manipulating other attributes of importance to the fishermen to make stock rebuilding palatable at a time of good recruitment - obviously critical to achieving the desired goal" (Healey, 1985).

In my study I examine how fishermen see themselves and how they see managers, and vice-versa. If fishery managers' attitudes towards fishermen (and vice-versa) are based upon negative preconceptions, then a likely result is mistrust on both sides and destructive conflicts. Acheson (1975) illustrates this idea when he analyzes the Maine lobster fishery and fishermen. For example, he emphasizes that it is very inaccurate to stereotype fishermen as being unconcerned with the resources they exploit. Also it is wrong to assume that fishermen cannot agree on anything, especially in reference to possible ways to manage the fisheries.

Fishermen and managers must develop mutual understanding in order to achieve good resource management. Pringle (1985) studied certain eastern Canadian and Californian inshore fishermen. He showed that fishermen have a positive concern for resource management, contrary to what most managers would think. He added that management plans could be successfully developed through a consultative process in which scientists and managers present resource-based science to the fishermen in a lucid fashion.

What Pringle (1985) suggested with his article is more commonly addressed by conflict resolution experts as the *cooperative* or *problem-solving* approach. By sharing their values, experiences and opinions, the interested parties participate in the process of conflict management, resolution and decision-making (Tjosvold, 1984).

In a democratic society such as the United States, experienced scientists and resource managers should understand that for management to work properly, scientists, resource managers, and fishermen must communicate effectively. They should realize that without confidence between fishermen and fishery managers the management plans will fail.

## The salmon industry

The salmon industry has been important to the Pacific Northwest for many decades. Salmon fishing is a controversial issue because of its decline and the possible extinction of many stocks. For this reason, I decided to focus my study on salmon fishermen and managers. I will summarize in this subsection some background on the salmon industry, causes of the decline of salmon, and ways to prevent further decline. The perceptions by fishermen and managers of these issues determine the way they act upon the resource and the conflicts generated during its management.

There are five species of Pacific salmon found in the West coast of North America: sockeye (*Oncorhynchus nerka*), pink (*O. gorbuscha*), chum (*O. keta*), coho (*O. kisutch*), and chinook (*O. tshawytscha*). The salmon are anadromous fishes that spawn in freshwater and migrate to sea, where most of their growth occurs. In the ocean the salmon migrate from western Alaska to Mexico and some are distributed as far as Russia and Japan, adding to the difficulty in managing the fishery (U.S. Department of State, 1978). When they become mature adults, they return to their natal streams, spawn, and die. In consideration of their life cycle, Healey (1982) defines a "stock" of salmon as the members of a particular spawning population.

Over the past 20 years recreational salmon fishing opportunities and commercial harvests have declined in the Pacific Northwest. Recreational and commercial fisheries have been regulated below levels needed to maintain satisfactory public access to the resource (Boley and Robinson, 1992). As an example, the salmon trollers that made landings in Oregon in 1992 decreased almost 50% when compared to 1991. There were 649 boats that made salmon landings in 1992 compared to 1,217 boats in 1991 (PFMC, 1993a). California and Washington State trollers also decreased their landings of salmon. When compared to the number of trollers landing salmon in 1982 (3,269) the low levels of salmon landings are even more evident. In 1972 the number of boats was

less (2,392) than in 1982, but it was still more than triple the number of boats in 1992.

The ocean salmon fisheries in Washington, Oregon, and California include commercial ocean troll and net fishermen, ocean charter, private ocean sport, inland sport, and Indian fishermen. Chinook and coho constitute the principal targets of the ocean salmon fisheries from the US/Canada border South to near Point Conception, California (PFMC, 1984).

Because of the migratory life cycle of salmon, the fisheries for salmon involve many different types of fishing methods and fishermen from many different regions. The causes of the decline of salmon are numerous. The hydroelectric and irrigation dams impose barriers and kill salmon migrating to and from the ocean. "Hatchery production used to support the weakest natural runs, at the same time may reduce the genetic viability and resistance of wild stocks and generate increasing fishing pressure" (PFMC, 1984). Hatchery fish increase the likelihood of diseases and are also competitors with the wild fish. "Logging destroys salmon habitat by eliminating water-protecting plants along streams and causing silt to clog spawning beds" (Northwest Power Planning Council, 1992). Salmon troll, drift-nets, sport fishing and even marine mammals result in the loss of salmon. Salmon are also caught incidentally in the west coast ground fishery (PFMC, 1984). The most variable and uncontrollable factors affecting the decline of the salmon are the adverse weather and ocean conditions, such as El Niño events, which change the ocean currents. This phenomenon reduces the upwelling near shore and the plankton productivity, which impacts the availability and size of the salmon as well as the survival of immature fish (Radtke and Jensen, 1988).

Many people will suffer if salmon runs in the Pacific Northwest continue to decline and eventually become extinct. The kinds and intensity of losses might differ between the affected parties, however. For example, commercial fishermen may not only suffer financially, but also emotionally because their identity is also at stake. Managers might still have their jobs if the resource is jeopardized, but they also have interest in protecting the resource;

therefore, they may have an emotional loss. Because protecting the salmon also involves making the dams less harmful to them, the electric companies will have to spend money, and eventually will transfer their costs to the rate payers. Coastal communities will suffer with the lack of tourists and fewer salmon processing plants. Sports fishermen will lose a recreation opportunity. Consumers will have less salmon to eat. The citizens will suffer with the loss of an important resource.

Management decisions also affect sectors of the fishery that support harvesters and their local communities. These sectors include processors, suppliers, marketers, and organizations associated with the fishery (PFMC, 1984).

To measure losses and benefits of different salmon management measures is difficult, especially because they do not always involve monetary figures. However, it seems there is still time to mitigate the losses and rebuild salmon runs. This is a "complex process because salmon lead complex lives" (Northwest Power Planning Council, 1992).

For example, there needs to be increasing survival in the rivers where the salmon spawn and develop, as well as in the tributaries. This requires screening dams to divert salmon from the turbines and water diversions for irrigation. There is a need to speed the water flows so that salmon can move more quickly to the ocean by increasing the amount of water stored during the winter to be released in the salmon migration period.

Fishing could take advantage of the timing and location of abundant runs, and avoid the weaker ones. Also managers need better information on how many fish are being caught and where they are being caught to help setting harvest policies. These few measures are controversial because of their cost and effectiveness, and they alone cannot guarantee that the runs will be rebuilt. The future of the industry is uncertain unless the parties involved with the salmon resource cooperate towards a common goal of rebuilding the stocks.



## The Pacific Fishery Management Council

The Pacific Fishery Management Council (PFMC or Council) is the entity responsible for making recommendations about conservation and allocation issues in the salmon fisheries, as well as other marine fisheries, in the Pacific Northwest. Many of the managers who were incorporated into this research were members of the PFMC. This subsection reviews the decision-making process by the PFMC with regard to the salmon industry.

The PFMC was created by the Magnuson Fishery Conservation and Management Act of 1976 with the "primary role of developing, monitoring, and revising management plans for fisheries conducted within 3 to 200 miles of the US coast" (PFMC, 1990).

The Council has 13 voting members. They include: the Regional Director of the National Marine Fisheries Service (NMFS); the Chiefs of Fisheries for Oregon, Washington, California, and Idaho; and 8 private citizens who must be knowledgeable and experienced regarding management of fishery resources in the Council area. These private citizens are appointed by the Secretary of Commerce from lists submitted from each State governor (PFMC, 1990).

In 1976 when the PFMC was formed, the Salmon Fishery Management Plan (FMP) dealt with the commercial and recreational fisheries for chinook and coho salmon for Washington, Oregon, Idaho, and California because they required immediate attention for conservation and allocation problems. Every year after that, the FMP was amended to focus on the specific needs and problems of that year. Management became more restrictive with each amendment in response to low run sizes and allocation requirements (PFMC, 1984). However, in 1982, after an examination of the management measures from 1977 to 1980, the degrees of success of the measures varied. One of the causes for the mixed success of the FMPs was that they had been "limited to the ocean harvest phase of the salmon resource and further limited to the ocean off Washington, Oregon, and California" (PFMC, 1984). As mentioned in the subsection "The

salmon industry", salmon management needs a comprehensive plan that addresses all phases of the salmon's life.

In 1984 the Council decided to change the annual amendment process of the FMP to a system that allowed the Council to make changes in the fishing regulations without extending the decision-making process and without the costly and time-consuming paperwork created by the amendment process. The Framework (Multi-Year) FMP process started for 1985 fisheries and allowed the fishery user groups to know the management measures at an earlier date. The public was still able to comment on the proposed regulations as a result of the Framework process.

The PFMC holds public hearings to identify issues which should be considered in the amendment of a FMP. The meetings are held in locations where there is a considerable public interest for the specific issue and they coincide with where the fish species are widely caught. The primary management meetings for salmon are in March and April.

The issues discussed in these meetings are directed to the appropriate technical team to develop a draft amendment. The draft is then submitted to the appropriate advisory subpanel and the Scientific and Statistical Committee for review and comment to the Council. Each draft approved by the Council is then submitted to the public for review and comment, and hearings are held. On the basis of the comments received, the Council may decide upon the appropriate amendment and submit it to the Secretary of Commerce for approval and implementation (PFMC, 1990).

Salmon fishing is a controversial issue and much attention is given by the public to the conservation and allocation measures. For example, newspaper articles were devoted to the PFMC recommendations for the 1993 salmon season. "But federal officials warned the Council could be overruled because the season may not allow enough salmon to return to the Klamath River" (Anonymous, 1993).

"On May 10, the PFMC reaffirmed its support for its original recommendations to the Secretary of Commerce for the 1993 ocean salmon fisheries" (PFMC, 1993b). Meanwhile, in terms of catch, the

1993 spring commercial season in the lower Columbia River was the worst since 1950, mainly because cold river temperatures forced the fish to stay in the ocean (Northwest Power Planning Council, 1993).

## METHODS

My interest in studying conflict management in fisheries led me to interview the parties involved in the conflict because I felt it was appropriate to learn from them their perceptions of the problem. Another approach I considered was to study records and transcripts of past public hearings, PFMC meetings, and advisory board meetings, and compare statements from fishermen and from managers to verify whether their perceptions differed in their statements, and whether the outcomes of specific conflicts reflected their different perceptions. However, I believe that empirical data, the researcher's own experience, and direct observations of the world, are much more valuable and credible when the research involves people and their perceptions.

After a preliminary observational study, I decided to focus my research on perceptions of fishermen and managers of the commercial salmon industry. I developed a questionnaire as a result of this first stage because I felt that this was the most objective approach to studying differences in perceptions. My intention was to ask fishermen and managers the same questions and compare their responses.

The observational stage was done in Corvallis and Newport, Oregon, from March to June 1992. Part of this observational work was done at a public hearing in Astoria (March 1992), and at a salmon advisory meeting and public meeting, in Milbrae, California (September 1992). The questionnaire was developed and reviewed during the months of July and August of 1992. The structured interviews started in August and ended in October 1992. They took place in Corvallis, Newport, and Milbrae, California. The following subsections describe the methods in more detail.

## Stage 1 - Observational study

I conducted my stage 1 observations with managers and biologists of the Oregon Department of Fish and Wildlife (ODFW) and commercial fishermen found in Newport. I also attended public hearings organized by the PPMC. This stage started in March and ended in June 1992.

This first stage could also be called exploratory or ethnographic research because it involved direct observation, interviewing and consultation without following a strict protocol. The interviews during stage one were not structured, because I did not have specific questions. I started by asking the interviewees about their work and professional goals. With fishermen I asked about their boat and gear to get them interested in talking to me. At some point in the conversation, I directed them to talk about the present fishery situation. With managers, I asked about their interaction with fishermen and vice-versa. Most of the interviews at this stage were tape-recorded. I transcribed both the tape-recordings and field notes to facilitate the reporting and analyses of my results.

As a result of these first interviews, I decided to focus my research on the perceptions of managers and salmon fishermen regarding certain issues. The salmon issue appeared several times during conversation with the subjects and was very controversial. The differences in perceptions appeared to be an interesting aspect to the problem because the subjects interviewed during stage one presented different views about the same issues. The results of this stage will not be reported in this paper. A paper was presented and an abstract has been published about this work (Mrakovcich, 1993). The important points, however, served as background for developing the questionnaire referred to in the next section.

## Stage 2 - Questionnaire development

The next step to this research was to develop a questionnaire for testing the hypothesis that fishermen and managers have different perceptions and that decision-makers have more similar perceptions than non-decision-makers. If fishermen responded differently from managers when answering the same questions, then the hypothesis that they have different perceptions would be supported. I included questions that allowed me to differentiate decision-makers from non-decision-makers to be able to verify their differences in perceptions as well. The questionnaire is shown in Appendix A.

The questionnaire was designed using recommendations given by Dillman (1978). Aspects such as issues, structure, and order of questions were considered. According to Dillman (1978), the first step to writing questions is to identify what kind of information is being sought. In my case I needed to determine the subjects' perceptions. Dillman (1978) describes this type of information as "beliefs", what a person thinks is true or false. When developing my questions I referred to his examples of questions about beliefs.

The second step was to decide on the structure of the questionnaire. I wanted some questions that would allow me to use statistical methods to measure the differences in responses between fishermen and managers, and I wanted some questions that would allow the subjects to express their opinion in their own words. The first type of questions are called "closed-ended", and the second type "open-ended". I chose to ask closed-ended questions with "unordered response choices" instead of ones with ordered response choices. For example, I chose to ask the subjects to pick one alternative instead of asking them to rate a statement from "strongly disagree" to "strongly agree". The problem with a limited list of responses is if the subjects' preferred options are not stated. That is the reason some of the questions in my questionnaire have so many alternatives. I tried to be as comprehensive as possible with the choices. According to Dillman (1978), the closed-ended

questions with unordered response choices are often used to establish priorities among issues and decide among alternative policies. These questions are usually more difficult to answer than those containing ordered answer choices, because the respondents must balance several ideas in their minds at the same time. However, I felt the unordered response choices were more appropriate for the type of information (perceptions) I was trying to measure.

I asked people with experience in the salmon fishery to review the questionnaire and comment on the content and wording of the questions. The questionnaire was reviewed by professors, fisheries managers, and one commercial fisherman. After reviewing the questionnaire, some people felt they could not pick one single answer for some of the questions. Therefore, I transformed these questions into statements to which the subjects were asked if they agreed or disagreed. Those are questions 7, 8, and 9 (Appendix A).

In developing my questionnaire I considered the order of the questions, an additional step not suggested by Dillman (1978). I wanted my questionnaire to follow the order of cause, effect, and solution. I also wanted to divide it into sections with each section following this same pattern. Therefore, the first section deals with the causes of salmon decline, the second one deals with the effects of fishery conflicts, the third one deals with fishermen and managers involved in the conflict, and the fourth one deals with the decision-making process and better ways to manage the fishery.

Dillman (1978) suggests that the initial questions should be simple to answer. Therefore, the first questions were closed-ended, because they involve less thought than the open-ended ones. The responses to the closed-ended questions are referred to as quantitative data and the responses to the open-ended ones as qualitative data. For example, the first four questions deal with the salmon industry, and the first three are closed-ended, and the fourth is open-ended. According to Dillman (1978), open-ended detailed questions usually follow closed-ended questions to allow the interviewee to vent his/her frustrations about the specific subject discussed. I recognize that open-ended questions have the

disadvantage of demanding more from the interviewee. However, open-ended questions encourage the free expression of thoughts, which is essential for the development of good resource management.

There are two basic philosophies about analysis in sociological studies; one view is that quantitative data should not interfere with qualitative interpretations, and the other is that qualitative and quantitative data complement each other. Blumer (cited by Hammersley, 1989) was a proponent of the first philosophy, while Hammersley (1989) criticized Blumer and reviewed some of his beliefs. My research follows the view that quantitative and qualitative data could be combined in the same study as long as reasonable arguments are given for the application of both techniques.

Blumer (cited by Hammersley, 1989) claimed that the statistical method is of limited value in social studies because it can only deal with static situations, not with processes developing over time. He felt that statistical methods are only appropriate where behavior is routinized. Furthermore, he emphasizes that statistical analysis can only give us correlation, not causal relations. I realize that the perceptions of fishermen and managers could change over time. Nevertheless, I feel it is important to study them at a point in time and recognize that the findings are specific to the time studied.

Taking into consideration Blumer's valuable insights regarding the limitations of statistical analyses of social data, my research recognizes the importance of using the best information available, which, in this case, I believe is the use of quantitative data with supplementary qualitative information (Glaser and Strauss, 1967) to verify the very complex phenomenon of perceptions. The following subsections will describe each section of the questionnaire given in Appendix A and explain each question in more detail.



## **The salmon industry**

The first question of the questionnaire is supposedly the most important because it can determine whether the subject continues to participate (Dillman, 1978). Because the only way to solve a problem is to find the cause(s) for it, I chose to ask about causes first. I expected the fishermen and managers to disagree on the causes of the salmon decline. In question 1, I listed possible causes of the salmon decline and asked the subjects to choose which they felt were most and least important.

Managers and fishermen were also expected to disagree on which parties would suffer the most and the least from the decline of salmon. Question 2 asked "who will suffer with the decline of salmon?". The alternatives listed were developed from comments by fishermen and managers collected during stage one as well as from the literature (Boley and Robinson, 1992; Northwest Power Planning Council, 1992). They did not reflect my personal opinion.

Given my expectation that fishermen and managers would disagree on the causes of the salmon decline, I also expected them to disagree on the ways to manage the problem. Question 3 listed the improvements needed to prevent the further decline of salmon and asked the subjects to choose the most and least important ones.

The first section of this questionnaire finished with an open-ended question about the future of the industry. With this question the subjects had an opportunity to convey their feelings about the future of the salmon industry and to clarify the points they made in their responses to questions 1 through 3.

## **Fishery conflicts**

I expected managers and fishermen to disagree on their perceptions of conflict, because they are affected differently by the results of fishery conflicts. Question 5 listed statements about

fishery conflicts and asked the subjects to choose the most and least appropriate. The statements were based on results from stage one interviews with some modifications using theories of conflict management.

I expected fishermen and managers to have different attitudes about conflicts because of their different backgrounds and cultures. Question 6 listed statements that describe possible attitudes that one might have towards a person with whom they are in conflict. The subjects were asked to choose the most and least appropriate ones. The statements were taken from the Thomas and Killman (1974) instrument, which tries to measure people's attitudes or styles in conflict situations.

### The human factor

Because generally people see themselves more positively than they see others, I expected fishermen to see themselves in a more positive way than managers would see them. Question 7 listed seven statements that characterize fishermen and asked the subjects if they agreed or disagreed with each statement. The statements were taken from the stage one interviews.

Question 8 was similar to 7, except that it had statements about managers. It was also composed of seven statements with which the interviewees were asked to agree or disagree. The statements about managers were also taken from the stage one observational study.

Question 9 inquired about the relationship between fishermen and managers. Five statements about the barriers between fishermen and managers were listed and the subjects indicated whether they agreed or disagreed with each statement. I expected fishermen and managers to have different perceptions of the barriers to their communication, because each group would try to blame the other for the miscommunication. If they disagreed about

the barriers to their relationship, they would have more difficulties overcoming them.

It is important to know the causes of the problem, but it is even more important to try to find solutions to them. Therefore, I closed this series of three questions with an open-ended question regarding what should be done to improve the relationship between fishermen and managers.

### **The Pacific Fishery Management Council**

This section deals with the decision-making process of the PFMC. Question 11 listed five alternatives and asked the subjects to choose the ones they felt the PFMC should give the most and least weight when making decisions. This question is a crucial one in understanding why there is so much conflict in the fishery decision-making process. Because I assumed fishermen and managers to have different values, I expected them to perceive the importance of issues differently.

Question 12 listed several meetings that occurred between 1991 and 1992 and asked the subjects to say which ones they were able to attend. I used this question to separate the decision-makers from the non-decision-makers (discussed later under "Data preparation").

The phrasing of question 13 was different for fishermen and for managers. It listed five activities and asked the subjects how often they had been involved in each activity. I did not use this question to measure the differences in perceptions, but I combined this information with the responses to question 12 to measure a fisherman's or a manager's willingness to participate in the decision-making process (discussed later under "Data preparation").

Question 14 listed four statements about salmon public hearings in 1991-1992 and asked the interviewees to select the most and least appropriate. The first two statements were constructive comments and the two last ones were destructive

criticisms about the hearings. I expected fishermen to perceive the hearings as being destructive and managers to see the hearings as constructive experiences, because fishermen are usually unsatisfied with the results of the hearings while managers are responsible for making the decisions.

The next two questions were open-ended. Question 15 asked "What do you think could be done to improve the quality of public hearings?", and question 16 asked "What do you think could be done to balance the power of all sectors of the fisheries industry?" These questions gave the interviewees an opportunity to express their views without being led to a pre-determined answer.

Beginning with question 17 were questions for collecting demographic information such as professional experience, size of boats for fishermen, or whether a manager had been a commercial fisherman. The responses were used to measure the representativeness of the interviewees as well as explore other groupings of fishermen and managers.

The very last question (number 22 for managers and 25 for fishermen) was open-ended and concluded the questionnaire with a request for other comments.

### **Stage 3 - The interviews**

The interviews started on July 10 and ended on October 10, 1992. During this period, 47 fishermen and 36 managers answered the questionnaire. Most interviews (51%) were in person, more commonly referred to as face-to-face interviews, 36% were done over the telephone, and 13% were mailed to me after a brief interview on the phone.

Instead of mailing questionnaires, I preferred the face-to-face approach because I believed that people would be more likely to cooperate if they knew that I was there to hear and care for what they had to say. After the stage one interviews, I realized that mailing questionnaires would only result in a low response rate. The

next statement from a fisherman illustrates how skeptical he was about giving out information.

What's happened is so much of the information that people have given out has turned against them. [You] fill out a form to find out what the best fishing area is and that's why they cut that one off. That's what [managers] have done with all this information we turned in to them.

Managers also showed reluctance in answering questionnaires. This quote from a manager interviewed on stage 1 confirms my suspicions that managers would probably not answer mailed questionnaires. "I don't think most [managers] would fill out a questionnaire. We're all sick of questionnaires... So most of us just basically don't fill them out." This same manager advised against sending questionnaires to fishermen, but interviewing them instead.

With fishermen I proceeded by going to docks 5 and 7 in Newport and trying to find fishermen who were willing to talk for a few minutes. I also went to the PFMC meeting in Milbrae, California, between September 13 and 18, 1992, and spoke with a few representatives from the fishing industry and met with fishermen attending the meeting. While in California, I went to the docks at the port of Half Moon Bay and met with two fishermen to whom I handed out 20 questionnaires for distribution among other port fishermen. Unfortunately, this approach was not very successful; I received only one response.

Most fishermen (40 out of 47) were interviewed face-to-face. Six of them mailed the questionnaire after answering it, and only one was interviewed on the phone.

With Council members and advisory board members as well as with managers from the Oregon Department of Fish and Wildlife (ODFW) and non-agency managers, I proceeded by telephoning them, explaining the purpose of my research, and trying to schedule a 20-minute interview. When I could not arrange a face-to-face interview because of scheduling problems and/or the long traveling

distance, I sent them a copy of the questionnaire and scheduled a telephone interview. Most managers (81%) ended up having a telephone interview. Only 2 out of the 36 managers were interviewed face-to-face and 5 mailed me their completed questionnaires.

Managers were more cooperative in answering the questionnaires than fishermen. Although I did not record how many people refused to be interviewed, I estimate that only about 10% of the managers did not answer the questionnaire, while most fishermen representatives whom I telephoned did not answer the questionnaire even after many attempts over the phone. On the face-to-face interviews at least half of the fishermen I approached did not answer the questionnaire.

### **Data analyses**

I used contingency tables to measure the differences in perceptions between managers and fishermen, and between decision-makers and non-decision-makers.

I used the statistical package "Statview SE+ graphics" for Macintosh for the analysis. Both missing values (unanswered questions) as well as multiple responses (more than one answer for the same question) were included in the analyses.

### **Data preparation**

To measure differences in the perceptions of fishermen and managers I assumed that my samples from the two groups were independent and I recorded fishermen's and managers' responses separately.

Because "decision-maker" is a subjective term, I needed an objective method to differentiate between decision-makers and

non-decision-makers. I used two methods for distinguishing between decision-makers and non-decision-makers.

For my first method I used question 12, which asks about the attendance at the 1992 public salmon meetings, to differentiate between the decision-making fishermen and the non-decision-making fishermen. I treated any fisherman who attended at least one meeting as a decision-maker. I reasoned that going to meetings indicates a willingness to participate in the decision-making process. For the managers, 31 out of 36 had been to at least one of the meetings listed in question 12. I did not feel it was appropriate to differentiate between decision-makers and non-decision-makers on the basis of how many meetings they attended, because it is part of the manager's job to attend these meetings. Instead, I decided to use question 13a that asks if they have ever been a Council member. I reasoned that Council members would have different perceptions than non-members because of their greater participation in the decision-making process.

For my second method I developed a more comprehensive scoring technique that considered more than one variable to distinguish between decision-makers and non-decision-makers. The scores were designed to measure the degree to which fishermen and managers interacted with each other, experienced the problems of the other party, and/or showed willingness to participate in the decision-making process.

I gave each fisherman one point for: (1) each meeting attended out of the listed ones on question 12; (2) having ever written a letter to the Council (question 13a); (3) having ever given testimony at meetings (question 13b); (4) having ever phoned or gone to ODFW concerning a permit or regulation (question 13c); (5) having ever been in the Council mailing list (question 13d); (6) having ever had any other type of involvement concerning salmon fisheries (question 13e). I gave each fisherman 2 points for: belonging to any fishing association (question 23). I then separated the fishermen into two groups. The ones with a total score less than six points I called "non-decision-making fishermen" (24 out of 47) and the ones with a score more than six points I called "decision-making fishermen".

I gave each manager one point for: (1) the number of the salmon public meetings attended (question 12); (2) being a member of the PFMC (question 13a); (3) attending salmon meetings or hearings (question 13b); (4) going to the docks to talk to fishermen (question 13c); (5) going out on the ocean with commercial fishermen (question 13d); (6) any other type of involvement with the salmon fisheries (question 13e). I gave each manager 2 points for: having ever been a commercial fisherman (question 20). I then separated the managers into two groups. Those with total scores less than seven, I labeled "non decision-making managers". The remaining 16 I called "decision-making managers".

In order to test the hypothesis that decision-makers' perceptions are more similar than non-decision-makers' perceptions (Table 1), I decided to use the fishermen and managers grouped using the combination score because it seemed to be the most comprehensive approach.

## Quantitative analyses

In this research I needed to measure the discrepancies between the responses by the different categories: fishermen (F), managers (M), decision-making fishermen (DF), non-decision-making fishermen (NF), decision-making managers (DM), and non-decision-making managers (NM). I used the  $\chi^2$  goodness-of-fit statistic to compare the groups,

$$\chi^2 = \sum [(O_k - E_k)^2 / E_k]$$

where  $O_k$  = observed frequencies in the  $k^{\text{th}}$  cell,

$E_k$  = expected frequencies in the  $k^{\text{th}}$  cell,

and the expected frequencies were based on the hypothesis of no differences between the different categories.

The term "goodness-of-fit" refers to the discrepancy between an observed set of frequencies (or answers in this case) and an expected set of frequencies (Champion, 1981). If the two sets of frequencies were identical, then  $\chi^2$  would be zero. As the samples



become more dissimilar  $\chi^2$  increases. The magnitude of  $\chi^2$  also depends on the number of categories (k) into which the data are divided. I used the two-tailed probability values ("p-values") for a theoretical  $\chi^2$  statistic with k-1 degrees of freedom to rank the total chi-square values. When the p-value was less than 0.05, I considered the  $\chi^2$  to be unusually large.

The recommended operating sample size range for the  $\chi^2$  statistic is between 25 and 250 observations. In my study the total number of interviewees was 83 (36 managers and 47 fishermen). One disadvantage of the chi-square statistic is that whenever expected cell frequencies are less than 5 for any cell, "distortion is introduced which yields an unusually large observed  $\chi^2$  value" (Champion, 1981). Because some of the questions had many alternatives and some of the alternatives were chosen infrequently, this problem occurred often during the analyses of my data.

I dealt with this problem of sparse cell frequencies by combining alternatives that had expected values less than 5, and then recalculating the  $\chi^2$ . However, if the original  $\chi^2$  was smaller than the 5% significance cut-off value, then I did not combine the alternatives, because to do so would only result in an even smaller  $\chi^2$ . I needed to combine alternatives for most questions, with exception of questions 6a, 7, 8, and 9 (Appendix A). The combined alternatives are mentioned when appropriate in the Results, subsection "Fishermen versus managers".

The chi-square procedure for analyzing categorical data is an approximate method. For two-by-two contingency tables with small samples, I used Fisher's exact method. I could only use this method for questions 7, 8, and 9 because they were the only questions with only two possible answers. For these questions when the total of the answers added up to 30 or less, and the p-value was less than 0.05, I verified the chi-square rankings using Fisher's procedure (Zar, 1974).

For example, on question 8.7 when I compared the decision-making fishermen versus the decision-making managers (DF v. DM - Table 3), the total number of subjects answering that question was 29, and the p-value from the chi-square analysis was less than 0.05

( $p=.0001$ ). When I analyzed the data using Fisher's method, I confirmed the  $\chi^2$  results and found the null hypothesis of no difference in perceptions between DF and DM to be rejected at  $p < 0.001$ . I repeated this procedure for all appropriate questions. Because Fisher's test confirmed the chi-square results in all instances, I just considered the p-values from the chi-square analyses when summarizing my results.

The results of the chi-square analyses were organized into a table and ranked by order of disagreement (e.g., Table 3) as measured by the p-value. I looked at how many questions presented large differences when testing: decision-making fishermen versus decision-making managers (DF v. DM); decision-making fishermen versus non-decision-making managers (DF v. NM); non-decision-making fishermen versus decision-making managers (NF v. DM); and non-decision-making fishermen versus non-decision-making managers (NF v. NM). The results of these analyses are discussed on subsection "Combination score", under "Results".

## Qualitative analyses

Because the terms "managers" and "fishermen" are generalizations and do not represent individuals, I included open-ended questions in the questionnaire to provide the subjects the opportunity to express their opinions on various issues of conflict management. The responses to these open-ended questions required qualitative interpretation and they helped me understand the complexity of the issues. I did not analyze the responses statistically, but summarized them in an orderly manner.

In addition to the responses gathered on the questionnaires I examined other qualitative information such as statements recorded at public meetings, a letter received from a fisherman, and material from my stage one interviews. Some of this information is used to illustrate the points made in the Results section.

For my qualitative analysis of the open-ended questions I examined the responses from fishermen and managers to questions

4, 10, 15, and 16, and 22 for managers or 25 for fishermen. I developed statements that best summarized the various answers and then tallied how many fishermen and managers used these statements in their responses.

## RESULTS

### Characteristics of the samples

#### Demographics

The questions numbered 17 and greater were used to measure demographic attributes of the respondents rather than for hypothesis testing. For example, question 17 asked the subjects for their years of experience, question 20 asked fishermen whether they were self-employed and asked managers whether they had ever been commercial fishermen. Because questions 12 and 13 (concerning public meetings and involvement with the decision-making process) similarly were not used in hypothesis testing, the responses to these questions are also discussed in this section.

For analyzing numerical responses, such as years of experience, I grouped the data into intervals or categories. For example, if a fishermen answered "Newport and Astoria" to the question "What ports do you fish from?", I put him in the category "Oregon ports".

Regarding the list of public salmon meetings (question 12), 17 out of the 47 fishermen interviewed said they had not gone to any of the meetings. Out of the remaining 30 fishermen, 21 had been to 1 meeting, 7 had been to 2 meetings, and 2 had been to 3 meetings. Twenty-three fishermen had never written a letter to the Council (question 13a). Sixteen fishermen had never given testimonies at meetings (question 13b). Sixteen fishermen had never phoned or gone to the ODFW office concerning a regulation or permit (question 13c). Nineteen fishermen had never been on the Council mailing list (question 13d).

Regarding their experience 30 fishermen said they had less than 20 years of experience as commercial fishermen (question 17); ten fishermen had between 21 and 25 years of experience; seven had

between 26 and 40 years of experience; and none of them had over 40 years of experience as a commercial fisherman. Many fishermen (23%) had between 16 and 20 years of experience of actually fishing (question 18), and most fishermen interviewed (94%) were currently active (question 19). Only 3 out of the 47 fishermen were retired. I included the retired fishermen in my survey because their previous experience qualified them to answer the questionnaire.

Forty-two out of the 44 currently active fishermen were self-employed (question 20); the other two were deck hands. Some fishermen (22%) interviewed fished only out of Newport (question 22). The remaining fishermen fished out of other ports in Oregon (20%), Washington and Oregon (7%), California and Oregon (20%), California, Washington, and Oregon (22%), only California (5%), and only Alaska and Washington (3%). Given that most of my interviews were done at docks 5 and 7 in Newport, it is not surprising that the fishermen I interviewed fished primarily from Oregon ports. One fisherman was interviewed at the Half Moon Bay Port in California, two at the PFMC meeting in Milbrae, and one fisherman representative was interviewed over the phone.

Many of the fishermen interviewed (51%) did not belong to any association (question 23). Given the problems faced by the industry, it is interesting that so many fishermen chose to maintain their independence and not belong to an association. Out of the 23 fishermen who belonged to associations, 9 of them belonged to associations in Oregon, 7 in Washington, and 7 in California.

Out of the 36 managers interviewed, 5 had not gone to any of the meetings listed on question 12. Sixteen managers had gone to 1 meeting. Ten managers had gone to 2 meetings. Two managers had been to 3 meetings, and 3 managers had gone to 4 meetings.

Twenty managers had never been a member of the PFMC (question 13a). Only one manager had never been to any salmon meetings (question 13b). Five managers had never been to the docks to talk to fishermen (question 13c). Twelve managers had never gone out on the ocean with commercial fishermen (question 13d).

Out of the 36 managers interviewed, 20 of them had 20 or fewer years of experience in fisheries (question 17). Ten of those

managers had between 16 and 20 years of experience. Of the remaining 16 managers, only 3 had over 40 years of experience.

An interesting finding was that many managers (10 out of 36) had no experience in salmon-related research (question 18) and yet they were making decisions about salmon regulations. Of the remaining 26 managers, 7 had less than 5 years of experience in salmon-related research. Only one manager had over 30 years of experience in research. I found that people who had a lot of experience in management were likely to have had little experience in research and vice-versa.

Most managers (24 out of 36) had less than 10 years of experience in salmon-related management (question 19). Only a few managers (5 out of 36) had been involved in managing the industry for more than 30 years.

Only 7 of the managers interviewed had ever been commercial fishermen (question 20). This question was introduced to determine whether managers who had been fishermen and had suffered the consequences of fishing regulations were more understanding and had perceptions more similar to the fishermen's. However, because there were so few managers who had been commercial fishermen, a formal analysis seemed inappropriate.

One of the 7 managers who had been a fisherman had between 26 and 30 years of experience as a commercial fisherman. Two had between 6 and 10 years of experience as fishermen, and 4 managers had from a few months up to 5 years of experience.

## **Representativeness**

It is important to verify that the samples obtained well represent the populations from which they were extracted. I was not able to randomly sample the fishermen because I did not have a complete list of the fishermen, and even if I had had a list, it would have been difficult to find fishermen at their addresses because they would have been fishing when the season was open.

My sampling approach was based on the notion that I would have to find and try to interview fishermen at the ports or at meetings. This opportunistic sampling design allowed me to interview a reasonable number of fishermen without knowing the exact population they were extracted from. All I knew about the fishermen was that they had to have a license to fish out of the Oregon ports, with the exception of two fishermen who fished only in California and one who fished out of Alaska and Washington.

I used the boat-sizes to verify the representativeness of the fishermen I interviewed. Fishermen must report the size of their vessel to the state fishery agencies to renew their fishing permits.

The sizes of the boats I sampled varied from 2 to 32 net tons. Most of them (59%) were between 5 and 10 net tons (Figure 1). Twenty-three percent were between 10 and 15 net tons; 7% were between 15 and 20 net tons; 5% were between 20 and 25 net tons; and the remaining 2% were between 35 and 40 net tons. I compared the size distribution of the boats I sampled with the size distribution of the licensed boats of Oregon in 1992 (ODFW, 1992). Out of those licensed boats, however, not all landed salmon during 1992 and it was impossible to identify which licensed boats did land fish in 1992. The licensed boats varied in size from 1 to 66 net tons. The mean tonnage of the licensed boats was higher (13) than the interviewees' boats (10). However, the modes for both distributions was in the under 10 net tons class.

In order to compare my samples to the boats that made landings in Oregon in 1992 (PFMC, 1993a), I had to convert the net tonnage of the boats I sampled into length in feet, because the list of the PFMC was only in feet. I applied regression analysis to ODFW's list of boats licensed in 1992 and estimated the following relationship:

$$\text{size in feet} = 24.928 + 1.191X - .008X^2 \quad (R^2 = 0.747),$$

where "X" is the net tonnage.

The boats I sampled varied from 27 to 55 feet (Figure 2). Most boats (68%) were between 30 and 39 feet. The boats that landed

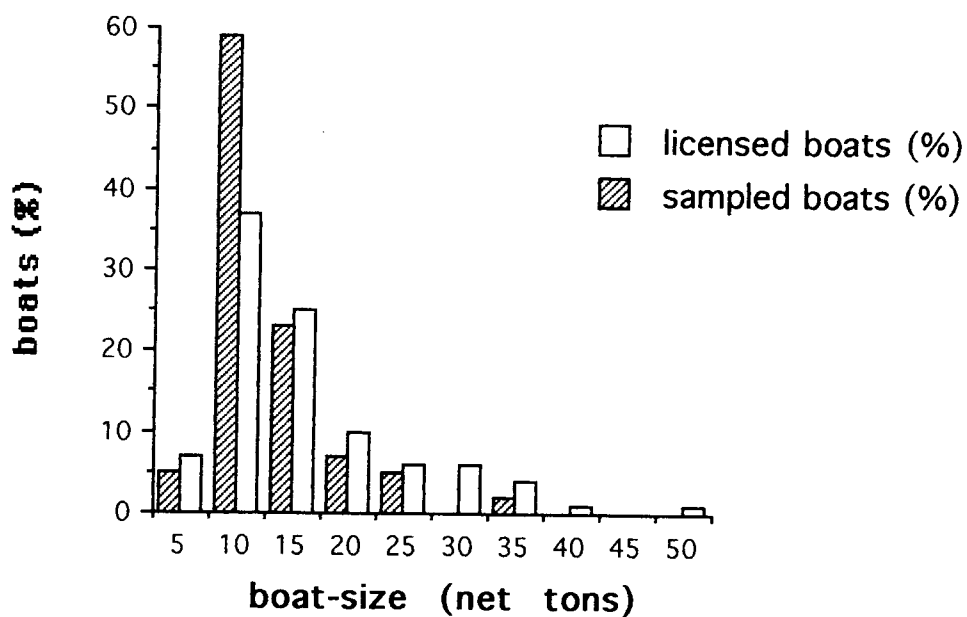


Figure 1: Comparison of the sampled boats with the salmon boats licensed in Oregon in 1992.

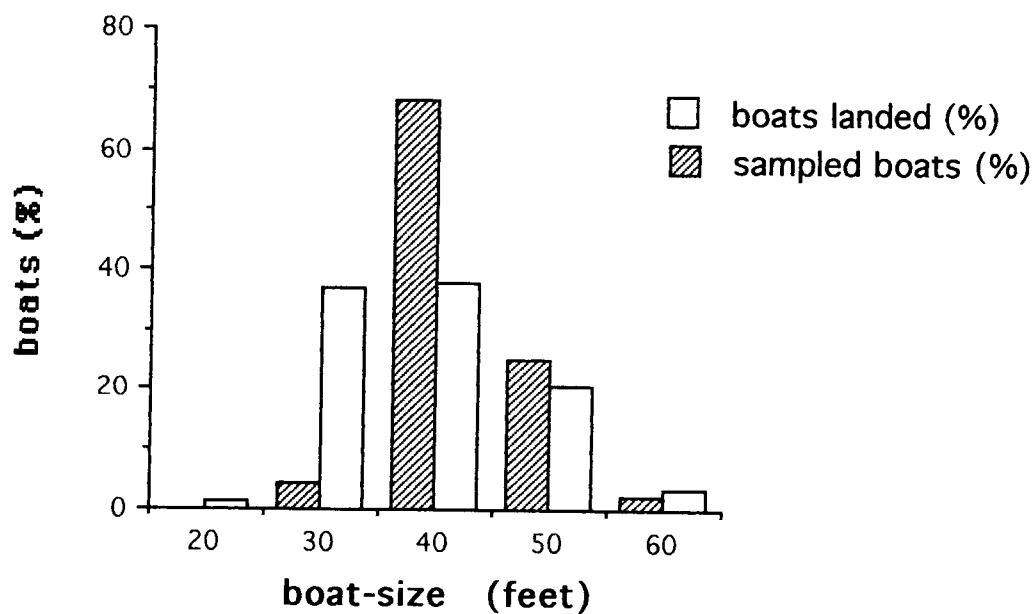


Figure 2: Comparison of the sampled boats with all the boats that landed troll-caught salmon in Oregon in 1992.



troll-caught salmon in Oregon in 1992 varied from less than 20 feet up to more than 50 feet (PFMC, 1993a). The mode from the boats that made landings were from 30 to 39 feet (38%).

According to Figures 1 and 2, the boats I sampled represent well the boats that were licensed and that landed salmon in Oregon in 1992. Knowing that the boats I sampled were a representative sample of the salmon in Oregon in 1992, does not necessarily indicate that the fishermen I sampled are a representative sample of all the commercial salmon fishermen in Oregon. However, this indirect measure was the only tool I had to verify the representativeness of the sample of fishermen.

The question of representativeness might not be appropriate for the managers because most managers I proposed to interview answered the questionnaire. I interviewed 16 out of 18 active Council members, 10 ODFW managers involved with salmon industry, all the Salmon Technical Team (7), and 3 non-agency managers. The managers interviewed were almost a complete census of the population from which they were extracted.

I am aware of the limitations of this survey. First, there was at least a 50% non-response bias for the fishermen. Second, the interviews with managers were done mostly over the phone while the fishermen were mostly interviewed face-to-face, so the 2 sets of results may have different forms of interview bias. Third, the sample of fishermen was not collected in a strictly random fashion. Because of these problems I cannot rule out the possibility that my survey results may not apply to the complete populations of salmon fishermen and managers.

### **Decision-makers versus non-decision-makers**

I concentrated my initial investigation on the hypothesis that the parties involved in the decision-making process will have perceptions that are less polarized because of their constant exchanging of information and listening to the other's perceptions.

First I differentiated fishermen and managers into groups of decision-makers and non-decision-makers, as described in "Data preparation". Then I calculated chi-square statistics to measure whether decision-making fishermen had different perceptions from the non-decision-making fishermen, and whether decision-making managers had different perceptions from non-decision-making managers.

The results of my chi-square analysis are presented in Table 2. The column labeled "DF v. NF - question 12" lists the 10 questions for which there was the most disagreement between decision-making fishermen and non-decision-making fishermen, with differential between the groups based on question 12. The questions are ordered by ascending p-value (descending amount of disagreement). It was intriguing that I found no questions for which the p-value was smaller than 0.05. If my survey had been truly random, I would conclude that the observed levels of disagreement were indistinguishable from random noise. This result suggests fishermen's perceptions are not affected by whether they attend public meetings or not.

The questions by ascending order of p-value for the decision-making managers versus the non-decision-making managers are presented in Table 2 column (DM v. NM - question 13a). Surprisingly, as happened with the fishermen, I did not find any difference using the chi-square analysis at the 0.05 p-value for any of the questions.

This result suggests perhaps that although managers who work closely with the decision-making process have more opportunity to interact with fishermen and listen to their views, their perceptions do not differ from other managers who are not decision-makers.

One could argue that going to meetings, does not make a fisherman a decision-maker. There is only one commercial salmon fisherman who is a Council member with actual decision-making authority. Even representatives to the salmon advisory subpanel do not make the decisions but only advise the Council. During a meeting in Milbrae, California on September 17, 1992 a fisherman representative said: " Now, these are the experts here (referring to

Table 2: The 10 questions that presented the most disagreement between decision-makers and non-decision-makers.

Order by p-value	DF v. NF question 12	DM v. NM question 13a
most disagreement	3a	1b
2	8.3	1a
3	1b	8.5
4	9.4	14a
5	5a	8.3
6	9.5	3a
7	8.5	5a
8	1a	8.7
9	8.7	9.4
least disagreement	7.3	2a

the Salmon Technical Team). We have to agree with at least some of what they have to say."

However, if the meetings were a setting where cooperative decisions were made, fishermen who go to meetings should have a better understanding of the process. Therefore, their perceptions should be less polarized than the ones that don't go to the meetings.

### Combination score

The results of the previous analysis intrigued me but were discouraging with regard to my hypothesis that decision-makers have more similar perceptions than non-decision-makers. However, I decided to repeat the analysis using the combination score as the criterion for separating decision-makers from non-decision-makers. The results are given in Table 3. The questions marked with asterisks had p-values that were less than 0.05, indicating a high degree of disagreement in the responses.

A table in the Appendix (Table 14, Appendix B) summarizes the responses from fishermen (F), non-decision-making fishermen (NF),

Table 3: The questions ordered from most to least disagreement between the groups tested.

ORDER	DF v. DM	NF v. NM	DF v. NM	NF v. DM
most disagreement	8.7*	1b*	1b*	1b*
2	9.1*	8.2*	8.7*	14a*
3	14a*	8.3*	8.2*	9.1*
4	8.2*	8.7*	11a*	8.7*
5	8.1*	14a*	8.1*	9.4*
6	14b*	11a*	8.3*	9.5*
7	1b*	8.5*	14a*	7.2*
8	11a*	9.5*	14b*	14b*
9	8.3*	14b*	9.2*	8.3*
10	9.4*	8.1*	8.5*	8.2*
11	7.2*	2a*	2a*	11a
12	9.2	5b*	9.1*	3a
13	9.5	1a*	9.5*	8.1
14	3b	5a*	5a*	6a
15	2a	9.2*	7.7	7.1
16	2b	7.2	1a	2a
17	8.6	6b	7.2	8.5
18	7.1	3a	7.3	5b
19	8.5	9.4	8.6	6b
20	5a	7.3	9.4	5a
21	6b	7.7	11b	8.4
22	3a	9.1	3b	2b
23	6a	6a	6b	3b
24	11b	7.1	2b	11b
25	7.6	9.3	6a	9.2
26	7.3	3b	9.3	1a
27	9.3	8.4	7.5	7.7
28	7.4	2b	7.1	7.3
29	7.5	11b	3a	8.6
30	5b	8.6	7.6	9.3
31	1a	7.6	5b	7.4
32	7.7	7.4	8.4	7.6
least disagreement	8.4	7.5	7.4	7.5

\* p-value less than 0.05.

decision-making fishermen (DF), managers (M), non-decision-making managers (NM), and decision-making managers (DM).

When I compared decision-making fishermen with decision-making managers (DF v. DM) they showed an unusual amount of disagreement on 11 questions (Table 4). When I compared non-decision-making fishermen versus non-decision-making managers (NF v. NM), they showed unusual amounts of disagreement on 15 questions. This result supports my hypothesis that the perceptions of decision-makers are more similar than the perceptions of non-decision-makers. However, this difference is not very large considering that the total number of questions was 33.

When comparing decision-making fishermen with non-decision-making managers (DF v. NM ), there was a level of disagreement (14 questions with  $p < 0.05$ ) that was intermediate between the decision-makers (DF v. DM ) and the non-decision-makers (NF v. NM ). This result also supports my hypothesis. However, when I compared non-decision-making fishermen with decision-making managers (NF v. DM ) they showed an unusual amount of disagreement on only 10 questions. There was less disagreement between these groups than would be expected under my hypothesis (Table 1).

These results in Table 4 do not strongly support my hypothesis that decision-makers have more similar perceptions than non-decision-makers. I expected that the decision-makers would disagree on the least number of questions, because they had the opportunity to exchange views. A chi-square test of Table 4 indicates that the numbers of different responses (11, 10, 14, and 15) are not significantly different from the average number of different responses (12.5). The chi-square value was 1.36 with 1 degree of freedom with a p-value between 0.20 and 0.30. This result suggests that the involvement in the decision-making process does not have an appreciable effect on the perceptions of fishermen nor managers.

Table 4: Degrees of disagreement between fishermen and managers.

Fishermen Managers	Decision-making fishermen (DF)	Non-decision-making fishermen (NF)
Decision-making managers (DM)	11	10
Non-decision-making managers (NM)	14	15

Because the number of questions in disagreement did not differ greatly when considering the decision-making criterion, I decided to examine in more detail the questions common to all combinations tested that presented the most disagreement. I took the top 10 questions from Table 3 that presented the most disagreement. The results are given in Table 5. The most disagreements were over perceptions of managers, followed by perceptions about public hearings.

It is also important to know what fishermen, managers, decision-makers and non-decision-makers agreed the most on. I took the bottom 10 questions (after question 23 on Table 3) and determined which questions appeared most frequently. The results are presented in Table 6. Most of the agreements were about perceptions of fishermen. These results will be discussed in more detail in the subsection "Fishermen versus managers."

### Other tentative groupings

Because my method for differentiating between decision-makers and non-decision-makers did not result in groupings with many differences in perceptions, I decided to try other criteria for separating fishermen and managers into groups.

Table 5: Issues that fishermen and managers disagreed the most on.

Question/ Statement	Most fishermen	Most managers
8.7: managers have never been on the ocean, so they don't understand	agreed	disagreed
8.2: managers are fisheries experts	disagreed	agreed
8.3: managers mediate fisheries conflicts	disagreed	agreed
8.1:managers try to interact w. fishermen	disagreed	agreed
1b: the least significant cause for the decline of salmon in the Pacific Northwest.	overharvest	driftnet fisheries
14a: the most appropriate statement about the salmon public hearings in 1991-1992.	fishermen were skeptical about what managers had to say	all parties had an opportunity to present their views
14b: the least appropriate statement about the salmon public hearings in 1991-1992	testimonies given by public influenced final decision	info. presented by Council was difficult to understand
11a: what should be given the most weight when decisions are made by PFMC	1)sustainability 2)well-being of all user groups	1) sustainability of fish populations (100%)

Table 6: Issues that fishermen and managers agreed the most on.

Question/Statement	Most fishermen	Most managers
7.5: fishermen are individualistic	agreed	agreed
7.4: fishermen like freedom	agreed	agreed
7.6: fishermen dislike governmental bureaucracies	agreed	agreed
9.3: fishermen and managers see problems in a different way	agreed	agreed
11b: what should be given least weight when decisions are made by PFMC	the overall economy	the overall economy
6a: most likely attitude in a fisheries conflict	cooperation	cooperation
8.4: managers speak a very technical language	agreed	agreed

I wanted to determine whether there were other factors influencing the perceptions of fishermen and managers that could explain some of my previous findings. This subsection describes tentative groupings of fishermen and managers based on variables such as years of experience, boat size, and membership in fishermen's association.

I divided fishermen into two groups based on their stated years of experience (question 17). The 30 fishermen who had less than 20 years of experience as commercial fishermen were compared to the more experienced fishermen to verify whether "years of experience" was a factor that influenced their perception. However, I found no differences between the responses of these groups at the 0.05 p-level for any of the questions tested. This result suggests that it does not matter whether the fishermen are more or less experienced; their perceptions are still the same.

I examined whether small boat fishermen had different perceptions than the large boat fishermen. I used the results from question 21 to divide the fishermen into two groups, one group with 28 fishermen who had boats that weighed less than 10 net tons, and another group with the remaining fishermen. I found no differences at the 0.05 p-level in the responses of these groups, which suggests that the size of boat fishermen work on does not affect their perceptions of the salmon issues.

Because most of my interviews were done in Newport, I wanted to determine if Oregon fishermen had different perceptions from the fishermen who fished elsewhere. I divided the fishermen into two groups using the results from question 22. Nineteen fishermen I called "Oregon fishermen only" and the remaining 26 I called "other fishermen". The latter group included fishermen that fished out of ports in California, Washington, and Alaska. I did not find differences at the 0.05 p-level in the responses of "Oregon fishermen only" versus the "other fishermen". However, the chi-square results were limited by the fact that many of the expected responses in the contingency table were less than 5. Nevertheless, this result indicates where the fishermen fished from had little influence on their perceptions.



I also speculated that membership in a fishing association might influence fishermen's perceptions. I used the results from question 23 to separate the fishermen into groups that were "organized" (20 fishermen) and "unorganized" (24 fishermen). For two questions (5a and 8.7) I found differences in the responses by the two groups at the 0.05 p-level. The results for these questions are given in Table 7.

The differing responses to question 5a (choose the most appropriate statement about fishery conflicts) suggest that fishermen who belong to an association, and are therefore more involved in the decision-making process, have more positive perceptions of conflict, because they do not perceive it as something that can be avoided or as something that prevents change.

I expected fishermen who belonged to associations (organized fishermen) to have a more positive attitude towards managers than the ones who did not belong to associations, because they would be more involved in the decision-making process and would have more opportunity to interact with managers. However, the responses to question 8.7 (managers have never been on the ocean, so they don't understand) indicates the opposite (Table 7). Perhaps the involvement by fishermen in the decision-making process makes them even more negative towards managers because their interaction is not a cooperative process.

In addition to examining alternative methods for separating fishermen, I also considered alternative methods for grouping managers. I tried using their years of experience (question 17) to differentiate between the less experienced managers (20 of them had less than 20 years of experience in fisheries) from the more experienced ones. However, I found no strong differences in the responses by the two groups to any of the questions tested. I tried separating the managers into two groups based on their years of experience in salmon-related research (question 18). There were 10 managers in one group that had no experience in salmon-related research, and the remaining 26 managers were in the experienced group. None of the questions generated strong disagreement between the groups. I also used the results from question 19 to test whether

Table 7: Questions that presented differences in the responses from "organized" fishermen and "unorganized" fishermen.

Question	Answer	Organized	Unorganized
5a: the most appropriate statement about fisheries conflicts	"Conflict is inevitable, but promotes necessary changes."	(14%)	(33%)
	"Conflict is inevitable, but it can be resolved"	(76%)	(25%)
	"Conflict can never be resolved, only managed."	(9.5%)	(17%)
	combined alternatives: "Conflict could be avoided" and "Conflict is inevitable, and prevents changes."	(0%)	(25%)
8.7:	"Managers have never been on the ocean, so they don't understand."	agreed (100%)	agreed (67%)

managers who have more experience in salmon-related management have different perceptions from the ones who have less experience, but I found no strong differences for any of the questions tested. The results from these analyses indicate that their years of professional experience have no strong influence on managers' perceptions of the salmon conflict.

I wanted also to determine if there were any differences between managers who had experience working on the ocean and the ones who did not. Because there were only seven managers who had ever worked as commercial fishermen, I could not conduct the chi-square analyses because the results would have been distorted by the low expected values. However, I was able to use the results of question 13d to separate the managers into groups that had, and had not, been on the ocean with a commercial fisherman and I found no strong differences in the responses of the two groups, which suggests that "hands-on experience" does not influence the perceptions of managers.

## Fishermen versus Managers

Because I found no strong differences between decision-makers and non-decision-makers, I decided to consider fishermen and managers as only two distinct groups and try to determine if their perceptions differ on certain issues.

This subsection discusses the responses of fishermen and managers and suggests possible reasons for their apparent differences in perceptions. First I examine the questions that presented the most disagreement in the responses of fishermen and managers. Then I examine the questions that presented the most agreement in the responses by fishermen and managers.

### Differences in the perceptions of fishermen and managers

In this subsection I discuss the questions that presented the most disagreement between fishermen and managers. Table 8 gives the results from my quantitative comparison of the responses by fishermen and managers. The questions are ranked according to the size of discrepancy between the responses from managers and fishermen. Out of 33 questions, 18 had high chi-square values with p-values less than 0.05 (indicated by asterisks). Below I discuss the questions and responses beginning with the question that showed the most disparity between fishermen and managers.

Question 1b: When asked to point out the least significant cause for the decline of salmon in the Pacific Northwest, 35% of the fishermen, but only 5% of the managers, said that "overharvest" was the least significant cause. This particular result is not surprising given that most fishermen will not hold themselves responsible for the decline of salmon and given that most managers believe that their contributions (fishery regulations) serve to enhance the resource. A comment by a fisherman at the Astoria public meeting

Table 8: Questions by order of disagreement in the responses from fishermen and managers (F v. M).

ORDER	F v. M	SUMMARY OF THE QUESTION
most disagreement	1b*	least significant causes of salmon decline
2	8.7*	managers never on the ocean, don't understand
3	8.2*	managers are fisheries experts
4	11a*	what should be given most weight by PFMC
5	14a*	most appropriate statement about public hearings
6	8.3*	managers mediate fisheries conflicts
7	8.1*	managers try to interact with fishermen
8	14b*	least appropriate statement about public hearings
9	9.1*	fishermen and managers don't trust each other
10	9.5*	fishermen and mgr. don't interact frequently
11	8.5*	managers are concerned only preserving fish pop.
12	2a*	groups who will suffer the most w. salmon decline
13	9.2*	fishers and managers don't speak same language
14	7.2*	fishermen like taking risks
15	9.4*	fishers & mgr. don't respect the other's knowledge
16	5a*	most appropriate stat. about fisheries conflicts
17	1a*	most significant causes of salmon decline
18	3a*	areas needing most improvement to prevent further salmon decline in the Northwest
19	7.3	fishers hold strongly about their positions
20	7.1	fishermen are knowledgeable about the ocean
21	6b	least likely attitude in a fisheries conflict
22	7.7	fishermen lack a conservation ethic
23	6a	most likely attitude in a fisheries conflict
24	2b	groups who will suffer the least w. salmon decline
25	5b	least appropriate statement about fishery conflict
26	3b	area needing least improvement to prevent the further decline of salmon in the Northwest
27	7.4	fishermen like freedom
28	8.4	managers speak a very technical language
29	8.6	managers are neutral in allocation issues
30	9.3	fishers and managers see problems differently
31	7.5	fishermen are individualistic
32	7.6	fishermen dislike governmental bureaucracies
least disagreement	11b	what should be the least weight by PFMC

\* p-value < 0.05.

on March 31, 1992 further illustrates the gap between fishermen and managers. "If harvest is the major problem, how come after restrictions in the last 15 years the stocks are way down?"

Because there were very few responses to the alternatives "dams," "logging practices," "poor management," "drought," "hatchery practices", and "habitat loss", I combined these into a single response "others", which was selected by 18% of the fishermen and 0% of the managers.

The two groups also split over the importance of marine mammals. While 8% of the fishermen chose "marine mammals" as the least significant cause of salmon declines, 27% of the managers chose this response. One explanation for this contrasting point of view may be that fishermen are directly affected by the attacks of marine mammals on hooked salmon. Because the size of the catch is extremely limited, coupled with the fact that the resource is very elusive, every fish taken by a marine mammal is viewed as a great loss. Here are 2 quotes that illustrate how fishermen feel about marine mammals. "Manage mammals better. There are too many of them." And "Nobody says anything about seals and sea lions. They are 24 hour-day fishermen."

Question 8.7: Eighty percent of the fishermen, but only 11% of the managers, indicated agreement with the statement that "managers have never been on the ocean, so they don't understand." Although I found earlier that "hands-on" experience had no major influence on managers' perceptions, fishermen evidently felt that managers do not spend enough time on the ocean to understand the problems that fishermen face. When I asked one fishermen "What do you feel could be done to improve the relationship between fishermen and managers?", he replied.

If the managers had to spend a season on a troller and see the problems that are caused by some of their regulations, management techniques, and practices, they would have given more consideration to their practices.

Managers try to justify their lack of "hands-on " experience by saying that they are not allowed enough time in the field. To the same question about improved relationships between fishermen and managers, a manager replied:

More field time being available to managers [would help]. Quite often you have too many other work priorities [that] tie you to your desk. Fishermen would have a better understanding if we were with them more. Ideally if we had simpler regulations, life would be less complicated and relationships between fishermen and managers would be better.

Smith (May 14, 1993, Department of Anthropology, Oregon State University, Corvallis, OR, 97331, personal communication) noted that fishermen want managers to go out on the ocean so that they can teach the managers, while managers feel it is important to go out with fishermen on a boat so that they can teach fishermen about regulations, biology, etc.

Question 8.2: Another statement that presented disagreement in the responses from fishermen and managers was that "Managers are fisheries' experts". Only 16% of fishermen agreed with this statement while 80% of managers agreed. Fishermen very frequently expressed doubts about the capability of managers in any sector of the fisheries as illustrated by the following quotes from fishermen. "Managers could spend more time studying and less time trying to manage something they have not studied adequately." And "Managers should be better qualified to do their job. The majority of managers have zero (if not very little) experience of being in the field. Managers have to [have] a more aggressive role addressing issues that affect the troll salmon industry."

Question 11a: Next on the list of the most disagreement between fishermen and managers was the question of "What should be given the most weight when decisions are made by the PFM." Although many of the fishermen (42%) chose "the sustainability of

fish populations", 100% of managers chose that alternative. The major source of disagreement in this case was that fishermen also chose "the well being of the commercial fishermen" (11%), "the overall economy" (4%), "the overall quality of the environment" (15%) and the "well being of all user groups" (28%). Managers found that the resource always had to come first, independent of the users' needs.

Question 14a: Another issue they disagreed on was "public hearings". Only 17% of the responses from fishermen were that "all interested parties had an opportunity to present their views" at the PFMC hearings, while 71% of responses from managers went to that alternative. Managers would like to believe that they are part of a fair and democratic process where everyone can express their opinion. Because they were chosen infrequently I combined the alternatives "the testimonies given by the public influenced the final decision" and "the information given by the Council was difficult to understand". Only 15% of the responses from fishermen and 14% from managers went to this combined alternative.

I found it interesting that fishermen and managers agreed that testimonies have little influence on the decision-making process at the hearings. Fishermen feel frustrated and sometimes give up participating at the hearings because they feel powerless in the whole process. The following illustrate this. When asked "What do you think should be done to improve the quality of public hearings?", fishermen answered "The testimony by the public should influence the final decision", or "They could have a meeting before the decision is made", or "Public hearings are to pacify the public only", and "...The Council meetings are a joke. They sit there and fall asleep (I've seen it). Unfortunately, it is our opinion they have already made up their minds before they have the meetings. Those meetings are the only thing that makes their decision legal."

It is important to note that managers also believe that there is very little weight given to testimonies. Some of them even feel that the PFMC hearings are only a formality and should be

eliminated. In response to the question about public hearings (question 15), a manager answered:

Eliminate them in favor of the workshop with all competing interests (i.e.: managers, loggers and fishermen's workshops). The public hearing process is a one-way street. The council listens but does not comment. I have not found them to be very productive. People come with outrageous comments and you can't make comments.

The technical nature of the information given at the hearings was mentioned as an impediment in the decision-making process. A few people suggested that the information should be summarized and available to the public before the hearings to facilitate the understanding of the alternative regulations. In response to question 15, one manager answered: "Get the information out as soon as possible in summary form. Limit the range of alternative seasons and quotas to those which can be selected realistically."

When asked to choose the most appropriate statement about salmon public hearings, most fishermen (68% of the responses) said that "they were skeptical about what the managers had to say", but managers were apparently unaware of this fact. Only 14% of managers chose that alternative. Miscommunication and mistrust can lead to destructive conflict management. The following is a quote that illustrates one fisherman's view.

Personally, I find the "numbers game" quite confusing as I'm sure many others do also. Realizing this is not an exact science and does have many variables, I would find it very helpful to know just how these numbers are arrived at. The formulas used have many variables and much [are] arrived at by educated guesses, but I would like to see and be able to analyze them myself before making judgment calls.



Question 8.3: Although some fishermen (37%) agreed that "managers mediate fisheries conflicts", most managers (94%) agreed with that statement. This question was introduced not only to test differences in perceptions, but also to determine whether the participants understood what mediation is because it is a widely misunderstood term. Moore (1988) defines mediation as "...an intervention into a dispute or negotiation by an acceptable, impartial, and neutral third party who has no authoritative decision-making power to assist disputing parties in voluntarily reaching their own mutually acceptable settlement of issues in dispute."

The following statement was taken from a letter sent to me by a fisherman representative in response to the questionnaire I sent him. His statement was written four years ago. It illustrates the idea that managers should not be expected to function as mediators between user groups because they are not viewed as a neutral party.

...the history of PFMC salmon regulation in and around the KMZ (Klamath Management Zone) has led trollers there to view PFMC as a mortal enemy, intent on eliminating the troll fishery. Tension between Indians and whites has been exacerbated by the transfer of catch from the ocean to the Indians, with no compensation to trollers for what has been taken from them. A brief thawing of trollers' relations with PFMC in 1986 and 1987 was followed by a chill in 1988, and a blast-freeze in 1989. Trollers have learned that logic and reason cannot be applied to PFMC's own data within the context of the PFMC process to win more equitable treatment; they have learned that any agreement with PFMC or its agents can and will be used against them; in short, there appears to be no hope for the future of the troll fishery within the PFMC process as it now exists. Therefore trollers are now turning to Congress as their last hope. Will Congress be able and willing to hold PFMC accountable for its actions?

This statement is also an example of how perceptions change over time. In conversation with this fisherman, he stated that the PFMC process is now much more democratic and that what he felt four years ago is not how he feels now.

Question 8.1: Fishermen were almost split equally on the question that "Managers try to interact with fishermen." Forty-one percent of fishermen agreed with the statement, and 91% of managers agreed. The managers apparently perceive that they interact with fishermen. Fishermen, however, seem to be less certain that this is true.

Question 14 b: Fishermen and managers also disagreed on "the least appropriate statement about public hearings". The most discrepancy between the responses from fishermen and managers was over the alternative "the testimonies given by the public influenced the final decision" . Most fishermen (72%) found that the least appropriate statement about public hearings, while only 28% of managers chose that alternative. "The information presented by the Council was difficult to understand" received 9% of answers from fishermen and 55% from managers. Because there were few responses I combined the alternatives "all interested parties had an opportunity to present their views" and "fishermen were skeptical about what the managers had to say." Fishermen chose this combination 19% of the time and managers chose it 17% of the time.

Question 9.1: When asked if they agreed with statements about "the major barriers between fishermen and managers", fishermen and managers disagreed the most concerning the issue of trust. Most fishermen (94%) agreed with the statement that "They don't trust each other", while 59% of managers agreed with it. The next following quotation from a fisherman summarizes some of his feelings of about "trust".

I think you hit the nail on the head about not trusting each other. We have been treated for several years now like liars and thieves. We are constantly boarded (on the ocean) checking our papers and fishing gear to make sure we are doing every thing legal. Some of us are checked every few days or at least once a month. The managers on land (PFMC) have more than once told us we had no credentials for making decisions about the fisheries. We have been burned more than once about working with management because they lie and keep the fisheries fighting amongst ourselves. The old divide and conquer system seems to work.

Question 9.5: In the section on the relationship between fishermen and managers another statement that suggested disagreement was "they don't interact very frequently". Seventy-eight percent of fishermen agreed with the statement while only 39% of managers agreed. Most managers seem to perceive that the two groups are given enough opportunity for interaction and resolution of conflicts. Some of them, however, think that more interaction is needed. The next quote from a manager states that without face-to-face interaction and communication a constructive management of fisheries is not likely.

The face-to-face discussion of problems that each group faces would improve the relationship. Both managers and fishermen don't know the problems that the other faces. Fishermen blame managers for things they can't do anything about...

Question 8.5: The statement that "managers are only concerned in preserving fish populations" also generated disagreement between fishermen and managers. Many fishermen (40%) agreed with the statement, but only 6% of managers agreed. Managers will not admit their bias towards the resource, although all of them already had mentioned their belief that "sustainability of the fish populations"

(question 11a) is the most important factor in the decision-making process by the PFMC.

Question 2a: There were differences in the responses by fishermen and managers to the question of "who will suffer the most with the decline of salmon". Only 13% of fishermen chose "future generations of citizens", while 44% of managers felt that this group had the most to suffer. When I interviewed some managers and biologists of the Oregon Department of Fish and Wildlife, they mentioned that the goal of the agency was to "protect the resource for future generations." Because managers have a bureaucratic role and probably internalize their organization's goal, it is understandable that they feel that the citizens will be the ones to suffer the most with the loss of the salmon.

None of the managers or the fishermen chose "managers" as the ones to suffer the most with the decline of salmon. "Large-boat salmon fishermen" received few responses by fishermen (18%) and managers (12%) compared to "small-boat salmon fishermen (40% for fishermen and 12% for managers).

Question 9.2: Fishermen and managers disagreed over the statement "Fishermen and managers don't speak the same language". Most fishermen (81%) agreed with the statement, but only 47% of managers agreed. If fishermen do not understand the technical language of managers and if they feel misunderstood during public hearings, then of course they will agree with that statement. The next quote is from a manager who was interviewed during stage one of my research. He was very concerned about the language differences between managers and fishermen.

...Generally, in a conflict situation the scientist-type has to earn respect just to get at the same level. I would give them a bunch of scientific [terms] and they'd just stop. I wasn't speaking their language.

Question 7.2: Among the statements about fishermen, the one that generated the most difference in the responses was "Fishermen

like taking risks". Only 20% of fishermen agreed with that statement while 51% of managers felt it was appropriate. Some fishermen commented that "We don't like taking risks, but it comes with the profession." Many managers, however, think that fishermen like dangers and financial risks.

Question 9.4: Most fishermen (76%) agreed that "managers and fishermen don't respect each other's knowledge", while only 46% of managers agreed with that statement. Fishermen, in general, were more negative about their relationship with managers and about managers. They seemed not to trust managers' capabilities or honesty in coming up with numbers, predictions, and regulations.

Managers are usually constrained by the quality of technical advice they receive. This is the failing of the present system. Technical advisors (most but not all) have at present: a) no scientific ethics; b) no accountability for mistakes; c) a lack of morality for public concerns different [from] their own personal political agenda. All too often the science is selectively presented to force a decision in keeping with the personal views of the technical advisors. All too often the science is terribly flawed, or indeterminate, always uncertain, but there is no accountability for mistakes.

Question 5a: When asked about the "most appropriate statements on fisheries conflicts", the alternative "conflict is inevitable, but promotes necessary changes" received 23% of the responses from fishermen and 31% of responses from managers. The alternatives "conflict could be avoided" and "conflict is inevitable, and prevents changes" were rarely chosen and were combined into one alternative "others". Some fishermen (13%) chose "others", but no manager chose that alternative. "Conflict is inevitable, but it can be resolved" was the most frequent response by fishermen (49%), and managers chose it 34% of the time.

"Conflict can never be resolved, only managed" was infrequently chosen by fishermen (15%). Many managers (34%) chose that alternative because managers apparently felt that conflict is inherent in fisheries and will never be fully resolved.

As long as you have fishery management you will have some level of fisheries conflict. In some cases you can solve the conflict. e.g: The restriction of gillnets in coastal rivers was not necessarily a good solution, but... The best you can do is to manage the conflict.

Question 1a: There were differences as well as areas of agreement between fishermen and managers concerning "The causes of the decline of salmon". Many fishermen (30%) and many managers (31%) blamed "dams" for the decline of salmon. Also, the alternative "others" in which I combined the responses "overharvest", "logging practices", "marine mammals", "drought", "adverse ocean conditions", "hatchery practices", and "treaty Indian harvest" was chosen 9% of the times by fishermen and 9% of the times by managers. However, the alternative that "poor management" was the major cause of the decline, was chosen by 25% of the fishermen and by only 9% of the managers. "High seas driftnet fisheries" was selected by some fishermen (12%) but was rarely chosen by the managers (2%). "Habitat loss" was the most frequently chosen alternative and received 23% of the votes from fishermen, but received 48% of the votes from managers. Some managers explained that their understanding of "habitat loss" also included "dams", "logging practices", and other causes. The managers' choice of "habitat loss" is not necessarily in disagreement with the alternative "dams" chosen by most fishermen.

Question 3a: The last question for which there was unusually large disagreement ( $p < 0.05$ ) was the "areas that need the most improvement to prevent the further decline of salmon in the Pacific Northwest". "Spawning habitat" received the most responses from fishermen (36%) but was chosen by 22% of managers. "Hatchery practices" and "fishing regulations" had to be condensed into "others"

and received 12% of responses from fishermen 2% from managers. "Management" did not receive many answers either from fishermen (4%) or from managers (3%), perhaps because it is too vague. "Fish passage up and down rivers" received 25% of responses from fishermen and 43% from managers. I found it surprising that managers, who did not blame "dams" as the most significant cause of the decline of salmon, here felt that the damage caused by dams needed the highest priority for restoring the salmon populations. "Rearing habitat" received almost the same response from fishermen (13%) and managers (10%).

### **Similarities in the perceptions by fishermen and managers**

The following questions did not support the hypothesis of differences in perceptions by fishermen and managers at the 0.05 p-value. It is important to discuss why fishermen and managers seem to agree more on the following issues than the ones mentioned above. However, I will not examine them in as much detail as above. I will first discuss the question that presented the most similarity between fishermen and managers (the highest p-values). It is the last one listed on Table 8. Then I will discuss the penultimate question, and so on.

Question 11b: Most fishermen (54%) and most managers (48%) chose the "overall economy" when selecting the thing "that should be given the least weight when decisions are made by the Pacific Fishery Management Council". This is a vague alternative because "overall economy" can mean many different things. I think fishermen and managers may have chosen it by elimination, because the other alternatives seemed more important and/or clearer.

Question 7.6: Most fishermen (93%) and most managers (91%) agreed that "Fishermen dislike governmental bureaucracies". This is

another statement that should either have been rephrased or deleted from the questionnaire. Because most people dislike governmental bureaucracies, it is hard to disagree with the statement.

Question 7.5: Most fishermen (98%) and most managers (97%) agreed that "Fishermen are individualistic". The next quote is from a manager interviewed during stage one and it illustrates this view of fishermen. "Historically organization has been the hardest thing. Fishermen are individualistic by nature. They are hard to get together and if they do, it is hard for them to decide on something."

The fact that fishermen are individualistic might be one of the reasons why they feel powerless in the decision-making process. Many fishermen do not agree with their representatives. Many of them do not like to be represented. Single, individualistic fishermen are less powerful than the organized ones. I will further discuss the issue of "power" in the subsection "Qualitative analyses of the open-ended questions", question 16.

Question 9.3: Most fishermen (96%) and most managers (97%) agreed that "Fishermen and managers see problems in a different way." This statement summarizes the whole question of differences in perceptions. Although they did not know the hypothesis underlying my study, fishermen and managers agreed that they perceive problems in different ways.

Question 8.6: Most fishermen (91%) and most managers (86%) disagreed with the statement "Managers are neutral in allocation issues". This is another intriguing result, because the same managers who felt that "Managers mediate fisheries conflicts" (question 8.3, discussed in the previous subsection), did not believe themselves to be neutral.

The idea that fishery managers could function as mediators in allocation issues among users of fish resources is unrealistic. In some allocation issues, such as sports versus commercial fishermen, fishery managers can serve as facilitators or technical advisors, but they can not mediate properly. The term "mediation"



implies that the process has to be impartial and fair and the mediator must have no interest in the outcome of the process.

One disadvantage to the manager functioning as a mediator is that his/her power and knowledge are often questioned by fishermen. Trust in the mediator by the parties in conflict is necessary for the success of mediation. The problem, however, according to some of my interviews of managers and fishermen, is that most fishermen don't trust managers very much and they are more likely to unite themselves against the manager.

Question 8.4: Most fishermen (79%) and most managers (72%) agreed that "Managers speak a very technical language". An intriguing finding, however, was that many managers (53%) disagreed that "Fishermen and managers don't speak the same language", (question 9.2, discussed in the previous subsection). If fishermen and managers speak the same language, as managers perceive it, then managers could not speak a very technical language, because fishermen certainly do not speak a technical language.

Question 7.4: Most fishermen (96%) and all managers agreed that "Fishermen like freedom". In retrospect, this statement was not a good one, because everyone likes freedom. Instead, I should have stated that they have a "free spirit" perhaps.

Question 3b: When asked "what area needs the least improvement to prevent the further decline of salmon in the Northwest", the most popular alternative among fishermen (42%) and among managers (50%) was "fishing regulations". Not all subjects answered this question, apparently because they felt that everything needs improvement and not one or the other area separately.

Question 5b: When asked "which of the statements listed are the least appropriate one about fisheries conflict", the most popular alternative among fishermen (42%) and among managers (63%) was "Conflict could be avoided". A manager on the first stage interviews stated that "The definition of conflict is a disagreement when a

decision is being made over an important resource. If there is an important resource, which this fishery is, and decisions are being made, there has to follow a disagreement by definition."

This is an encouraging result because if fishermen and managers agree that fisheries conflicts cannot be avoided, the parties are not likely to postpone the conflicts nor will they withdraw from them. In most conflict management cases, the avoidance of conflict only leads to postponement, frustration and eventual destructive conflict escalation.

Question 2b: The most popular answer for fishermen was "managers" (48%) for the "ones who will suffer the least with the decline of salmon in the Pacific Northwest". Surprisingly, many managers chose that alternative also (44%), but it came second after "electric rate payers" (53%). One manager stated: "As long as we have problems with the resource, more biologists and managers will be hired to resolve them."

Question 6a: Many fishermen (47%) and managers (69%) chose the alternative "I attempt to get all concerns and issues immediately out in the open" as their "most likely attitude when approaching a person who has a different opinion from theirs in a fisheries conflict." According to Thomas and Killmann (1974), a person who attempts to get all concerns and issues immediately out in the open is likely to be cooperative in a conflict situation. If "cooperation" is in fact their most likely attitude, then the resolution or management of conflict should be productive. However, my experience with fisheries conflicts leads me to question that both parties try to cooperate or that they perceive themselves as having a positive attitude towards the other party.

Question 7.7: Most fishermen (94%) and managers (80%) disagreed that "Fishermen lack a conservation ethic". Although fishermen exploit the resource, it seems to be the common opinion that they do not intend to harvest the very last fish.

Question 6b: Most fishermen (57%) and most managers (85%) chose the alternative "I sacrifice my own wishes for the wishes of the other person" as their "least likely attitude when approaching a person who has a different opinion from their in a fisheries conflict". This result indicates that both sides will not be accommodating to the other and that a passive attitude is not likely to occur.

Question 7.1: All fishermen and most managers (89%) agreed that "Fishermen are knowledgeable about the ocean". Unlike fishermen's perceptions of managers' knowledge, managers seemed to respect fishermen's knowledge.

Question 7.3: Most fishermen (87%) and 100% of the managers agreed that "Fishermen hold strongly about their positions". However, this statement is very general. Most people hold strongly about their positions.

### **Qualitative analysis of the open-ended questions**

This subsection discusses the responses to questions 4,10, 15, 16, and 22 (for managers) or 25 (for fishermen). I grouped the responses to the questions into statements to compare the responses from fishermen and from managers. Tables 9 through 13 summarize the responses to the open-ended questions. The number of statements in each table is greater than the number of respondents because I counted each "no comment" as one statement. Also, when a fisherman or manager made more than one statement, I counted each statement.

The results support my hypothesis that fishermen and managers have different perceptions, because although the interviewee's had an opportunity to respond the questions in their own words, most responses by fishermen differed from the managers' responses.

Table 9: Summary of the responses by fishermen and managers to the question "What do you think is the future of the salmon industry?" (Question 4).

Statement	Fishermen	Managers
Number of respondents	47	36
Number of statements	56*	76*

\*Percentages are of the number of statements.

### Negative views

Expressions such as: "bleak", "dim", "poor", "not good", "hopeless", "doomed", "down the tube", "no future", "endangered".	34%	13%
Recreational fishing will replace commercial fishing.	0%	26%
The future of the salmon industry is uncertain.	11%	0%
More runs will be listed as endangered.	0%	9%
Mixed-stock fisheries will be reduced.	0%	7%
There will be terminal fisheries on hatchery surpluses.	2%	5%
Harvests will be restricted.	0%	7%
Populations will rebound, followed by another crash. It is a cyclical phenomenon.	0%	5%
There will be specialized markets.	0%	4%
There will be limited-entry.	0%	4%
It will be a short-term status quo and minimal fishery.	0%	4%
Commercial fishing is becoming a part-time occupation.	0%	3%

Table 9 (continued)

<u>Statement</u>	<u>Fishermen</u>	<u>Managers</u>
There will be a reduction or elimination of many fisheries.	0%	3%
Other miscellaneous responses.	2%	5%
<u>Positive views</u>		
"I am hopeful."	9%	0%
The future will be good.	2%	4%
The salmon industry can be saved if changes are made.	7%	0%
Endangered Species Act will restore salmon to moderate levels.	0%	1%
<u>Criticisms or suggestions</u>		
Management is the problem. They don't know anything.	16%	0%
We need to get politics out of the industry.	7%	0%
The salmon industry needs more state rather than federal control.	7%	0%
The management needs a "gravel to gravel" approach.	<u>4%</u>	<u>0%</u>
	100%	100%

**Question 4** - Most fishermen and most managers had a negative perception about the future of the salmon industry. For example, 19 fishermen and 10 managers used negative expressions when referring to the future (Table 9). The following example is from a fisherman.

Without major changes in water management and allocation policies (at least in California) I see little hope for the survival of the salmon industry in this state. Those agencies charged with the responsibility to protect and manage the salmon resources have seemingly chosen instead to manage the fishermen while displaying a complete disregard for the socio-economic chaos that resulted. Without a new, realistic and equitable water management policy that provides for the needs of fish and wildlife the salmon industry will soon have no future at all.

An interesting finding was that 20 managers stated that recreational fishing will replace commercial fishing while fisherman seemed to be unaware or to give little importance to that issue. According to Larkin (1982), there are many similarities between commercial and sports fishermen. For example, they are both "addictics of the thrills of the chase", which is one reason for the non-adoption of the limited entry advised by many economists. Another reason for commercial fishermen not viewing sports fishermen as adversaries is the latter are not nearly as efficient in terms of catch for effort or dollar spent.

In my opinion, commercial fishermen do not see recreational fishing as a threat, except when managers make regulations in favor of the recreational fishery. In this case, they are more likely to blame the managers and not the sports fishermen for the unfairness.

According to Smith (1986), if the fishery is viewed as an organism that evolves and has life cycles, the fishery should change as a result of adapting to new environmental conditions. Smith (1986) states that the life cycle of a fishery starts with emphasis

on the commercial use of the resource, then recreational interests become more important, and last the aesthetic or nonconsumptive use of the resource predominates. Through conservation measures and allocation decisions, management tries "to preserve a commercial fishery, or to maintain a mix of commercial, recreational, and aesthetic uses" (Smith, 1986). If the salmon fishery follows the life cycle described by Smith (1986), commercial fishing will be eventually eliminated in favor of recreational fishing. This is also what some managers predicted for the future of the salmon industry. The next quote is from a manager. It supports the idea that the salmon fishery is undergoing a life cycle transition from commercial to recreational use.

[There will be a] shift in priorities towards recreational fishing. If the runs are not rebuilt the commercial fishing, especially in the Columbia River, will end. (...) If the runs are rebuilt and the sport fishing has not an equal [opportunity for] growth, then there is a future for commercial fishing, but it will be difficult to maintain it.

Larkin (1982) compares the salmon fisheries in the Pacific Northwest of fifty years ago with the fisheries of today. Today there are fewer but more efficient commercial fishermen, a larger number of sports fishermen, and hundreds of fishery scientists.

Only managers mentioned that more runs will be listed under the Endangered Species Act (ESA). The same managers usually mentioned the reduction of mixed-stock fisheries. A few of them felt that the industry will supply only a limited specialty market.

[The] salmon industry is in for a rough period as the ESA will curtail mixed stock harvest. [ESA will restore salmon into moderate levels, by improving and protecting the habitat]. Commercial salmon fishing will continue but at a reduced level to supply premium salmon to specialty outlets.

A few fishermen felt uncertain about the future. The next quote indicates the frustration of one fisherman, who felt he could not predict the future or change it, because it is in somebody else's hands.

It is difficult to predict what the future holds for the troll salmon industry. The decisions affecting its future are political in nature and, consequently, can change in order to fulfill political wishes. Unless issues such as water diversions, habitat, and ocean dumping are addressed, the troll salmon industry will continue to decrease.

Very few people had what I call "positive views" about the future of the salmon industry. Only one fisherman and three managers felt that the future was good, but every one of them had some restrictions to their expectations. The following is the statement from the fishermen who had a positive view about the future.

The future is good. It will not be the same as we know it today. It will be a focus on making the conditions better for the ones making a living in the industry. Through limited entries, and individual transferable quotas, there will be an attempt to provide a better living to full-time fishermen. There'll be continued focus on selective harvest attempting to avoid wild and weak stocks, perhaps terminal fisheries.

Four fishermen felt that the resource can be saved if changes are made. Four fishermen recommended more state rather than federal control. The next statement from a fisherman summarizes those views about the future of the salmon industry. "Fair to good, if federal government is less involved in legislation. Better if fisheries have more state control".



All "criticisms and suggestions" came from fishermen. Nine of them blamed management for the dim future of the salmon industry. One fishermen said "There is no future. There's more fish [than] we've ever had. The management is the problem." Another said: "It's shot, because of bad management." And a third said "It could be bright if management [would] improve."

Two fishermen mentioned a "gravel to gravel" approach, which, I believe, means that because salmon begin life in the gravel and also end it on the gravel, management should base its measures on all phases of the salmon life history.

Management is responsible for managing salmon. They are responsible for spawning habitat and responsible for exiting smolts down stream, responsible for fishing regulations and to see that returning adults reach the spawning grounds. Until a "gravel to gravel" management approach [is taken], the salmon industry will be bankrupt.

**Question 10** - When asked what could be done to improve the relationship between fishermen and managers, many fishermen and managers answered active interaction, communication, and "role reversal" (Table 10). Their answers suggested that both fishermen and managers know what it takes to have cooperative management of conflicts.

Although some fishermen and some managers had similar responses to this question, the overall analysis supports my hypothesis that fishermen and managers have different perceptions, because in most cases either fishermen or managers gave more importance to an issue.

A few fishermen (6) and many managers (19) suggested active interaction, face-to-face discussion of problems, and openness as ways to improve their relationship.

Table 10: Summary of responses by fishermen and managers to question "What do you feel could be done to improve the relationship between fishermen and managers?" (Question 10).

Statement	Fishermen	Managers
Number of respondents	47	36
Number of statements	62*	72*
*Percentages are of the number of statements.		
No comment.	3%	2%
There should be more: openness, face-to face discussions, and interaction.	10%	26%
Managers should be on boats collecting data with fishermen.	9%	9%
We should develop common objectives.	6%	7%
There should be role-reversal (Fishermen put in management positions and managers put in commercial fishing positions).	3%	10%
Fishermen should have more influence in the decision-making process in management positions, by implementing co-management.	11%	1%
We should improve sharing of knowledge.	6%	2%
There should be explanation of decision criteria for management decisions.	0%	7%
We should have more knowledgeable managers.	6%	0%
There should be less politics.	6%	0%
Managers need to know more about the industry they regulate.	3%	1%
There should be a better educational system in resource management for managers and for fishermen.	0%	4%
We should simplify regulations.	0%	4%

Table 10 (continued)

<u>Statement</u>	<u>Fishermen</u>	<u>Managers</u>
Managers should manage the resource and not the fishermen.	3%	0%
More local management.	2%	1%
There should be equal representation at all levels.	3%	0%
Managers should be accountable for their mistakes.	3%	0%
There should be more field time given to managers.	0%	3%
Better education of managers about people's thinking.	0%	3%
Managers should reduce the technical language that confuses the public.	1%	1%
Other miscellaneous responses.	15%	8%
<b><u>No suggestion</u></b>		
It is hopeless.	3%	0%
"If we had a surplus of resources..."	0%	3%
<b><u>Positive feed-back</u></b>		
At the council level there is good interaction.	0%	4%
Continued dialogue by the agency.	0%	1%
The representation of fishermen is adequate.	<u>0%</u>	<u>1%</u>
	100%	100%

The next quotes from some managers indicate some good ideas about conflict management. I hope they will implement these ideas. "More active interaction on a week by week basis is needed. Fishermen need a voice in a much more open weekly management scheme."

More issues where the two must work on a long term issue. Our current problem is that the two either don't interact or they interact on crisis "right now" types of problems. Long term planning issues need the expertise of both groups and allow for "lower pressure" interactions, which promote better relationships.

A few fishermen (4) and managers (4) suggested that they should work together in developing common objectives. The next quote from a manager illustrates that perception:

1) Establishment of common goals; 2) Accountability by both groups for actions taken in relation to those goals; 3) Co-management systems to replace current bureaucracy.

Although only one manager and one fisherman used the term co-management as a way to improve their relationship, this idea was implicit in many answers from fishermen and from managers. For example, 6 fishermen felt that they should participate more in the decision-making process, 4 managers mentioned that "there should be explanation of decision criteria for management decisions", which is the idea of co-management.

Co-management can be defined as sharing the resource management authority between government agencies and the communities who use the resource (Dale, 1989). According to Rettig *et al.* (1989) co-management can reduce public cost, by reducing the amount of field research needed through the use of fishermen's information. It can reduce the costs of planning by sharing management with fishermen, and local communities are more likely

to accept management measures, which will reduce the need for enforcement. The authors suggest that the rights of fishermen in a co-management process are clearly defined in law to lessen the costs to fishermen as a result of co-management. "Local knowledge of natural history and fishermen's day-to-day experiences while fishing can provide an inexpensive and useful kind of information that complements scientific data" (Rettig *et al.*, 1989).

The fisherman who made the following remarks feels that he/she has tried everything to participate but his/her efforts were in vain.

When the 200 mile bill passed, we fishermen were under the impression we would be co-managers of the salmon. Having been around the resource for years, we thought we could contribute our knowledge to the management of salmon. Since it was our livelihood we thought our knowledge was important. We suggested a "gravel to gravel" management plan. [But] we were told that we did not have the credentials (Ph.D.) to suggest any sort of plan. Shortly after that, I stopped going to all the various meetings. They meant nothing. And the managers with credentials were going to manage the people instead of salmon and that's the way it is.

Some fishermen and many managers suggested "role reversal" to improve their relationship. This means that fishermen would be put in the positions of managers and managers would experience the difficulties faced while fishing on a commercial boat.

While fishermen are often put in commissions in which they are part of management, managers are seldom put in the same position of commercial fishermen. Sports fishermen, yes. That's why sometimes sports fishermen have a better break. Managers should be required to, at least, better understand the business of a private venture.

Three managers suggested that regulations should be simplified and that in-season management should be reduced.

More directed research which responds to comments and theories of the fishermen.  
Simplify regulations whenever possible, even when the regulation modifications are proposed by industry. Reduce in-season management measure - this helps eliminate confusion and violations.

Only managers had a positive view of their relationship with fishermen, because they feel they are doing the best they can to improve the current situation. This again supports the hypothesis of differences in the perceptions of fishermen and managers. A few managers said that things have improved considerably.

We're doing a lot of things. The PFMC advisory committees have a lot of impact in the decision making and it helps. It is a good example of what works well. The agency should continue to have dialogues to help the decision.

**Question 15** - Many fishermen (11) and many managers (11) had no suggestions or comments about the quality of the hearings or how things could be improved (Table 11). One reason for this result could be that many of them had not been to any of the salmon meetings listed on question 12. Out of the people who had suggestions about how to improve the quality of public hearings, fishermen and managers disagreed on most of their suggestions, which, again, supports my hypothesis that they have different perceptions.

Table 11: Summary of responses by fishermen and managers to question "What do you think could be done to improve the quality of public hearings?" (Question 15).

<u>Statement</u>	<u>Fishermen</u>	<u>Managers</u>
Number of respondents	47	36
Number of statements	47*	40*
*Percentages are of the number of statements.		
No comment.	57%	29%
Have meetings in all ports with local information.	11%	4%
Limit time for testimonies.	0%	12%
Summary of the information should be out as soon as possible.	0%	12%
Eliminate public hearings.	6%	2%
Make the meetings less technical, and more informal.	6%	2%
Better preparation of issues by fishermen and managers.	0%	9%
More public hearings before the decisions are final.	4%	2%
Public hearings need to be more influential.	4%	0%
Increase time for testimonies.	4%	0%
More advertisement.	2%	2%
Better communication between the parties involved.	2%	2%
Council should adopt some of the public's suggestions.	2%	2%
Other miscellaneous responses.	<u>0%</u> 100%	<u>22%</u> 100%

Some fishermen and managers suggested having more hearings in all ports before the decisions are final and making the hearings more influential in the decision-making process. Five managers recommended that a summary of the information be given to the public as soon as possible. While 4 managers suggested limiting the time allotted for testimonies, 2 fishermen felt that their time to testify should be increased.

**Question 16** - Eleven fishermen and 2 managers had no comment on the question of how to balance the power in all sectors of the fishery industry (Table 12). Some felt "there is nothing we can do" about it. One fisherman and three managers felt it was not an appropriate goal to try to balance the power.

Not an appropriate goal. Surprisingly the public input does make a big difference. The more powerful groups are the ones who are better organized. For example, the charter boat fishermen have more power because they are better organized than the individual recreational [fisherman], but they are lumped together and less consideration is given to the little guy who goes out on the weekend. The best thing they can do is to show up at the meeting of PFMC.

Those fishermen and managers who felt that something could be done, had different perceptions of how the power should be balanced. Only one fisherman and three managers used the word "co-management" to suggest a way to balance the power. However, the concept of co-management was implicit in many other responses from fishermen and managers who felt that there should be more cooperation and sharing of decisions in the fisheries industry. One manager answered: "Co-management by users, public, academia."



Table 12: Summary of responses by fishermen and managers to question "What do you think could be done to balance the power of all sectors of the fisheries industry?" (Question 16).

Statement	Fishermen	Managers
Number of respondents	47	36
Number of statements	54*	38*
*Percentage is of the number of statements.		
No comment.	20%	6%
There should be a balance between the users on the Council.	11%	21%
There should be co-management.	8%	11%
The commercial troll fishery needs an expert at the Council.	10%	3%
The individual fishermen should be more organized.	2%	9%
We should restore the availability of the resource.	0%	8%
The management should change.	7%	0%
The industry should unite for a common goal.	4%	3%
We should improve the habitat and focus our attention on ecosystems.	6%	0%
There should be more local representation.	2%	3%
The managers should be unbiased and honest with the fishermen.	2%	3%
We should better educate the people involved.	4%	0%
We should get rid of gillnetters.	4%	0%
Other miscellaneous responses.	14%	27%

Table 12 (continued)

<u>Statement</u>	<u>Fishermen</u>	<u>Managers</u>
<b><u>No suggestion</u></b>		
There is not much we can do.	6%	6%
It is not an appropriate goal.	2%	8%
Power is already balanced.	0%	3%
It can never be done.	<u>2%</u> 100%	<u>0%</u> 100%

Six fishermen and 8 managers felt that there should be a balance between the users on the Council (Table 12). The following responses from fishermen illustrate this point. "Commercial fishermen are very outnumbered with one representative and 4 recreational representatives. I question the legality of the Council."

The structure of the power organization is financial. The charter boats, the large boat fishermen have more money, pay more taxes, have more power. It should be based on a true democracy. We add as much to tourism as the sport fishing does. People like coming to the docks.

However, under a democratic decision-making process the rights to use the resource go to the most numerous users. "Anglers who develop an interest in the fishery for its pleasure or subsistence value typically outnumber commercial fishers" (Smith, 1986). Therefore, is difficult to question the legality of the Council, because according to democratic principals, the recreational groups should have a larger share of the resource and larger representation on the Council.

Question 22 for managers and 25 for fishermen - Only 21 fishermen and 21 managers had final comments about fishery conflicts. The small response may have been due to the length of the questionnaire. People did not care to spend time on this matter and were anxious to end the interview. Although this was not a specific question, fishermen and managers had different comments, perhaps because they perceive the importance of issues differently.

One fisherman and three managers felt that conflict will always exist (Table 13). "In the fisheries arena conflicts will probably always exist. Managers should do the best job they can to manage those conflicts by developing the data and communicate that good information on the issues in a timely and understandable way." Others felt that there should be more focus on habitat.

Try to save what we've got. Cry about it if you want to, but "you cannot reverse the clock." Enjoy your cheap electricity. That is what you paid for your salmon, whether you knew it or not. (90% is managing people and 10% is managing fish.) Quit looking for utopias: Conflict is unavoidable, but if habitat is protected, then allocation becomes just a political problem. Habitat is the most important thing.

Fishermen had a lot to complain about. They felt that the PFMC does not manage the fisheries properly and that managers should treat fishermen better and let them fish. The following are quotes from fishermen. "Managers should ask us and not tell us things. Not treat us like [children]. They must recognize that fishermen must be bright enough to at least be able to survive on the ocean." And "100 years ago they had lots of fish and no biologists. Now they [have] lots of biologists and no fish."

Table 13: Summary of responses by fishermen and managers to question "Are there any other comments you wish to make related to the issues of fisheries conflict?" (Question 22 for managers and 25 for fishermen).

Statement	Fishermen	Managers
Number of respondents	47	36
Number of statements	48*	38*
*Percentages are of the number of statements.		
No comment.	44%	55%
Conflicts will always exist.	2%	8%
There should be more focus on habitat.	2%	5%
Now there are more conflicts between the industry and other users.	0%	5%
The PFMC does not manage fisheries properly.	4%	0%
They should let us fish.	4%	0%
Managers should treat fishermen better.	4%	0%
Managers should have accountability for their mistakes.	4%	0%
They should de-politicize the fisheries management.	2%	3%
There should be co-management.	2%	3%
Other miscellaneous responses.	<u>31%</u> 100%	<u>21%</u> 100%

## SUMMARY, RECOMMENDATIONS, AND CONCLUSION

The overall purpose of this study was to test the hypothesis that (a) managers and fishermen have different perceptions about the same issues in fisheries, however, (b) if they are involved in the decision-making process, their perceptions are less polarized. I expected fishermen and managers to have different perceptions of the same issues because they come from different cultures, they are on different "sides" of the fishery industry, and they are affected differently by the decision-making process. I expected fishermen and managers, who have more opportunity to interact and exchange ideas, to have more similar perceptions than the ones that did not interact. My results confirmed the first portion of the hypothesis, but did not strongly support the second portion.

I conclude from these findings that the current system apparently does not facilitate communication between fishermen and managers, and it may, in part, be causing salmon conflicts to be destructive ones.

Some types of issues presented more disagreement than others. For example, the questionnaire statements about managers generated the most disagreement between fishermen and managers. This may have occurred because "managers" is a broad term. For many fishermen the mental image of the manager was somebody who regulates the fishery and who is there to punish fishermen. Some fishermen asked me "what do you mean by managers?" I answered, "everyone, except from the fishermen, involved in making the fishery regulations, specifically for the salmon industry." According to my view, managers could be people from different backgrounds, ranging from biology to economy. The PFMC, for example, is composed of a representative from the Coast Guard, State Fish and Wildlife managers and biologists, the Sport Fishing Association director, an Indian representative, the Fishermen Marketing Association representative, the National Marine Fishery Service director, and private citizens. When managers responded to the statements about themselves, they had a clearer definition of the term than the fishermen. That may be why the perceptions about managers

differed so much. By contrast, the statements about "fishermen" (question 7) did not present much disagreement, because some of the statements were not controversial.

Fishermen and managers also disagreed on the least significant cause of the salmon decline. When there is disagreement about the causes of a conflict, it is difficult to agree on ways to resolve the problem. Fishermen selected "overharvest" as the least significant cause, perhaps because they do not feel responsible for the decline. Managers chose "drifnet fisheries" because this fishery has been regulated to prevent the incidental catch of salmon.

The public hearings were also one of the issues that generated considerable disagreement. Because public hearings are where fishermen and managers interact most frequently, it is important that both sides feel comfortable about the setting where the decisions are made so that constructive management can take place. However, fishermen were skeptical about managers and did not feel that the testimonies influenced the final decision, while managers felt that the parties had an opportunity to present their views and that the information presented by the Council was not difficult to understand.

In my survey I found little difference between the responses by non-decision-makers versus decision-makers. One reason for this result may be that the decision-making process in the salmon fishery is not constructive. Involvement in the process should improve people's interaction and exchange of ideas. If the decision-making process does not influence the perceptions of the people involved in it and make the perceptions more similar, then the process is not working properly. The interactions between fishermen and managers, the settings where they interact, and the process involved in their interaction should be changed to improve communication.

I believe that attention should be given to the recommendations from the fishermen and managers on how to improve the quality of public hearings (discussed in the subsection "Qualitative analysis of open-ended questions"- question 15). For example, they suggested that summaries of the information be made

available as soon as possible, that hearings be held in all ports, and that testimonies have more influence in the decision-making process. If these types of recommendations are ignored, then the management of conflicts may fail, because people will feel that their views are unimportant, and they will no longer believe in the process.

I agree with the recommendation that commercial fishermen should become more involved in the decision-making process, by attending the meetings, giving testimony, and talking with the fishermen representatives. Many of the fishermen interviewed did not go to any of the public meetings, or telephone the ODFW, or belong to any fishermen associations. This indicates that they are not interested in the decision-making process, in which case they should not complain if the decisions are not favorable to them.

Another sensible recommendation is that there should be less of a power difference between fishermen and managers so that they can speak at the same level and contribute to the decisions in a more democratic way.

Managers should try to avoid causing systemic distortions in the organization (Bella, 1992). They should not allow information to be filtered and distorted in the process of making decisions. They also should be accountable for their mistakes and be willing to point out failures in the system. For example, political considerations may be involved in the early stages of the amendment process without the knowledge of people who will ultimately make the decision about the amendment. By the time the decision-makers vote on a specific measure, the distorted information may have altered their understanding of the situation.

Pister (1992), a retired fish biologist, states that "politics and tradition speak much louder than logic" when it comes to activities of fish and wildlife agencies. Some managers are often "given strong support by politically appointed commissioners, who then receive the accolades of the sportsmen's groups responsible for their appointments" (Pister, 1992).

In my opinion, agency managers should delegate responsibilities for allocation to the parties directly involved in the

allocation. Managers should encourage the parties in the dispute to work out their differences, "while making explicit the legal and administrative boundaries within which alternate solutions must fall" (Cormick, 1980). Hanna and Smith (1992) recommend a participatory process where the users of the resource are key players in the decision-making process.. According to the authors, because fishery conflicts usually have broader bases than just fishing groups, an authoritative process where governmental agencies make the decisions, is not adequate.

An example of a successful participatory process is the salmon allocation between recreational and commercial fishermen. The two groups reached an agreement in 1982 based on a compromise that satisfied the recreational fishermen's desire to have a long summer fishing season and the commercial trollers' desire to take the maximum catch possible. Prior to the 1982 agreement, the allocations between recreational and commercial harvesters were based on historical shares, which lead to conflict over the equity of the historical commercial/recreational split (Hanna and Smith, 1992).

Although the responses from the commercial fishermen to this questionnaire indicated that some feel they are under-represented relative to recreational fishermen, their distrust is not directed towards the recreational fishermen, but towards the unfair system.

Although I conducted my research in what I thought was the most appropriate manner, in retrospect I feel that this research could be improved in various ways. For example, I should have conducted all of the structured interviews with the questionnaire in the same way to avoid adding uncontrolled variation in the results. Most of the interviews with managers were done over the phone, but most of the interviews with fishermen were done face-to-face. One could wonder whether some of the differences between fishermen and managers were artifacts of the interview method. Because there were too few fishermen interviewed over the phone and too few managers interviewed face-to-face, I was unable to determine whether the interview method influenced the responses.



Another problem with my study was the small sample size. A total of 83 questionnaires were answered, 47 from fishermen and 36 from managers. These relatively small sample sizes limited the ability of the statistical tools to detect small differences.

Also, my samples were not randomly selected. I feel that the sample of managers was representative. The population of salmon managers was small enough that I was able to sample most of it. However, I did not have a complete list of fishermen to choose a sample from. Because fishermen are difficult to contact, the only way to interview them, in my opinion, was to go to the docks. However, at least half of the fishermen I approached did not want to be interviewed. As a consequence, my results may not be completely representative of the entire population of commercial salmon fishermen.

This research has demonstrated that fishermen and managers have different perceptions about some issues in fisheries and has examined the reasons behind those differences. Although the issues and people examined by this research were specific to the salmon industry, I think the results and techniques could also be applied to other fisheries. The decision-making process for all US fisheries is similar and there are managers and fishermen involved in the process.

In conclusion, my research has convinced me that conflicts between fishermen and managers could be minimized if both sides made constructive efforts to know more about the fishery. I recommend that the people who are making the decisions have training about research and on how to deal with people. I would also stress that managers should spend more time interacting with fishermen, not only in formal settings, such as public hearings, but also at the docks or on boat trips with fishermen.

I will finish with a quote from a manager that, in my opinion, summarizes well fishery conflicts and a cooperative approach to manage them.

...Because buried in all that anger and pain, sometimes are some of the best ideas. Fishermen really do understand the ocean. They really do understand fish better than we do. We know about the theoretical biology. We know all about the federal regulations and the models and things like that. What they know about is how the fish react to times of the year, how fish migrate, and how the migration is different from year to year, depending on weather condition and so on. That's important information. The best management program is when it matches the two [types of knowledge].

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# APPENDICES

## Appendix A: Questionnaire

The first four questions deal with the decline of salmon in the Northwest.

- 1) People have identified the following as the major causes of the decline of salmon in the Pacific Northwest:
 

(1.1) overharvest	(1.6) drought	(1.11) habitat loss
(1.2) dams	(1.7) adverse ocean conditions	
(1.3) logging practices	(1.8) hatchery practices	
(1.4) marine mammals	(1.9) treaty-Indian harvest	
(1.5) poor management	(1.10) high seas drifnet fisheries	

  - 1a) Which one do you feel is the most significant cause? \_\_\_\_\_
  - 1b) Which one do you feel is the least significant cause? \_\_\_\_\_
  
- 2) People have identified these groups as being the ones who will suffer the most with the decline of salmon:
  - (2.1) electric rate payers
  - (2.2) future generations of citizens
  - (2.3) managers
  - (2.4) "large boat" salmon fishermen
  - (2.5) "small boat" salmon fishermen
  - (2.6) coastal communities
  - 2a) Which one do you think will suffer the most? \_\_\_\_\_
  - 2b) Which one do you think will suffer the least? \_\_\_\_\_
  
- 3) People have identified the following areas as the ones needing the most improvement to prevent the further decline of salmon in the Northwest:
  - (3.1) spawning habitat
  - (3.2) hatchery programs
  - (3.3) fishing regulations
  - (3.4) management
  - (3.5) fish passage up and down rivers
  - (3.6) juvenile rearing habitat
  - 3a) Which one do you think needs the most improvement? \_\_\_\_\_
  - 3b) Which one do you think needs the least improvement? \_\_\_\_\_



- 4) What do you think is the future of the salmon industry?

The next two questions deal with conflicts in fisheries.

- 5) People have given the following statements about fisheries conflicts:

- (5.1) Conflict could be avoided.
- (5.2) Conflict is inevitable, but promotes necessary changes.
- (5.3) Conflict is inevitable, and prevents changes.
- (5.4) Conflict is inevitable, but it can be resolved.
- (5.5) Conflict can never be resolved, only managed.

5a) Which one do you feel is the most appropriate? \_\_\_\_\_

5b) Which one do you feel is the least appropriate? \_\_\_\_\_

- 6) People have stated the ways they approach a person who has a different opinion from theirs in a fisheries conflict:

- (6.1) I try to do what is necessary to avoid useless tensions.
- (6.2) I attempt to get all concerns and issues immediately out in the open.
- (6.3) I am firm in pursuing my goals.
- (6.4) I propose a middle ground.
- (6.5) I sacrifice my own wishes for the wishes of the other person.

6a) What is your most likely attitude? \_\_\_\_\_

6b) What is your least likely attitude? \_\_\_\_\_

The next four questions deal with the relationship between fishermen and managers.

- 7) People say these things about fishermen. Please say if you agree or disagree with each statement:

7.1) They are knowledgeable about the ocean. \_\_\_\_\_

7.2) They like taking risks. \_\_\_\_\_

7.3) They hold strongly about their positions. \_\_\_\_\_

7.4) They like freedom. \_\_\_\_\_

7.5) They are individualistic. \_\_\_\_\_

7.6) They dislike governmental bureaucracies. \_\_\_\_\_

7.7) They lack a conservation ethic. \_\_\_\_\_

8) People say these things about managers. Please say if you agree or disagree with each statement:

- 8.1) They try to interact with fishermen. \_\_\_\_\_
- 8.2) They are fisheries experts. \_\_\_\_\_
- 8.3) They mediate fisheries conflicts. \_\_\_\_\_
- 8.4) They speak a very technical language. \_\_\_\_\_
- 8.5) They are concerned only in preserving fish populations. \_\_\_\_\_
- 8.6) They are neutral in allocation issues. \_\_\_\_\_
- 8.7) They've never been in the ocean, so they don't understand. \_\_\_\_\_

9) People have identified the following as being the major barriers between managers and fishermen. Please say if you agree or disagree with them:

- 9.1) They don't trust each other. \_\_\_\_\_
- 9.2) They don't speak the same language. \_\_\_\_\_
- 9.3) They see problems in a different way. \_\_\_\_\_
- 9.4) They don't respect each other's "knowledge". \_\_\_\_\_
- 9.5) They don't interact very frequently. \_\_\_\_\_

10) What do you feel could be done to improve the relationship between fishermen and managers?

These last few questions deal with the Pacific Fishery Management Council and the 1991-1992 salmon public meetings.

11) When decisions are made by the Pacific Fishery Management Council the following things are considered:

- (11.1) the sustainability of fish populations
- (11.2) the well-being of the commercial fishermen
- (11.3) the overall economy
- (11.4) the overall quality of the environment
- (11.5) the well-being of all user groups

11a) Which do you think should be given the most weight? \_\_\_\_\_

11b) Which do you think should be given the least weight? \_\_\_\_\_

12) Were you able to attend any of the following salmon public meetings in 1991-1992?

- (a) Astoria, Oregon
- (b) Coos Bay, Oregon
- (c) Olympia, Washington
- (d) Eureka, California
- (e) Milbrae, California
- (f) ODFW user group meetings

13) (for fishermen) Have you been able to do any of the following? If yes, how often?

- a) write a letter to the council. \_\_\_\_\_
- b) give testimony at meetings. \_\_\_\_\_
- c) phone or go to the ODFW office concerning a regulation or permit. \_\_\_\_\_
- d) to be in the council mailing list \_\_\_\_\_
- e) other type of involvement concerning salmon fisheries  
(specify)\_\_\_\_\_

13) (for managers) Have you been able to do any of the following? If yes, how often?

- a) to be member of the Pacific Fishery Management Council.\_\_\_\_
- b) to attend salmon meetings or hearings. \_\_\_\_\_
- c) to go to the docks to talk to fishermen. \_\_\_\_\_
- d) to go out on the ocean with commercial fishermen \_\_\_\_\_
- e) other type of involvement concerning salmon fisheries  
(specify)\_\_\_\_\_

- 14) People have said the following things about the salmon public hearings in 1991-1992:
- (14.1) All the interested parties had an opportunity to present their views.
  - (14.2) The testimonies given by the public influenced the final decision.
  - (14.3) The information presented by the Council was difficult to understand.
  - (14.4) The fishermen were skeptical about what the managers had to say.
- 14a) Based on what you know about the hearings, which do you think is the most appropriate? \_\_\_\_\_
- 14b) Which do you think is the least appropriate? \_\_\_\_\_
- 15) What do you think could be done to improve the quality of public hearings?
- 16) What do you think could be done to balance the power of all sectors of the fisheries industry?

(last page for fishermen)

- 17) How many years of experience do you have as a commercial salmon fishermen? \_\_\_\_\_
- 18) How many years have you actually fished? \_\_\_\_\_
- 19) Are you currently active? \_\_\_\_\_
- 20) Are you self-employed or what position do you hold on the boat? \_\_\_\_\_
- 21) What is the size of the boat you work on (in net tons)? \_\_\_\_\_
- 22) What ports do you fish from? \_\_\_\_\_
- 23) Do you belong to any fishing association? \_\_\_\_\_
- 24) If yes, what is the name? \_\_\_\_\_
- 25) Are there any other comments you wish to make related to the issues of fisheries conflict?

(last page for managers)

- 17) How many years of experience do you have in fisheries? \_\_\_\_\_
- 18) How many years have you had in salmon-related research?\_\_\_\_\_
- 19) How many years of experience have you had in salmon-related management? \_\_\_\_\_
- 20) Have you ever been a commercial fisherman? \_\_\_\_\_
- 21) If yes, for how long? \_\_\_\_\_
- 22) Are there any other comments you wish to make related to the issues of fisheries conflict?

**Appendix B - Table 14: Responses to the questionnaire**

Alternative	F	NF	DF	M	NM	DM
(1) Causes of the salmon decline in the Pacific Northwest						
(1a) Most significant causes						
<u>number of responses</u>	(56)	(26)	(30)	(42)	(25)	(17)
(1.1) overharvest	0%	0%	0%	5%	8%	0%
(1.2) dams	30%	31%	30%	31%	28%	35%
(1.3) logging practices	2%	0%	3%	5%	8%	0%
(1.4) marine mammals	4%	4%	3%	0%	0%	0%
(1.5) poor management	23%	31%	17%	5%	4%	6%
(1.6) drought	2%	0%	3%	2%	4%	0%
(1.7) adverse ocean cond.	2%	0%	3%	2%	4%	0%
(1.8) hatchery practices	2%	4%	0%	0%	0%	0%
(1.9) treaty-Indian harvest	0%	0%	0%	0%	0%	0%
(1.10) driftnet fisheries	12%	11%	13%	2%	4%	0%
(1.11) habitat loss	23%	19%	27%	48%	40%	59%
(1b) Least significant causes						
<u>number of responses</u>	(49)	(23)	(26)	(37)	(21)	(16)
(1.1) overharvest	35%	39%	31%	5%	5%	6%
(1.2) dams	2%	4%	0%	0%	0%	0%
(1.3) logging practices	0%	0%	0%	0%	0%	0%
(1.4) marine mammals	8%	9%	8%	27%	29%	25%
(1.5) poor management	8%	4%	11%	0%	0%	0%
(1.6) drought	4%	9%	0%	0%	0%	0%
(1.7) adverse ocean cond.	18%	17%	19%	16%	19%	12%
(1.8) hatchery practices	2%	0%	4%	0%	0%	0%
(1.9) treaty-Indian harvest	18%	13%	23%	3%	5%	0%
(1.10) driftnet fisheries	2%	0%	4%	49%	43%	56%
(1.11) habitat loss	2%	4%	0%	0%	0%	0%

**F: Fishermen****M: Managers****D: Decision-making****N: Non-decision-making**

\*The number of responses include the multiple answers to the same question.

(2) People affected by the decline of salmon						
(2a) Who will suffer the most						
Alternative	F	NF	DF	M	NM	DM
<u>number of responses</u>	(55)	(28)	(27)	(34)	(20)	(14)
(2.1) electric rate payers	0%	0%	0%	0%	0%	0%
(2.2) future generations	13%	14%	11%	44%	45%	43%
(2.3) managers	0%	0%	0%	0%	0%	0%
(2.4) large boat fishermen	18%	18%	18%	12%	5%	21%
(2.5) small boat fishermen	40%	39%	41%	12%	10%	14%
(2.6) coastal communities	29%	29%	30%	32%	40%	21%
(2b) Who will suffer the least						
<u>number of responses</u>	(48)	(24)	(24)	(34)	(20)	(14)
(2.1) electric rate payers	37%	42%	33%	53%	60%	43%
(2.2) future generations	6%	4%	8%	3%	0%	7%
(2.3) managers	48%	46%	50%	44%	40%	50%
(2.4) large boat fishermen	4%	4%	4%	0%	0%	0%
(2.5) small boat fishermen	0%	0%	0%	0%	0%	0%
(2.6) coastal communities	4%	4%	4%	0%	0%	0%
(3) Areas needing improvement to prevent the further decline of salmon						
(3a) Most improvement						
<u>number of responses</u>	(56)	(29)	(27)	(46)	(25)	(21)
(3.1) spawning habitat	36%	38%	33%	22%	12%	33%
(3.2) hatchery programs	9%	10%	7%	0%	0%	0%
(3.3) fishing regulations	4%	7%	0%	2%	4%	0%
(3.4) management	9%	7%	11%	4%	4%	5%
(3.5) fish passage	25%	24%	26%	43%	44%	43%
(3.6) rearing habitat	18%	14%	22%	28%	36%	19%
(3b) Least improvement						
<u>number of responses</u>	(43)	(21)	(22)	(34)	(22)	(12)
(3.1) spawning habitat	14%	14%	14%	15%	14%	17%
(3.2) hatchery programs	7%	9%	4%	15%	14%	17%
(3.3) fishing regulations	42%	48%	36%	50%	54%	42%



Alternative	F	NF	DF	M	NM	DM
(3.4) management	14%	9%	18%	12%	9%	17%
(3.5) fish passage	5%	5%	4%	6%	9%	0%
(3.6) rearing habitat	19%	14%	23%	3%	0%	8%
(5) Statements about fisheries conflicts						
(5a) Most appropriate						
<u>number of responses</u>	(47)	(24)	(23)	(35)	(21)	(14)
(5.1) Conflict can be avoided	9%	17%	0%	0%	0%	0%
(5.2) Conflict is inevitable, but promotes necessary changes	23%	25%	22%	31%	29%	36%
(5.3) Conflict is inevitable, and prevents changes	4%	8%	0%	0%	0%	0%
(5.4) Conflict is inevitable, but can be resolved	49%	33%	65%	34%	43%	21%
(5.5) Conflict can never be resolved, only managed	15%	17%	13%	34%	29%	43%
(5b) Least appropriate						
<u>number of responses</u>	(47)	(24)	(23)	(35)	(21)	(14)
(5.1) Conflict can be avoided	43%	29%	56%	63%	48%	86%
(5.2) Conflict is inevitable, but promotes necessary changes	4%	4%	4%	0%	0%	0%
(5.3) Conflict is inevitable, and prevents changes	13%	8%	17%	14%	24%	0%
(5.4) Conflict is inevitable, but can be resolved	2%	4%	0%	3%	5%	0%

Alternative	F	NF	DF	M	NM	DM
(5.5) Conflict can never be resolved, only managed	38%	54%	22%	20%	24%	14%
(6) Ways to approach a person w. a different opinion in a fisheries conflict						
(6a) Most likely attitude						
<u>number of responses</u>	(51)	(26)	(25)	(35)	(20)	(15)
(6.1) I try to do what is necessary to avoid useless tensions.	25%	35%	16%	17%	15%	20%
(6.2) I attempt to get all concerns out in the open.	47%	42%	52%	69%	70%	67%
(6.3) I am firm in pursuing my goals.	12%	8%	16%	11%	15%	7%
(6.4) I propose a middle ground.	16%	15%	16%	3%	0%	7%
(6.5) I sacrifice my own wishes for the wishes of other person	0%	0%	0%	0%	0%	0%
(6b) Least likely attitude						
<u>number of responses</u>	(47)	(24)	(23)	(32)	(20)	(12)
(6.1) I try to do what is necessary to avoid useless tensions.	13%	17%	9%	3%	5%	0%
(6.2) I attempt to get all concerns out in the open.	6%	0%	13%	0%	0%	0%
(6.3) I am firm in pursuing my goals.	17%	21%	13%	6%	0%	15%
(6.4) I propose a middle ground.	6%	8%	4%	6%	10%	0%
(6.5) I sacrifice my own wishes for the wishes of other person	57%	54%	61%	85%	85%	85%

(7) People say these things about fishermen						
Agreement with the statement *						
(7.1) knowledgeable about the ocean	100% (47)	100% (24)	100% (23)	89% (36)	86% (21)	93% (15)
(7.2) like taking risks	20% (46)	17% (23)	22% (23)	51% (35)	33% (21)	79% (14)
(7.3) hold strongly about their positions	87% (45)	86% (22)	87% (23)	100% (36)	100% (21)	100% (15)
(7.4) like freedom	96% (46)	96% (23)	96% (23)	100% (46)	100% (21)	100% (15)
(7.5) are individualistic	98% (47)	100% (24)	96% (23)	97% (36)	95% (21)	100% (15)
(7.6) dislike government bureaucracies	93% (45)	96% (23)	91% (22)	91% (35)	85% (20)	100% (15)
(7.7) lack a conservation ethic	6% (47)	8% (24)	4% (23)	20% (35)	20% (20)	20% (15)
(8) People say these things about managers						
Agreement with the statement *						
(8.1) try to interact with fishermen	41% (41)	57% (21)	25% (20)	91% (35)	90% (20)	93% (15)
(8.2) are fisheries experts	15% (45)	23% (22)	9% (23)	80% (35)	76% (21)	86% (14)
(8.3) mediate fisheries conflicts	37% (43)	41% (22)	33% (21)	94% (34)	100% (20)	86% (14)
(8.4) speak a very technical language	80% (44)	86% (22)	73% (22)	72% (36)	67% (21)	80% (15)
(8.5) concerned only in preserving fish pop.	40% (45)	41% (22)	39% (23)	6% (35)	10% (20)	0% (15)
(8.6) are neutral in allocation issues	9% (45)	18% (22)	0% (23)	14% (35)	9% (21)	21% (14)
(8.7) never been on the ocean, don't understand	80% (41)	68% (22)	95% (19)	11% (35)	10% (20)	13% (15)

\* The numbers in parentheses are the numbers of responses.

(9) Major barriers between managers and fishermen						
Agreement with the statement *						
Statement	F	NF	DF	M	NM	DM
(9.1) don't trust each other	94% (47)	87% (24)	100% (23)	59% (34)	70% (20)	43% (14)
(9.2) don't speak the same language	81% (47)	75% (24)	87% (23)	47% (36)	57% (21)	33% (15)
(9.3) see problems in a different way	96% (46)	96% (23)	96% (23)	97% (36)	100% (21)	93% (15)
(9.4) don't respect each other's "knowledge"	76% (45)	77% (22)	74% (23)	46% (35)	48% (21)	43% (14)
(9.5) don't interact very frequently	78% (45)	83% (23)	73% (22)	39% (36)	38% (21)	40% (15)
(11) When decisions are made by the PFMC, the following are considered						
(11a) What should be given the most weight						
<u>number of responses</u>	(47)	(21)	(26)	(36)	(21)	(15)
(11.1) sustainability of fish populations	43%	52%	35%	100%	100%	100%
(11.2) commercial fishers	11%	0%	19%	0%	0%	0%
(11.3) overall economy	4%	5%	4%	0%	0%	0%
(11.4) environment	15%	14%	15%	0%	0%	0%
(11.5) all user groups	28%	29%	27%	0%	0%	0%
(11b) What should be given the least weight						
<u>number of responses</u>	(37)	(16)	(21)	(33)	(19)	(14)
(11.1) sustainability	3%	0%	5%	0%	0%	0%
(11.2) commercial fishers	19%	37%	5%	21%	26%	14%
(11.3) overall economy	54%	44%	62%	49%	42%	57%
(11.4) environment	11%	6%	14%	15%	16%	14%
(11.5) all user groups	13%	12%	14%	15%	16%	14%

\* The numbers in parentheses are the numbers of responses.

(14) Statements about public hearings						
(14a) Most appropriate						
Statement	F	NF	DF	M	NM	DM
<u>number of responses</u>	(47)	(21)	(26)	(35)	(23)	(12)
(14.1) all parties had opportunity to present their views	17%	19%	15%	71%	70%	75%
(14.2) testimonies influenced decisions	2%	0%	4%	6%	4%	8%
(14.3) information was difficult to understand	13%	14%	11%	9%	9%	8%
(14.4) fishermen were skeptical about what the managers had to say	68%	67%	69%	14%	17%	8%
(14b) Least appropriate						
<u>number of responses</u>	(43)	(22)	(21)	(29)	(20)	(9)
(14.1) all parties had an opportunity to present views	12%	9%	14%	0%	0%	0%
(14.2) testimonies influenced decisions	72%	73%	71%	28%	30%	22%
(14.3) information was difficult to understand	9%	14%	5%	55%	55%	56%
(14.4) fishermen were skeptical about what the managers had to say	7%	4%	9%	17%	15%	22%