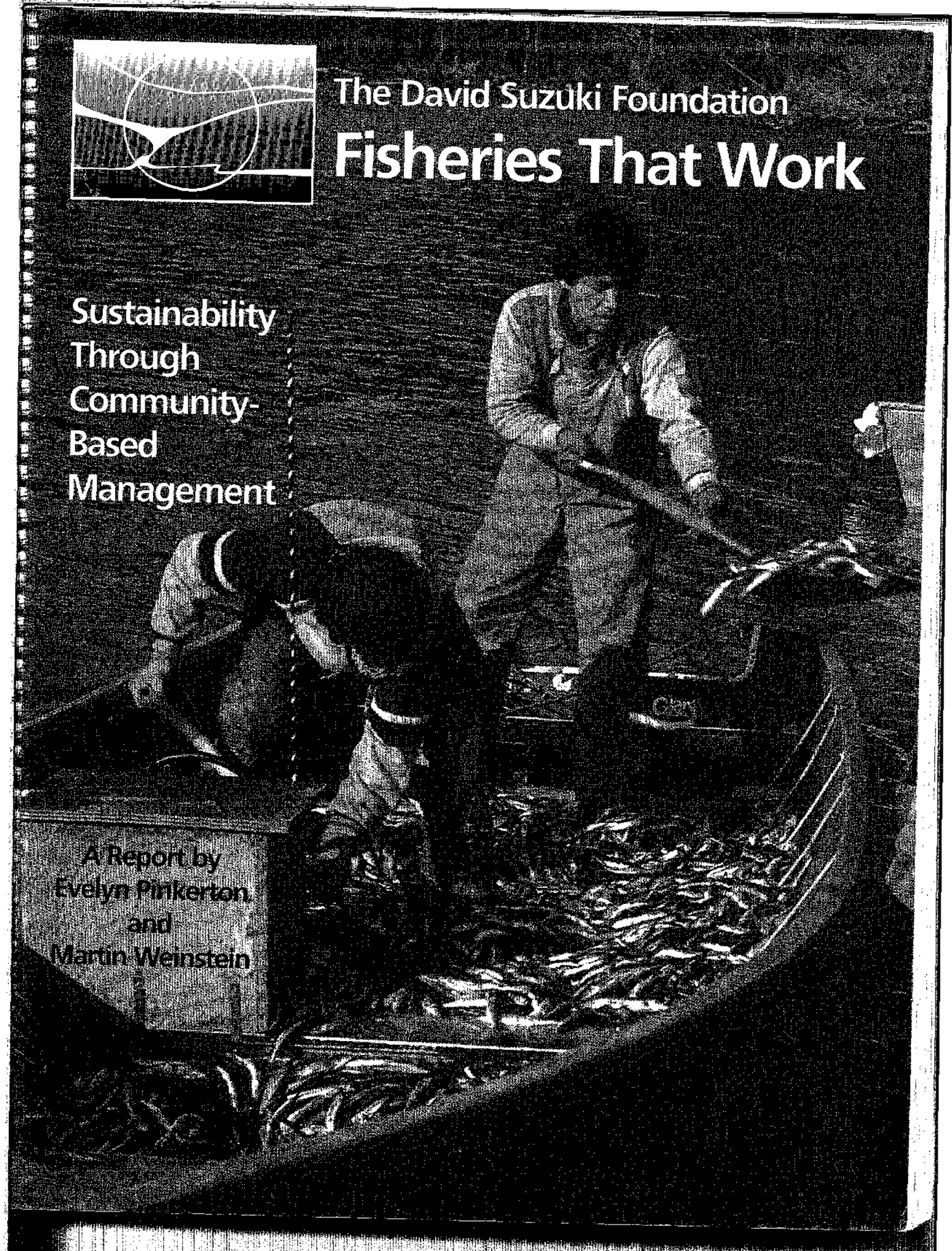

The David Suzuki Foundation

Fisheries That Work

Sustainability Through Community-Based Management

A Report by
Evelyn Pinkerton
and
Martin Weinstein

FISHERIES THAT WORK

Sustainability Through Community-Based Management

A Report to The David Suzuki Foundation

By
Evelyn Pinkerton and Martin Weinstein

July 1995

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The David Suzuki Foundation

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Cover Photo: Nisga'a fishermen at Fishery Bay, by Martin Weinstein.

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FOREWORD

After decades of buying bigger boats and more advanced hunting technologies, fishers have nearly fished the oceans to the limits. Of the planet's 15 major marine fishing regions, the catch in all but two has fallen.... Finding the political will to change fishing policies, however, is harder than finding fish. The overcapacity of the world's fishing fleets means that the industry is in for a period of painful readjustment. Who gets squeezed out has enormous implications for jobs and coastal communities. Either the industrial fishing fleets or the community-based fishers are going to pay a heavy price. If countries continue to favour large-scale, industrial style fishing, some 14-20 million small-scale fishers and their communities are at risk.[1]

Fisheries around the world are at a crossroads. In many coastal regions, including Atlantic Canada, fishing communities have already experienced devastating collapses. Meanwhile, large-scale industrial fishing fleets are continuing to expand, in many cases squeezing out community based fishers. Since 90 percent of the fish caught in the world come from 10 percent of the oceans closest to land, it is the smaller scale, community-based fishers that face the greatest risks from overfishing.

This report marks the second phase of The David Suzuki Foundation's Fisheries Project. The Foundation released its first fisheries report, *Fish on the Line: The Future of Pacific Fisheries,* by Dr. Carl Walters, on January 31 st, 1995. That report documented tragic declines of fish stocks and made numerous recommendations to protect biodiversity.

Fisheries That Work: Sustainability Through Community-Based Management, by Dr. Lyn Pinkerton and Dr. Martin Weinstein, is the Foundation's second Fisheries report. It describes in detail the fundamental building blocks for ecologically and economically sustainable fisheries. The report is filled with success stories in fisheries management from around the world. They represent living, working, viable alternatives to conventional fisheries models. These case studies vary widely, but all share one common feature: they are community-based.

The David Suzuki Foundation is dedicated to the search for solutions to major problems facing our planet. We hope that reports such as this one can be used as a tool to help communities protect and rebuild the natural resources on which we all depend.

Jim Fulton, Executive Director
The David Suzuki Foundation

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[1] Peter Weber. 1994. *Net Loss: Fish, Jobs and the Marine Environment.* Worldwatch Paper #120 (Washington, DC: WorldWatch Institute, July 1994).

PREFACE

This report is a response to three broad issues facing British Columbia fisheries in the 1990s and beyond. It is intended to explore some creative ways for dealing with these issues, and to analyze some of the costs and benefits of doing so.

The Broad Issues We Address Are:

What will relations of Native and non-Native communities be after the resolution of First Nations claims to fisheries?
The evolving legal understanding of aboriginal rights to fish means that business as usual is not an option. Clearly federal and provincial agencies have received legal advice that significant changes in management are needed to accommodate these new understandings. New programs, pilot projects, and models are being tested, usually involving a greater management role for First Nations. To many First Nations, these have not gone far enough.

To others in the industry, some of the programs are truly frightening. Some have chosen all-out resistance to any change in the status quo. Others have perceived that they too will benefit in the long run if management in general can be made more accountable, effective, and participatory. They note that effective management in the broadest sense is impossible without the active support and co-operation of many parties in solving problems. One possibility is that First Nations and others make the resolution of claims an opportunity to democratize many aspects of fisheries management, making it more accountable to a broader range of management concerns. If First Nations and others worked together closely on management, they would be in a far more powerful position to press their common concerns about the increasing loss of fish habitat, enhancement needs, and other vital issues, This report focuses on some hopeful examples of joint problem-solving where different parties or sectors co-operate in various aspects of fisheries management. All of the B.C. cases in this report involve Native/non-Native co-operation, as do many of the international cases.

How can key aspects of management be improved, as government is downsized?
Resources for adequate fisheries management are becoming scarcer, yet there is even greater need for habitat monitoring, harvest monitoring, spawner escapement enumeration, by-catch reduction, etc. Case studies in this report illustrate some of the ways that collaboration between communities and regions has been successful in mobilizing greater resources for better management and more sustainable fisheries.

What alternatives exist to trends such as the privatization of resource access and the export of shorework jobs?
Through a consideration of community rights as an alternative to government rights, and to private rights, this report illustrates a way to approach these problems. Fish are commodities, but the public nature of their ownership implies the need for more accountability to maintain the health of the resource, and to return benefits to Canadians. Fish farming permits which are not part of community foreshore plans, ITQs which are unconditionally transferable, and the export of unprocessed fish can all involve forms of non-accountability. Our case studies explore ways in which more accountability to sustainable management and the welfare of Canadians can be created in areas such as these.

Methods

The David Suzuki Foundation hired us to review a selection of the social science literature on common property theory and community-based fisheries management. They were convinced that this literature has potential value for addressing the more intractable problems of B.C.'s fisheries. Recent advances in this literature remain relatively unknown to both the B.C. fishing community and the people charged with management of the west coast fisheries. Our task was to choose a few case studies from this growing world literature for detailed analysis. Our selection criteria were threefold:

1. long-term and well-established instances of regional or community-based fisheries management,
2. well-developed information on sustainable performance, and
3. fisheries with strong similarities to B.C. fisheries.

We also chose four cases of multi-party co-operation in B.C., each of which is only a few years old. These follow the same principles as the international cases, and illustrate how these principles have been successfully applied in B.C. In the conclusion, we distinguish what all these cases together, plus the broader literature, tell us about the criteria for making such arrangements successful

Organization Of The Report

The heart of the report, and its particular value to B.C., lies within the case studies. They are valuable for the powerful examples they provide of co-operation within fisheries. Many members of the fishing community, biologists, professional resource managers, and the general public, feel that fisheries are essentially unmanageable without the hard stick of vigilant top-down enforcement and authority. The cases do not say that co-operation is a simple matter. We do provide enough examples of failure to indicate that the balancing edge is fairly sharp.. We also provide enough examples of success over significant periods of time to indicate the shape of possibilities. The report is organized into seven sections.

Part One. *Introduction,* presents our definition of fisheries management, which is broader than many. Management, as we see it, goes beyond the tasks that fisheries biologists and economists perform. It includes decisions about the production of fisheries stocks, their habitat, enhancement, harvesting, marketing, regional planning, allocation, and more. We see community-based and regional management as an opportunity to integrate a very fragmented process which sets sectors of management against each other, and ultimately threatens the resource and the public benefit. Our message is that the problems are not inevitable, but at least partially preventable.

Part Two. *A Traditional Village Territorial Fishery,* presents the simplest possible case: control of access by fishing villages. This system is old, stable, has had sustainable fisheries for centuries, and is a very common form of management. The case shows how this ancient system has survived and adapted under a modern nation-state.

Part Three. *Salmon Management,* presents two Alaskan cases and two closely-related B.C. cases. Two of these cases involve Native and non-Native groups working together. All four cases involve improving data collection and combining resources to produce more co-ordinated harvest planning among different parties. This often results in larger harvests. Two cases involve co-ordinating enhancement and regional planning.

Part Four. *Stationary and Inshore Species,* presents four cases, showing both successes and failures. The Japanese inshore fisheries stand out as the most valuable and comprehensive example in this section, and perhaps in the entire report. The inshore sector of the world's most productive fishing nation is managed on a community basis.

Part Five. *Habitat and Watershed Restoration,* presents one Australian and two B.C. cases of multi-party efforts to co-operatively protect, enhance, and restore watersheds. One of the B.C. cases, Kennedy Lake and the West Coast Sustainability Association, is a rare example of a shared focus on both watershed planning and several broader aspects of fisheries management.

Part Six. *Newfoundland Inshore Cod Fisheries,* is an instructive example of a policy failure in the handling of a viable community-based inshore fishery.

Synthesis and Conclusion. *Principles for Success,* summarizes how fisheries problems are addressed by the case studies. Although the four types of resource situations described above (modernized traditional, mobile/migratory, immobile or inshore, and watershed habitat) differ in the management activities they exercise, the management systems which have evolved in each situation share certain basic characteristics. We pull together what these four types of systems have in common, by generalizing about principles for success.

ABOUT THE AUTHORS

Evelyn Pinkerton is a maritime anthropologist who has been involved with fishing communities for the past 24 years. She conducted M. A. research in West Pubnico, Nova Scotia, and spent seven years doing a community study of Queen Charlotte City, B.C. for a PhD thesis. After teaching for two years in the Department of Anthropology and Sociology at the University of British Columbia, she participated in a major study of the B.C. fishing industry, authoring three chapters of *Uncommon Property: the Fishing and Fish Processing Industries of British Columbia.*

Evelyn has helped to develop the field of fisheries co-management through her edited volume *Co-operative Management of Local Fisheries: New Directions for Improved Management and Community Development*, and the concluding chapter of Dyer and McGoodwin's *Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management.* She is currently a Research Associate at the School of Community and Regional Planning at U.B.C., and has authored numerous articles on the theory and practice of community-based management of fish and forests.

Evelyn is especially grateful to fishermen and other friends who taught her about the resource, themselves, their work, and their communities in Queen Charlotte City, Masset, Tofino, Ahousaht, Ucluelet, Port Alberni, Bella Coola, Prince Rupert, and Hazelton.

Martin Weinsteln is a natural resources scientist. He was trained as a biological oceanographer and an animal ecologist at the Marine Sciences Centre, McGill University, completing his Ph.D. in 1973. At the early stage of his career he was a member of several expeditions in the high arctic. His interests turned to questions of the sustainability of resource dependent communities after conducting fisheries studies with Cree families on the James Bay coast and living in a British farming community and a Japanese fishing and farming village.

His work with First Nations and governments across northern Canada and on the BC coast during the last 20 years bridges the realms of biophysical and social sciences. His research focuses on the socio-economic side of resource management and the relationship of long-established communities to their environment and renewable resources.

His particular interests include traditional ecological knowledge, customary systems of resources tenures, community resource management, and the resolution of conflicts between aboriginal land/sea use and industrial-scale resource development. He has also had a long-term interest in Japanese community in-shore fisheries management methods, and has travelled extensively in Japan.

He lives in Comox, on the east coast of Vancouver Island, where he operates a consulting practice.

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PART ONE: **INTRODUCTION ••**

Chapter 1: Opportunities And Problems In Fisheries Management Institutions

Some of the biggest problems in fisheries management stem from the fact that our management agencies have been trained to manage fish populations but not people. Yet the main way fisheries are managed is by regulating the activities of the human harvesters, the fishermen. Fishermen are not really like predators in the natural world, even if they sometimes play that role during the fishing season. Some fishermen become passionately single-minded about getting every fish they can when the bite is on. But in the off season they still live in families and communities which are regulated by man-made laws and rules, ones which they largely support.

In Ms or her home community, a fisherman might sit on a municipal or band council and participate in making by-laws for protecting school children, parks, clean air, or promote an orderly and wise 20-year community housing development plan. So why are so few fishermen involved in devising fishing regulations and policies which serve the public good or the good of the fishing community?

Under the current management system, government managers seem to believe that every fishing regulation and policy devised by government is cause for the ingenious and creative discovery of loopholes. They ask: why do fishermen seem to have the uncanny ability to make government policies have the opposite of the intended result? And even many fishermen find a kind of self-fulfilling prophesy in these beliefs.

But managers should consider why and how fishermen act as real resource stewards in some management systems. If fishermen are acknowledged as rational and public-spirited planners on land, why would they be incapable of long-term thinking at sea? Why is it that in fisheries and situations as different as Japan and Prince William Sound, Alaska, fishermen work so co-operatively with government to make fishing regulations, enforce the regulations, monitor catches and collect and analyze critical data, design or participate in research? Why do fishermen in many systems contribute hours of volunteer labour, free materials, or even voluntarily tax themselves in exchange for real participation in the management system? And, most important of all, what makes the systems which enjoy the greatest participation from fishermen more likely to be managed sustainably?

The purpose of this report is to look at what these co-operatively and sustainably-managed systems have in common. How do government managers share power with fishermen's organizations and communities? How do these systems make both government and fishermen accountable? What makes them function effectively? How are different parties and communities represented in the management system? Who bears the costs of non-sustainable use and who enjoys the benefits of sustainable use?

In the last two decades social scientists have come a long way in understanding some basic truths about what makes resource management systems sustainable.[1] These truths show up in very simple fish management systems where there is only a small community of people and a resource like clams that moves very little. But the same truths apply-with a few twists-in very complex agreements between different types of fishermen in different communities working with more than one government agency.

This report presents 10 case studies of sustainably managed fisheries with high levels of power-sharing. These successes are cause for some optimism. We also present cases of systems with

[1] A definition of sustainability is offered in Appendix 1

possibilities, but which collapsed because some critical conditions were not met. These stories, and many others in the literature, make it possible to have some fairly strong predictions about what is most likely to work in a given situation. Of course, since people and their communities and situations are highly complex, there is no foolproof formula. But there are some general principles which can help people make strategic choices, and which increase predictability.

These case studies clearly illustrate that there is more than one road to sustainable management. One purpose of this report is to encourage dialogue about the different approaches to co-operative, sustainable management. This includes approaches which are already being tested in BC. In learning from what has already been tried around the world, and in some parts of BC, communities and organizations of fishermen may consider more options about how to solve the problems which face them. Just as important, governments may consider the benefits of power sharing.

We use the term "fishermen" to include women who fish, because it is the term used by the fishing community in British Columbia.

The Nine Great Socio-Political Problems In Fisheries Management

The case studies in this report are best understood as stories about how fishermen's organizations and communities have grappled with one or more of nine major socio-political problems which are common to most fisheries management situations. In identifying these problems, we combine the insights of many natural and social scientists with our own 20 years of experience in looking at BC fisheries. The significance of each story will be clearer if it is seen as one possible solution to a problem. Not every problem is illustrated in every story, but all the problems exist in the BC fisheries.

We do not see fisheries management as simply a matter of licensing fishermen or setting seasons. For us, management is far more inclusive. It is equally about stock assessment, habitat assessment and protection, monitoring and enforcement of harvest and habitat rules, allocation, rules about the transfer of licences, enhancement, the co-ordination of different uses and enhancement strategies, broad policy-making and evaluation, and the development and regulation of supply flow, product quality, and product diversity. In the stories we tell here, fishing communities and organizations are involved in some or all of these activities.

1. The Problem of Undervaluing or Ignoring Human Capital.

Much of the recent debate on sustainability in ecological economics has centred around the extent to which natural capital (minerals, air, water, soil, flora, fauna, ecological systems) can be safely converted to manufactured capital (machines, buildings, infrastructure). Many natural and social scientists have also recognized the importance of "human capital", also variously known as "social capital" or "cultural capital." Human capital is what individuals and communities build up over time in the way of knowledge, skills, experience, attitudes and values about how to solve problems. The importance of human capital is evident, for example, when a group of fishermen know where to get a reliable index of the real abundance of fish, or when they notice that fish are not appearing in a place where they have appeared for generations. The fishermen may also relate the timing of this disappearance to a past pattern of disappearances and to other natural occurrences they observe. They may be in a position to construct plausible hypotheses about observations with data which are not available to research scientists. Or their knowledge, combined with other research observations,' may suggest a completely new possibility. So human capital is first of all the wealth of knowledge-often localized, and unrecorded-about how fish populations and the local environment have behaved over long time periods.

Human capital can also be thought of as people's willingness and ability to make (or support) rules to govern their own behaviour. When it comes to what should be done about new problems in the fishery, fishermen have an understanding of how they and their communities and organizations are likely to respond. For example, they know: how important they think the problem is, how much they value the fishery, how many meetings they are willing to attend to discuss the problem, what they believe is a fair solution, what kind of regulation they would be willing to support, etc.

Government regulators pay dearly when they ignore this aspect of human capital. The most brilliant economic strategy for reducing investment and for increasing efficiency is useless if is not workable-if it subverts the intended result. However, if fishermen are involved on the ground floor in designing programs to solve problems, many pitfalls can be avoided. If fishermen are involved in designing and implementing research, the research results are likely to be more applicable to management prescriptions, and to have more credibility with fishermen.

All of our case studies are about management systems which have tapped human capital in significant ways. They have made fishermen's energy, ingenuity, understanding, and ability work for the system instead of against it.

2. Confusing Public Policy/Public Values With the Interests of Powerful Actors.

The Canadian Minister of Fisheries and Oceans makes policy, with consultation from advisory committees of various sorts. However, this arrangement is subject to lobbying from powerful economic and political interests who claim the ability to deliver votes. Unfortunately, such powerful interests may also be in a position to reap the short-term benefits of high, non-sustainable harvest rates, while escaping the worst of the long-term consequences suffered by fishermen and communities. For example, major processors in Newfoundland, Fishery Products International and National Sea Products, which acquired quotas to take fish in Newfoundland waters based on their operation of fish plants there, put pressure on the Minister to keep cod and groundfisheries open long after there was considerable evidence that harvest rates were unsustainable. Yet Fishery Products International, after closing 10 fish plants in Newfoundland, was able to buy and sell fish on international markets, resulting in record-breaking sales in 1993, with an even better projection for 1994 (Vancouver Sun, May 4, 1994).

In other words, decisions about what management risks to take may be most influenced by parties who benefit from risks the general public and the majority of fishermen would be unwilling to take. Such powerful interests may be able to avoid most of the costs of poor decisions, while the Canadian taxpayer and communities and fishermen with less influence on decisions foot the bill.

The Newfoundland case may sound extreme, but the way decisions are made about acceptable risks is not substantially different on the west coast. The point here is that many decisions are not really technical, but rather judgements about what level of risks the public is willing to take. This is an issue of public values and public policy. The public, and the fishing communities, pay for bad decisions, and therefore have the right to a strong voice in deciding what standards should be used in making the right decisions, and who should be involved in implementing the standards.

To address this problem, either the general public must be far better educated about fisheries issues, or fishing communities and organizations who stand to lose the most must have enough formal decision-making power to balance the most powerful economic interests. Our case studies are mostly about the second type of solution to this problem.

At least some, basic public understanding is important as well. Where there is little public understanding of fisheries issues, there is often little public willingness to fund fisheries

management. The resource and its management is taken for granted as an (almost) free public good, not something precious and potentially diminishing which is deserving of significant resources for wise management

The issue of what risks to public resources are acceptable is only a part of the much larger question of how much fishing-dependent communities and fishermen's organizations should be involved in policy-making. Despite numerous advisory processes in BC, opportunities to scope problems, propose agendas, project a vision, define the most fundamental goals of management, and conduct or participate in research are quite limited. Our case studies offer more developed examples of these types of involvement in policy-making.

3. **Passing on the Costs of Fish Habitat Protection to the Fishing Communities and the Public.**

Public policy has been slow to establish a "polluter pay" principle, or to identify the need to balance the perceived benefits of development against the price the public pays for the shrinkage of a natural resource. When powerful interests who are perceived as providing important socio-economic benefits either remove water from fish habitat or use fish habitat as "free" waste removal sites, they are really passing on the costs of lost production as well as the cost of restoring habitat to fishermen, fish management agencies, and other users-and hence the public. In the past, when impacts were lower and the public was less informed, clean and plentiful water and fish nursery areas such as wetlands and estuaries were assumed to be "free for the taking." So far there is a considerable history of habitat shrinkage which has been taken for granted as the cost of development. Muir (1983, cited in Felt 1990) estimates that between 25% and 40% of original Canadian Atlantic salmon habitat has been lost. There has been little recognition that the public and fishing communities in particular have picked up the tab for this loss.

Government agencies seldom take the lead in pressing for a recognition and public accounting of how habitat protection costs are passed on. They are usually kept in check by senior politicians and other, more powerful government agencies. In BC, fishing communities and fishermen's organizations such as the United Fishermen and Allied Workers Union (UFAWU) have taken the most legal action and raised the issue to greater public awareness. Some of our case studies illustrate ways communities have been able to establish enforceable habitat protection rules at the local level, as well as forming coalitions with other communities, fishermen's and environmental organizations, and issue networks with sympathetic government officials.

4. The Compliance/Enforcement Problem.

Some fishermen obey fisheries regulations simply because it is the law. Others follow regulations to a greater or lesser degree in proportion to how legitimate they consider the regulations to be. It is a sociological rule that highly legitimate governments receive much good will, support, and voluntary compliance with laws in general, thereby reducing the cost of enforcement Likewise, regulations which are considered practical, equitable, and appropriate (well designed to achieve their purpose) achieve higher rates of compliance than rules which are considered "stupid," "unfair" and ill-designed to achieve conservation. Of course, there is a percentage of fishermen who will disobey regulations whenever they think they may get away with it, regardless of the quality or value of the regulations. However, this group will be less tolerated by the law-abiding fishermen if regulations are well-supported and considered important to the welfare and future of the fishery.

In other words, governments which are unwilling or unable to explain why a particular regulation is necessary, and also the best available means of achieving conservation, will suffer lower rates of compliance. During periods of low abundance-when fishermen suffer cost/price squeezes-or during periods of low support for an unpopular policy or regulation, such governments are likely to suffer severe compliance failures, and large enforcement costs.

Of course, explaining and justifying regulations is not an easy task under the best of circumstances. Nor is it easy to devise programs and regulations for which fishermen will not find loopholes and escape hatches (Copes 1986). The more fishermen find ways around the rules, the more complex the rules have to become, resulting in higher costs of monitoring and enforcement (Panayotou 1984; Scott and Neher 1981).

However, the more fishermen and fishing communities participate in making the rules, the more difficult it is for fishermen to play the "us vs. them" game. Our stories, and the larger social science literature, show that an effective way to produce appropriate, workable, and enforceable regulations* is for fishing communities to write, or participate in writing them, and to enforce or participate in enforcing them. Of course, regulations have to follow principles of sustainable use. Here government can play an important oversight role, checking that management plans and regulations to implement them are sound, providing technical advice, and/or some of the enforcement personnel.

5. The Problem of Too Many Big and Powerful Boats.

Economists are fond of pointing out that in an unregulated open access situation, competitive race for first capture tends to lead many, if not all, fishermen to intensify their investments in vessels and gear. Even if there are limits on the number of fishermen, there is still a race for first capture. This happens because the first to catch fish have lower costs than the last. The individual costs for the first to catch fish are below the true (average) costs of fishing (Wilson 1994). The last to catch fish have higher costs because the fish will be less concentrated, harder to find, or not available.

Fishermen have accused economists who make this analysis of trying to meddle in the private business of fishermen. Why should anyone else care if an individual chooses to "overinvest" If he or she fails to make a profit, s/he takes the consequences and nobody else is hurt.

While we do not believe the tendency to "overinvest" is as "inevitable" as economists believe, one thing is clear. When fishermen do invest in many big boats, there are some undesirable consequences.

Investing in a fishboat or licence is not like investing in a taxi licence-in one important way. The larger the investments fishermen have in the boat and gear, the more vulnerable they are to fluctuations in abundance. The more vulnerable they are, the more pressure they will feel to take every fish they can get-and the more difficult it becomes for anyone to control their behaviour (Cove 1973, Langdon 1982). The largest boats have the highest capital costs and operating costs and need the greatest numbers of fish to make their operations pay. They have the most to lose if they don't get enough fish. Large boat owners may make the case to government that they have the biggest investment and therefore the biggest stake (and therefore should get special consideration). They are more likely to be indebted to, or partially owned by, a major processing company, giving additional clout to their demands. Such vessels can travel quickly, are more intimidating for a fisheries officer to board, and in general are acknowledged to get away with more than smaller boats.

Furthermore, large investors are usually influenced by whether they could receive a better rate of return if they put their money elsewhere. They may thus be less inclined toward long-term conservation and have more incentives to seize opportunities for short-term gains and reinvesting in other sectors (Clark 1973, cited in McCay 1976).

In recent years an additional problem has become more evident in BC. Large vessels with significant holding capacity can more easily conceal the area in which they caught the fish. Freezer trailers, for example, can hold fish for long periods and report fish as taken during times and in areas other than the real ones. This makes illegal fishing easier, and also undermines the data base which is the basis for good management decisions. When fisheries enforcement is cut back, as it has been recently in BC, the problem is compounded.

The point is that it is legitimate for the public and communities to be concerned about conditions which push fishermen toward competitive overinvestment, because fishing effort becomes more difficult to control under these circumstances. In our case studies, communities which regulate their inshore, nearshore, or river fisheries have found different ways to address this issue. Communities tend to focus on making simple rules about where, when, how, and by whom fishing is allowed. These rales result in the control of fishing effort. They also lower incentives to "overinvest," sometimes directly, and sometimes because the rules successfully guarantee equitable access, or an equitable economic return.

6. Defining Boundaries and Access: the Exclusion Problem.

Every management system has to deal with some form of exclusion, because there are eventually more would-be fishermen than fish available. (That is, some exclusion is necessary if any group of people is going to make a living at fishing). One of the most common rules communities make deals with who can fish a nearby local area which the community is able to monitor. In such cases, the community defines both the area boundaries and the membership of eligible fishermen. Systems based on centuries of stable occupation of areas by groups with well-defined social roles have ready-made social structures which make this the simplest management option.

But who defines membership and boundaries varies. Not all our examples are about isolated communities where everybody grew up together: i.e. where membership and boundaries are simple and obvious. We include examples from places which are more like British Columbia: there are both long-term and short-term residents in the area. Or non-residents may fish the area on a regular basis. In some cases, such as Alaska, a larger policy community participated in drawing the boundaries of the .areas and in making the membership rules. For some fisheries, membership includes non-residents. Also, members (eligible fishermen) may be able to make many of the rales about the conduct of the fishery, but they do not always define who all the other members are. State laws may define who can fish in the area.

Our cases also demonstrate the flexibility and permeability which has developed in boundaries, depending on the nature of the fishery. Area-based rules work best, and are most enforceable, when the costs of exclusion are not too high. First, it has to be easy to identify outsiders. Second, there must be human resources readily available to keep them out. It is often easier to negotiate special permits, overlapping uses, interception agreements, etc. with outsiders or non-members than to completely exclude them. Highly mobile or migratory resources may require complex arrangements.

Our cases show that at least some form of exclusion also makes it easier for systems to capture the human capital of their members. Members are more willing to invest time and energy into enhancing local stocks or improving them through better management, habitat restoration, or

whatever, when they can expect at least some of the benefits to remain in their own area. If most of the improvements they make can be captured by "outsiders" who did not contribute to the improvements and who are perceived as only "takers" and not "givers," then local contributors will feel exploited and are not likely to continue their efforts with much enthusiasm. In some migratory fisheries, such as salmon, local improvements have to be shared with outsiders through interception agreements, so that some fair division can be achieved.

In any case, the ability to exclude at least some outsiders in some situations is fundamental to the ability of local communities to make rules and to enforce them. Communities which can exclude outsiders and regulate their membership are usually successful at maintaining sustainable fisheries.

7. Uncoordinated Strategies and Uses.

Conventional government management often ends up being an uncoordinated tug of war between different activities or bureaucratic divisions (harvest planning, enhancement, habitat protection), sometimes working at cross purposes. When reasons for low fish abundance need to be analyzed and addressed, problem-solving should ideally occur across divisions to look at all possible roots of the problem, and attack the problem in a co-ordinated and comprehensive way. Fish management in the future should be more oriented toward ecosystem management, if it is to get beyond bureaucratic turf struggles and develop effective analyses and strategies.

Ecosystem management means not focusing on a single species, but considering species interactions. It also means considering the impact of environmental conditions on species health. If a ran of wild salmon is declining, an ecosystem approach would look at whether the spawning and rearing freshwater habitat is in good condition or whether the salmon smolts from an enhancement project are being released at a time that makes them eat the wild salmon fry.

On the local level, the potentially conflicting uses and harvest patterns of neighbouring communities and regions should be planned in a co-ordinated fashion, based on rational management principles and not pure economic or political influence. Enhancement strategies should be co-ordinated with harvest planning so the two do not work at cross purposes. In some cases, formal interception agreements and dispute resolution procedures may be necessary.

Our case studies illustrate ways in which communities and regions have done effective regional planning or otherwise addressed the problem of co-ordinated use, particularly with migratory species such as salmon. Communities and their neighbours which are able to spell out the principles of co-ordinated use and regional planning, and to hold each other directly accountable, often have a better chance of escaping the inter and intra-governmental conflicts described above and below.

8. The Problem of Intergovernmental Conflict.

Intra-agency conflicts among divisions are writ large in federal/provincial or intra-provincial conflicts over jurisdiction. For example, the best efforts of the federal Department of Fisheries and Oceans to protect fish habitat in BC may be systematically subverted by the provincial Ministry of Forests' policies or the provincial government's agreements with water users such as Alcan. This occurs because powerful economic interests in timber and energy are able to pressure Ottawa directly. Ottawa-based decision-makers do not have to deal with the sustainability debate surrounding their decision in BC nor the political fallout from it. An agency whose attempts to manage -are constantly subverted by a political process in a separate jurisdiction suffers demoralization, loss of a sense of mission, and a tendency to respond most directly to the greatest

sources of power and economic interest, which are perceived to be the rulers of the day. This sets the stage for debacles such as recent events in Newfoundland, and reinforces blockages to the needed tax reforms mentioned by many analysts.

Even if federal/provincial conflicts are overcome (e.g. if fishing were-brought under provincial jurisdiction), the co-ordination of provincial agencies such as the Ministry of Forests, the Ministry of Environment, Lands and Parks, and the Ministry of Agriculture, Food, and Fisheries is not easily achieved. It is tempting to look toward the 1991 Resource Management Act in New Zealand for a more radical solution. New Zealand reorganized its ministries and statutes in order to achieve more sustainable, integrated and ecosystem-based management of all natural resources. Significantly, New Zealand shifted much of the decision-making about how to implement the Act to regional and local boards made up of communities, Maori representatives, and stakeholder groups (Palmer 1992). Whether or not BC chooses to reorganize ministries or merely force them to co-ordinate their activities along ecosystem lines, local and regionally-based bodies play an important role in grounding this co-ordination in a local reality. Several of our case studies show the important contribution local fishing community and regional bodies can make in this regard.

9. The Problem of Supply Management? Product Quality and Product Diversity.

The price that fishermen receive for their fish may be heavily influenced by (a) scarcity or glut on the market for that fish in its unprocessed form, (b) the freshness and quality of the fish when sold, and (c) the product form in which the fish can be finally sold. Supply management is probably the most important factor—where it is an option.

Some fisheries such as salmon or roe herring seem to offer little opportunity for fishermen to practice supply management, because the fish are available for such a short time and in such large numbers. Furthermore, these supply conditions contribute to the ability of processors to exercise market power-i.e. fishermen are in a precarious bargaining position. The toughest collective bargaining and price negotiations occur around these species, because (with the exception of freezer trailers) massive amounts are caught at once and must be delivered to a processor immediately.

Fish and shellfish which are available for longer periods, however, offer important supply management opportunities which may affect price. Canadians have responded to these opportunities quite effectively in some cases. For example, the Mclvor Commission concerned with the marketing of freshwater fish in Alberta, Saskatchewan, Manitoba, Northwest Territories, and Northwest Ontario in the mid 1960s recommended that the necessary measures be taken to maximize returns to fishermen. The Freshwater Fish Marketing Act of 1969 set up a monopoly non-profit crown corporation, the Freshwater Fish Marketing Corporation, which processes and markets all fish which cross provincial or federal boundaries, returning all benefits to the fishermen (Touchette 1985, FFMC 1986). The FFMC theoretically has nothing to do with supply management. However, it has found itself in the position of advising the fishermen that they could, get higher prices for fresh fish if they delivered fewer during certain time periods. If they delivered more, the fish would have to be frozen and the price would be lower (Bruce Smith, pers. com.). Bonnie McCay (1980) has documented a New Jersey marketing co-operative of whiting fishermen practising similar supply management strategies.

In the 1980s Japanese co-operatives, which manage both local harvest and marketing, began to manage harvest with the objective of not only sustainability,. but also returning more benefits to fishermen through supply Management, and management for optimum product quality and product diversity. The Japanese believe that such a strategy enhances the commitment to sustainability by enhancing the stability of the fishermen's livelihoods. (It is important to note that Japanese co-

operatives market fish as federations of local co-operatives, and are thus far more responsive to local conditions and management needs than a state level Crown corporation such as the FFMC can be).

Quality and product form, two other mechanisms for enhancing prices for fishermen, can be greatly affected by local management bodies, as two of our case studies illustrate. The ability of communities and organizations of fishermen to affect these factors can be a key aspect of promoting stability and hence sustainable management

Formal And Informal Rights In Fisheries Management State, Private, And Community

How could communities have the power to address any of these nine daunting problems if they have no rights to manage the fishery? Indeed, most Canadians think of rights to control or manage a fishery as having only three possible forms:

1. an absence of, rights: the fishery is "open access" to anyone who wishes to fish; there is no control or management exercised; This occurs in some areas of open ocean beyond any country's 200 miles limit. Only international agreements regulate fishing activity here.

2. private rights: private ownership or long-term lease offish grounds or access to a portion of the harvest. The sale of private harvesting rights can imply informal private harvest management rights, if government does not specify otherwise. In other words, a' privately-owned quota of fish may often be taken at any time and in any manner by the quota holder, with little or no government regulation. The assumption is often made, that private ownership of this sort makes government regulation unnecessary, because private owners are automatically good stewards. However, private owners may have incentives not to be stewards if they have opportunities to sell their quota rights before long-term impacts of their harvesting activities are understood.

3. government rights: government legal ownership of the resource, as well as the right of government to make all the decisions about how the resource is managed. Most west coast fisheries are managed this way currently. The federal Department of Fisheries and Oceans (DFO) has the constitutional mandate to protect and conserve fish stocks. The department collects and analyzes data on fish populations and their habitat, issues licences to harvest, makes and enforces fishing regulations, protects fish habitat, and makes policy on most management issues. DFO has convened a number of regional and provincial-level advisory committees to assist with decision-making. This is usually limited to allocation of fishing opportunity and some aspects of harvest planning. DFO is not required to take the advice of these committees, however, and in some cases responds to the most powerful party over the agreement of all other parties". In other cases it ignores all parties (Fraser River Sockeye Public Review Board 1995).

Debates about fisheries management often centre around whether government-or the private sector can do a better job of management. But our stories in this report are about a fourth form of rights: community rights (Ciriacy-Wanthrup and Bishop 1975, Feeny et al. 1990).

4. community rights: In some cases, communities exercise rights to manage their local fisheries informally, simply by doing it. They may have no formal or legal right to do so, but they do not ask permission of government. They just do it by making rules for themselves to solve problems which arise. The process by which long-standing rights exercised by communities becomes accepted into standard practice is illustrated in the following Nova Scotia and Maine examples.

How informal community rights become accepted practice. Jeff Brownstein, secretary-treasurer of the Maritime Fishermen's Union in Little River, Nova Scotia, explains how his community dealt with lobster traps being robbed by non-owners in the late 1800s. With the leadership of the Presbyterian minister of the time, the community decided that every lobsterman would fish only the marine area fronting his own property. Property boundaries became marked so they could be seen a few miles from shore. Fishermen working off someone else's property would be under suspicion. While this system of property rights was never formalized in law, it worked well and went unchallenged for about a century.

Then, 10 years ago, some lobster licenses left the area, and new ones were brought in by new residents without shoreline access. At the same time, some lobstermen had come to own long pieces of shoreline and others had property with better lobster bottom. To deal with these new problems, the local fishermen's association became stronger and developed a system of democratic rule-making. They decided that, while land ownership was still necessary to set lobster traps, adjustments should be made if an area became less productive. They also made rules for "open grounds" to which everyone has access (Brownstein and Tremblay 1994).

As in many other cases in the literature, this system of rules persisted, because of the positive results. The community's ability to control fishing effort has resulted in higher catch per unit of effort (each trip to haul up lobster traps produces more and bigger lobsters) than in communities which have exerted no management rights over their lobster fisheries.

Also typical is the way the informal exercise of community rights has led to new forms of collaboration with government. The community now has a highly co-operative relationship with DFO in researching patterns of lobster growth and movement in the area, and is extending community rule-making to other aspects of management (Brownstein 1994). DFO is conducting the research, but sharing the raw data and results with the lobstermen. Since the research was premised on lobstermen/government co-operation in information sharing, the lobstermen are very helpful to the research effort, offering free transport to DFO researchers, meticulously recovering and turning in tags, etc. This is not full co-management, which would have involved conceptualizing and planning the research with the community, but it is a limited form of it-Informal-community management of lobster harvest in the state of Maine has led to more extensive forms of co-management with government Through years of controlled studies, Acheson (1975, 1988) found that the communities which regulate their own harvests enjoy a higher catch per unit of effort than neighbouring communities managed only by conventional state regulations. Self-regulating Maine communities have formed co-operative relationships with the government regulatory agency, which has adopted some community rules into state regulation (Bowles and Bowles 1989).

How community-based rules develop. The story of Little River, Nova Scotia, illustrates how community-made rules can develop and be effective at controlling fishing effort if (1) the majority of fishermen agrees there is a problem that needs solving and (2) there is a way for fishermen, or community members (or some third party they trust), to make the rules work (for example, by being able to observe fishermen's behaviour with the help of visible markers). Such community-made rules then affect behaviour in a patterned and predictable way, whether they have been blessed by government or not. The ability of the community to enforce its own rules demonstrates that informal community rights exist (Schlager and Ostrom 1993).

Ostrom (1990) notes that (1) ability to agree on the rules, and (2) ability to monitor each other's activities, are key pre-conditions for a community to make rules successfully. In addition, she highlights the importance of (3) a system of threats or punishments which increase if rules are continually broken ("graduated sanctions"). Such a system does exist in the self-regulating Maine

lobster communities. When a lobsterman discovers an outsider's trap in his "territory" (the marine area fronting his property), he ties a knot in the rope as a warning for the intruder to leave. If the outsider continues to place his traps in this lobsterman's territory, however, his traps will be simply cut. If trouble still persists, the lobsterman and other members of the "harbor gang" will take more drastic action (Acheson 1975, 1988).

Canadians usually find such behaviour in their southern neighbours distasteful, but these may be the tactics which work best in that more violent society. Stories from small communities in both Nova Scotia and Prince Edward Island suggest that a town meeting to reach agreement may be all that is required in that part of Canada. Whether the tactics are gear destruction or social pressure, these are both types of sanctions, and one can imagine what other back-up sanctions might be used in Canada. When pushed to the limit, Canadian fishermen have on occasion engaged in boat burnings or rammings.

Community-based management around the world. So far there are at least 50 well-documented cases of community-made fisheries rules at work in different situations around the world, and dozens more cases which are only partially or poorly documented. Scholars are cataloguing these cases and analyzing what types of rights and what areas of management are covered by them (e.g. Andersen 1979, Christy 1984, NRC 1986, McCay and Acheson 1987, Durrenburger and Palsson 1987, Cohen and Hanson 1989, Pinkerton 1989, Berkes 1989, Cordell 1989, Jentoft 1989, Feeny et al. 1990, Ostrom 1990, Schlager 1990, Bromley 1992, Schlager and Ostrom 1993, Wilson et al. 1994, Dyer and McGoodwin 1994, Pinkerton 1994a).

Community-based Management and Co-management. Today, few community-made rule systems function in isolation. When government agencies realize that community rules are solving problems, they may ignore them, try to overrule them, or they may write them into regulations while making a co-management agreement with the community. Local or municipal governments may participate as partners.

Co-managernent agreements are probably the most desirable way to promote sustainability, because they usually force both parties to spell out the principles of the rules, and commit themselves to being accountable to objective criteria in implementing them. We call such systems "community-based management" in general and "co-management" systems when they have been incorporated into a government management system.

Formal and informal rights. In their most highly-developed form, as seen in Japan, community rights are formal, protected in legislation, and the manner in which several levels of government work with communities is spelled out. In fact, the enormous and rapid economic success of Japanese inshore fisheries stimulated an early Canadian interest in co-management.

However, a co-management system may still operate on an informal basis for years until or unless all parties decide to formalize it with a statute, court order, or legal agreement. In other words, co-management involves a formal or informal agreement to share power, to share the right to manage. It is a mixture of government and community rights. It might be conceptualized loosely as being somewhere between point two and point nine on a scale from one to ten of increasing government involvement in management

community management				co - management					government management
1	2	3	4	5	6	7	8	9	10

The schematic above implies there is one single management function. But we have already noted seven separate areas of management. It is quite possible for power to be shared differently in different areas of management, as discussed below.

The Range Of Management Functions, Rights, And Duties

Not all communities want to be involved in all aspects of management. They may want to be involved only in areas of management where conflicts tend to arise and problems need to be solved. Or a community may have a cultural tradition which requires its leaders to exercise certain duties and responsibilities toward its members. An aboriginal chief or sub-chief, for example, may have an obligation to regulate the access of his extended kin to a fishing spot in order to provide equitable fishing opportunity to all members.

In other words, many communities think more in terms of management duties than management rights. This thinking is by no means confined to aboriginal communities. BC commercial fishermen involved in long-term volunteer enumeration and enhancement of salmon streams near their communities think of themselves as "taking care of or "looking after" the salmon and their habitat. Here we will speak of rights and duties as different faces of the same coin.

Management rights and duties being exercised may cover one or several functions of management. It is useful to divide fisheries management into seven general categories:

1. policy-making and evaluation (scoping problems, setting long-term objectives, research and education);

2; ensuring the productive capacity of the resource (monitoring habitat, enhancing/restoring habitat, enhancing stocks);

3. regulating fishery access (membership or exclusion, transfer of membership, allocation of harvest);

4. regulating fishery harvest (stock assessment, harvest planning, harvest monitoring);

5. co-ordinating potentially conflicting resources uses and management activities (sport, commercial, and subsistence fisheries; harvest and enhancement activities);

6. enforcing or implementing rules;

7. maximizing benefits to fishermen (supply management, quality enhancement, product diversity).

Currently, DFO exercises all the above mentioned management functions, with the following exceptions: There is little or no public education about fisheries management, or attempt through community forums to involve communities in self-education. There is little scoping (exploring dimensions and alternatives) of problems, at least in public: commissions or inquiries usually operate with fairly narrow terms of reference (FRSPRB 1995). There is little or no regulation of the transfer of licences or ITQs. There is little involvement in maximizing benefits to fishermen or Canadian fishing communities.

When a community is involved in management, each function or activity in which it participates corresponds to a right/duty being exercised either formally or informally by the community. The rights and duties exercised by communities also correspond roughly to the nine major fisheries problems identified earlier. That is, when communities exercise these rights or duties, they could be thought of as either responding to one or more of these problems-or preventing them from happening. Table 1 illustrates the correspondence of fisheries management problems, management functions, and community rights and duties.

TABLE 1 MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES

MANAGEMENT PROBLEMS	**MANAGEMENT FUNCTIONS**	**PROPERTY RIGHTS AND DUTIES**
1. POLICY MAKING AND EVALUATION		
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS SETTING OBJECTIVES LONG RANGE PLANNING RESEARCHING THE RESOURCE SYSTEM PUBLIC EDUCATION	Right/duty to do long-range planning Right to research key questions affecting community values Right/duty to educate own and larger community re problems
2, PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE		
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF HABITAT MONITORING OF CONDITION OF STOCK	Right/duty to protect fish habitat against other harmful uses Right of access to government information Right to collect own information Right to interpret information in light of local knowledge Right/duty to enhance or restore a) resource/resource productivity b) habitat
3. COMPLIANCE WITH RULES		
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules: a) re harvesting b) re habitat damage c) re exclusion and poaching
4. FISHERY HARVEST		
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own Right to interpret information in light of local knowledge
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re: a) size of overall catch b) location of the fishery c) timing of the fishery d) gear types permitted e) size of allowable interception

CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS UNDERVALUING OR IGNORING HUMAN CAPITAL	HARVEST MONITORING	Right of access to government information and right to collect own Right to interpret information in the light of local knowledge
5. FISHERY ACCESS		
DEFINING BOUNDARIES AND ACCESS: EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude: a) certain classes of fishery (e.g. sport, commercial) b) certain classes and sectors of fishers
	HARVEST ALLOCATION	Right to allocate: a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to distributive mechanism
	TRANSFER OF MEMBERSHIP	Right/duty to. limit license transfer to other community or area members Right/duty to regulate conditions of transfer
6. RESOURCE USE COORDINATION		
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNING THE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses Right/duty to communicate problems and try to solve with others Right/duty to resolve disputes internal and external
7. RETURNING OPTIMUMS VALUE TO FISHERMEN		
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING PRODUCT QUALITY PRODUCT DIVERSITY	Right to manage harvest timing for optimum product value

The Shortcomings Of Conventional Management Assumptions

The stories told in this report are much more than examples of how communities can help out a bit here and there in management. The cases show that we need to revise some of our most fundamental assumptions about how good management works. They show that the accountability mechanisms needed in all systems do not come exclusively from government. If we are to explore the new possibilities demonstrated by community-based management, the very models we now live by in fisheries management need to be re-examined.

The Power-of Models: Greek Tragedy and Animal Behaviour

We are trained to think of management in terms of two fundamental models: the tragedy of the commons, and the predator/prey relationship. These two models condition the way most fisheries managers in North America think of how fishermen "inevitably" behave. It is difficult to overestimate how deeply these models in fact permeate the training and thinking of management agencies.

Since managers are trained to manage fish populations and not people, they think of management in terms of predator/prey relationships. A manager would predict that, as a "predator", a fisherman would only look after himself, stopping at nothing to catch the last fish if he were hungry enough for food or money. Predators cannot be reformed. They act on instinct in the presence of prey. They respond to individual need, not to social rules. They are incapable of long-term thinking. They justify the old saying: "You can't have the foxes guarding the henhouse."

In a slightly different vein, Hardin's (1968) "tragedy of the commons" model represents the individual well-meaning fisherman as somebody who might practice long-term thinking (conservation) if he could make everybody else do it too. The problem or "tragedy" is that the individual does not have any mechanism for making others think long-term, so he gives up and decides "I might as well get mine." Since somebody else will overfish anyway, his self-restraint would be of no benefit.

In the tragedy of the commons model, the individual is perfectly civilized and rational, but the situation is tragic. The tragedy comes from the fact that individuals seem to be condemned to act in their own individual short-term self interest, even if this will eliminate their fishery in the long run. What seems to be individually rational in the short term is both individually and collectively irrational in the long term.

Our cases demonstrate that neither the predator/prey model nor the tragedy of the commons model predicts how people behave when communities exert management rights, either formally or informally. Communities, can make rules which they can and do make their members obey. Fishermen in the context of community-made rules behave neither like predators nor like the person who takes one more fish with a sigh of resignation that the stock will inevitably be overfished.

So managers have been imprisoned in their thinking that the only possible arrangements, or institutions, for managing our fisheries are the ones we already have. The arrangements we have now do in fact tend to make at least some people behave as the animalistic or tragic models predict. But the models, and fishermen's behaviour, are bound by the situation, not by tragic inevitabilities. How some fishermen behave is the fault of the institutions, not. the individuals. It is perfectly possible to modify key aspects of our management institutions without radical changes in our current social and political structures.

In fact, we are already familiar with institutional arrangements related to open access, private rights, government rights, and community-based rights. The next section notes some of the ways we have experienced all four forms of management rights in British Columbia.

Open Access? State, Private, and Community Management Rights in British Columbia: a Brief Overview

During the long period of aboriginal tenure of land and resources in BC the different tribal groups devised highly diverse systems for regulating access to resources. Access control, and other aspects of management, range from the ultra-informal among many interior hunting, trapping, and fishing groups to the ultra-formal, complex and ritualized systems of some of BC's coastal peoples.

Groups whose language belongs to the Wakashan linguistic family (the Kwakiutl and the Nuu-chah-nulth of Vancouver Island) developed a complex system of corporate ownership of specific resource rights. Within the Kwakiutl system each of the residential house groups, the namima (the fundamental unit of governance), owned a set of rights to fish and other resources within the Kwakiutl territory.

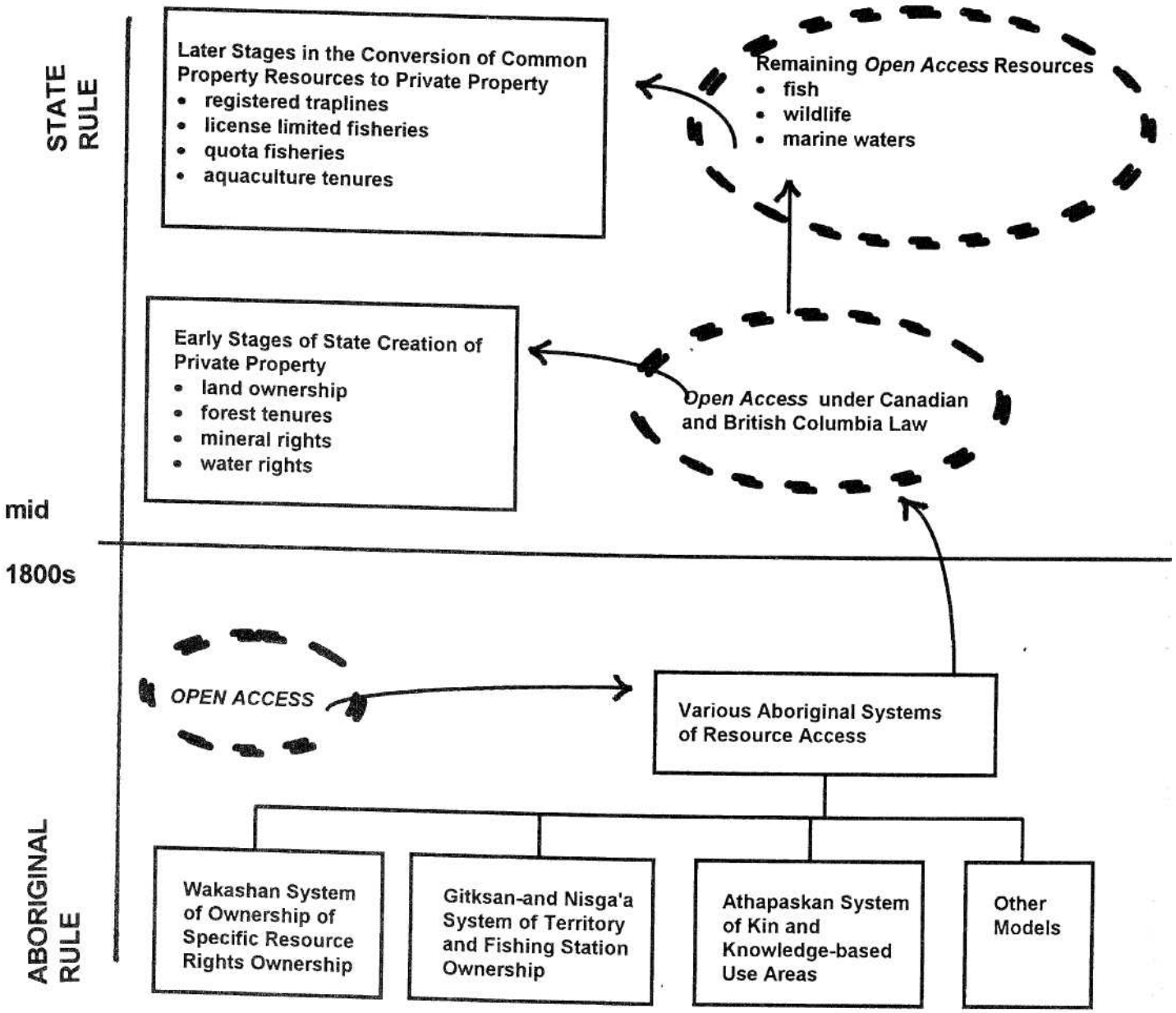
Joint rights were held for particularly abundant or scarce resources. A number of tribal groups could hold rights to fish the more productive salmon runs on Kwakiutl lands. Similarly, different namima and tribes held rights to fish eulachon (a smelt-like fish whose saltwater and freshwater life cycle resembles that of salmon) on one or the other of the two rivers where it could be found. Some of the Kwakiutl namima lacked eulachon fishing rights; these groups fished and sun-dried halibut during the spring eulachon runs for trade in eulachon grease (the prized oil extracted from this fish) and other products with namima who had rights to eulachon. Kwakiutl also owned specific halibut and groundfishing sites in the marine waters of their home straits.

Anthropologists believe that potlatching, among its many other social and governance functions, served to reinforce responsible management by chiefs. Prior to and during the early stages of European contract, the goods distributed during potlatches were the processed resources of lands and waters belonging to namima. The chief held responsibility for his people and resources. The chief and his namima could lose their place in Kwakiutl society if they could not demonstrate through gifting that the abundant fisheries and other resources were being stewarded well enough to provide the goods needed to conduct a proper potlatch.

On the north coast, the Tsimpshian speaking peoples, among them the Gitksan and Nisga'a, devised a somewhat different kinship-based system of resource access. Within both the Nisga'a and Gitksan systems, house-owned resources were organized on a watershed territory basis. Access to salmon runs on the main rivers (the Nass and Skeena) were controlled by a combination of ownership of fishing sites and smoke houses or processing locations. For example, in the Nass, non-house members were free to fish on the main river for immediate use. Preservation of salmon, however, required permission to use the territory for processing, an effective method for combining generosity and control of access to resources.

When the Canadian state began to allocate provincial resources it painted over a very elaborate and richly coloured canvas. The state ignored the historical aboriginal systems of controlled access to resources and effectively declared that the entire canvas was open access (Figure 1). During the first stage of allocation, private rights to land, forests, minerals and water were distributed to settlers and corporations. The aboriginal share came from the allocations of land by the reserve commissions during the late 19th and early 20th centuries. (This was something of an anomaly during this period, since reserve rights were vested in a community rather than in an individual or corporate entity.)

FIG. 1. A MODEL OF THE HISTORY OF RESOURCE ACCESS IN BRITISH COLUMBIA



Fish and wildlife were left as open access, but increasingly state-managed, resources after the early stage of creation of private rights in land and resources. Looking more closely, however, we can discern a long and incremental history in BC of the development of private tenures to fish and wildlife resources, beginning with the creation of registered traplines in 1926. The development of aquaculture tenures and quota fisheries represents an extension of private interests into fisheries and marine waters. The historical trend during the tenure of the Canadian state has been one of progressive shrinking of the pool of open access and state managed resources through the creation of various forms of private rights to resources.

The Fisheries Management Implications of **the** Sparrow Decision

(Source: Weinstein and Morrell 1994)

The *R. v. Sparrow* Supreme Court of Canada decision ([1990] 1 SCR 1075) decision fundamentally changed how the rights of aboriginal people to fisheries resources are legally viewed in Canada. Although the decision was about the rights of aboriginal people to fish for food, the implications of the judges' rulings have broad implications for the management of all sectors of the British Columbia fisheries. The ruling must be taken as the starting point for any consideration of reform in the fisheries, since it powerfully establishes the aboriginal right to fish for food as having precedence over other uses, commercial or other.

Sparrow is commonly understood as giving aboriginal people the first place in a fisheries allocation line-up. First Nations axe to get their food needs and the rest of the pie is then left to be divided among the commercial and recreational fisheries sectors. This view implies that as long as the resource is abundant enough to satisfy the aboriginal food need and the conservation need of an adequate spawning population, the organization and management of BC fisheries can continue essentially the same as in the past-that *Sparrow* does not require any fundamental reorganization of existing fisheries management

The implications of *Sparrow* are far broader than the above interpretation would suggest. The judges found that the aboriginal rights to fish are *sui generis,* meaning the rights are unique and must be defined according to aboriginal custom and traditional practice. The rights include fishing for food, ceremonial and societal use. The way these uses are defined in aboriginal custom have sweeping implications.

First, the social or societal right to fish goes far beyond the simple supply of food for the table. The ruling specifically mentions that the rights exist for the purpose of meeting cultural and social needs and goals. At its most simple interpretation, the social right to fish includes the reproduction of the culture and its traditions, that is, the ability to teach succeeding generations how to harvest, process, and distribute fish and marine resources according to the tradition of a given aboriginal group. This is the construction and replication of "human capital" described in the introduction. In this case the human capital includes harvest methods, local environmental and resource behaviour knowledge, and how to integrate these types of knowledge to provide for the society and the long-term sustainability of the resources on which it has historically relied.

Second, aboriginal food harvesters around the world have relied on a strategy of harvesting resources which provide high catch per unit effort **(CPUE)..** Food harvesters do not spend time on scarce resources; rather, they switch to alternatives. There has been a fundamental conflict between sport and commercial fishing and this aspect of the preferred exercise of the aboriginal right to fish in BC coastal waters. The conflict is most intense in the more sedentary fisheries, such as crab, prawn, clams, etc. The commercial fishery harvests the resources down to stock levels that do not provide the high CPUE results required by aboriginal food fishermen. And in some areas of coastal BC, government and other tourist promoters advertise fishing, crabbing, and prawn fishing

opportunities in areas that have been left to lie fallow by local aboriginal residents because their stock levels have been reduced to too low a level to provide the required CPUE.

The solutions to these legal conflicts are not readily apparent. However, it is likely that the resolution will require major structural changes in the way that salmon, groundfish, and invertebrate fisheries are managed. The geographic scale of fisheries management will likely change to become more in keeping with the scale used by aboriginal communities. This may mean commercial fishermen will have to use a number of territories. Similarly, the requirement to manage fisheries on a local scale, rather than province-wide, establishes one of the critical conditions necessary for seriously considering a community-based fisheries management system like that practised in our case studies. The most likely solutions to the legal change required are fully compatible with community-based fisheries management examples discussed in this report.

A Footnote on the Fuss Over "Common Property"

This section explains why we prefer the term "management rights" to "property rights." The term "common property" has been used a great deal in discussing sustainable management issues. We find it misleading and unhelpful, but those attached to the term may wish to understand why we do not use it. Those unconcerned about terms may skip this section without penalty.

Fish have been called a "common property resource" in two very different ways. Sometimes the term describes the physical situation of fish and fisheries and hence logistical problems in managing them; at other times, it refers to the legal rights governing their harvest. Since some writers have confused these two uses, we present separate definitions.

1. Common property, describing the physical situation of fish, is used to distinguish a category of natural resources such as fish, wildlife, water, forests, rangelands which are difficult to manage under a simple management arrangement such as private property. This is true partly because of the mobility, scale, or opportunities for secret use of the resource. Consider, for example, how fish often pass through lands and waters which are under multiple and different jurisdictions. Many of the nine great fisheries problems discussed in the beginning result from the logistical difficulties government—or anyone—has in managing the fisheries. To avoid the confusion caused by the term "property", we follow Ostrom (1990) in preferring the term "common pool" resource to describe this aspect of fish.

2. Common pool resources may be managed under a number of different systems of rights or regimes, including open access (no rights), state management, private management, or community management (Ciriacy-Wantrup and Bishop 1975). Rights to manage are often called "property rights," but we prefer the simpler term "management rights." Both terms are quite general. As explained above, there are at least seven general types of activities potentially covered by "management rights," and the same is true of "property rights" (Ostrom and Schlager 1993).

3. "Common property" was frequently used by early theorists to mean the absence of property rights (open access), or sometimes the absence of limits on fishing licences. A number of scholars confused the common pool nature of fish with the system of rights under which most fish tend to be managed in North America in the 20th century. It was often argued that the common pool nature offish required private management Sometimes the observations used to support these assertions were mostly about the problems in open access or state management systems.

4. British Columbia fishermen sometimes use the term "common property rights" to mean the right of established licensees not to be arbitrarily excluded from the fishery. This rallying cry is usually raised against DFO attempts to reduce the size of the fleet, or various ways in which DFO might enclose ocean access, thereby creating inequities. Used in this context, "common property rights" more fundamentally means the right to be included in policy-making about how access rights will be defined and allocated. It is an attempt to assert informal access rights of stakeholders against the arbitrary imposition of government policies.

5. Common property theorists have more recently used "common property" to mean rights held by communities of fishermen. To avoid confusion with other uses of the term, we prefer the term "community management rights."

In summary, we prefer to use the terms as illustrated in the following statement. This discussion points out some of the problems when can arise when a common pool resource, fish, is managed under different sets of rights, governmental (state) management rights and private management rights. When management rights are held by communities, certain common pool management problems are more readily addressed.

Our discussion distinguishes seven different categories of management rights, and a number of sub-categories. In real situations, all of these rights are seldom held by either government, private parties, or a community. Most situations are made up of a mixture of rights held by one or the other of these actors, or of rights which are shared (co-management). Tables are presented for each of our cases which show which management rights are held by the community exclusively, which are shared with government, and whether the rights are formal (legal) or informal.

OVERVIEW OF THE CASE STUDIES

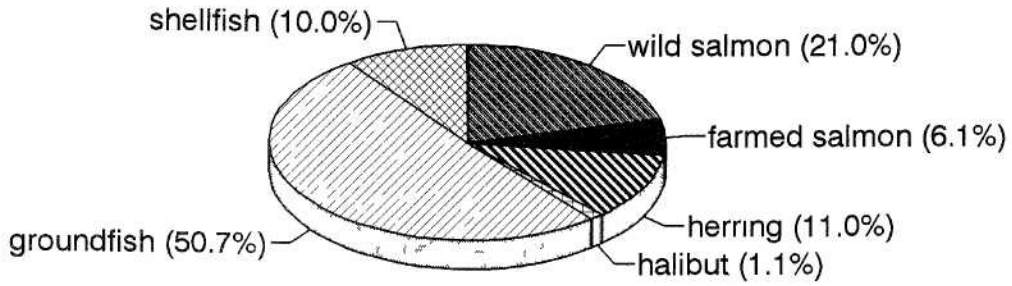
British Columbia fisheries and the communities involved in them are highly diverse. The situations and problems faced by the fisheries vary greatly from one area of the coast to another and from one fishery to another. At the same time, there are important commonalities shared regionally and within fisheries. No single model or example is likely to be a universal solution. Rather, what is required is choice. To date, information about alternative "bottom-up" forms of fisheries management which have been used elsewhere have not been readily available for consideration by people thinking about structural changes in the BC fisheries.

Salmon often dominates the debates on BC fisheries management. However, Figure 2 shows that in 1992 wild salmon contributed only 36% of the landed value of all BC fisheries. Shellfish and groundfish together were almost as valuable as wild salmon. With this important diversity in the resource, we believe a menu of examples is necessary to show the range of possible solutions available. Our hope is that enough varied examples are presented to stimulate thoughtful design of pilot projects for different fisheries in different areas of the coast.

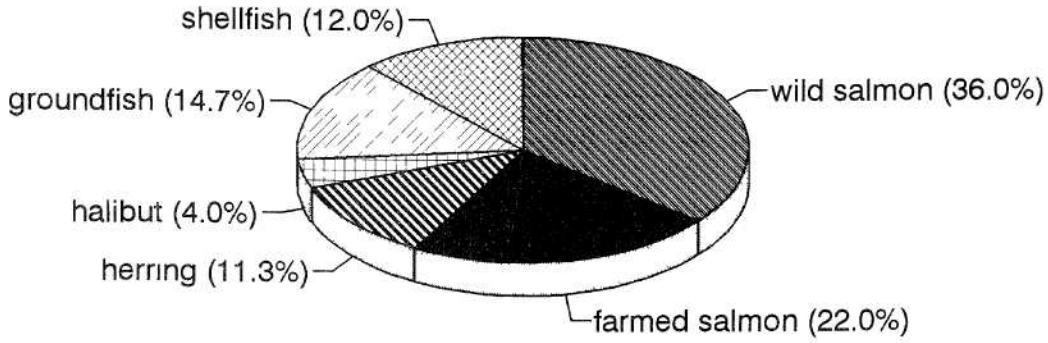
Our cases are selected to illustrate in several ways how these systems work. They vary in scope and focus (what functions or activities are performed at the local level), in level of operation (community or regional, and how many levels of government are involved), in degree of mstitutionalization (how much they have become the usual way of doing business), in the type of actors involved (kin-based vs. heterogeneous communities), in the number of parties (one homogeneous community from one sector or fishery vs. several communities from different sectors), and in the type of resource and fishery (immobile and local to mobile and highly migratory). The organization and main thrust of each of the cases is summarized below.

Fig.2. BC Marine Fisheries - 1992

LANDINGS (Total = 318,3000 tonnes)



LANDED VALUE (Total = $535,000,000)



(Data from British Columbia 1994)

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PART TWO. A TRADITIONAL VILLAGE TERRITORIAL FISHERY

Chapter 2. Small Villages on the Shores of Lake Titicaca, Peru. Our first case is the skeletal prototype for all the rest of the cases. It is narrow in scope, involving only the defence of local fishing territories by small villages. Hence it is only about control of access. It also occurs in the absence of government's ability to manage, and thus shows the effectiveness of informal rules which have allowed sustainable harvest over centuries.

PART THREE. REGIONAL MULTI-PARTY MANAGEMENT OF PACIFIC SALMON

Chapter 3. Alaska Regional Enhancement Associations are legally-constituted corporations of all commercial owner-operator licensees in one region. They elect a board to run enhancement projects of their own choosing. Associations also plan the coordination of harvests of enhanced and wild salmon, and the allocation of harvest opportunity among different gear groups: seine, gillnet, and troll. Regional association have increased abundance of selected species, and created fisheries in areas and at times which most benefited fishermen. Other achievements include the coordination of conflicting uses, the ability to finance itself, the ability to include non-residents, and some involvement in collective marketing.

Chapter 4, Multiple Parties on the Kuskokwim River, Alaska; Yup'ik and non-Yup'ik communities living up and down the river contribute to a co-ordinated salmon stock assessment effort and develop an in-season harvest plan which co-ordinates their harvest while keeping escapement high. Government acts as observer and data supplier to the process and implements the plan developed by the fishing parties. This case provides an impressive example of multiple parties working together in-season to solve the problem of lack of data.

Chapter 5. The Skeena Watershed Committee includes commercial, sport, and aboriginal. fishermen on the Skeena River in northern British Columbia, who produced a harvest plan to reduce interception of Skeena-bound steelhead and coho. Agreement was reached through the use of an independent facilitator who helped the three sectors find common ground. The federal and provincial governments then committed themselves to implementing the agreement. The committee also increased its scope to deal with stock assessment, harvest monitoring, enforcement, enhancement, habitat protection and restoration.

Chapter 6. Gitksan Traditional and Surplus Fisheries shows how a First Nation on the Skeena River maintains a traditional fishery management system and a commercial fishery on enhanced stocks which are excess to spawning requirements. Their fisheries planning is also co ordinated with the Skeena Watershed Committee discussed in Chapter 5.

PART FOUR. INSHORE AND STATIONARY FISHERIES

Chapter 7. Japanese-Inshore Fishermen's Co-operative Associations. This complex case involves almost the entire inshore sector of the world's most productive fishing nation, comprising about one-half million fishermen. Management is centred around several thousand local Fishermen's Co-operative Associations (FCAs). Each FCA hold exclusive, legal rights to harvest in designated waters adjacent to its home community. Some rights (particularly for more mobile species) are jointly shared with adjoining co-operatives. The result of exclusive and shared rights is a complex fisheries management geography, with tens of thousands of management units, far too complex for top-down management. Gear groups, joint fishermen/government committees, and government agencies all participate at various times in management decisions.

Chapter 8. Differing Oyster **Management Regimes on the U.S. Gulf of Mexico and** Long Island. This chapter discusses successes and failures in different regional oyster fisheries in four Gulf of Mexico states. In Louisiana, the fishery is based on legal tenures. Access to the Florida fishery is controlled informally through restricted knowledge of the fishing grounds and the processing sector. Both fisheries have long histories of high production and fishermen participation. In Alabama and Mississippi, on the other hand, open access results in low levels of capital and time investment in the resource, and correspondingly low and irregular levels of oyster production and a transient fishing community. The Long Island oystermen's story is a vignette about a fishery that collapsed around 1900. It is a lesson about the importance of alliances and the liabilities of unresolved conflicts. The fishery was restricted to local residents, but conflicts between the two sectors (growers and wild stock fishermen) prevented the formation of political alliances. The fishery was taken over by large outside investors who bought out the tenures. Without a united force to push for pollution control measures, the oyster market subsequently collapsed.

Chapter 9. Local Management of Korean Seaweed Fisheries. In this chapter three different types of exclusive local tenure over wild seaweed in Korea illustrate a range of possibilities and outcomes. One village divides benefits on a share basis, with some equity arrangements between equipment owners and pure labourers. A second village rotates harvestable areas to maintain sustained yield, and can thus lease some areas to outsiders without risk. While the first two villages share ownership and benefits widely, private ownership of seaweed beds in a third village leaves all but the few owning families in poverty.

Chapter 10. Multi-party Clam. Management in British Columbia. Uncontrolled access to clam fisheries during the 1980s combined with unfavourable environmental conditions led to a collapse of clam populations on partis of the BC Sunshine Coast. In response to a discussion paper on clam fishery problems and opportunities, prepared by DFO and the Ministry of Agriculture,. Food, and Fisheries, the Sliammon First Nation and local Non-aboriginal groups submitted proposals for community-based management of the clam fishery in Area C. In early 1994, DFO sponsored a joint (aboriginal and non-aboriginal) pilot project to manage the Area C clam fishery.

PART FIVE. MULTI-PARTY HABITAT. PROTECTION AND WATERSHED RESTORATION

Chapter 11. The Mitchell River Watershed Board, Australia, co-ordinates the multiple users of water, including an aboriginal fishing community, which is represented on the board in three capacities. It is especially useful as an example of a successful alliance, of aboriginal and non-aboriginal commercial fishermen working to protect fish habitat in the watershed, to produce better data on fish abundance, to control poaching, and to set up conservation refuges within the watershed where fishing is prohibited.

Chapter 12. A Shy swap Watershed Committee in British Columbia, on a much smaller scale than the Mitchell River, provides a forum for Native and non-native neighbours to talk about issues they never discussed together before. This group discovered overlapping interests in restoration and protection of riparian zones, and have mobilized both specific work efforts and broader plans.

Chapter 13. Kennedy Lake Restoration and West Coast Sustainability Association. On the west coast of Vancouver Island, a Native/non-Native working group collaborates with federal and provincial government agencies to restore depressed sockeye stocks to Kennedy Lake through a multi-pronged approach. Some members of this group are also involved in the West Coast Sustainability Association, a more grass roots organization of commercial salmon trollers and their communities attempting to rehabilitate local stocks and to survive as communities.

PART SIX, A CANADIAN POLICY FAILURE

Chapter 14. The traditional Newfoundland, inshore fishery operated for decades like most other successful community based fisheries, but was largely bypassed in the last two decades through government policies allowing a corporate-owned offshore dragger fleet to intercept and then overfish the cod stocks. Inshore data on stock decline was ignored and the fishery collapsed. Alternatives to Canadian development policy and ways to structure accountability to communities are noted.

PART SEVEN: SYNTHESIS AND CONCLUSIONS

Chapter 15. Principles for Success summarizes the variety of ways that institutions can set up new incentives and deterrents which change behaviour, and structure accountability. We synthesize how the various cases have done this, and how the fisheries management problems mentioned in the introduction are addressed.

Division of labour between authors

Each author was the original and main writer of some sections, although the entire report has received input and suggestions from both authors. The Preface was co-authored. Weinstein wrote Part Four (Inshore and Stationary Fisheries) and the two sections in the Introduction on aboriginal tenure and *Sparrow,* Pinkerton wrote the rest of the report and Chapter 10 of Part Four (Area C Clam Management).

PART TWO: A TRADITIONAL VILLAGE TERRITORIAL FISHERY

Chapter 2: Small Villages On The Shores Of Lake Titicaca, Peru

(Source: LeVieil 1987, Northcote and Morales 1989, LeVieil and (Move 1990)

Focus. The system of community self-management which developed in the 151 small villages on the Peruvian shores of Lake Titicaca is our simplest case: it was based almost completely on a system of exclusion. Villagers defended the inshore territory fronting their community from outsiders who wished to fish there. The system *had* to be simple to succeed, because it received no support from official quarters. It operated secretly and illegally on the local level only. The system had to be secret, because the Peruvian government viewed any form of exclusion as a challenge to the Peruvian law of open access to the lake fisheries. But exclusion of outsiders from fishing space was the main mechanism used by the villagers to control fishing effort. This is one of the most common and universal mechanisms found in community-managed inshore fisheries.

The problem. Although the Peruvian fisheries department declared the fishery to be open access, it did not have the resources to patrol or collect data on fisheries in Lake Titicaca, an area covering 8,100 square kilometers and a Peruvian shoreline almost 900 kilometers (Fig. 3). About half the lake is shared with Bolivia, which has a similar—but less well-documented-system. The very fact that government could not suppress the local system is ample evidence of the fact that government would not have been able to control overfishing either. Without the community self-management system, there would probably be no fishery on Lake Titicaca today. So the story is first of all about the value of human capital in maintaining a viable fishery. In this case, "human capital" is the willingness of the community to make and enforce rules which control fishing effort.

Degree of institutionalization. However, the "rules" were developed so long ago that they have become inextricably linked with local custom and culture. Perhaps the most astounding fact about this fishery is that harvest levels appear to have remained stable since the 16th century, when some Spanish records are available. The lake was a major trade centre during the Spanish occupation and is still a meeting place for two major Amerindian groups: the Quechua and the Aymara. For centuries it has been a net exporter to the Pacific coast (Northcote and Morales 1989). For the last 10 years when survey data are available, the number of fishermen has also remained stable: about 3,000 fishermen harvest about 8,160 metric tons of fish annually (on the Peruvian side of the lake). Stable production over long periods, coupled with a consistent number of fishermen, is a good indicator of sustainable harvest levels. All this suggests that the management system is very old.

The local management institution. The basic management unit is the small village, averaging about 20 fishermen each, managing an average of six kilometers of shoreline and 30 square kilometers of aquatic zone.. In other words, a "fishing territory" extends about five kilometres into the lake from the shoreline. Although each village operates independently, the whole region works on the same set of informal rales for-protecting the fishing territories. It is thus a system of many small co-ordinated units.

Scope of management activities. The chief mechanism for controlling fishing effort is the exclusion of non-residents from the local fishing territory, except for those who claim access by kinship or marriage to residents. One fishermen might be able to access four or five different, fishing territories in this way. In such a stable system, his kin ties and claims would be well known. And more than half the marriages are between residents of the same territory.

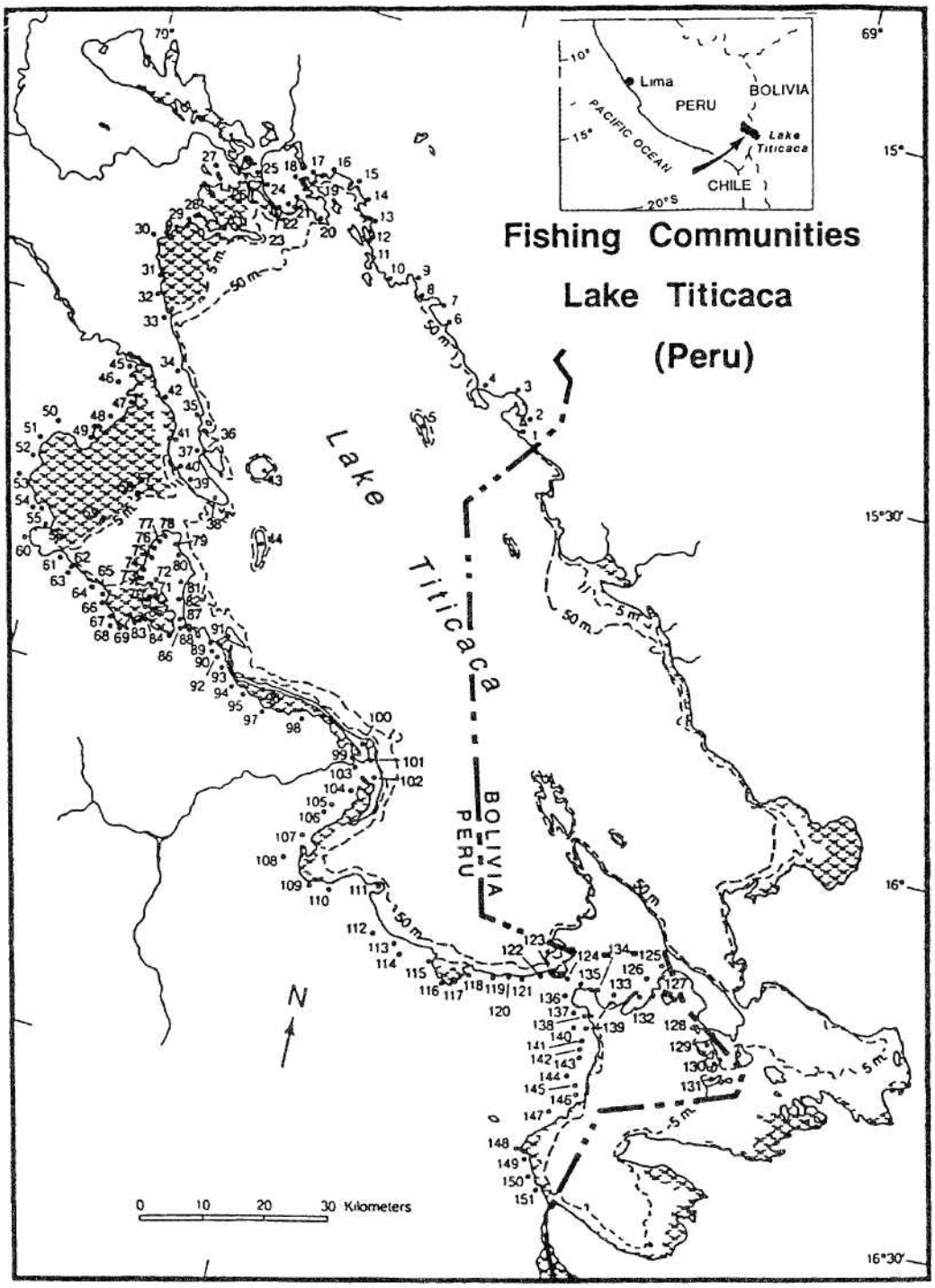

Fig 3 Map of fishing communities on the Peruvian shores of Lake Titicaca
Source LeVieil and Orlove 1990

Variations in type of fishery and in formal/informal rights of access. Access to the fish in the local territory is open to all the fishermen in the small, local community. This type of arrangement is common in situations like this one, in which fish move from one area to another. The most important fish are 30 species of *Orestias,* of which the most fished are carachi and ipsi. The latter tend to spend part of their life cycle in inshore areas.

In contrast, totora reed beds in waters close to shore with predictable yields are either communally or privately owned. The latter type of ownership and control of access is formal (legal). Totora reeds are highly valued as cattle fodder, and as material for roofing, handicrafts, and the construction of fishing rafts.

Technology and level of capitalization. Fishermen use low-cost, home made small crafts-made of tortora reeds or wood, most often propelled by sail and oar. Few motors are used. They make trips to set nylon mesh gillnets in the afternoon, and then return home. They check or retrieve the nets the following morning. The level of capitalization is low compared to the price of fish. About 75% of the catch is sold into local markets, and the rest consumed, given away, or bartered locally. LeVieil claims that fairly high rents are captured.

Mechanisms of exclusion. Both fishermen and other local residents are successful in excluding "outsiders" by the use of several mechanisms. The policing of totora beds is assigned to individuals for a year-long term. Fishermen also check strange boats on their way to and from their nets. When outsiders are seen in the area, they are threatened verbally and told to leave. They are accused of having intentions of stealing local nets or totora reeds. If these sanctions do not work, physical violence is used. Nets, left in the area by outsiders will be stolen, and/or outsiders will be physically attacked. In other words, the defence of legal property (nets) is used as the pretext for defending fishing territory.

Variations in the effort to exclude. Inshore, nearshore, and offshore areas are all defended, but to varying degrees, in proportion to the cost of defending the boundary. The cost of defending the area depends on the bottom topography of the lake. Where the lake bottom is shallow or gently sloping to a five meter depth, totora reeds grow out to several kilometers from shore. The presence of reed makes it easier for communities to "mark" their boundaries and claim the adjacent open water beyond the reeds, where they may place gillnets and catch species attracted to the reed beds.

Where the lake bottom slopes more steeply, totora beds do not extend more than a few hundred meters from shore. Marking the territorial boundary is more difficult. Where the lake bottom slopes quite sharply and is too deep to anchor set gillnets, the farshore area is used periodically by pairs of trawl fishermen towing a-net between them. Since nets are not left overnight, gear molestation and theft is not an option for repelling them. Since they come in pairs, physical threats are more difficult to arrange. Therefore, compensation by trawl fishermen to the local community is a common practice in areas with deeper lake bottom. However, when large schools of the prized ispi fish pass through the farshore waters of the territory, local fishermen defend the territory and take these fish during those periods. Communities thus defend territories to varying degrees, depending on the balance of costs and benefits associated with defence.,

Use of formal rights to reinforce informal rights. Local communities also use the legal system in whatever way possible as the basis for building mechanisms for exclusion. For example, village fishermen's guilds and associations have the legal right to make rules for the orderly conduct of fisheries. So they prohibit night fishing "to prevent net theft and accidents." It is of course much easier to keep outsiders away in the daytime when they are more easily detected. Furthermore, a local volunteer official, called the "beach sergeant", carries out a few light duties for the government by keeping a list of local fishermen and registering their boats. The beach sargent often discourages outsiders from using the area "to keep the peace."

The exercise of informal community management rights is also facilitated by formal (legal) private and communal ownership of shoreline and nearshore resources. There are various legal forms of communal ownership through local co-operatives and older institutions recognized in law. Individuals own some landing sites, channels through totora reed beds, and some inshore reed beds. Communities also own reed beds. By excluding outsiders from trespass on these forms of private and community property, access to fishing grounds from shore is effectively prohibited.

As in many fishing communities with sea tenure, property rights over fishing space are also seen as an extension of land tenure arrangements (Alexander 1977, Ruddle and Achimichi 1984, Ruddle and Johannes 1985, Durrenberger and Palsson 1987, Cordell 1989). On Lake Titicaca, access to fishing space replicates both private land ownership and grazing fields held by agricultural cooperatives. It may be either privately or communally managed, depending on the nature of the resource.

The role of the community. Given the favourable rents or benefits which can be captured by local fishermen, why do they not increase their catches? LeVieil (1987) argues that fishing effort within the village is restricted by large demands on fishermen's time through the need to keep lakeshore land under cultivation, the need to participate in the construction and maintenance of village projects, and the requirement to participate in regular village fiestas and religious celebrations. Uncultivated land may be legally claimed by others who will cultivate it, and thus the landowner would lose his shoreline access to the lake if he did not work his land. Participation in feasts is an important avenue for keeping one's status in the community, and one cannot be a member of the community without discharging obligations to it.

Of course, these activities do not constitute rules to restrict fishing effort. Lowered fishing effort is merely a by-product of alternative demands on fishermen's time. But these activities do illustrate the general rale that participation in community life is often a necessary part of receiving community backing in whatever rule enforcement may be needed. Therefore, it is. to be expected that the communities-especially where there is little or no support from government-ask for some kind of reciprocal contribution from fishermen. These come in the form of gifts of about one-sixth of the catch to non-fishing community members.

There are strong structural similarities between the Lake Titicaca fisheries and the Gitksan example we discuss in the next section. The parallels are especially strong in both mechanisms of exclusion and in the relations between fishermen and community. They remind us of the general point that self-regulation occurs more easily when it is part of other aspects of community life. It is merely one aspect of the general social order.

Benefits to fishermen and communities from exclusion. The favourable ratio of fishing effort to supply of fish means that when fishermen do fish, they have a high catch per unit of effort, and they "capture substantial economic rents." They are not forced to invest heavily in competitive gear and equipment, so fishing expenses are low. Therefore, the fishermen get a high level of benefit from the fishery.

Although the members of most fishing households spend less than a third of their labour time on fishing, they receive between half and three-quarters of their income from fishing, since it offers higher returns than the farming, herding, occasional wage work, and handicrafts work they also do. About two-thirds of the catch is sold for cash. The rest goes to feed the household directly or is given away or exchanged for other foods.

Sustainable harvest rate. LeVieil believes that the fish stocks are harvested at a rate even below what could be sustained. However, since there are a number of different species with possibly different optimum rates of harvest, a great deal of data would be required to determine what the overall most sustainable rate of harvest would be. It may be that a lower rate on some

species is just sustainable on others. The very fact that species are NOT being overexploited is rare in a worldwide context (Christy 1994, Larkin 1991).

Overall, if we set aside the fact that the system of territorial defence is largely illegal and operates despite government (and under the guise of protecting legal property), the Peruvian Lake Titicaca fishery suffers from none of the great fisheries management problems. If it can continue to operate undisturbed, there is no sign in the literature that its stability and sustainability will be threatened.

In summary, Lake Titicaca fishing communities exercise the following management functions by exerting informal rights (see Table 2):

1. regulation of fishery access: exclude non-residents unless they have appropriate kin or marital relations with residents, or pay compensation
2. regulation of transfer of fishery access: right of access cannot be sold or leave the locally-based kin group, although kin do not have to live in the village. Most fishermen do reside locally, however.
3. enforcement of access and transfer rules: vigilant mutual monitoring of activities, and use of adjacent private property mechanisms to exclude outsiders.

The informal community property rights system in Lake Titicaca shows all the characteristics of sustainable community management, except for information sharing, public discussion of management, and the co-ordination of different uses. These aspects of management are not possible because of the constraints on this system to operate surreptitiously. However, these aspects of management do not present a problem at present because there has been no major effort by government to launch conflicting fisheries or allow other conflicting uses. Pollution is confined to one urban area and its bay; it does not appear to affect the fisheries outside this small area. The lake communities operate as a closed system.

What makes a system like this tick? Why did local people in all 151 communities decide to operate in this manner? We have no blow-by-blow history of how the system developed, but we can identify some characteristics of the communities which are common to self-managed systems. These are:

1. A high level of dependence on the resource. Fishermen earn over half their incomes, and an important part of their diet, from fishing.
2. A high level of vulnerability to non-sustainable use. There are no other activities which could replace fishing in this area.
3. A strong identification with the area through traditional land ownership, custom, and the . inability to move these assets.
4. An unwillingness to alienate the resource from the community. The rights to the resource are not viewed as saleable or transferable. They are a critical part of what makes it possible to live in that place.
5. An equitable sharing of the benefits of sustainable use: The exclusion of outsiders creates higher yields for everyone and reduces the fishing effort required to obtain those yields. Everyone benefits from gifts of fish for home consumption. Everyone benefits from compensation paid by outsiders for use of the territory.

The foregoing characteristics create a high level of motivation or potential for the community to agree about mechanisms or rules for achieving sustainable resource use. However, the community is severely constrained in. what it can do, since the government only allows local committees to make rales about "orderly conduct." Therefore, the community does not have the luxury of going through a public process of the type that will be evident in many of our cases. However it does work internally to maintain rules and customs. The local informal management system has the following characteristics.

1. *It is effective.*

a) Communities have made appropriate rules which work to exclude outsiders.
b) Communities monitor trespass in their territories.
c) Fishermen confront trespassers and enforce the exclusion rules.
d) Efficiency is promoted in local fishing activities (a high catch per unit of effort, a favourable ratio of investment in gear and vessel to profit from sales of fish)
e) Stewardship is promoted. Fishing is part of a cultural complex which makes people feel connected to and responsible for the fishery for future generations.
f) Stable and sustainable rates of harvest have been maintained over long time periods.

1. *It is adaptive.*

a) The rules are applied differently in different situations, according to costs and benefits. Energy is invested where the benefits are the greatest.
b) The rules extend land ownership patterns into sea use, and thus maintain consistency.

Major Features Of Lake Titicaca Fisheries

Major Problem Addressed: no governmental control of overfishing
Major Management Focus: exclusion of non-residents
Scope Of Activities: monitoring & enforcement of exclusion rules
Most Important Outcomes: stable, sustainable harvest over centuries
Local Management Institution: small village, operates independently
Human Scale Of Management Unit: c. 20 fishermen, backed by village
Regional Context: 151 small villages using same set of rules
Scale Of Unit Area: 6 km. shoreline, extending out 5 km. from shore
Type Of Actors: culturally homogeneous, kin-based, immobile
Level Of Operation: local level only
Degree Institutionalized: 4 centuries of traditional practice
Degree Formalized (Legalized): illegal, but use other legal supports
Type Of Fishery: fixed and mobile gear, mobile and immobile species
Economic Benefits: high CPUE, low capitalization, favorable returns
Role Of Community: obligations to distribute surplus, support exclusion
Relationship With Government: local system operates underground
Possible Relevance To BC:

- similar to aboriginal fisheries in BC in relationship of fishermen to community (community obligations affect conduct of fishery and obligations to distribute surplus)
- model of differing treatment of different fisheries: some shared with outsiders, some kept for exclusive use of community.
- differential access rights to private and communally held resources.

TABLE 2 MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES- Lake Titicaca Fishery

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	PROPERTY RIGHTS AND DUTIES	LTF
1. POLICY MAKING AND EVALUATION			
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS	Right/duty to do long-range planning	NO
	SETTING OBJECTIVES	Right to research key questions affecting community values	NO
	LONG RANGE PLANNING	Right/duty to educate own and larger community re problems	NO
	RESEARCHING THE RESOURCE SYSTEM		
	PUBLIC EDUCATION		
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE			
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION	MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	NO
		Right of access to government information	NO
		Right to collect own information	NO
UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF CONDITION OF STOCK	Right to interpret information in light of local knowledge	NO
		Right/duty to enhance or restore a) resource/resource productivity b) habitat	NO
3. COMPLIANCE WITH RULES			
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules re: a) harvesting b) habitat damage c) exclusion and poaching	Informal
4. FISHERY HARVEST			
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own	NO
		Right to interpret information in light of local knowledge	NO
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re: a) size of overall catch b) location of the fishery c) timing of the fishery d) gear types permitted e) size of allowable interception	NO

CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	HARVEST MONITORING	Right of access to government information and right to collect own	NO
UNDERVALUING OR IGNORING HUMAN CAPITAL		Right to interpret information in the light of local knowledge	NO

5. FISHERY ACCESS			
DEFINING BOUNDARIES AND ACCESS: EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude: a) certain classes of fishery (e.g. sport, commercial) b) certain classes and sectors of fishers	Informal
	HARVEST ALLOCATION	Right to allocate: a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to redistributive mechanism	NO
	TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members	Informal
		Right/duty to regulate conditions of transfer	Informal

6. RESOURCE USE COORDINATION			
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNINGTHE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses	NO
		Right/duty to communicate problems and try to solve with others	NO
		Right/duty to resolve disputes internal and external	NO

7. RETURNING OPTIMUM VALUE TO FISHERMEN			
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING	Right to manage harvest timing for optimum product value	NO
	PRODUCT QUALITY		NO
	PRODUCT DIVERSITY		NO

PART THREE: REGIONAL, MULTI-PARTY MANAGEMENT OF PACIFIC SALMON

In contrast to the inshore and/or relatively sedentary resources managed in many community-based fisheries, these three cases of Pacific Salmon management operate at a regional level Salmon migrate thousands of kilometres over open Pacific marine pastures before returning to spawn in their rivers of birth. The rivers themselves may be more than a thousand kilometres long. During much of this time, salmon are of harvestable size and good quality. Therefore, even though local communities may lay claim to spawning grounds, community interests in salmon are inherently regional in scale.

In these case studies, salmon is managed over fairly large geographic coastal areas (130 to 360 kilometres) or over river systems of equal length. These cases also involve the co-operation of more than one geographic community, more than one gear type, and more than one sector (commercial, sport, aboriginal) who live or work within these areas. Two of the cases involve co operation between aboriginal and non-aboriginal communities, and the last chapter of this section describes traditional and modern aboriginal management, and how it fits into the regional co operative system. These cases demonstrate that even with resources as complex and mobile as salmon, co-operation across communities and between communities and government contributes significantly to management. The three cases are: the Alaska regional enhancement associations, the Kuskokwin River (Alaska) Management Working Group, and the Skeena Watershed Committee, BC The last chapter deals with the Gitksan, a First Nation which maintains its own management system on the upper Skeena River and also participates in the Skeena Watershed Committee.

Chapter 3: Cost Recovery Salmon Enhancement Associations, Alaska

(Source: Amend 1989, Pinkerton and Langdon 1988, Pinkerton 1994b, interviews 1995)

The problem. Alaska is a vast subcontinent of North America with a coastline 33,000 miles long, exceeding that of the remainder of the continental United States. Its abundant salmon runs reached an unprecedented low level at about the time Alaska was becoming a state and undertaking major reforms. Although long-cycle trends in ocean survival are now believed to play an important role in salmon abundance, Alaskans were convinced that past mismanagement under federal jurisdiction was also a major cause of the decline.

The regional enhancement associations were established in the mid-1970s, when Alaska was at the bottom of a 30-year decline in salmon abundance: the catch was only 30 million. This can be contrasted with Alaska's 1994 record salmon catch of 194 million. Out of a period of extreme stress in the late 1960s and early 1970s emerged several initiatives in the state legislature to address the problems in the fisheries.

Exclusion: owner-operators receive regional licences. One of these initiatives was the establishment of licence limitation by region to control the number of fishermen in any regional fishery. Alaska has seven regions where fishermen can be licensed to fish salmon commercially: Southeast, Yakutat, Prince William Sound, Cook Inlet, Kodiak, the Alaska Peninsula/Aleutian Islands, and Bristol Bay. The size of these regions, as measured in kilometres of coastline, varies from 130 kilometres (Prince William Sound) to 360 kilometres (Southern Southeast).

The Commercial Fisheries Entry Commission tried to establish the number of salmon licences in each region which could be supported by the natural abundance of that region. Regional licensing is a form of exclusion, in that only fishermen licensed to fish that region may fish there. It was not necessary to live in the region to own a licence there, although in the first issuing of licences, rural and regional residents had extra points. A fisherman's history in the industry was also weighed heavily.

It was, however, necessary to be an owner-operator to receive a licence. Licences could be sold, but only to other owner-operators. Licences could not be leased or combined. A fisherman could not own more than one salmon licence.

Funding made available to-regions. The second initiative was the creation of a new division • of Alaska Department of Fish and Game (ADF&G) called the Fisheries Rehabilitation, Enhancement, and Development (FRED) in 1971, which built and operated 19 hatcheries. Out of the $900 million in oil revenues beginning to come on stream, the state eventually dedicated a $40 million bond issue to hatchery construction, some of which would be funnelled through regional associations.

Formal authority and mandate of local institution. The third initiative was state legislation in the mid-1970s enabling the formation of regional enhancement associations of commercial fishermen.- Such associations were empowered to borrow money from the state, conduct salmon enhancement projects of their own choosing, and sell surplus salmon from these projects to pay for their operations. "Surplus" means salmon which were not caught in the marine area before they reached the hatchery, and which were not needed for hatchery broodstock. The surplus figure which worked ended up being about 30% of the enhanced fish. (The other 70% of enhanced fish were taken in the regular fishery). Also by majority vote, associations voted to tax themselves two or three percent of their catch to help pay for the projects. The associations also had the authority to be partners with the state in making long-range regional enhancement plans, and in judging whether proposed projects fit into those plans.

Economic and political accountability of fishermen's associations. The associations were first of all remarkable as regional economic development projects which paid for themselves. The associations were also remarkable as grass-roots initiatives by commercial fishermen: state legislation enabled their formation, but the regions had to organize themselves. Fishermen's projects were widely viewed as far preferable to state hatcheries or private hatcheries. By the mid-1970s, reputed poor decision-making and patronage in state hatchery siting and species selection, or private gain in private hatcheries, caused both state and private hatcheries to be viewed less favourably. Both state and private forms were seen, as non-accountable to the impact of hatcheries and enhancement projects on fishing patterns and resource sustainabillty. In contrast, fishermen were seen as likely to be the wisest and most dependable decision-makers for these kinds of projects. Policy-makers and legislators who pushed the regional association model took some of their inspiration from the Japanese inshore fisheries model, which they felt they were adapting to Alaska.

In the past 20 years, at least five regional associations-in Alaska have become solid successes, contributing significantly to the economic well-being of fishermen by increasing the supply of fish in their region. The five active associations have adopted very different, financial and production strategies. Two associations have taken on considerable debts. One association has chosen to enhance at a very high level. The majority of associations are in sound financial shape and have planned enhancement projects which make key contributions to the fishery in strategic areas, without causing major problems.

Scope of management activities. In addition to their enhancement activities, the associations have assumed greater informal role in regional co-ordinated use planning, in harvest planning, in

stock assessment, and in allocation. Fishermen's contributions to their own economic development have thus placed them in a position to be far more involved in fisheries management in general. By 1993, 20 years after the first regional association formed, many of the state hatchery projects had been taken over by the regional associations, and the FRED division of ADF&G had been terminated. (By statute, a state hatchery considering closure had to be offered to a regional association before other options were considered). The regional associations had come into their own.

The issue of membership.

This story is particularly important to British Columbians as an example of how membership in the associations included residents and non-residents. The associations were formed by the majority vote of commercial licensees in the area, who were not necessarily residents of the area.

Alaska's licence limitation program, unlike British Columbia's, was regionally-based: each fisherman was licensed to fish only a particular region. A fisherman does not have to live in the region in which s/he is licensed to fish.

Association board members are elected at annual meetings, and associations are required to have board "seats" distributed in a representative manner: usually this is done by gear type and by region of residence. Thus the Southern Southeast Regional Aquaculture Association has a "Seattle" seat,. because a significant number of southern Southeast licence holders live in Seattle.

However, region residents still have the greatest influence on decisions, because they inevitably are more active on executive committees, which meet more frequently than the full board, and do more of the association's work. Thus the associations deal with the membership/exclusion issue by including non-residents in broader policy decisions, but using more local residents in the implementation and day-to-day decision-making of the association. Local residents also supply the volunteer labour and materials and emergency help for local projects, simply because they live close to these activities.

The reasoning behind Alaska's regional enhancement concept, is that enhancement projects are most feasible when done on some kind of regional or local scale. Taking initiatives in enhancement work means learning a lot about favourable local stocks as e*gg* sources, the pre-existing fishing patterns and migration patterns of wild stocks, and all the possible positive and negative impacts of new projects. The solid core of this kind of investment in time and energy is more likely to be forthcoming from local residents-both because they are more available and able to attend meetings and to help, and also because they have a greater sense of place and long-term commitment to the region.

The fishermen in Prince William Sound who initiated the regional enhancement association concept (and who had led a state-wide campaign for licence limitation) saw licence limitation and regional licensing as a precondition to regional enhancement. They reasoned that it is much easier to plan impacts and measure results if the intention is to benefit a limited and known number of fishermen. In 1990 the 200 or so Prince William Sound region seiners contributed an average of $2,974 to their association through a 2% tax, but received gross benefits from enhanced fish averaging $70,907 each. If twice as many seiners had been involved, the benefits to each seiner would have been about half as much.

Diversity of regional enhancement strategies. Structuring enhancement on a regional basis, and decentralizing the decision-making about whether and what each region would do has had several advantages. First, each of the five regional associations has adopted a different strategy

for enhancing salmon. The opportunities are different in each region, as have been the preferences of the majority of fishermen in each region. So fishermen now receive benefits in proportion to the kinds of choices and contributions they have chosen to make regionally. They are accountable for the choices they have made.

The regional scale also appears to be appropriate for enhancement projects because there are limits to the amount of data on stocks and landscape that any one body can reasonably keep in active memory. No matter how many staff an association could afford to hire (and this too is limited); some committee of regional fishermen has to keep on top of what is going on and decide what to do next

Local management institution. Finally, the regional approach is also important in an entirely different way. The regional association are required by statute to represent their region, but they have some flexibility in doing so. The majority on the regional boards are commercial fishermen. They are elected to the regional association board by their gear groups, which have equal numbers of seats. But the elected fishermen majority then appoint several other kinds of representatives from the region to also serve on the board: a Native Corporation representative, a subsistence representative, a sport representative, a community representative, a local processor, and (in one association) a crew representative. Although commercial fishermen form the majority of the board, these other actors ground the association regionally, since they live in the area, and stand to benefit from sustainable economic activity. They also stand to lose substantially if poor decisions are made. The associations are accountable to the regions.

The issue of risk to wild stocks.

The diversity of choices made in different regions is beneficial when considered as long range experiments in what kinds of enhancement are the most sustainable in the long run. It is valuable to have a range of strategies being attempted, all of which may prove to be viable and appropriate for each situation, or some of which may prove to be wiser than others in the long run. Prince William Sound at one end of the spectrum has chosen rapid and large scale enhancement of pink salmon. Pink salmon in the Prince William Sound region was also the most abundant wild stock: it provided an average catch of five million before 1980. At the opposite extreme is Northern Southeast, which has chosen a more cautious gradual strategy, with an emphasis on habitat enhancement, and the enhancement of chum, coho, and chinook stocks in a dominant wild pink salmon fishery.

Although in the 1980s wild stocks in Prince William Sound rebounded together with hatchery stocks on an overall basis, in the 1990s some wild stocks were not doing as well. Serious questions have been raised about the possible impact of a mixed stock fishery targeting hatchery stocks which is open in some years at the southwest entry of the sound. Well before this issue became a concern, however, the regional association (Prince William Sound Aquaculture Corporation or PWSAC) was contributing to tagging and tag recovery studies, and to in-season overflights of 209 indicator streams in the sound. Since 1992 the legislature has issued a clear mandate to the Alaska Department of Fish and Game that management of wild fish has first priority, and ADF&G has required associations to take responsibility for generating information on enhanced stocks. These developments improved the ability of ADF&G to resist pressures to open a fishery which is likely to endanger wild stocks.

. This issue has also led to increased pressure within PWSAC to generate even better data on hatchery stocks in-season, and to have a data-sharing partnership with ADF&G. In 1995 PWSAC begins marking 100% of hatchery pinks of oliths, an inexpensive procedure which uses temperature modifications in hatcheries to lay down a prominent dark ring on the fish's ear, which is detectable

[2]under a microscope. Otolith analysis is currently done in the state capital at Juneau, but PWSAC may eventually have a regional laboratory, possibly in Cordova. This would allow analysis of the hatchery composition of runs within 12 hours of a test fishery, and greatly enhance in-season management capability. The presence of such a facility would likely open the door to a greater data sharing partnership with ADF&G, because of the potential for volunteer labour contributions to laboratory analysis. PWSAC would like a higher level of data and data analysis in stock assessment. They would like to do an independent analysis to get a more accurate picture of hatchery/wild interactions.

The issue of risk to wild stocks demonstrates how legal and political liability works when power is shared. ADF&G has the mandate to protect wild stocks, and has been able to get a clearer mandate from the legislature to give priority to wild stock protection when there is uncertainty. Public perception of risks to wild stocks has placed heat on PWSAC, which is politically liable. This has created more pressure, political will, and capacity to increase data and analysis of wild/hatchery interactions.

The issue of economic benefits and management benefits.

British Columbia's community-based projects in DFO's Salmon Enhancement Program provided a partial model for Alaska's regional associations. A major difference, however, is that BC community projects can only sell for "cost recovery" a small amount of the "surplus" salmon returning to a stream or hatchery as a result of their efforts. The "excess salmon to spawning requirements" (ESSR) salmon sales (those fish not needed for broodstock which make it to the hatchery) are minor compared to the 30% of enhanced production which Alaskans are allowed to sell.[1] In Alaska, ADF&G is required to manage the fishery so that only 70% of the enhanced fish (in addition to the wild fish) are caught in regular fisheries, while the other 30% of enhanced fish make their way back to the hatchery. This means that BC projects are mostly dependent on government support and volunteer labour, and cannot pay for tagging studies to measure, and manage for, the contributions of their enhancement projects to salmon runs.

The Prince William Sound region. To illustrate how fishermen and some areas of fisheries management can benefit from association activities, we continue to use the example of Prince William Sound Aquaculture Corporation (PWSAC), the first association to form in Alaska, in 1974 (Figure 4). The main community is Prince William Sound is Cordova, with a population of 2,000, almost completely dependent on fishing. The majority of licence holders and board members are local residents, and there has been little transfer of licences out of the region. Although non-local licence holders attend the thrice-yearly board meetings where general policy is set, local residents tend to be more active on the committees which do most of the associations' work.

PWSAC is not typical of the associations in that it went into rapid and larger scale hatchery production, and it chose to produce mostly pink salmon. We often use the word "enhanced" instead of "hatchery" fish below to emphasize the point that the same general strategy could be applied to a wide variety of forms of enhancement, not all of which depend heavily on hatcheries. PWSAC's efforts as an organization of fishermen illustrate some important principles, whatever particular enhancement techniques were used.

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[1] In Alaska, salmon farming (pen rearing) is illegal. The cost recovery enhancement practiced by the regional associations in Alaska is sometimes called salmon ranching. Ranched salmon spend most of their adult life in the wild, and are mostly (70%) harvested in regular commercial fisheries.

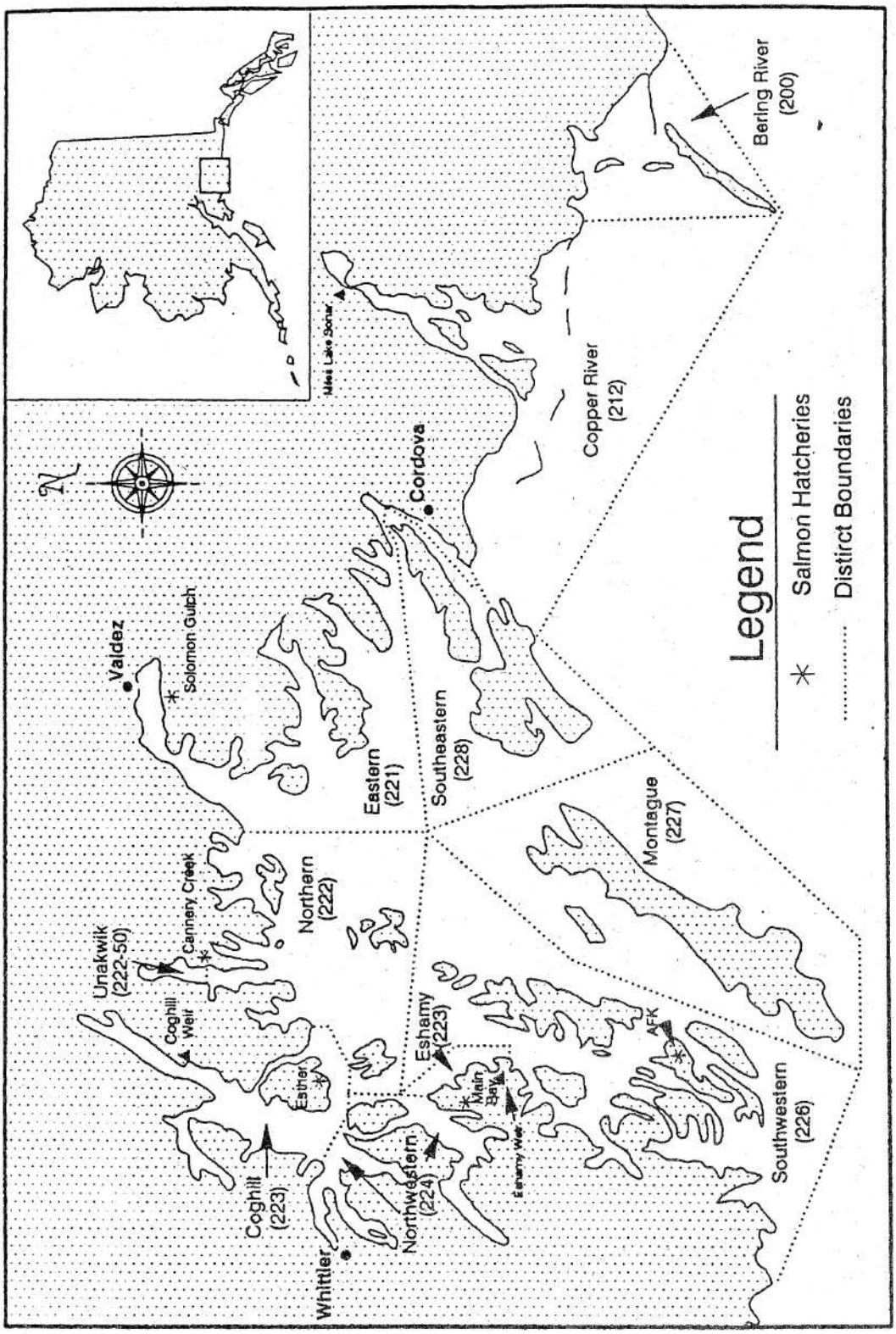


Fig. 4. Map of Prince William Sound showing commercial fishing districts and hatcheries. Source: Geiger 1990.

PWSAC began operations by choosing a stock and constructing a hatchery. Cost recovery salmon enhancement as practised by PWS AC involves harvesting eggs from a favourable stock, artificially incubating and rearing the eggs to the fry, fed fry, or smolt stage in their first year of life, and releasing these young salmon to the North Pacific to feed and grow. PWSAC released its first fry in 1976. The salmon return as adults to the area from which they were released. Timing of release, site of release, choice of stock, and timing of harvest of wild stock can be varied so that hatchery stocks interfere less and mix less with wild stocks. If appropriately and carefully used, cost recovery enhancement can act to strategically balance natural variations in run size without endangering wild stocks. In Alaska this was particularly important, because very cold winters can significantly reduce the number of salmon eggs which successfully hatch into fry in the spring.

Of course, this approach is not without risks, as discussed above. Both because of the risks, and because of the importance of documentation, we highlight Principle 1: enhanced fish must be tagged? so that their contribution to the fishery can be evaluated, and so that they can be distinguished from the wild stocks in potentially mixed stock fisheries. In almost all five Alaska regions with enhancement associations, tagging helps state managers make decisions about when and where to have fisheries. In other words, enhancement activities involving tagging automatically lead to better stock assessment of wild and enhanced stocks, even if they also make management more complex.

In order for the enhancement projects to be self-supporting, 30% of the enhanced fish returning to the area are harvested for broodstock and cost recovery when they reach the hatchery site. They are sold by PWSAC as an association, not by individual fishermen. The other 70% of the enhanced fish are taken by the individual fishermen in their regular fisheries. Principle 2: the sale of a minority of the returns for "cost recovery" pays for the production of the majority of the enhanced fish, which are a direct benefit to fishermen in increased catches. The associations are run on a non-profit basis. However, they do produce significant direct benefits to individual fishermen. In Prince William Sound, the historical average return of five million pink salmon was increased to a 10-year average of 18 million pinks 1979-88. After an alarmingly low return of 3.9 million pinks to PWSAC hatcheries in 1993 (raising questions about the potential impact of the oil spill), Prince William Sound enjoyed its third largest recorded hatchery return in 1994,20 million hatchery pinks. By 1994, the association had voted to have PWSAC sell 40% of the hatchery returns to pay debts due to poor returns and low prices. So in 1994 Prince William Sound area fishermen harvested 16.8 million pinks produced by PWSAC hatcheries and 5 million wild pinks. About 150 seiners participated in the 1994 fishery, and made an average of US$84,000 apiece from fishing hatchery pinks.

The need to tag enhanced fish, and the need to develop an integrated harvest plan for wild and enhanced stocks, resulted in PWSAC tagging programs, tag recovery, and contributions to escapement counts which increased scientific understanding of wild stocks as well as enhanced stocks. Principle 3: cost recovery enhancement pays for greater stock-assessment in general, and hence contributes to a greater understanding of both wild and enhanced runs.

PWS AC's production of enhanced fish initially caused more problems in harvest management, because the "new" fish had to be divided equitably between seiners and gillnetters, and because the harvest of enhanced and wild fish had to be integrated in some. way. However, cost recovery also • produced more resources for addressing these problems. PWSAC hired a planner to work with the fishermen, who collectively worked out an allocation scheme. PWSAC then worked with ADF&G through the Regional Planning Team process to produce an integrated harvest plan for Prince William Sound. The Prince William Sound gillnetters ended up harvesting more enhanced chum, and coho, and both enhanced and wild sockeye. The statewide citizens' Board of Fisheries, which . makes allocation decisions, approved PWSAC's allocation plan, giving it a formal status.

Principle 4: cost recovery pays for allocation planning for wild and enhanced stocks, and for the integrated harvest planning of wild and enhanced stocks. This means that fishermen's associations originally involved only in enhancement are likely to take on a much larger role in both allocation and in harvest planning.

The most surprising result of the PWSAC strategy of mass production of pink salmon was an eight year period of price advantage for PWSAC's sale of the 30% cost recovery fish. Between 1983 and 1990, PWSAC was able to sell these fish at a premium. There were several reasons why PWSAC fish were very attractive to buyers. These included: the increased volume of these fish in the 1980s, their high quality (because they were held and sold live in floating pens), the avoidance of packing costs (for floating processors), the consistency of the product, an ability to even out processor flow in some years, and the simplicity and predictability of dealing with one large seller who had gained a reputation. Although PWSAC has not been successful in persuading fishermen to sell more of their fish collectively-and some cannot because of their indebtedness to processors--this principle would apply to individually-caught catch as well, if it were sold collectively.
Principle 5: consistent high quality and stable volumes of fish obtainable through one seller return greater value to the fishermen.

The sudden and unexpected entry of Russian pink salmon into traditional North American markets (Japan and Europe) in 1991, due to unforeseen internal changes in the former Soviet Union, radically changed world supply conditions by 1991, and eliminated PWSAC's premium. It also radically lowered the price all North American fishermen could obtain for pink salmon in Asian and European markets.

PWSAC is now spurred even faster than before to develop new product forms for pink salmon which can enter the North American or even the world market In 1993 PWSAC fanned a non-profit marketing subsidiary to conduct product form research on its own and in partnership with several other governmental and non-governmental bodies. Product forms which look promising so far are salmon chowder, skinnless/boneless fillets, salmon nuggets, salmon burgers, and green eggs (for Asian products). In some cases, local processors are testing and marketing small amounts of new products. In other cases, PWSAC's marketing arm is contracting out this process--especially when local processors refuse to buy some of the pink salmon, as they did in 1991.

Some of the traditional canners of pink salmon have no interest in exploring product forms other than canning. They are traditionalists who "would rather fight than switch." The considerable Japanese investment in the Alaska processing industry also inhibits interest in product diversity. The Japanese can now acquire pink salmon very cheaply in Russia's extended economic zone in exchange for technological and marketing assistance. They are not interested in having Alaska pink prices rise through targeting more diversified markets. This means that Alaskan processors in general are not supportive of state infrastructure developments such as rentable cold storage facilities-which would assist in developing product forms besides canning.

PWSAC has a tricky and difficult road ahead, but in this it is not alone. And it has certain advantages which can buffer it in periods of rapid change. As a regional association which is seen as providing significant public benefits, it has been able to restructure state loans in order to recover from a disastrous 1991 and a difficult 1992 market situation, followed by the mysterious low return of pinks in 1993.

It is important to see the "oversupply" of pink salmon in Prince William Sound in a worldwide context, because most fisheries are being overexploited and supplies of fish in general are diminishing, especially relative to population growth (Larkin 1991, Christy 1994). Lower value fish such as pink salmon are especially important, since they can potentially enter a wide variety of

markets and provide high quality protein. **Principle 6: because of unpredictable fluctuations in world supply, diversification or development of new product forms is an important strategy for returning stable value to fishermen.**

In summary, the great fisheries problems which PWSAC has addressed are the uncoordinated use problem, the undervaluation of human capital (by PWSAC contributions to enhancement and stock assessment), and parts of the product quality and product diversity problem. The management functions performed by PWSAC are (see Table 3):

1. enhancement: formal planning and execution of projects which are approved by government
2. co-ordination of uses: formal planning with state on Regional Planning teams: produce 20 year plan. Annual meetings assessing whether new proposals by any party fit into plan.
3. stock assessment: first stage of informal participation with government. PWSAC holds raw data but has not yet done independent analysis of the data. Interest in 1996 in doing in-season analysis of tag data to determine hatchery/wild stock composition and do run reconstruction
4. allocation: informal planning of allocation of enhanced fish between gear types; approved by Board of Fish
5. harvest planning: formal pre-season framework planning with ADF&G through PWSAC's mandate to co-ordinate use on Regional Planning Team
   - set areas
   - set times
   - set gear
6. product quality and quantity: informal ability to get premium for 8 year period being a single seller of sufficient volume
7. product diversity: formal ability to use marketing subsidiary, but informal limits on the exercise of this function.

Issues not successfully addressed. It is important to mention that government regulation has addressed the exclusion problem through licence limitation and regional licensing. Government regulations also inhibited some of the "big boat" problem through limits on the size of purse seine vessels (50 ft.). In spite of this, the increased prosperity of the fishery in the 1980s resulted in greater investments being made in seiners. Most of this investment in the 1980s was geared toward improving refrigeration systems, and thus product quality. Part of this could be returned to the fishermen in improved prices.

The greatest "overcapitalization" in boats occurred as a result of the lucrative charters paid by Exxon in the years following the 1989 oil spill in Prince William Sound. At this point many skippers jumped from 40 to 50 foot boats at the US$500,000 level. Once investment on this scale was put in motion, the overcapitalized skippers applied pressure to fish the abundant runs in mixed stock fisheries on the capes. These fisheries were more complex to manage and created some of the problems described above. By 1991 when the pink salmon price dropped, the more expensive vessels could not be supported by the fishery. About 100 salmon seiners licensed in the region have not fished salmon in the last few years. While this case is highly unusual (because of the oil spill money), it may still indicate a vulnerability of regional systems to the dissipation of fishermen's profit margin through increased investment in boats. This problem does not appear in the more localized community-based fisheries.

Native/non-Native co-operation was not strongly evident in this example, but the board structure of regional associations could easily be adapted to equalize Native and non/Native participation.

What regional characteristics were important in making this system work?

1. A high level of dependence on the resource: the salmon run "failures" in the 1960s and 1970s catalyzed PWS AC's formation.
2. A high level of vulnerability to non-sustainable use-hence a willingness to take indications of non-sustainability very seriously (suppprting increased tagging, tag recovery, and spawning surveys to measure impact on wild stocks).
3. A strong identification with the area by local residents, and respect for that by non-residents.
4. An unwillingness by the majority of local residents to transfer the resource from the community. State policy dictates that licences may be sold to anyone, but the licences cannot leave the area. During a year of low abundance or low fish prices, some licences are not fished. Seiners fishing Prince William Sound have varied from about 250 fishing in 1988 to less than 100 fishing in 1993, to more than 150 in 1994.
5. An equitable sharing of the benefits of sustainable use: among licence holders, the allocation plan was deemed equitable. The PWS AC's activities have created more office and processing jobs in the area, and more fishing opportunity for other users, but cash benefits are not shared.

What characteristics of PWSAC and the co-management relationship permit the formation of these characteristics into a workable institution along the following dimensions:

1. *It is accountable:*

a) All PWSAC projects are approved by ADF&G.
b) The Regional Planning Team's members which create a 20 year vision and approve new projects are half PWSAC, half ADF&G.
c) Alaska is a fishing-oriented state in which the legislature makes fisheries policy in response to public perception of risk to public resources. The 1992 directive to give first priority to wild stocks acts as a check to potential mixed stock fishery problems.
d) The PWS AC board is accountable to the communities through various local memberships on the board. The PWSAC is also accountable to the legislature, which considered the option of lowering the amount of enhanced fish PWSAC is permitted to release after world prices fell in 1991.
e) The allocation decisions made locally must be approved by the statewide citizens' Board of Fisheries.
f) The PWSAC, and each of the regional associations, is accountable for the choices and democratic decisions made by the membership in its region.

2. It is effective:

a) It mobilizes the human and financial resources to accomplish its main goal: to stabilize natural fluctuations in salmon abundance by supplementing wild with enhanced stocks.
b) It is considered highly legitimate and has taken over the state hatcheries.
c) It has improved the position of fishermen by returning higher value for PWSAC fish for 8 years. This experience has demonstrated how this can be achieved.
d) Information on PWSAC activities is widely and rapidly shared through an association newsletter.

3. *It is representative:* all locally relevant parties are represented on the PWSAC board, as well as the range of commercial licensees. Non-residents are represented in proportion to their membership, but are less active on executive and other committees.

4. *It is adaptive*:

a) As new conditions develop in mixed stock fisheries and in prices, PWSAC adopts new strategies, by becoming more active in stock assessment and in product form research partnerships. PWSAC has also entered into partnership with the state in pre-season harvest planning.

b) Each regional association adapts to different regional enhancement opportunities in its area, and the willingness of the local fishermen to risk certain innovations.

Summary Of Major Features Of PWSAC

Major Problem Addressed: low abundance of salmon runs

Major Management Focus: enhancement of targeted species

Scope Of Activities: regional planning, co-ordinated use, harvest plan, allocation, stock assessment

Most Important Outcomes: increased harvests to fishermen in area, price advantages under certain world supply conditions

Local Management Institution: regional board of elected area commercial fishermen and other appointed sport, aboriginal, subsistence, and citizens at large in region

Human Scale Of Management Unit: 250 seiners, 537 gillnetters, 2000 local residents

Regional Context: 4 other successful regional associations, non-residents may hold regional licences

Scale Of Unit Area: 130 km. long by 130 km. wide

Type Of Actors: majority local residents, heterogeneous

Level Of Operation: regional and state

Degree Institutionalized: after 20 years, well accepted

Degree Formalized: statutory mandate to do enhancement and planning

Type Of Fishery: commercial salmon seine and drift gillnet in area

Economic Benefits: dramatically increased harvests, shore processing jobs in community

Role Of Community: participate on board

Relationship With Government: partners in regional planning, govt. approves all local projects, government appointed citizen's board approves allocation plan

Possible Relevance To BC:

- possible model for how to include non-residents in area fisheries planning and harvesting
- possible model for cost-recovery aspects of enhancement, especially its value in supporting data on impact of enhancement activities
- possible model for how to co-ordinate conflicts between enhancement projects and wild fisheries
- possible model for achieving selective and strategic increases in salmon abundance

TABLE 3 MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES- AK Regional Enhancement Association

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	PROPERTY RIGHTS AND DUTIES	AKR
1. POLICY MAKING AND EVALUATION			
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS	Right/duty to do long-range planning	Informal
	SETTING OBJECTIVES	Right to research key questions affecting community values	NO
	LONG RANGE PLANNING		
	RESEARCHING THE RESOURCE SYSTEM	Right/duty to educate own and larger community re problems	NO
	PUBLIC EDUCATION		NO
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE			
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION	MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	NO
		Right of access to government information	NO
		Right to collect own information	NO
UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF CONDITION OF STOCK	Right to interpret information in light of local knowledge	Informal
		Right/duty to enhance or restore a) resource/resource productivity b) habitat	Formal
3. COMPLIANCE WITH RULES			
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules re: a) harvesting b) habitat damage c) exclusion and poaching	NO
4. FISHERY HARVEST			
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own	Shared
		Right to interpret information in light of local knowledge	Informal
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re: a) size of overall catch b) location of the fishery c) timing of the fishery d) gear types permitted e) size of allowable interception	(Pre-season) NO Informal Informal Informal NO

CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	HARVEST MONITORING	Right of access to government information and right to collect own	NO
UNDERVALUING OR IGNORING HUMAN CAPITAL		Right to interpret information in the light of local knowledge	NO

5. FISHERY ACCESS			
DEFINING BOUNDARIES AND ACCESS: EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude: a) certain classes of fishery (e.g. sport, commercial) b) certain classes and sectors of fishers	State Policy
	HARVEST ALLOCATION	Right to allocate: a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to redistributive mechanism	NO Informal Informal NO
	TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members	NO
		Right/duty to regulate conditions of transfer	NO

6. RESOURCE USE COORDINATION			
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNING THE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses	Formal
		Right/duty to communicate problems and try to solve with others	NO
		Right/duty to resolve disputes internal and external	NO

7. RETURNING OPTIMUM VALUE TO FISHERMEN			
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING	Right to manage harvest timing for optimum product value	NO
	PRODUCT QUALITY		Informal
	PRODUCT DIVERSITY		Formal

Chapter 4: The Kuskokwim River Management Working Group, Alaska

(Source: Albrecht 1990, Albrecht, pers. com., Mundy 1995)

Focus. This case is both more recent and more limited in scope. It began in the mid-1980s, and is still unfolding. This is a story of 21 communities, spread along some 200 miles of river in an isolated region in southwestern Alaska (see Figure 5). These communities pooled their efforts at in-season salmon run strength estimates so they could get accurate enough data to keep their fishery open.

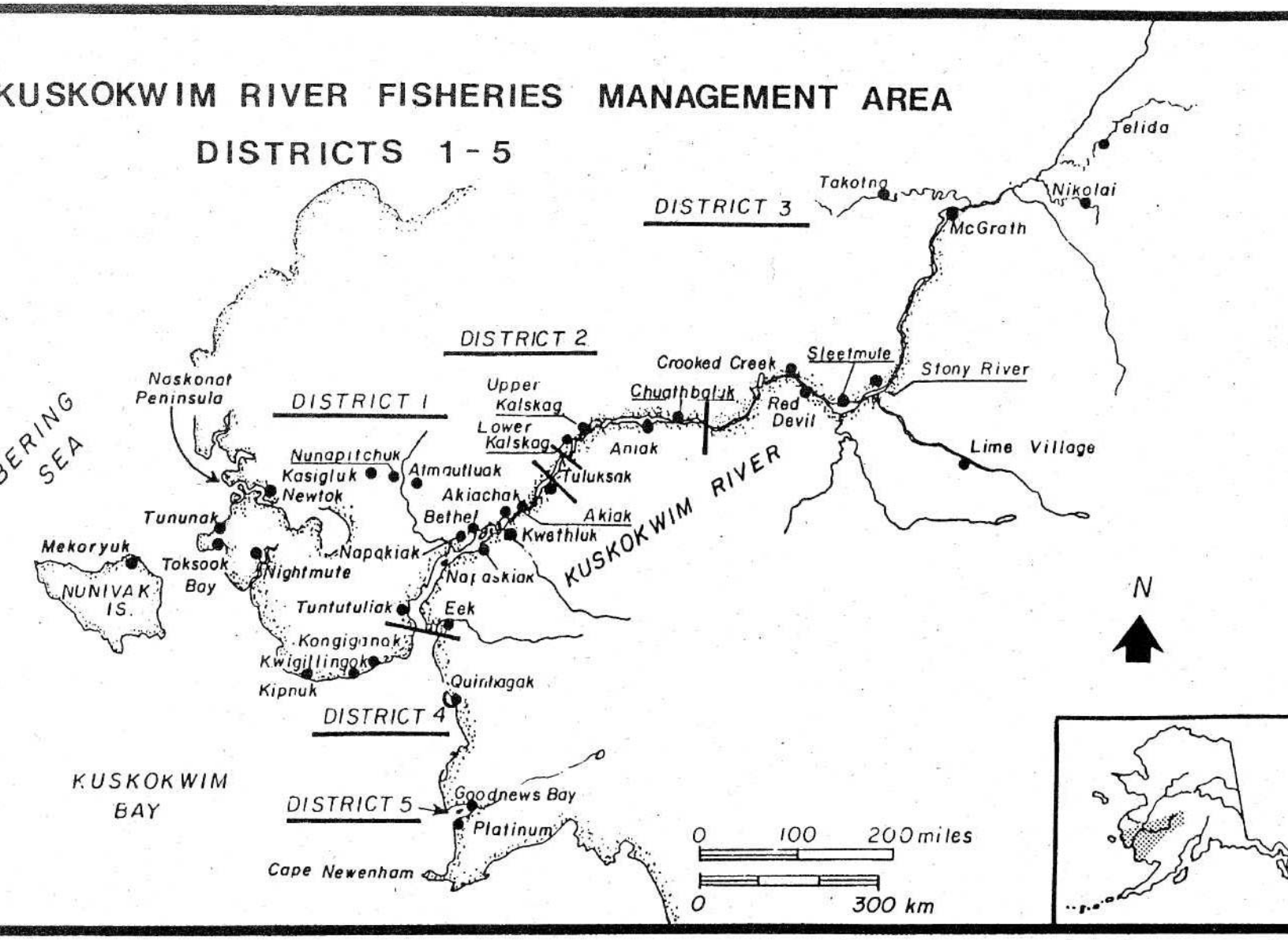
It is a diverse group including commercial, subsistence, and sport fishermen, and local processors. The Yup'ik (Eskimo) residents were born in the region and have lived there for centuries in stable communities. Non-Yupik commercial and subsistence fishermen have mostly immigrated to the region during their own lifetime, but have become locally-oriented residents with no intention of leaving.

The management problem. The original motivation for these parties to get involved in management was simple: the Alaska Department of Fish and Game was going to close the river chinook salmon fishery based on recent spawning escapement data trends. Commercial harvests of chinook, coho, and chum salmon had been steadily increasing since the early 1970s and by 1984 reached a million fish. Government feared that by the mid 1980s fishing effort had simply become too great to sustain a chinook fishery. Although the first work focused on chinook, the process was later generalized to chum and coho.

At first the communities and various fishing organizations on this nearly 1000 mile long river were up in arms, lobbying through all available institutions to keep the fishery open. The statewide citizen's Board of Fisheries which makes allocation policy was the main forum for debate. It gradually became apparent to all parties that government was proceeding on the best available data, and that scarcity of data (and the resources to collect better data) was the real problem. Little historical data existed on run strength, and the relationship of index streams to the entire drainage was unclear*. This galvanized the various parties demanding meetings with government to discuss the limits on data, and possible alternative interpretations of data.

Formation of local Institution. Eventually confrontational meetings evolved into practical discussion about how to solve the management problem. The local parties began figuring out what they could do to contribute data, especially in-season data, to an accurate and timely estimate of run strength. The condescending attitude of Alaska Department of Fish and Game, and the confrontational attitude of the communities dissolved as parties began to adopt a business-like team approach to tackling a problem with the best available resources.

Scale of area managed. The task of producing a timely run strength estimate was actually quite daunting, given the size (1600 kilometres long) and siltiness (low visibility) of the river, the location of fisheries (the lower 320 kilometres), and the location of ADF&G's Bethel test fishery 112 kilometres inland. The only other indicators of run strength were a sonar at Aniak on a tributary even further upstream of the fisheries and five index streams used to estimate spawning escapement after 90% of the run was well into the river. Given government's caution-about low run strength, it had been difficult to open a commercial fishery in the lower river until a significant portion of the fish had reached the inland test fishery much further up the river and the sonar at Aniak. But by then a large part of the ran would have passed the in-river gillnet fisheries.


KUSKOKWIM RIVER FISHERIES MANAGEMENT AREA
DISTRICTS 1-5
DISTRICT 1
DISTRICT 2
DISTRICT 3
DISTRICT 4
DISTRICT 5
BERING SEA
KUSKOKWIM BAY
KUSKOKWIM RIVER
Naskonat Peninsula
Nunapitchuk
Kasigluk
Newtok
Tununak
Mekoryuk
NUNIVAK IS.
Toksook Bay
Nightmute
Napakiak
Napaskiak
Bethel
Akiachak
Akiak
Kwethluk
Tuluksak
Upper Kalskag
Lower Kalskag
Aniak
Chuathbaluk
Crooked Creek
Red Devil
Sleetmute
Stony River
Lime Village
McGrath
Takotna
Nikolai
Telida
Tuntutuliak
Eek
Kongiganak
Kwigillingok
Kipnuk
Quinhagak
Goodnews Bay
Platinum
Cape Newenham
N
0 100 200 miles
0 300 km

Human scale. The largest number of communities and population is located on the lower 320 kilometres of the river, where most of the fishery is focused. The river shore has a population of 10,000, of which 4,000 are in the service centre, Bethel, while the rest are spread out in 21 villages with an average population of 300 each. There are about 600 commercial fishermen and 1,300 subsistence households.

Type of fisheries. There is considerable overlap between commercial and subsistence fishermen, but the two fisheries are open at different times to ensure that subsistence caught fish are not sold into the commercial fishery. In line with the priority which the state is mandated to give to the subsistence fishery—which is enjoyed by all rural residents alike, regardless of race or cultural origin—the subsistence fishery is open continuously until subsistence needs are met. This is usually measured by the point at which the drying racks are full. Over a million salmon a year, were taken commercially from the mid-1980s on. Coho, chum, sockeye, chinook, and pinks are caught in that order of abundance. The gross average catch value was about $6.7 million from 1985 to 1989, but annual fishing income per fisherman averaged only $8,483. Commercial income is often used to buy equipment to conduct the subsistence fishery and subsistence hunting. The economy in this part of Alaska is fundamentally organized around subsistence.

Nature of communities. Although the majority of area residents are Yup'ik speakers, all residents are extremely place-oriented individuals, who have no intention of living anywhere else. The high degree of dependence on the fishery means that a threat by government to close a fishery has a strong uniting and energizing effect on such locally-oriented communities. They can rally around the challenge to solve a problem so that government is not in a position to unfairly run their lives. . .

The local co-management institution. Within two years these communities had formed an ad hoc working group with representatives from each sector. This group met with government pre-season to discuss the management needs for the fishery, and two or three times a week in-season to make in-season management decisions. The Kuskokwim River Salmon Management Working Group, as it came to be called, elected two co-chairs who developed the meeting agendas.

The working group was formed of those representatives who were willing to attend and deemed legitimate to participate. They represented loosely defined categories of upriver and downriver communities, subsistence, commercial, local processors, elders, and sport. The public attended and participated actively in meetings as well Although this involved considerable time and effort, this working group operated on a completely volunteer basis. Fortunately, enough representatives from the various sectors lived in Bethel and were thus able to attend meetings without travel costs. They were then able to communicate with their membership via public radio announcements and VHF or CB radio phone.

Relationship with government. ADF&G attends meetings as an observer, as a supplier of data, as an interpreter of state agency policy, and as an advisor on how the state is likely to respond to working group actions or decisions. The group operates on a consensus minus one basis. ADF&G is invited to express reservations about working group decisions, and reserves the right to overrule a decision if they feel a more conservative approach is necessary. In recent years of low chum salmon abundance, ADF&G has used its authority to lower fishing intensity. However, all parties want to avoid a return to the confrontational and unproductive meetings of the past Of course, the Working Group has no formal or legal power; it is merely advisory. But ADF&G .has implemented almost all of the working group's decisions so far.

Contributions of different parties, to improving the data. The main work accomplished by the group in its first two years was a strategy of co-ordinated test fisheries, one at the mouth of the river, and several by the in-river subsistence fisheries, to supplement ADF&G data. In the first season, a processor voluntarily paid $40,000 for salary, fuel, and gear for two Yup'ik fishermen

to do a test fishery at the river mouth. These fishermen knew where fish congregated better than ADF&G, and the working group believed their test fishery would be a superior and earlier gage of abundance. ADF&G contributed $18,000 for a technician on board to tabulate catch data, and to assure that the methods were consistent with ADF&G standards. The ADF&G staff at Bethel computed and analyzed the daily catch per unit effort data from both its test fishery at Bethel and the Working Group's coastal test fishery. The combination of these two test fisheries enabled better tracking of fish entry and upstream migration.

In later years, when the processor abandoned funding of the coastal test fishery, ADF&G hired one of the Yup'ik fisherman, who was by then well known and trusted. The fisherman simply radioed ADF&G at the end of each day with the fish count. Although winds sometimes disturbed this index, it became accepted as a critical tool in estimating run strength. It was far cheaper to hire a Yup'ik test fishermen who already lived in Eek near the test site than for ADF&G to set up a 90 day summer fish camp, or rent accommodations for staff in Eek. The Yup'ik fisherman could be hired on a daily basis for some 70 days, since he lived there already. The Bering Sea Fishermen's Association obtained funding for this test fishery work in July-August 1994 and June 1995. These kinds of efforts by local organizations to supplement and relieve ADF&G expenditures when the opportunity arises contribute to the good will and working relationship which has developed with ADF&G.

In the first year there were also 12 subsistence fishery sites monitored. (These were reduced to eight sites the second year, and eventually to four sites). The Yup'ik fishermen's organization paid $15,000 the first year and $9,000 the second year for monitors to record CPUE data in the subsistence camps. They were also able to obtain some state grant funding to help with analysis and communications. The data was radio-transmitted to the organization's office in Bethel, where it was computerized and graphed. The subsistence site monitoring was also used to track the progression of the run up the river, since subsistence fisheries occurred at strategic points throughout the lower 200 miles of the river.

Outcomes. It was eventually decided that the subsistence data was useful as a source of real time data on the run as it progressed up the river, two to three weeks before it reached the spawning grounds. By tracking both the early run progress and subsistence effort, this data also helped provide timely information on when the racks were full (i.e. people have had good subsistence opportunity) and it was safe to open a commercial fishery. Although obtaining better information on the timing of the subsistence fishery had not been the original purpose of the working group, it became a significant side benefit.

A second side benefit of the improved data was a better ability to provide equitable fishing opportunity to all the communities up and down the river. The strategy which worked on the Kuskokwim was to wait until the fish were distributed throughout the river before opening a commercial fishery. Improved data made it possible to use this strategy effectively. The Working Group could thus be thought of as co-managing allocation, by making it more possible to implement equitable allocation, and by familiarizing groups up and down the river with the data used to provide equitable access. (The data does not extend to stock groupings at this point. Each species is managed as one stock).

The participation of village subsistence fishermen in the data effort had an important spin-off benefit. It encouraged their participation in and support of the working group. Soon there was a regular time on the agenda for the "Traditional knowledge report", during which elders and other village (commercial and subsistence) fishermen shared their insights into the status of the run.

Voluntary contributions of time and resources by any one group or agency usually elicits complementary voluntarism from others for the public good. The Association of Village Council Presidents (Yup'ik) provided secretarial services in the formative months. A Yup'ik NGO

translated minutes and donated funds to communication efforts. The former co-operative relationship of both these groups with the US Fish and Wildlife Service on the Yukon-Kuskokwim Delta Goose Management Plan (a co-operative management regime with Yup'ik subsistence hunters) elicited further support from this agency. The USFWS provided the working group regular use of their conference room in Bethel for meetings. ADF&G staff worked overtime in gathering and synthesizing data for meetings. Three other processors donated funds in the second year.

The working group's agreement on times and areas for the chinook and chum salmon fishery were successful, and the process was extended then to the August coho salmon fishery as well As the group developed more confidence in itself and its new tools in the next few years, it was able to experiment with more flexible pulse openings to allow adequate passage of fish, as well as to maximize harvests of biologically available surpluses.

Degree of mstitutionalization. The "Joint Statement on the Management of the Kuskokwim River Salmon Fishery", a declaration of the intent of parties to work together on these issues, was adopted by the Board of Fisheries in 1988, giving the working group a recognized status. Every two years since then, the Board of Fisheries has heard a detailed performance report and self-evaluation of the Working Group. Although the Working Group has no legal authority, it has become a working management institution in the sense that certain decisions automatically devolve to it. It has the informal power to make those decisions, because everyone has recognized that it can do a better job than can government alone. It has been allowed to take the power because it has taken on the political and social accountability for making the right decisions. If wrong decisions are made, it will be politically and socially liable, even though ADF&G is legally liable, ADF&G considered the working group a successful model, and has begun working jointly with fishermen on the Yukon River to produce co-operative research and long-term management plans.

Scope. As certain problems were solved, the group also became willing to listen to other related problems brought forward by concerned local residents: health, safety, and the use of the fishery to smuggle drugs into the country.

The Kuskokwim River fishery really suffered from only one of the nine major management problems: the undervaluing of human capital. When a mechanism was developed for direct community participation in stock assessment and harvest planning through setting time and location limits, this problem was addressed. Conflict was avoided and the fishery harvested at a level which is likely to be sustainable.

In the process the communities on the Kuskokwim have learned much more about the risks and uncertainties of management decisions. If population levels and demands change in the future, the foundation has been laid for a principled approach to further joint decisions.

In summary, the management functions performed by the working groups included (see Table 4):

1. *stock assessment:*
a) informal, accessing government data and analysis
b) informal, producing own data and analysis from test fisheries
c) informal, using traditional knowledge to help interpret data

2. *harvest planning*, pre-season and in-season:
a) informal, setting times
b) informal, setting areas

3. *allocation:* informal monitoring of distribution of opportunity adequate to provide equitable opportunity

4. *policy making*

a) informal, scoping problems (identify data needs, human and financial resources needs)
b) informal, setting objectives (plan one opening at a time; improve next opening and next season's strategy)
c) informal, researching the resource system
d) informal, public education, communication (communicate with constituency on issues, disseminate information)
e) informal, get process and plan adopted by statewide Board of Fisheries

What made this process work? What community characteristics were important? In this case, we do have a blow-by-blow description of how the process got started. Important community characteristics are the same as those in other processes:

1. A high level of dependence on the resource for commercial, but more fundamentally for subsistence, use. The commercial fishery plays a key role as a cash generator which enables the purchase of equipment to pursue subsistence activities in fishing and hunting;
2. A high level of vulnerability to non-sustainable use-hence a willingness to take indications of non-sustainability very seriously.
3. A strong identification with the area. Neither Yup'ik nor non-Yup'ik residents had any intention of leaving this home.
4. An unwillingness to alienate the resource from the community.
5. Subsistence rights cannot be sold. Although commercial salmon permits can be sold, there is little transfer out of the region.
6. An equitable sharing of access is part of state management policy. Equitable sharing of benefits of sustainable use occurs in subsistence-based fisheries through distribution.

Important characteristics of the working group indicated a willingness to forge these potentials into a workable institution:

1. *It is accountable:* to the resource, to members, to sustainability principles

a) It has an open public discussion of the issues.
b) It reaches agreement of, what the problem is and what basic strategies are mostly likely to work.
c) It produces a plan on attack on these problems, and makes this public: the in-season harvest plan.
d) It communicates this plan to its members through open meetings, radio announcements, and puts time and resources into dissemmination of information and education.

2 . *It is effective:*

a) It obtains information on the status of the resource and shares it widely.
b) It produces clear and appropriate rules and procedures for attacking the problems.
c) It produces the financial and human resources to attack the problem: fishermen invest time and commit resources.
d) It monitors how well the rules and procedures are implemented.
e) It is considered legitimate.
f) It promotes the growth of stewardship by getting people involved in figuring out how they can improve management, and learning more about the resource.
g) It promotes an efficient collection of data and use of human resources to analyze the data: it lowers transaction costs.

3. *It is representative:* All sectors are represented on the working group, and all corners to the meetings are welcomed.

4. *It is adaptive:* After the first season, the group decided to build more flexibility into the planning process. Each season the group has learned. Each in-season opening and differently scheduled pulse fishery adapts to the specific conditions of the run as they are understood through the test fisheries. The in-season planning process becomes a mechanism for insuring more equitable access and for better planning of the subsistence/commercial transition.

Summary Of Major Characteristics Of Kuskokwim Case

Major Problem Addressed: lack of in-season data on stock abundance

Major Management Focus: stock assessment, harvest planning

Scope Of Activities: allocation, policy making Outcomes:

mobilization of. many resources, credible process Local Institution:

Working Group,

Human-Scale Of Management Unit: 15 Working Group members, assisted by paid monitors and volunteers, general public of 10,000

Regional Context; 21 communities contributing m different ways

Scale Of Unit Area: 320 kilometres of lower river

Type Of Actors: aboriginal and non-aboriginal commercial, subsistence, sport and processors, all working together

Level Of Operation: regional co-ordination of 21 communities

Degree Institutionalized: decisions devolved to region

Degree Formalized: no legal authority

Type Of Fishery: in-river fixed gillnets; village-based, daytime

Economic Benefits: more finely-tuned fishery instead of closure

Role Of Community: cooperates and supports data collection, problem solving on other issues.

Relationship. With Government: co-management of regional harvest

Possible Relevance To BCs

(1) Multi-sectoral, aboriginal/non-aboriginal working group solves local problems jointly and gets support of government

(2) Volunteer efforts donated and funding raised by local groups to improve management in order to benefit local communities. These contributions also benefit the governmental management agency.

(3) Legal accountability remains with government, but political and social accountability are with regional working group.

TABLE 4 MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES- Kuskokwim River Fishery

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	PROPERTY RIGHTS AND DUTIES	KRF
1. POLICY MAKING AND EVALUATION			
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS	Right/duty to do long-range planning	Informal
	SETTING OBJECTIVES	Right to research key questions affecting community values	Informal
	LONG RANGE PLANNING		
	RESEARCHING THE RESOURCE SYSTEM	Right/duty to educate own and larger community re problems	Informal
	PUBLIC EDUCATION		Informal
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE			
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION	MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	Informal
		Right of access to government information	NO
		Right to collect own information	Informal
UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF CONDITION OF STOCK	Right to interpret information in light of local knowledge	Informal
		Right/duty to enhance or restore a) resource/resource productivity b) habitat	NO
3. COMPLIANCE WITH RULES			
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules re: a) harvesting b) habitat damage c) exclusion and poaching	NO
4. FISHERY HARVEST			
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own	Informal
		Right to interpret information in light of local knowledge	Informal
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re: a) size of overall catch b) location of the fishery c) timing of the fishery d) gear types permitted e) size of allowable interception	NO Informal Informal Informal Informal

CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	HARVEST MONITORING	Right of access to government information and right to collect own	Informal
UNDERVALUING OR IGNORING HUMAN CAPITAL		Right to interpret information in the light of local knowledge	Informal

5. FISHERY ACCESS			
DEFINING BOUNDARIES AND ACCESS: EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude: a) certain classes of fishery (e.g. sport, commercial) b) certain classes and sectors of fishers	State Policy
	HARVEST ALLOCATION	Right to allocate: a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to redistributive mechanism	NO NO NO NO
	TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members	NO
		Right/duty to regulate conditions of transfer	NO

6. RESOURCE USE COORDINATION			
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNING THE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses	NO
		Right/duty to communicate problems and try to solve with others	NO
		Right/duty to resolve disputes internal and external	NO

7. RETURNING OPTIMUM VALUE TO FISHERMEN			
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING	Right to manage harvest timing for optimum product value	NO
	PRODUCT QUALITY		NO
	PRODUCT DIVERSITY		NO

Chapter 5: The Skeena Watershed Committee, British Columbia

(Source: Marchak et al. 1987, Taylor 1993, Pinkerton 1993, meeting and interviews 1994-1995)

The Skeena River flows into the Pacific Ocean at Prince Rupert in northern British Columbia, just south of the Alaska border. The Skeena watershed encompasses an area of some 32,000 square kilometers and includes over 150 tributaries, which together support all six species of Pacific salmon (Figure 6).

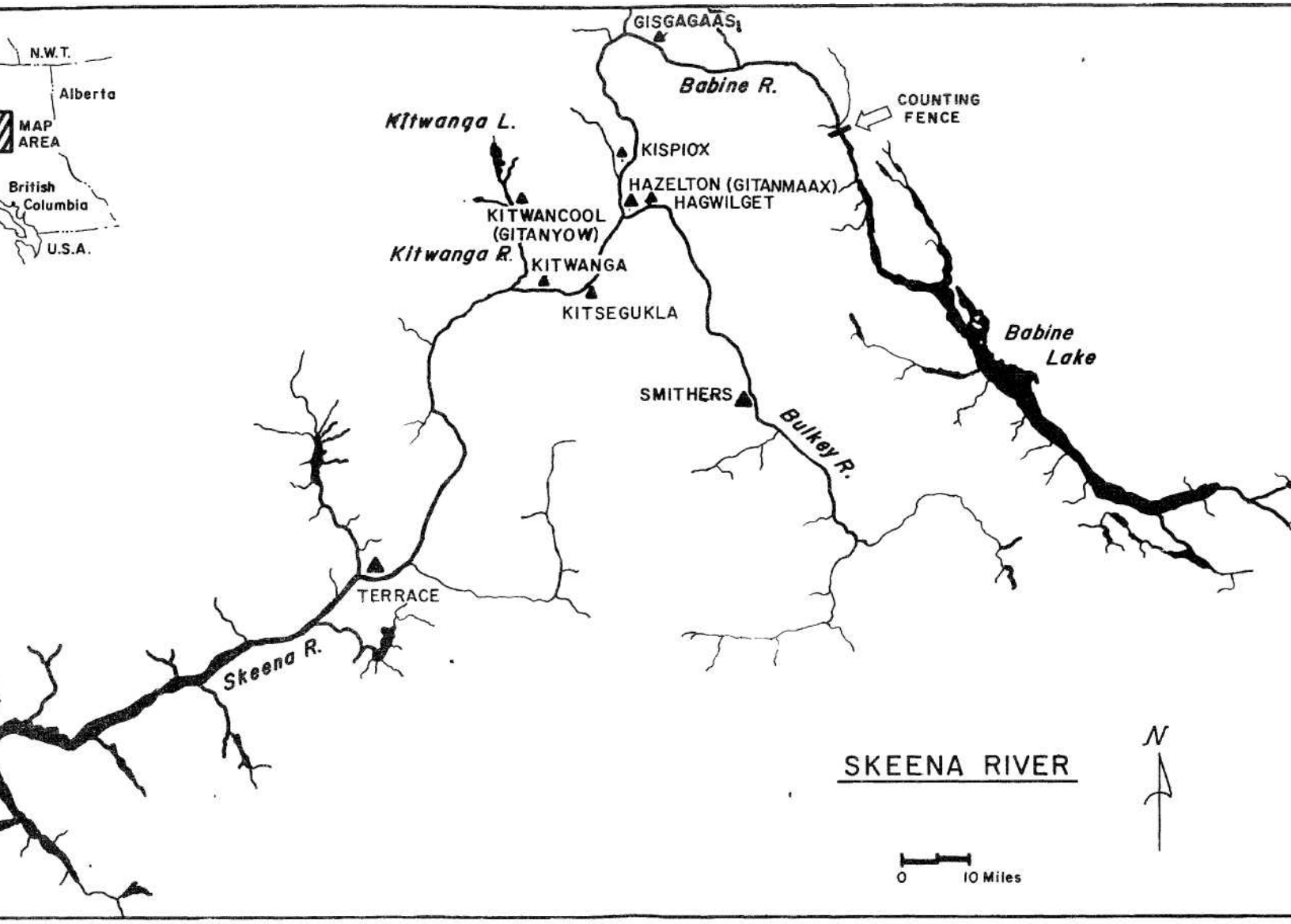
The problem. For at least a decade there have been two basic allocation conflicts simmering on the Skeena River. One conflict was between commercial fishermen in Area 4 near Prince Rupert at the mouth of the river and sport fishermen upriver. Another conflict was between commercial fishermen at the mouth and Gitksan and Wet'suwet'en First Nations who asserted the right to conduct a commercial harvest on surplus escapement upriver. The Skeena Watershed Committee came together in 1992 to address these basic conflicts within a larger framework of improving stock assessment, stock enhancement, habitat protection, enforcement, and watershed restoration.

Most of this chapter focuses on the sport/commercial dimension of this issue, while the next chapter deals with one of the traditional and modern commercial upriver First Nation (Gitksan) harvests. However, it is useful to mention here some basic stock composition conditions which affected both conflicts.

Harvest rate on enhanced stocks. The Pinkut and Fulton sockeye salmon stocks had been significantly increased after DFO completed the artificial spawning channels for these tributaries to Babine Lake at the top of the Skeena mainstem in 1971. These stocks could not be fully fished at the mouth of the river for conservation reasons (mixed stock fisheries). The enhanced Pinkut and Fulton stocks could tolerate a harvest rate of 80%, but other stocks which entered the river at the same time could only tolerate a much lower harvest rate. But neither could the full run be allowed to enter the spawning grounds off Babine Lake, where their numbers exceeded the spawning ground capacity. Spawners deemed excess or surplus to spawning requirement were killed by DFO at the counting fence before they could enter Babine Lake.

The Gitksan proposal. Throughout the 1980s the Gitksan proposed a legalized upriver harvest and sale of the enhanced Pinkut and Fulton sockeye stocks which DFO deemed surplus to spawning escapement. Although these "surplus" fish could not be safely harvested in Area 4 when mixed with other stocks, they could be harvested farther upriver when other smaller stocks had hived off to their spawning grounds in other tributaries. During the 1980s the commercial sector in Area 4 opposed this innovation, fearing that it could open the door to massive reallocations of the catch upriver, and a harvest not adequately supervised by DFO.

The Gitksan commercial harvest of these (otherwise wasted) fish was not legally sanctioned by DFO until it became part of an experimental Aboriginal Fisheries Strategy agreement in 1992. This commercial upriver fishery operated as a special Excess Salmon to Spawning Requirements ■- (ESSR) fishery under a specific agreement with DFO to target the enhanced sockeye stocks. This meant the fishery operated only during the three to four weeks the enhanced stocks were migrating through the area.



River Watershed.

The immediate problem. Although the agreement between DFO and the Gitksan to conduct a commercial ESSR fishery coincided with the formation of the Skeena Watershed Committee, it was not the only—or even main—driving force. The immediate problem which"precipitated the formation of the Skeena Watershed Committee in early 1992 was three successive years of poor steelhead returns to the Skeena River. The sport fishermen on the Skeena feared that a number of steelhead stocks (as well as early-timed coho and other smaller stocks) were on the verge of collapse. The run timing of this salmon species (prized by sportsmen) overlaps considerably with the run timing of the sockeye stocks so important to commercial fishermen. Steelhead were being taken in commercial gillnet and seine fisheries in northern BC, especially where these fisheries targeted sockeye in Area 4 at the mouth of the Skeena River near Prince Rupert. Increased interceptions by Alaskan fisheries in the late 1980s compounded the problem.

Like many of our case studies, this one presented a fundamental data problem. Little information existed on the status of 13 important steelhead stocks and there were poor or no escapement counts to verify fishermen's perceptions of lower abundance. Given the lack of "hard" data, the commercial sector tended to view the sportsmen's concerns as being more about allocation than conservation.

The concept of bringing together First Nations, commercial and sport fishermen into a committee to jointly plan the harvest of Skeena River stocks was almost inconceivable in 1991. Each of these parties was engaged in a war of words in the local press with at least one of the other parties. Some of the sports fishermen living in Terrace, a community some 150 kilometres upriver, declared the need to "eliminate" the coastal gillnet fishery. Upriver Gitksan and coastal commercial letter writers argued over how much each sector caught. Misinformation was rife. Gillnetters were so upset at DFO at one point that they wrapped the DFO office in Prince Rupert with gillnets. This action united Gitksan coastal gillnetters and other coastal commercial gillnetters.

Yet by October 1994 representatives of these parties were active participants in a professionally facilitated, community-driven watershed planning exercise they felt was "the most progressive process in Canada." The process was funded, but not run, by DFO. Also in 1994, the federal DFO, which manages sockeye, and the BC Ministry of Environment, Lands and Parks (MELP), which manages steelhead (as a freshwater "sport fish"), signed a Fisheries Management Protocol agreeing to consult and co-operate closely with each other on in-season management and with the Skeena Watershed Committee in general. All local and governmental parties agreed to a set of "in-season fisheries management guidelines" for the 1994 season and at the end of the season all parties felt that the guidelines had been applied fairly and accurately. The management agencies did what they had committed to do, and the predictions about management outcomes (commercial catches, steelhead escapement) were reasonably accurate. More steelhead and coho escaped up the river. The parties consulted so far are quite proud of the process, and there appears to be a consensus to keep trying and see what works over a longer time period. This is an example of the advantages of informal rights in developing a conflict resolution process. Any formalization of rights—at least in the short term—would create complexities in federal and provincial mandates and possibly aboriginal claims.

How did this process succeed in bringing warring parties together? What longer-term management outcomes can be expected from this process, and how might they contribute to sustainability? The complexity of the parties and the types of communities involved is cause for some optimism: if joint planning can be done on the Skeena at this level of complexity, it should be possible to resolve less complex conflicts elsewhere. In order to explain how the parties came together, we briefly characterize the commercial and sport sectors.

The commercial sector. The local commercial fishing sector is made up chiefly of 428 gillnetters based in Prince Rupert (population 17,000) and the neighbouring northern First Nations communities of Port Edward, Kitkatla, Metlakatla, Kincolith, Port Simpson, Kitsumkalum, and

Hazelton, plus Skidegate and Massett on Haida Gwaii (the Queen Charlotte Islands) and Hartley Bay and Kitamaat to the South. Non-native communities such as Queen Charlotte City, New Massett and Oona River also participated. When the runs are good, this northern fleet is joined by as many as 400 more vessels from the south, plus a portion of the seine fleet. Commercial fishermen are organized locally in the Northern Gillnetters Association, and coastwide in the UFAWU and the Native Brotherhood.

The north coast is exceptional in BC as an area where there is a large commercial Native-owned fishing fleet. In 1982 the Northern Native Fishing Corporation purchased the more than 200-vessel northern gillnet fleet of the processing company, BC Packers. This supplemented the already active participation of Tsimshian, Gitksan, Nisga'a, Haida, and Haisla commercial fishermen who fished the Skeena (and the Nass and Queen Charlottes as well, in most cases). In 1991 the Tsimshian, Gitksan, and interior Babine Lake Nat'oot'en organized themselves into the Skeena Fisheries Commission for the purpose of co-ordinating agreements with DFO related to the Aboriginal Fisheries Strategy. This represented an important reorganization of First Nations political bodies along watershed lines. It gave more prominence to in-river and especially up-river fishing as an activity which needs to be planned within a common framework with ocean commercial fisheries. This also represented a response to the prominence of community food fisheries given by the *Sparrow* decision, and the fact that the aboriginal fishing right is defined as a community right (as opposed to the right of individual commercial licence holders).

The commercial organizations work with DFO through Commercial Fishing Industry Council on a coastwide allocation plan. Input into the management of local Area 4 fisheries at the mouth of the Skeena has traditionally occurred through the North Coast Advisory Board, the oldest advisory board on the coast (active since 1955).

The UFAWU was a co-founder of the Rivers Defence Coalition, and has been active in habitat protection issues such as pesticide control hearings, Alcan's proposal to withdraw water from the Nanika River (a tributary of the Skeena), the Ridley Island coal port, and the Port Simpson liquefied natural gas port.

The $100 million dollar commercial fishery out of Prince Rupert is over 100 years old and used to have a 17 week season (9-10 of it in Area 4), making it the longest continuous fishing season on the coast. Over two million Skeena-bound sockeye salmon, plus four other salmon species, were commercially caught in a good year. Together with fish processing in Prince Rupert, commercial fishing is the lifeblood of these northern communities. As timber production, wood processing, and mining appear to be declining industries, the sustainable management of the fishery becomes all the more vital.

The sport sector. The sport fishery on the Skeena began to grow in importance in the 1950s when a Skeena-caught steelhead won a prize as the largest recorded to date. The guiding industry expanded in the 1960s, but by the late 1970s a decline in steelhead had become noticeable. In 1990 the "value" of the sport steelhead fishery in terms of direct Skeena watershed expenditures was $2.8 million, although this figure would have been twice as high when steelhead were more abundant. Much of the tourist industry is tied to the sport fishery, and is seen as possibly the only other sustainable industry on the Skeena.

Since 1990, the issuance of a set number of individual transferable quotas (ITQs) on guided sportfishing "rod days" limited some of the growth of this sector,, but also attracted offshore quota buyers. Some local sport fishermen are also dismayed by the number of illegal guiding operations; they see the difficulty of monitoring and enforcing regulations on so-called non-guided, non-resident sport fishermen as a growing problem. In short, local sport fishermen who want a well regulated industry and a fair share of the guiding do not think exclusion mechanisms are adequate.

The local sport fishermen are mostly resident in Terrace and Smithers on the upper Skeena and Bulkley Rivers. They are organized locally in the Skeena-Nass Watersheds Sportsfishers' Coalition (including the BC Wildlife Federation) and the Northwest (Terrace) and Bulkley Valley (Smithers) chapters of the Steelhead Society of BC Local representatives from the Steelhead Society, from the BC Wildlife Federation, and from independent anglers also formed the Skeena subcommittee of the province-wide Sport Fishing Advisory Board to DFO. The entire sport sector became better organized provincial in the 1980s, reached the Minister's ear, got a seat on the Pacific Salmon Commission, and conducted an educational campaign about their fishery. By 1988 the Skeena sportsmen were practising catch and release fishing on steelhead and lobbying other sectors to adopt more selective fisheries. The Steelhead Society in Terrace had been involved since 1970 in a broad range of habitat protection issues, and was a co-founder of the Rivers Defence Coalition. They actively supported the concept of a commercial up-river First Nations fishery, and a multi-party watershed board.

The sport sector acquired additional energy in 1990, when a new chapter of the Steelhead Society was founded in the Bulkley Valley on the upper Skeena, and launched a wild steelhead campaign of letter writing, article writing, and creating a videotape. By 1991 the Steelhead Society was communicating internationally about the decline of steelhead and was beginning to reach the Minister of Fisheries and Oceans. International support was strong because the Skeena was considered to have the healthiest wild steelhead stocks in the world. These concerns coincided with the mixed stock fishery concerns of the Gitksan (see below), and of some parties within DFO who had published in 1986 a Skeena Stock Management Plan in an attempt to priorize the mixed stock issue. The concerns were aired at a conference in late 1991 organized by the Steelhead Society. DFO and speakers from all parties committed themselves to co-operating with one another to address the apparent steelhead decline problem.

How parties came together. On one level, the sport, commercial, and aboriginal sectors first agreed to come together when government was forced to acknowledge that there appeared to be a problem. But the process did not move much further until government (1) presented difficult choices to the commercial sector, and (2) allocated funding for research which could be overseen by the SWC, and hired an independent non-governmental mediator. Starting in 1991 DFO began threatening to unilaterally impose steelhead conservation measures on the commercial fleet if the fleet did not put forward their own plan, at first through the North Coast Advisory Board, and later through the Skeena Watershed Committee. Conservation measures suggested by DFO included time and area closures and the use of weedlines. Weedlines lower gillnets in the water several feet so that many of the surface-swimming steelhead are not caught. While this may be an effective conservation measure for steelhead, it also results in the loss of many sockeye—even though sockeye are deeper swimmers.

The commercial sector agreed in principle with the April 1992 Memorandum of Understanding among the parties involving seven founding principles, including:

- "Fisheries management problems in the Skeena Watershed require 'made in the North' solutions that accurately reflect resource conservation and the wellbeing of individual residents and communities....
- The Committee will encourage high environmental ethics and integrated resource management as the primary means to achieve sustainable fisheries...
- The Committee will recognize and respect the constitutional rights of aboriginal people...
- This agreement is without prejudice to rights....
- The Committee will strive to devise solutions to conservation problems which minimize any disruptions to longstanding fisheries."

Meetings in the first two years broke the ice, but failed to set up a viable consensus process. It was not until 1994 that an independent mediator was hired and the sport sector dropped its aggressive

campaign. One major accomplishment of this period was the procuring of federal Green Plan funds for research on steelhead and coho stocks (about $2 million a year over four years for the SWC, about $1 million a year for the Skeena Fisheries Commission). This began to address the concern of the commercial sector that they were being asked to make major sacrifices on the basis of scanty data. This first period also occasioned an experiment in steelhead catch and release by the gillnet fleet. This experiment was probably most valuable for its educational impact: by attempting to get the whole fleet to take the initiative in practising catch and release, the gillnetters who launched this program got the fleet talking about the issue. This shifted the debate somewhat from *whether* there was a steelhead interception problem to *how* the problem could best be addressed. Eventually, most parties seemed to be convinced that neither catch and release nor weedlines could provide the entire solution to steelhead interception.

DFO and the province also conducted workshops with the North Coast Advisory Board and the SWC, modelling different steelhead conservation options. A limited closure was finally imposed in 1993, causing angry public demonstrations from the commercial sector. This sector symbolically took possession of the DFO building in Prince Rupert by wrapping it in gillnets. This action affirmed solidarity between Native and non-native commercial gillnetters who were affected equally by the closures. DFO attempted to persuade the entire gillnet fleet to fish farther out, where more of the non-native fleet fished. The non-native gillnet fleet refused to be isolated from Native fishermen who traditionally fished further up into the river, where turbulent currents made weedlines impractical. Ironically, this solidarity downriver helped keep dialogue going with upriver First Nations.

But by the end of the second year the commercial sector was again withdrawing from the SWC process. Under pressure to honour its 1991 stated goal of reducing steelhead interception by 50%, DFO finally threatened to fully impose its own time and area closures and weedlines if the SWC could not produce its own plan by April 1994.

A breakthrough was possible in early 1994 when DFO decided to try turning the process over to a professional facilitator they met at a training course in Banff, Alberta. It is easy to underestimate the importance of this innovation. Up to this point DFO had sponsored, convened, and chaired the meetings. This meant that the SWC was an advisory committee with no real power. Like other DFO advisory committees, its advice might be taken or not, depending on ministerial or departmental discretion.

As other successful processes in Canada have shown (Public Policy Forum 1993), government cannot be both the sponsor and convenor of a process, or the process will simply be perceived as a way to impose government's agenda. If participants have no real power, they are unlikely to contribute solutions. They will act as lobbyists preoccupied with attempting to co-opt government. Government can be present as a sponsor and as a participant, but a process convened and managed from outside government is required. This is exactly what DFO did in hiring a professional facilitator, who was elected as chair of the process, and who thereafter convened and ran the meetings.

The facilitator did a great deal of work in early 1994 caucusing with the different sectors, seeking out the common ground between them. He gradually assembled from their statements a working document called "Some of the things which I think I have been hearing" which was then presented at a SWC meeting for informal ratification. It included the first framework for how participants wanted to alter the DFO time and area closures.

By this time DFO and the province had built a stock, effort, and area computer model to generate options for discussion during SWC meetings. They gave the data and model to the SWC participants. In working with the data, several commercial participants were able to propose a series of commercial openings before and after the main steelhead run which gave the commercial

sector more fishing time than it had under the DFO plan. Eventually this plan was accepted and became the 1994 fishing plan. The SWC then insisted that the government representatives make their ministers promise that they would not override the plan.

Outcomes. DFO and the province consulted in-season as promised. During 1994 the historical estimated average 36% harvest rate on steelhead was reduced to 21% or 22%. This was considered a tremendous achievement, even though 18% was the target. Conflict was reduced, and research is now underway. The technical subcommittee of the SWC is beginning to insist on regular reporting of research findings by the federal and provincial agency researchers and other contractors. The commercial sector now expects the sport and aboriginal sectors also to present fishing plans to the SWC, and to discuss enforcement issues. Enhancement and habitat restoration projects are being planned. With four years of federal Green Plan funding, the SWC is making a strong start at building the biological and sociological base for sustainable local management.

The SWC performs the following informal management functions:

1. joint stock assessment: The SWC advises on the federal/provincial research programs. Radio-tagging and GSI (genetic stock information) have been used to get better information on the timing of migration of different stocks. Catch sampling has been conducted through an observer program, in which some SWC members have participated. A technical review subcommittee of the SWC works with the research effort. The North Coast Advisory Board is considering taking on the management of the coastal test fisheries, under the auspices of the SWC.

2. joint harvest planning: The SWC commercial sector worked with the government's stock model and generated options for time and area closures. All parties agreed to a 1994 plan and government stuck to the framework plan, which was "used like a bible" throughout the season. The plan is a compromise which gets more steelhead up the river and gives more fishing time to the commercial sector. Although the plan has focused on the commercial sector so far, the conditions are now ripe for other sectors as well to present their harvest plans to the SWC, as this body works toward a co-ordinated vision for the watershed.

3. harvest monitoring: The participants agree on an on-vessel monitoring and research program (combined with stock assessment). Prince Rupert residents are hired to do GSI samples; 30 boats are sampled per opening, a 10% sample. Monitoring is being experimentally expanded to a creel survey of the sport sector.

4. compliance: The additional enforcement needs and possible role of the SWC are under discussion. A proposal for DFO, MOELP, and the SFC to share helicopter time to monitor the harvest of all three sectors and to monitor habitat is under discussion.

5. resource use co-ordination: Aboriginal groups see the need to work with other groups. All parties recognize they have no process without the commercial sector. Although all parties recognize that First Nations have the legal right to take steelhead for food and to fish non-selectively for food on other species, First Nations recognize that they undermine a co ordinated watershed stock plan and the sacrifices other parties agree to make if they too do not make sacrifices. The Gitksan were willing to accept closures on their commercial fishery to co ordinate with coastal closures and a pulse fishery strategy (see below).

6. policy-making, defining nature of problem, setting objectives: The SWC agreed in 1994 on the objective of getting more steelhead and coho up the river over the next three years. The means of doing that are left open-ended. The first two years of the SWC (1992-93) could be said to involve a certain amount of scoping the problem (discovering its dimensions), but mostly involved an attempt to find an objective that everyone could agree to. The group has not agreed

to the steelhead interception target which government originally suggested in 1991 (reducing the harvest rate on steelhead by 50%). The increased scope of activities in 1994, as well as the increased power of the group, has created incentives for greater and more consistent participation by all sectors. The group now has some capacity to shape, the future of the fishery by creatively combining a number of strategies in ways which offer more hope than existed under DFO regulation. The SWC now sponsors and co-ordinates any initiative in the watershed related to fish. The SWC parties have obtained funds for habitat restoration and enhancement under the Forest Renewal Plan of BC.

7. enhancement and restoration: The SWC is the body through which all proposals and projects of this nature flow. There are such projects in the making through the Green Plan funding and the provincial watershed restoration funding.

The Skeena Watershed Committee process so far shows strong indications that:

1. *It is accountable.* A balance between federal and provincial, government and fishermen, sport/commercial/aboriginal, has helped keep each party aware of the need to commit itself to principles in good faith which it can also demand of other parties. An independent facilitator has helped make all parties accountable to the principles and an objective process. Sharing the pain has been and will be an even more important principle. So far the commercial sector has taken the biggest "hit."

2. *It is representative.* The three fishing sectors and two governments are equally represented on the SWC.

3. *It is effective.* The data problem is being addressed, so that parties are soon to be in a position to mutually monitor one another's harvest relative to stock strength, and to judge how each party is contributing to sustainability.

4. *It is adaptive.* The SWC is learning by doing, and keeping some options open.

Summary Of Major Features Of The Skeena Watershed Committee

Major Problem Addressed: conflict among uncoordinated uses, decline in biodiversity

Major Focus: data collection, first stage of co-ordination

Scope: stock assessment, harvest planning, problem scoping, habitat enhancement and restoration, enforcement enhancement

Local Institution: local representatives of sport, commercial, and aboriginal, plus federal and provincial governments reaching consensus under an MOU

Human Scale: 3 urban centres, a dozen small dispersed communities

Scale Of Unit: 300 km. long river, 44,000 sq. km. area.

Number Of Parties: sport, commercial, aboriginal, federal, provincial

Type Of Actors: heterogeneous non-aboriginal communities with some population mobility, homogeneous, kin-based, residentially immobile aboriginal communities

Level Of Operation: regional

Chapter 6: Gitksan Management Of Subsistence And Commercial Salmon Fisheries, Skeena River, British Columbia

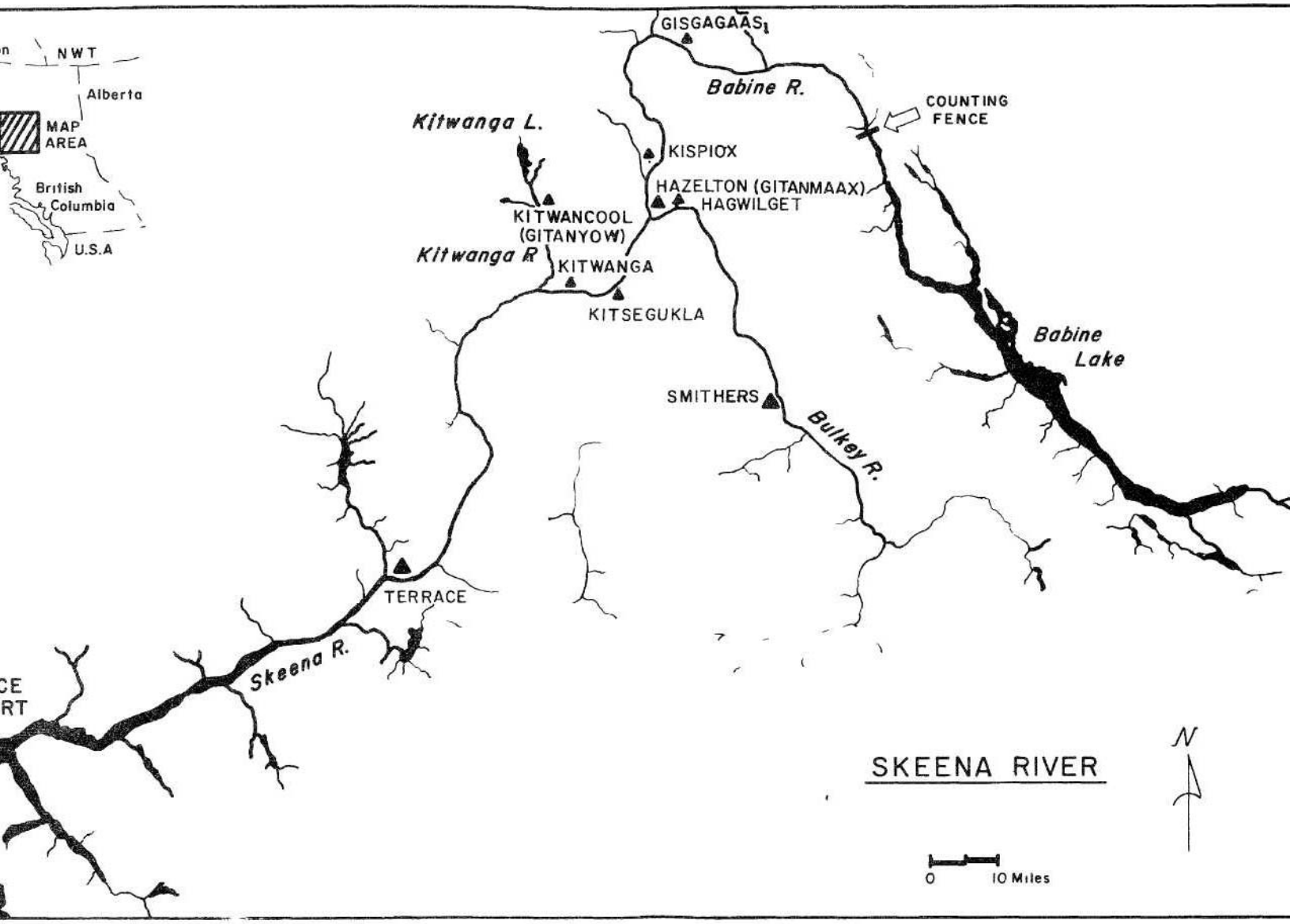
(Source: Gitksan-Carrier Tribal Council 1981, Cove 1982, Morrell 1985, Morrell 1989, Taylor 1993, Gitksan and Wet'suwet'en Watershed Authorities 1993, Gitksan and Wet'suwet'en Watershed Authorities 1994, interviews 1994-1995)

Before European contact, most of the aboriginal groups in what is now British Columbia practised some form of self management. A common mechanism on the coast was the practice described in Lake Titicaca fisheries: exclusion of outsiders, and the regulation of transfer of rights through inheritance rules. The Gitksan of the upper Skeena River used both these mechanism and also the regulation of access to owned fishing sites by the chief of the site-owning group.

A great deal has changed since traditional times in the stock composition of the fishery, in the ecology of the watershed, and in the political and social circumstances faced by the Gitksan. The enhanced Fulton and Pinkut sockeye stocks dominate the fishery, and many smaller tributary stocks fished by the Gitksan at the time of contact are now severely depressed or extinct. Over 60% of the tributaries have been logged by clearcutting, altering water flows and temperature, and often leaving no buffer zone to protect streams from erosion and slides. Despite the settling of some 30,000 Europeans on their traditional territory, and the entry of many Gitksan into commercial logging, milling, fishing, and fish processing jobs, the Gitksan have invested considerable effort into building their current management system from a traditional base. Therefore, it is possible to describe important features of pre-contact management institutions at the same time that the current system is described. Although the degree to which the Gitksan have drawn upon their own traditions may not be typical of the majority of BC First Nations, their story is useful for illustrating how traditional institutions can be revitalized and adapted to deal with modern problems. The Gitksan have been leaders and innovators in attempting to achieve this ambitious goal.

Regional context. As discussed in the previous chapter, the Gitksan participate in the Skeena Fisheries Commission, a body which has co-ordinated aboriginal agreements with government on the Skeena since 1992. As part of the SFC, the Gitksan also participate in the Skeena Watershed Committee, the multi-party body for dealing with basin wide issues (Chapter 5).

The Gitksan on the Skeena. In 1994 the Gitksan and neighbouring Wet'suwet'en, who had previously co-operated in a land claim, a court case, and in fisheries management, decided to separate as First Nation political bodies. For simplicity we discuss only the Gitksan portion of the institutions, and the Skeena River portion of the Gitksan system. About 2700 Gitksan live in six reserve communities on the upper Skeena: Kitwanga, Kispiox, Kitsegukla, Kifwancool (Gitanyow), Gitanmaax (Hazelton), and Sikadoak (Glen Vowell). Almost as many live off-reserve in the traditional territory, making a total of about 5,000 locally resident Gitksan out of a total of 6,000. A 200 kilometre length of the Skeena River runs through the territory in which the Gitksan have an interest (Figure 7).



ena River / Gitksan

Local management Institution. The management system is highly decentralized, but co-ordinated. The management unit is the kin grouping around a "house" (extended family) chief, who has the right and responsibility to manage the access of house members to the fishing site which s/he holds in the name of the house. Some 56 actively fishing Gitksan house chiefs thus control fishing effort through control of access to limited fishing spaces, and control of the timing of that access. Access cannot be denied to house members, their spouses, and children of female house members. Access may also be granted to children of male house members, or to others who are in some relationship of reciprocity with the house. House chiefs also have the right and obligation to protect fish habitat, under Gitksan traditional law.

Enforcement of traditional law through peer pressure and the feast hall. Each house chief manages his or her site separately. However, his or her claim to the status and rights of a chief must be validated under the scrutiny of the feast hall, where the other houses also participate in public ceremonials. Improper behaviour by a chief may be censured through peer pressure by the entire community. It may also be censured by the other chiefs periodically through the feast hall. In this fashion, standards of behaviour and compliance with Gitksan traditional law are ideally maintained over the long term. Gitksan law requires equitable access to fishing sites within the house, distribution to house members who are unable to fish, and the avoidance of waste.

Type of fishery. In pre-contact times, the technology used at the fishing site was usually a cylindrical basket or barrel trap, sometimes combined with a weir (fence) built wholly or partially across the stream. Spears, gaffs, and dipnets were also used. After the banning of traps and weirs by DFO in the early 1900s, set gillnets were used. In earlier times many of the fishing sites were on tributaries where it was easy to place traps or build weirs across the stream. As smaller tributary stocks were overfished in coastal mixed stock fisheries, and as enhanced runs increased in the 1970s and 1980s, the Gitksan moved much of their tributary fishing activity out to sites on the mainstem of the river. The system of regulating access to the site remained.

Rights. So the Gitksan practice informal and claim formal rights by house chiefs to regulate the access of some of their members to the house fishing site. They also claim the right to dispose of the fish by sale, a right which they successfully exercised informally in a limited fashion up to 1992, when an interim contract agreement was reached with DFO. This right was exercised in the face of harassment, net seizures, and court charges by DFO, which invested significant energy in the 1979-80 period in an attempt to suppress the sale of fish. No charges were successfully prosecuted against the Gitksan.

Harvest data collection and analysis. During the 1980s the Gitksan conducted an extensive professional biological study of their fishery (Morrell 1985) and trained a number of their people in the science of fisheries management and in the operation of the traditional system. Their catch surveys during this period, using standard sampling estimates of CPUE and total effort, have produced a data base which is being maintained today, and which is considered reasonably reliable by both DFO and the Gitksan.

The Gitksan harvest study spelled out its sample size, methods, and confidence limits (reliability), making itself accountable to scientific and political scrutiny. Since the 1992 ESSR fishing agreement with DFO (see below), the Gitksan have published their current catch monitoring methods and data. Regional DFO staff believe that the Gitksan catch monitoring system "is as good as you can get at this point without excessive expenses which would only improve the data a little more." Through the study of their resource and fishery, and through consultation with the chiefs, the Gitksan are exploring options for improving the conditions of stocks in their area, and coordinating their management system with DFO management.

Development of selective harvest methods. During the 1980s, the Gitksan had also begun to explore options for conducting more selective fishing methods, in order to target the enhanced

Pinkut and Fulton (Babine) stocks and to conserve and rebuild numerous depressed wild stocks which had been overharvested in mixed stock fisheries. When an agreement was signed with DFO in 1992 as part of the Aboriginal Fishing Strategy, it specified that an upriver Gitksan commercial fishery on 50,000 sockeye must target those enhanced Babine system sockeye stocks which were excess salmon to spawning requirements (ESSR). (The ESSR is 1995 is predicted to be at a "normal level", which is. 3-400,000 sockeye.) Therefore, the agreement specified that the commercial quota would be selectively harvested. The 1992 agreement stimulated experiments with traps and fishwheels as promising selective fishing technology, but' so far beach seines have worked best. The fish are corralled into shallow water by the beach seine.and non-targeted species (pinks, coho, steelhead) are lifted over the net and returned to the river. Of course, the issue of mixed stocks remains with wild Babine and other unenhanced sockeye stocks which do not separate out until they reach Babine Lake. It is not possible to distinguish these stocks visually, so only genetic stock identification studies would enable progress on this issue.

Another method for targeting the Babine enhanced stocks (without harvesting weaker stocks) is to move fisheries further up the river, past certain key tributaries. The sockeye fishery at Kitsegas (Gisgagaas), which has increased in recent years, is a good example of this strategy being put into practice. This fishery is above the exit of several important stocks: the Bulkley, Kispiox, and Kitwanga Lake.

By 1994, there were 10 Gitksan houses that were conducting commercial fisheries. The 1994 agreement with DFO specified that 100,000 sockeye could be taken in the selective commercial fishery, and that 10% of the harvest must be dedicated to management costs.

Communication and co-ordination. The Gitksan and Wet'suwet'en Watershed Authorities (GWWA) was formed in 1991 by the house chiefs to co-ordinate their fishing activities and carry out parts of their contracts with DFO, including the production of annual post-season reports on their management activities. The GWWA is staffed by Gitksan trained in the 1980s, assisted initially by a professional biologist.

Relations with DFO. The GWWA is the interface between the chiefs and DFO. They interpret the house-based fishery to DFO and to other users, and interpret DFO to the chiefs. The three senior Gitksan fisheries staff of the GWWA also meet or hold conference calls weekly in-season with three DFO biologists. Together this six-person technical committee discusses the in-season harvest data (also shared with DFO through copies of sales slips), and effort data (number of net days and CPUE). The committee decides when in-season closures are necessary for ESSR fisheries. Frank discussions about how to best interpret the data (in concert with DFO data on the coastal fisheries) have produced considerable agreement on the technical requirements of the fishery. Under the AFS agreement, DFO retains final authority to close a fishery for conservation, but the technical committee usually is able to agree on when the fishery needs to be closed.

Policy development Inside the Gitksan social system, two of the GWWA staff are themselves attaining considerable stature in the feast hall, which contributes to their ability to bring serious attention to fish management issues. In the post-season meeting they conduct with the chiefs, they report on data collection and analysis on the state of the stocks, habitat inventory, the results of the fishery, gear development, enforcement training and reports, and recommended policy development. Their role is educational, to co-ordinate a discussion of policy options (i.e. selective fisheries, rebuilding stock diversity), to provide technical assistance to the chiefs in planning, to conduct research on the stocks and their habitat, and to call the attention of the chiefs to the need to integrate and co-ordinate their fisheries.

For example, in their 1993 post-season report, the GWWA reported that 51 % of the total sockeye catch was selective in 1993 (vs. 11% in 1992). (The "home use" portion of the catch is not taken on selective gear, but the report estimates the size of the home use catch and suggests that moving

to selective techniques in all fisheries would be desirable.) This observation suggests that the legal sale of selectively-caught fish is beginning to have an influence on the entire fishery. People are beginning to talk about the possibility of harvesting both their home use fish and their commercial fish selectively to promote better stock by stock management. A fish wheel experiment at a new site is scheduled for 1995.

The GWWA report reviews the system-wide harvest rate on sockeye, which it states is too high. Before the Babine Lake spawning channels were built (for the Pinkut and Fulton stocks), the harvest rate on sockeye was 53%. With increased abundance, DFO compromised with pressures for a higher rate and raised the harvest rate to 60%. The total harvest rate on sockeye in 1993 was 68%. (All coastal commercial fisheries took 61%, while all upriver aboriginal groups took 7%; the latter included the Gitksan-Wet'suwet'en harvest of 2.4%.) In other words, the Watershed Authority is saying that a 68% harvest rate puts unacceptable pressure on weaker stocks. Even through the Gitksan and Wet'suwet'en only contribute 2.4% to that unacceptably high harvest rate, the GWWA is asking the chiefs to take a long-range view of the urgency of developing selective methods in ALL their fisheries. The GWWA is advocating more stringent attempts to bring back depressed and possibly less productive stocks in smaller tributaries through lowering the harvest rate.

In a situation like the Skeena River, where many parties fish the same stocks at different points in their migration, the willingness of one party to "take a hit" for conservation purposes puts pressure on other parties to do likewise. In other words, the Gitksan attempt to impose more selective fisheries on themselves is also part of a broader attempt to persuade other parties to follow suit. It should be remembered from the discussion of the Skeena Watershed Committee that the Skeena River gillnetters in Area 4 at the mouth-some of them Gitksan-took a very substantial "hit" in 1994 to conserve steelhead and coho.

The house chiefs as a group could also agree to a policy or regulation to deal with a problem arising and ask the Watershed Authority to enforce it. For example, at some point the chiefs may decide that some mechanism will be necessary to equitably distribute commercial catch among the houses or general areas. If so, they could instruct the Watershed Authority to have openings and closures to achieve this objective.

Enforcement. As part of the AFS agreement, six Gitksan fishery officers began training in 1992. They have worked in teams with DFO officers carrying out enforcement duties in the territory, and by late 1995 will have full powers to enforce the *Fisheries Act.* The presence of GWWA guardians (as apprenticing fisheries officers are called) around the territory and regularly at fishing sites is extremely important in increasing the ability of house members and individuals to monitor each others' behavior. It is a sociological rale that most social control operates at the level of peer pressure.

The AFS agreement between the Gitksan and DFO has significantly altered-the Gitksan relationship to DFO enforcement is other ways as well. Before the agreement, DFO fisheries officers were not welcome in Gitksan territory. Now they are seen as colleagues who are helping get a job done. DFO officers periodically do overflight net counts, interview Gitksan fishermen about catches and . fishing effort, or do undercover checks. DFO enforcement officers and the GWWA independently make the same statement about illegal commercial fisheries (fish sold to independent buyers which is not reported) in Gitksan territory. "There are a few who get away with a little now and then, but we know who they are, and we keep an eye on them. There is not much that gets through." The GWWA now has the ability to order any suspect container track to leave the territory, so that large scale purchase by independent buyers is no longer possible.

Commercial sales are now regulated in a standard fashion, as specified in the AFS agreement between the chiefs and DFO. By 1993 there were eight commercial fishing sites (10 in 1994). Each commercial fishing site has (or is) a specified landing site, where catch is monitored and sales recorded by species. By 1993, all the commercial catch had to be sold directly to the Git-Wet Corporation, a marketing subsidiary of the collective house chiefs: it is run by a board of chiefs. Git-Wet supplied ice and standardized containers to each landing site, collected the fish on a daily basis, and supplied species counts and recovered tags to the GWWA. Sales slips were provided to DFO on a weekly basis. Chiefs at the fishing sites got immediate feedback on any inaccuracies in count or species.

The Gitksan have always had a "home use" or "food fishery" which is taken non-selectively, mostly by gillnets. The new commercial sale agreement allows the sale of targeted species only, and any net marks on the fish (indicating it was not selectively caught) automatically disqualifies it from commercial sale.

Economic benefits. The legalization of commercial sale has brought important economic benefits to the region. With ice delivery, collection, and marketing systems in place, the GWWA is attempting to persuade Gitksan gillnetters who fish Area 4 to relocate their fishery upriver. For a Gitksan, the upriver fishery involves a smaller volume of fish, but much lower harvesting costs, after one-time start-up costs. (AFS funding has assisted in start-up costs). The commercial season upriver is much shorter, but the catch per unit of effort (CPUE) during that season is high.

Scope. The management activities of the fishery expand every year, partly as the chiefs request, and partly as the GWWA convinces the chiefs of the necessity of such activities. It is the chiefs who sign agreements with DFO, and the GWWA which executes the agreements.

In 1994, management activities included:

1. joint stock assessment: This occurs through a joint tagging program with DFO, MELP, and the Skeena Fisheries Commission. This included a Genetic Stock Identification program, to assess stock timing, abundance, composition, and size.
2. baseline data collection: This involved evaluating choices for index streams from 50-60 tributaries in the Gitksan area.
3. monitoring condition of habitat: Beginning some inventories in 1992, the GWWA does fish habitat assessment as part of an integrated resource plan for the Fiddler Creek drainage.
4. joint enforcement of harvest regulations: Gitksan fishery officers in training (through a training agreement with DFO) team with DFO officers to patrol area.
5. data collection: The GWWA conducts spawning escapement surveys of all sockeye tributaries in the territory and a majority of the coho tributaries.
6. resource use co-ordination: Co-ordination of uses within Gitksan territory is done by the GWWA in consultation with the house chiefs. Co-ordination of uses outside territory is done through the Skeena Fisheries Commission and Skeena Watershed Committee.

The management activities of the GWWA thus formalize and extend some of the traditional chiefly harvest management activities. The chiefs in a narrow sense managed only space and time access, exclusion, and membership transfer in traditional times. However, the chiefs also traditionally practised a limited form of stock assessment, enforcement, use co-ordination, monitoring of harvest and habitat, policy development, education and research. The GWWA now performs the latter functions in a broader and more co-ordinated fashion. Stock assessment and enforcement are now conducted jointly with DFO.

The Gitksan management system addresses a number of the great fisheries management problems. Fishing effort is controlled and fishery access is regulated. Human capital is tapped through the chiefly regulations and through informal peer pressure and the enforcement activities of fishery

officers. Importantly, the move to more selective fisheries is being spearheaded as a policy/values issue on which the Gitksan exercise leadership. This is the most remarkable aspect of the Gitksan management system—that it has been a force for the development of a strategy which is in everyone's long-term best interest, but which requires all parties to "take a hit" in the short term.

Some observers have been happily surprised that the Gitksan have put so much emphasis on selective fisheries, when they have a short-term self-interest in merely asserting their rights to a portion of the run. On closer examination, however, it should not be surprising that the Gitksan take the long view on the selective harvest issue. The decentralized nature of territorial occupation means that specific stocks adapted to those specific tributary areas belong to the chiefs of those territories. Not only are the stocks seen as having intrinsic value which it is a chiefs duty to protect, but they are an important form of tangible wealth that a chief can claim. When tributary stocks in a chiefs territory are overfished or eliminated, s/he may still claim access to mainstem stocks, but these stocks clearly have to be shared with others. Adopting a policy on selective fisheries has also had strategic importance in the context of the other Skeena fisheries, as discussed above.

In summary, the Gitksan communities are:

1. highly dependent on the fishery (There was up to 90% unemployment seasonally before-AFS; the commercial fishery is one of the most important economic opportunities, even though it is very limited in time.)
2. highly vulnerable to non-sustainable use (The houses want to protect salmon stocks which return to specific reaches of specific streams which they occupy and claim).
3. highly identified with place (Houses have specific rights in specific territories only).
4. unwilling to transfer access rights out of area
5. willing to use mechanisms for equitable resource access and sharing

The Gitksan management system is:

1. *accountable:* The Gitksan resisted DFO direct involvement in data collection and catch monitoring in the past. DFO is now more involved both directly and indirectly, through:

a) the 1985 publication of Gitksan stock assessment methods and data; the consistency of subsequent reports;
b) weekly technical meetings with DFO since 1991 around the ESSR fishery; open collegial discussion of data; Gitksan interest in DFO program design suggestions;
c) DFO independent enforcement surveillance in the area and conviction that the Gitksan data "could not be very far off';
d) Gitksan participation in the Skeena Watershed Committee, involving increased face-to-face discussions with sport and commercial fishing organizations, and joint planning and problem-solving.

Accountability of the GWWA to the chiefs and Gitksan society at large is achieved by the following mechanisms:

e) public discussion of policy options, and the gradual building of consensus on the appropriate course of action;
f) identification of the need to generate better data on stocks and to develop more selective harvesting methods;
g) a clear, publicly articulated description of management actions and outcomes through publication of the annual GWWA reports, which spells out all assumptions and methods.

2. *effective:*

a) able to make (or support) appropriate rules of access;
b) able to monitor and enforce rules;

c) able to censure non-compliance through peer pressure and the social control functions of the feast hall, sanction potential excesses by any individual, even a chief;
d) able to enforce, backed by DFO, and through the training of Gitksan fishery officers;
e) able to garner support through the educational activities of GWWA staff respected in the traditional system;
f) able to promote efficiency (lower harvesting costs);
g) able to promote continuation of traditional stewardship

3. *representative* The chiefs make policy decisions, representing their houses. Agreements with DFO to perform certain technical task are made by the GWWA, but signed by the speakers, representing the chiefs.

4. *adaptive:*
a) able to receive clear feedback signals about success or problems (through reporting mechanism)
b) able to attempt new technology and change in response to success or failure.
c) able to reach out for new learnings in undeveloped areas of management
d) able to co-operate with other parties sharing the same stocks through the Skeena Watershed Committee

Summary Of Major Features Of Gitksan Selective Surplus Salmon Fishery

Major Problem Addressed: overfishing of smaller stocks

Major Focus: exclusion and access regulation of kin group members

Scope: data collection, stock assessment, habitat assessment, enforcement, co-ordination of uses

Local Institution: house chief regulates in name of house.

Human Scale: variable size extended kin grouping

Regional Context: 56 houses maintaining social values and the rules of the feast hall

Scale Of Unit Area: small fishing site

Type Of Actors: united by kinship, culture, local residence

Level Of Operation: local and regional

Degree Institutionalized: centuries old tradition

Degree Formalized: ESSR fishery developed in 1992, through specific contract; constitutional relationship under ongoing negotiation

Type Of Fishery: beach seine or fixed gear, close to river shore

Economic Benefits: high CPUE, low capitalization

Role Of Community: peer pressure to maintain values of proper role and duties of chief

Relationship With Government: co-operative partnership being developed

PART FOUR: INSHORE FISHERIES AND SEDENTARY RESOURCES

Not all fisheries are inherently difficult to manage. The dramatic problems that influence public opinion usually come from high seas or migratory resources. Many important and valuable marine fisheries are based on resources which are either sedentary or have low mobility. Such fisheries lend themselves biologically to territorial management. Stock assessment, monitoring and protection from interception by other fisheries are much simpler. Problems still remain. There is always some degree of resource mobility, if only by the dispersal of larval stages. So exclusive rights to harvest and protect a territory are not adequate. Fishermen involved in territorial fisheries for low mobility resources still need an ability to influence the surrounding aquatic and terrestrial environments. They still need to interact with other parties, both within the fishing industry and in the general public, to protect their interests in territorial fisheries. And many of the classic socio-political problems (Chapter 1) are not inherently resolved by territorial fisheries alone. Nonetheless the problems are of a different scale than those of the mobile and high seas fisheries.

This section examines a number of alternative management models that are used for inshore and sedentary resources. The case studies range from the Japanese inshore, probably the most complete and successful example of community fisheries management globally, to examples of success and failures of territorial-based management within the U.S. oyster industry, to alternative tenure arrangements and their benefits and problems within the Korean seaweed fishery. A final case study examines a B.C. Multi-party clam management pilot project.

Chapter 7: Management of Inshore **Fisheries by Japanese** Co-operative Associations

1. Introduction

No matter how the statistics are arranged, Japan clearly emerges as one of the world's leading fish producing, fish importing, and fish consuming nations. Japan is one of the most important markets for BC, fisheries products. Indeed, nearly the entire production of EC's lucrative herring roe and sea urchin fisheries are exported to Japan; and the high market value of these products results from Japanese taste and cultural preferences. These are well known facts. Less well known is the story of Japan's indigenous system of fisheries management and the high production levels that come from Japanese inshore waters.

While most other instances of community fisheries management tend to be limited to single or perhaps a few communities, the Japanese case actually includes a major portion of the national fishery. During recent years, several thousand fishing communities in Japan were involved in fisheries management. Contrary to its image in manufacturing industries, within the fisheries sector Japan is dominated by small-scale and household enterprise. In 1989 community managed coastal fisheries contributed nearly 1/3 of the 11+ million ton national catch and almost 50% of its value (Short 1992).

Since the early 1980s increasing attention has been paid to Japanese fisheries management by international organizations for its potential value in guiding reform of the seemingly intractable problems (Chapter 1) that plague fisheries globally. The reason for the interest is the difference between the most fundamental arrangements of fisheries management in Japan and in most other developed countries. Two basic models operate. Most developed nations manage their fisheries

under total allowable catch (TAC) principles. Government agencies set the quotas, and generally regulate the harvest through the control of fishing effort. In the Japanese inshore fishery, community co-operatives have exclusive legal rights to the harvest of designated resources in a defined territory. TACs are seldom calculated; and the fishermen themselves, operating in conjunction with government agencies and public consultative committees, have the responsibility for defining management policies and practices as well as carrying out their implementation and enforcement (Yamamoto and Short 1992a).

2. Historical Roots

Modern Japanese fisheries management methods stem from Japan's entrance onto the global stage during the mid- and late-19th century. Japan was an isolated nation with very limited trade and contact with other states prior to the mid-19th century. The severe political disruptions of the early trade-contact period led to radical reforms. During this period the fledgling government followed a strategy of rapid modernization in order to avoid the economic colonization by European and American powers that neighbouring Asian states had experienced. As part of the strategy, the Japanese government sent representatives to study the methods used by the developed countries of the time. The intention was to return with understandings of the most advanced methods available globally. Representatives chosen to study a given field went to the country most noted for its prowess in that area: business methods were studied in the United States, military organization in Germany, education in Britain, and so on. In fisheries, after examining methods available in more advanced nations and making a conflict-laden attempt at re-structuring this important economic sector of the national economy along lines commonly followed elsewhere, the Japanese Government decided to reform and institutionalize the indigenous fisheries management methods that had been developed during their own feudal period. In effect, the government by their actions recognized their own management methods as the most advanced available in the world at the time.

Japanese inshore fisheries institutions have their origin in the medieval past when rights were granted to fishing villages by feudal lords in exchange for rents in fish or other produce. In the late 19th century, the government dissolved all of the former feudal fishing rights and, for a period, chaos reigned as the new administration experimented with different tenure and management arrangements. In 1876, ownership of all fisheries reverted to the central government. Fishing was open to all based on payment of fees. This resulted in the move of farmers into the fishing sector and a large-scale increase in fishing pressure. People with access to capital benefited and those without, which often represented residents of traditional fishing villages, lost.

These changes were similar to measures enacted by other nation states at the time, including Canada. Customary sales of communities which had historically relied on fisheries resources for their livelihood were ignored in favour of the creation of an open-access regime (see Fig. 8).

In 1881, fishing co-operatives were made the organizations responsible for "coodinat[ing] the use of coastal fishing grounds" (Ruddle 1987:24). The co-operative associations emerged from earlier fishing village guilds. Guild membership, which was limited to people born in a village, had required members to follow rules about gear, season, and fishing areas. Under the 1901 Fisheries Law, fisheries associations became the unit of fisheries organization. The associations were structured along the lines of the old guilds, with membership subject to residency requirements and with the intention of benefits of local inshore fisheries providing the economic livelihood for adjacent villages. Tenure rights and licenses were granted to the associations, as the coastal fisheries management units.

As far-reaching and far-sighted as the early law was, problems of inequity continued. Small-scale and poor fishermen continued to be poor. Control of use and marketing remained in the hands of

wealthy fishermen, middle-men and wholesalers. The situation became worse with the availability of gas powered boats. Fishermen who had the ability to invest in faster and larger boats gained a significant advantage. Government encouraged fisheries associations to enter marketing during the 1930s to break the control of middle-men brokers and money lenders (Ruddle 1987).

The general reform of Japanese law following World War II was seen as an opportunity to rectify the more serious problems of the earlier fishing laws. The new laws were intended to democratize the fishery by strengthening the place of locally resident, active fishermen and thereby avoid the development of absentee rights, which had impoverished active fishermen earlier in the century.

3. Legal Fishing Rights And Licences

At their most basic, Japanese fisheries have a two tiered structure (Table 5), based on government grants of legal fishing rights and licences. Exclusive territorial rights are used for the management of sedentary resources, such as molluscs, seaweed, some bottom fish, etc., which are inherently easy to manage on a territorial basis. Under Japanese law, fisheries rights have an equivalent power to privately owned agricultural holdings. The ownership of rights to most sectors of the inshore fisheries are limited by law to Fisheries Co-operative Associations (FCAs), the fundamental unit of fisheries management in the inshore under the Japanese system. These rights are held jointly by co-operative members.

On the other hand, a licensing system is used for fisheries that require high degrees of fishing mobility. The licensing system is used for regulating fisheries in distant oceanic waters, high seas areas within Japan's 200 nautical mile exclusive economic zone (EEZ), and mobile fleet fisheries in nearshore waters immediately beyond the tenure-based fishing areas (Ruddle 1987).

Fishing rights are granted by prefectural governments for 10 year periods. Licenses are granted by the national Minister or by prefectural Governors (for fisheries within prefectural waters), generally for 5 year periods, with the exception of distant oceanic fisheries subject to international negotiations which are only issued for a single year at a time (Morisawa et al. 1992).

When considering renewal of rights or licenses or granting of new licenses, prefectural governments are obligated to take the advice of the local Prefectural Fisheries Regulatory Commission. Each prefecture has such a Commission. Members are elected from among the fishing community and appointed, as experts, by the prefectural governments. Commissions hold hearings; gather information and submit their recommendations to the prefectural governments (Morisawa et al. 1992).

Joint fishery rights (Table 5) can only be held by a FCA, which designates rights to its membership. Fishing rights are intended to be essentially inalienable. Transfer is possible, but under strict legal control and subject to review of the FCA membership (Ruddle 1987).

Typically, each FCA holds a complex of fishing rights, one for each area and type of resource. FCAs are given a wide latitude in decisions on how to manage their resources. The basic prescription comes from the prefectural Commissions, which establish broad management goals and means. Each FCA then has the responsibility to formulate Fisheries Right Management Rules, one set for each right they hold. The Rules, which act as a detailed .fishing plan, are ratified at general meetings of the membership; and are subject to prefecture approval.

Table 5. Legal Fishing Rights in Japan. (based on a table from Ruddle 1987)

Categories	Granted to
RIGHTS	
1. JOINT FISHERY RIGHTS	
A.) Gathering seaweed, shellfish and other benthos	Exclusively to Fisheries Cooperative Associations (FCAs)
B.) Specific small-scale net fisheries	Exclusively to FCAs
C.) Beach seines, unmotorized trawling, fish shelters	Exclusively to FCAs
2. DEMARCATED FISHERY RIGHTS	
A.) Special Demarcated Rights	Exclusively to FCAs
B.) Demarcated Rights	To FCAs, private organizations, and individuals.
3. LARGE-SCALE SET-NET FISHERY RIGHTS	To FCAs, private organizations, and individuals.
LICENCES	
1. NEARSHORE, SMALL-SCALE OPERATION	To FCAs or individuals
2. DEEP WATERS, MEDIUM-SCALE OPERATIONS	Mostly to private organizations and individuals
3. DISTANT WATERS, LARGE-SCALE OPERATIONS	Mostly to private organizations and individuals

4. Scale of the Management Units

Because community management in Japan occurs in several thousand fishing communities, it is not a simple task to define the scale of the units involved in management.

In 1990, the 2,127 marine fisheries co-operatives had a membership of about 535,000 (Sato 1992). Consequently, average co-operative membership is in the order of 250 fishermen. Cooperatives are linked at both prefectural and national levels. There are 43 prefectural co-operative associations (one for each prefectural jurisdiction) and as well a National Federation of Fisheries Co-operative Associations (Zengyoren).

Communities range from remnant fishing communities within heavily Industrialized zones to relatively isolated villages in which fishing remains the critical industry. It is likely that most communities lie somewhere in-between—within the small-scale industrial, but largely rural landscape, which represents most of contemporary Japan.

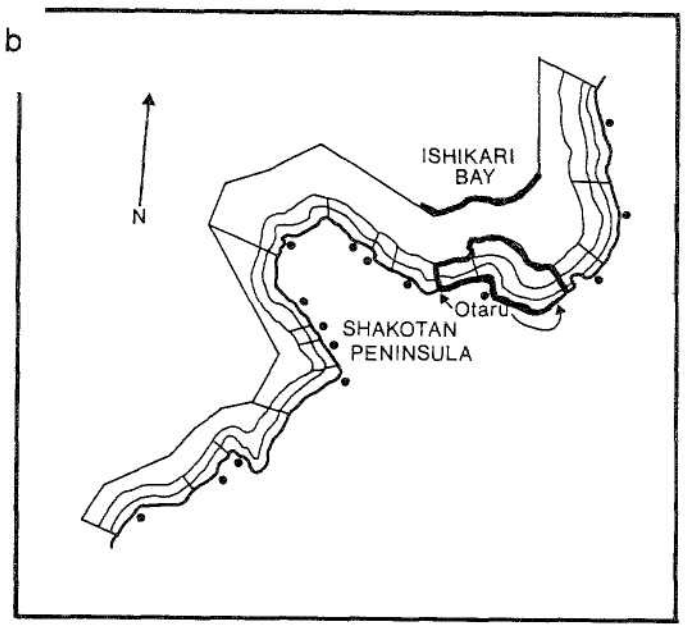
Typically each fishing household owns one or possibly two small vessels (with an average displacement of 2.5 tons and motors limited to 30 Hp). Fisheries tend to be organized on household lines, supplying their own labour within the family group and owning their own equipment.

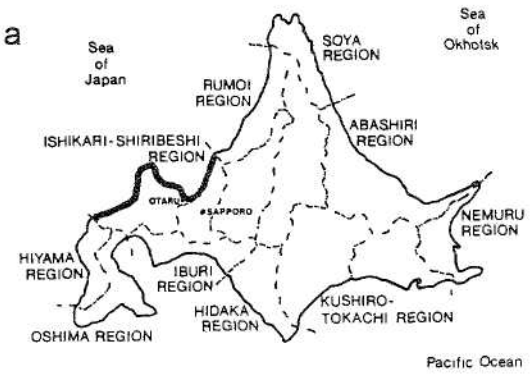
Communities are homogeneous, sharing a common heritage and history. They are highly cohesive social units, with long historical association to the local environment and resources and a traditional knowledge of both local waters and local ecology passed down for many generations. All of these combined with the specific fishing rights provided by the Fisheries Law result in a powerful sense of local interest.

The question of the size of areas held under fisheries rights tenures would appear to be fundamental. For Japanese community management the question is not easily answered. There is a high degree of variation in the size of fishing grounds. Some of the variation results from regional differences in the productivity of the inshore. The Japanese islands span several thousand kilometres, from sub-arctic to tropical seas. And some of the variation results from the historical density of the human fishing populations and the history of tenure creation (Ruddle and Akimichi 1989). Since the definition of most community fishing rights areas originated in the historical past and was based on customary use areas, we can assume that the scale of areas was guided by the goal of providing a basic livelihood for village families.

4.1. The Otaru FCA *(based on Short 1989; Short 1992)*

Although there are no set answers to the average size of areas managed by FCAs, several case studies (on Otaru FCA in the north and Okinawa Island in the tropics) have included valuable maps which are instructive both about the scale of the management areas and the spatial geography of fishing rights. The maps of the Otaru FCA fishing rights areas (Fig. 8) are particularly instructive about the degree of over-lap in rights to specific types of resources. As mentioned above, under the Japanese system rights are specific to types of resources or, in mixed fisheries, to types of gear. The consequences of this arrangement is the possibility that a given section of coast may have a complex mixture of fishing rights. The details of the Otaru FCA fishing rights geography provide very important insights into the reasons why the Japanese inshore management model is inherently based on management by the fishermen themselves.





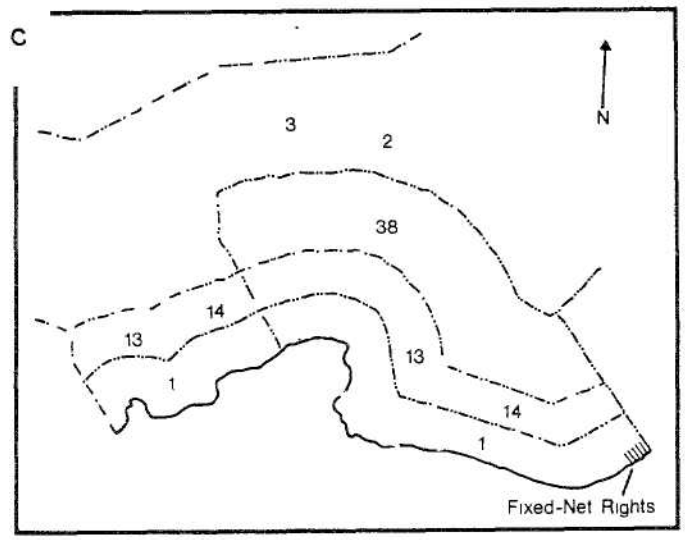


Fig. 8. Fishing rights held by the Otaru FCA. (based on Short 1989 and Short 1994). Map **a** shows the section of Hokkaido coast on which the FCA holds fishing rights. Map **b** shows the distribution of rights held by regional FCAs (black dots). Map **c** indicates the rights held exclusively by the Otaru FCA (1, 13, 14, and 38) and those shared with adjoining FCAs (2 and 3). (The details of the rights are discussed in the text).

Otaru is a large coastal city with population of 180,000 and an important fishing port on southwest coast of Hokkaido (Fig. 8a). The Otaru City FCA, which has about 400 full-time active members, holds a number of exclusive fishing rights and a number of rights jointly shared with neighbouring co-operatives.

Figure 8b shows the region of the coast within which the Otaru FCA holds fishing rights; Figure 8c — really a detailed inset of Figure 8b — is limited to the Otaru rights areas. In both figures, the fishing rights areas are shown as strips of coast paralleling the shore at four distances (approximately 2.5, 5, 10 and 20 kilometres).

The complexity of the FCA's fishing rights results from the degree of spatial over-lap in the rights. The over-lap includes both fishery rights held exclusively by the FCA (#1, #13, #14, #38) as well as rights shared with other FCAs. For example, the near-shore strip—2.5 kilometres from shore (right #1)—-provides exclusive harvesting by the Otaru FCA of several species of bivalve, abalone, sea cucumber, two species of sea urchin and seaweeds. Rights #13 (octopus harvesting within 5 kilometres of shore) and # 14 (gill-netting and small-scale set-netting for flatfish and other finfish in the 5 kilometre zone) includes the area covered by right #1. Right #38, which provides exclusive mantis shrimp harvests in the 10 kilometre zone, includes part of the areas covered by rights #1, #13 and #14.

Among the joint rights shared by the Otaru FCA with neighbouring FCAs, right #3 covers a large area of coast within the near waters of 8 FCAs. It provides Otaru and the other FCAs with octopus fishing rights between 5 and 20 kilometres from shore. Right #2, also jointly held in the same area, is for gill netting flat fish and other fin fish.

If we interpret the scale of the maps from seaward distances of the rights, the area of exclusive rights held by the Otaru FCA is approximately 225 square kilometres, (along a 20-25 kilometre section of coast) extending for a distance of 5 to 10 kilometres from shore. Whereas, the joint octopus and finfish gillnetting rights (#s 2 & 3) shared with adjoining FCA extend up to 20 kilometres from shore and includes an area of approximately 500 square kilometres.

4.2. Okinawa Island *(based on Akimichi 1984; Akimichi and Ruddle 1984)* There is a particularly rich literature on the social management of Okinawa fisheries. The maps (Fig. 9) produced by Akimichi and Ruddle (1984) show the layout of fishing rights territories on the entire coast, and the way that the arrangement has been altered during this century. Okinawa is a sub-tropical island in which the fishery focuses on coral reef fish. Okinawan fisheries have an elaborate array of customary fisheries rules. The detailed rules which govern fishing behaviour stem from the complexities of the reef environment. The micro-topographic features combined with the behaviour of resource species makes for highly variable productivity of fishing sites. The fishing community has a long experience with differences between the productivity of fishing sites and the consequences of gear interception. The rules are remedies worked out to avoid predictable conflicts over interception and to give fishermen equitable harvest opportunities.

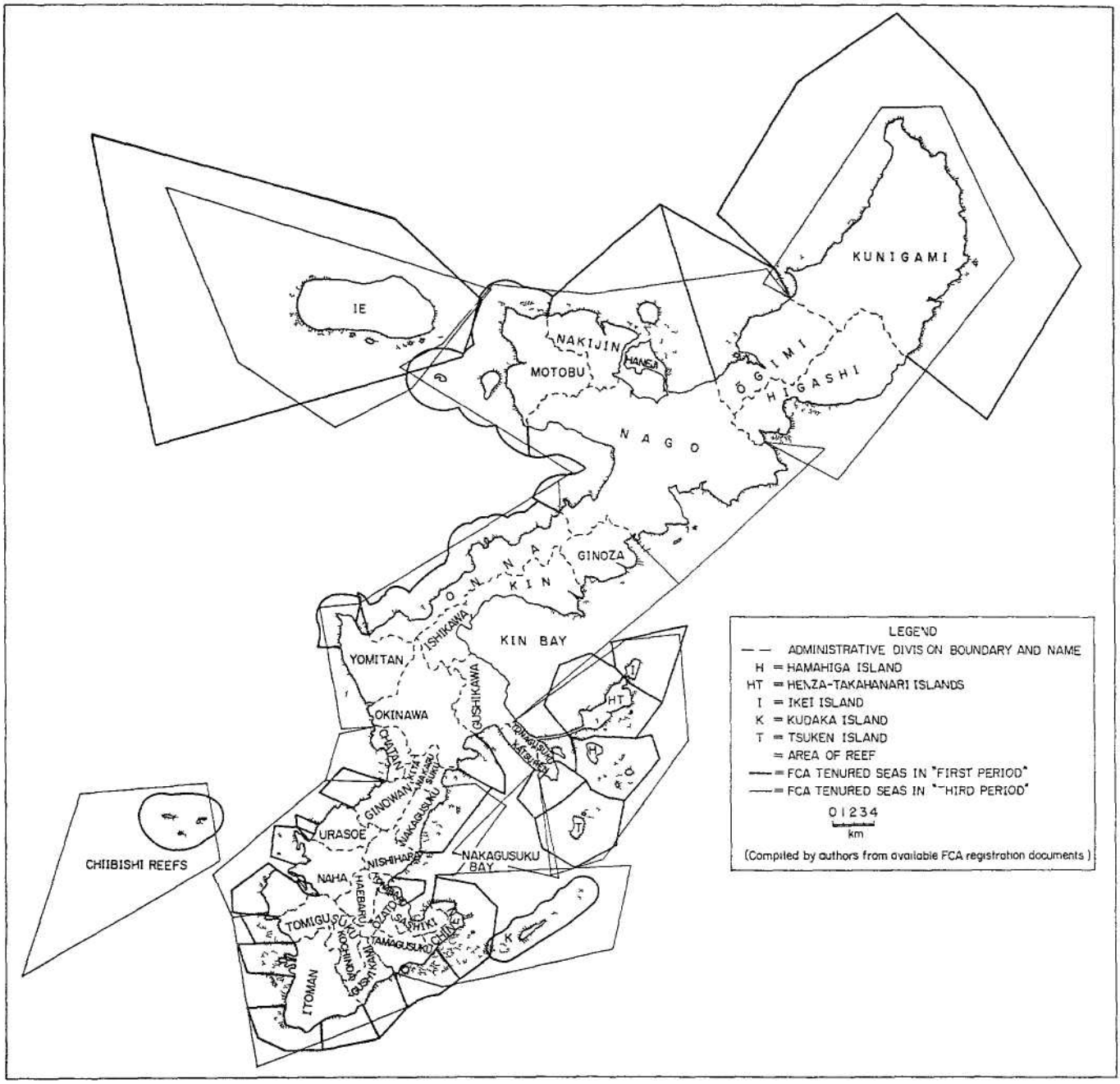


Fig 9. Changes in the territories of Okinawa FCAs (from Akimichi and Ruddle 1984)
First period 1907-1940, Third Period 1974-1984

Although FCAs own rights to fish, coastal boundaries are not fixed in stone for all time. FCAs are fishing organizations and the communities of fishermen may change. The objective of the rights-holding co-operatives is to provide for productive and profitable fishing. Social change in fishing communities may result in redrawing the rights boundaries between adjoining fishing co-operatives. This has happened in the case of Okinawa fishing co-operatives. The changes in the arrangement of Okinawa FCAs resulted from amalgamation of some of the island's FCAs following periods of population shift and social change. The original mapping of rights territories took place in 1902 following the implementation of the 1901 Fisheries Law. For the most part, the boundaries followed traditional customary rules. In more recent years the territories were redrawn due to a combination of FCA amalgamation, various agreements on shared rights and a recognition that some large offshore areas were not in use by more local fishing efforts (Pig. 9).

The current seaward boundaries of FCA rights territories range between 2.5 and 15 kilometres. The average size of areas under exclusive rights tenures to FCAs is unclear. However, the territories in Fig. 9 range between 30 and 225 square kilometres. Overall, Okinawa Island FCAs have a membership of 2000, with greater numbers concentrated in the central (863) and northern (831) areas—reflected in the larger size of their fishing rights territories.

5. Parties and Basic Institutions Involved in Fisheries Management

The Japanese inshore fishery is an example of a fully linked system of management, from neighbourhood and local fishing gear groups to prefectural and national fisheries agencies and co-operative federations. The linkages provide what appears to be an effective two-way means of communication. The lower levels are able to protect their interests and express their ideas (e.g., Kalland 1981), while the upper levels are able to broadly monitor community, economic and resource health and make policy recommendations based on regular and direct communication with the other parties involved in the management process.

5.1. The community level

Essentially, however, air aspects of the inshore fisheries, including its management, are dominated by small-scale and household enterprise. The FCAs, as the legal fishing rights holders, are the central formal organization in management. For example, a FCA is responsible for writing a management plan for each of the fishing rights it holds and having the plan ratified by the general membership and approved by the appropriate Sea Area Fisheries Regulatory Commission. That is the formal structure.

Japan is remarkable as an industrialized nation for retaining many of its small, community institutions. Brameld (1968), for example, describes a variety of local, informal institutions in a fishing community which serve to link people who are ultimately dependent on fisheries resources, but who may not have a voice in the FCA or gear groups. The FCA Brameld describes also has both a women's auxiliary and a youth division. Although these have no official power, they are formal institutions which serve as linkages between fishing and non-fishing villagers.

Brameld also describes a remarkable grass roots organization, which operates broadly through the community, linking fishing families and others on neighbourhood and regional levels, providing each citizen with a potential voice in community affairs. The arrangement has its origins in the distant past and was used for hierarchical control of the populace by feudal lords and the latter day military government during the 20th century. Its present incarnation, however, provides a high degree of potential democracy to Japanese communities. Each neighbourhood (groupings consisting of a dozen or so households) selects a representative whose primary responsibility is to

stay in touch with the households and act as the neighbourhood representative at meetings of joint area representatives. These, in turn, chose an area representative for meetings at larger levels. Although these groups are not directly involved in fisheries management decisions, they are the constituency whose economic and environmental welfare is affected by the decisions made by those who are. The informal institutions provide the broad community with a voice to FCA and fishery/gear group members.

5.2. The FCA

By law, the ultimate FCA authority is the General Assembly which meets only once or twice a year. Large FCAs, which may have nearly 1000 members, conduct routine business (such as reviews of previous years' activities and approval of annual fishing plans) through meetings of a more limited Representative General Assembly (Ruddle 1987). In the case of the Otaru FCA (400 members), a smaller body of 100 is elected by residential district. Nine districts elect representatives in proportion to their membership (Short 1989). Routine FCA functions are carried out by a council elected by the General Assembly. In larger FCAs the senior positions are filled by professional administrators and the general council members are elected from among the active fishermen.

Brameld's (1968) Ebibara co-operative elects a 32 member council, consisting of 12 executive directors, 5 financial officers, and 3 representatives from each residential district. Elections require a 2/3 majority and operate through secret ballot, but most candidates are hand-picked by the leadership. The entire council meets about 20 times a year, and sectional leaders and the executive meet more frequently in smaller meetings. Each member receives a small, token annual stipend for his/her services.

5.3. Local fishing groups

Within the FCAs, fishermen are organized into units based on their type of fishery and residence area. They make decisions about their own affairs and interests and communicate their views to the council. The council is obligated to follow the advice of the fishing groups as closely as possible. Consequently, the fishery and residential groups are the main policy-making bodies for resource allocation and conflict resolution (Ruddle 1987; Short 1989).

The Japanese inshore fisheries are very far from being free of conflict. Rather, there are a variety of methods for resolving conflict and diffusing tensions. The methods include social linkages and the development of rules for fishing behaviour. When fishermen from the same residency and fishery/gear group return to harbour there is an opportunity for regular exchange of information about the day's events and an ability to monitor how each member is doing. Even with an overriding goal of social harmony and equity and fairness in the fishery, conflicts and tensions arise frequently. Conflicts are resolved at fishery/residency group policy meetings. Although a leader presides at these meetings, there is no delegation of authority. Each person represents himself in attempts to arrive at a general consensus.

> Meetings of groups or squads are often long and noisy. Fishermen speak out frankly, and are not intimidated by the leaders. Emotional outburst are common, and the meetings often break up temporarily into small groups of heated debate. Ideally a meeting should produce a consensus that takes into account the interests of all parties. To close a meeting by disposing of objections through majority rule would be normatively unacceptable.

> Once a definition has been reached and the meeting adjourned, the men send out for rice wine and dried fish, and a small party begins. During this time the men have an opportunity to assuage feelings hurt and egos bruised in arguments or compromises (Short 1989:378).

When broad issues are resolved or specific solutions are agreed on by the local fisheries/gear groups, the results are communicated to the FCA.

Many of the conflicts stem from internal conflicts over allocation or gear interference, which has parallels with problems over interception in BC. The Okinawa stake net fishery, guided by prefectural policy of limiting gear interference, resolved the problem by their own policy of prohibiting placement of one net in front of another. Local fishing groups, however, have devised a complex of informal or customary rules covering detailed situations about possible interference of nets. These rules are the informal, but iron-clad prescriptions worked out through decades of experience and recorded in a book of decisions or 'Rule Book' (Ruddle 1987). The Rule Book is a 'community judicial' record of the past history of consensus decisions. Its authority derives from the FCA as a legal holder of rights. And it is guided by the prefectural policy of limiting gear interference, which probably derives, in turn, from a recognition of the operation of the stake net fishery and the conflicts to which it is prone. This is a very clear example of the way that management of fisheries is integrated and linked within the Japanese system.

5.4. Linkage with state organizations

Three types of players are involved in the co-ordination of the inshore fisheries management system: Fisheries Co-operative Associations, Sea Area Regulatory Commissions and Prefectural Fisheries Agencies (Short 1989). The first has been described above. The second, the regulatory commissions are regional bodies that are jointly appointed by the fishing industry and government. Japanese seas are divided into 65 administrative zones, each with its own Regulatory Commission. The majority of seats on regulatory commissions are elected by fishing community members and the remaining seats are appointed by prefectural governors. Most of the appointees are technical experts, but several commissioners are designated to represent the general public interest (Ruddle 1987).

In complex administrative and management areas, another body—United Sea Area Fisheries Adjustment Commissions—may be established by the national or prefectural governments. These bodies are created to deal with issues which cannot be handled by a single Area Commission. In effect, they act as multi-commission co-ordinating agencies. They operate where seasonally migratory stocks are an issue or in conflict prone circumstances like the Inland Sea fisheries, where many prefectures and PC As may be involved. Much of relevance to the BC fisheries might be learned from a detailed understanding of how such bodies operate. However, such information is currently lacking in the English language literature on Japanese fisheries management.

The Regulatory Commissions are powerful management agencies. They have multiple responsibilities, including the preparation of coordinated plans for management of regional fishing grounds, making recommendations on granting and renewing rights and licences, and mediating conflicts. The Commissions hold hearings, gather information and submit their recommendations to the appropriate prefectural government Fisheries Agency.

The legal authority for resource management in the inshore zone belongs to the prefectural governors and through them to the administrative Prefectural Fisheries Agencies. The Agencies' regulatory sections are responsible for setting general rules of operation. These are guided by the plans and recommendation of the Commissions, and by principles of efficient use of prefectural resources, avoiding over-exploitation, and preventing conflict among fishermen (Short 1989).

The Prefectural Agency roles are three-fold. First, they legally grant and renew the rights and licenses. Since the prefectural governor is obligated to take the advice of the local Regulatory Commission when considering renewals or granting new tenures, the fishing community retains a very powerful voice in allocation and rights decisions. Second, the Agencies provide a basic set of fishing rules, defining seasonal, gear, area, size, and other restrictions for each type of resource; These basic regulations are not prescriptions for the fishery. Rather, they represent part of a dialogue between fishermen, their representatives, technical experts, and government administrators. The regulations have their origin in Commission plans and recommendations, which have a high degree of contribution from the fishing community. The Agencies formalize Commission concerns as a general set of measures and prohibitions. The FCAs which have the greatest knowledge of local stock and environmental conditions, review the Agencies' general plans and make their own formulations. In some instances, fishing groups and the FCA enact more stringent restrictions in their fishing plans than those which come from Agency desks (Short 1989). And third, Prefectural Agencies are lead organizations in the development of aquaculture, sea ranching, and enhancement technology. Implementation of the techniques on a commercial production scale is generally left to the FCA or a group within the FCA.

6. Management of the Fisheries

-The legal framework for the fisheries places the FCA at the centre of all aspects of fisheries management. The co-operatives are not simply fishing organizations. Rather, they are holders of the rights and administrative organizations. Their primary objective is the optimal use of resources and equal opportunity for member fishermen. Equal opportunity may not always be achieved, but the goal moves the management of inshore fisheries well beyond simple concern for the conservation and sustainability of the resources. Wise use is recognized as a necessary part of management, but the equitable distribution of benefits among active fishermen is also an issue. Looking after biological, social and economic realms of the fisheries means that the FCAs act as integrated management institutions. Fisheries management according to the Japanese inshore model includes fishing strategy, resource productivity, allocation, economics, and social equity.

The starting point for understanding the complex linkages which manage inshore fisheries in Japan is to imagine a nation-wide map of rights to the inshore fisheries. With several thousand FCAs, each holding multiple rights (to different resources and fishing techniques), there are tens of thousands of specific territorial fishing rights within a 25 kilometre zone of the Japanese coast—a very complicated geography, made even more complicated by over-lapping and shared rights arrangements. The level of complexity is too great to allow effective top-down management, except for the purposes of general guidance, co-ordination and providing services.

Co-operatives are responsible for formulating their own basic rules of operation. The sales cover both fisheries and the organization of the co-operative. The Otaru FCA, for example, sets forth its operational rules in a formal document which includes membership as well as management restrictions (seasonal closures, area and gear restrictions, etc.) for each of the fishing rights it holds (Short 1989, 1992). The rules of common grounds use are agreed on by vote at **FCA** general meetings and, when changed or up for renewal, are submitted to the prefectural fisheries agencies for formal approval. The agency is required to "seek the advice" of the appropriate Area Fishery Regulatory Commission before making a decision (Short 1992:52).

The Rules work in conjunction with the Fisheries Resources Conservation Law and the various regulatory guidelines formulated by the prefectural fisheries agencies. Determination of quantities to be harvested and the equitable sharing of fishing grounds and benefits are left to the FCAs and

fishing groups. The Fisheries Resource Management Rules usually combine prefectural and FCA initiated regulations. Essentially, the prefectural regulations are treated as recommendations and varied, upward or downward, to suit the situation of the local fishery.

6.1, Membership

The rules of membership are central to all aspects of management, since membership provides both access to fisheries and a voice in management. Stringent limits on membership and leasing and transferability of rights were imposed to control the problems of concentration of ownership by and indebtedness to absentee rights holders. The law restricted membership to local residents who fished for a minimum of 90-120 days per year. The actual requirement is decided by the membership (Ruddle 1987).

The transferability of rights
Transferability of rights is a muddy area. Legally, rights and licenses have limited transferability. They cannot be loaned or sold, but they can be inherited by kin or a designated successor who belongs to the FCA. The law attempted to accomplish two very different ends: 1. to formalize the customary rules of the fishing communities and 2. to prevent the loss of control to absentee or non-fishing members. The strict law covering transfer of membership is softened by the informal rales which still operate in fishing communities (Ruddle 1987). Generalization is not possible, since the rules vary widely between communities.

> [O]nly scant information is available on the topic [of customary or informal laws for the acquisition and transfer of fishing rights] since, not surprisingly, few informants in fishing communities are willing to discuss customary law practises [sic] that contravene the letter of the national laws. (Ruddle 1987:48)

Transfer is necessary for recruitment into the fishery. Generally, entry is through years of on-the-job training with family members. Young fishermen then can apply for their own FCA membership or, in other instances, assume the rights of parent or kin on retirement or death. In many FCAs, a senior member of a fishing group will hold full FCA rights and others, such as crew, will hold associate status. This is really nothing more than a family line passing on their traditional means for making a living. Similarly, rights can be obtained by marriage into a community or a fishing group and working with in-laws.

6.2. Managing the economics of the fishery

The FCAs are also primary agents in the economic management of the fisheries. Collectively they represent a significant portion of the marketing sector, since 60% of the national production is marketed through FCAs (Sato 1992). The overall 1988 profits of 2100 FCAs was in-excess of C$ 1.5 billion. Most of this (40%) came from fish marketing, but the FCAs are diversified commercial entities in their own right. Of the 1988 profits, 19% came from savings and loans, 13% from sales of supplies, 10% from fishing operations, 7% from ice sales and cold storage, 3% from processing, 1% from insurance and 10% from other business interests (Hirasawa et al. 1992). . .

At the local level, the co-operatives play a critical integrative economic role. They arrange daily auctions or tender of members' catch, taking a commission off the top and depositing the rest to members' accounts. The auctions ensure a constant check on resource demand and a means for monitoring product quality. Gear purchases are paid directly out of fishermen's accounts. FCAs also provide insurance and financing services.

The co-operatives also play a role in fishing income equalization schemes, some of which are tied to strategies for reducing fishing effort. Some fishing groups pool their catch income to reduce both costs and fishing pressure. FCAs, as marketing agents, distribute proceeds into individual member accounts. The basis for share calculation can be highly variable. In some instances, profits are pooled and shares are calculated from catch records and non-paid contributions to the fishery, such as efforts in enhancement work, predator destruction, etc. (Hasegawa et al. 1992). These arrangements are often adaptive solutions to common pool resource problems that remain even though fishing in a given area is restricted to member fishermen.

For example, the Isobe FCA (Fukushima Prefecture) hen clam fishery operated on an annual quota basis (Asada et al. 1983). Stock assessments were done by the Prefectural Fishery Experimental Station. The harvest quota,, based on stock assessment data, was set by the FCA in consultation with the fishing group. The fishermen, although involved in setting the quota, were progressively circumventing and finally ignoring the detailed FCA regulations imposed to control fishing effort (Hirasawa et al. 1992). The clams are subject to recruitment pulses with a 10 year period. The bonanza following each massive seeding maintained a spirit of competition during the years of declining stocks. During a first stage of regulatory efforts in the 1970s, fishing was limited to morning hours. Fishermen responded by towing at faster speeds, increasing the number of hauls possible. The strategy damaged the clams, resulting in decreased quality and lower prices. In the second stage, the FCA imposed limits on the number of hauls per day. Fishermen made technology changes allowing a greater area to be swept by their trawl and rake gear. At the third stage, the FCA placed restrictions on the length of the towing rope and the daily catch volume. Fishermen responded by hiding catches in excess of the quota. The FCA began an inspection program, with a 30 day suspension penalty for breach of the rules.

The problem was finally resolved by a fisherman recommending to the FCA that the fishing group agree to reduce the fleet by 50% through fishing 2 men per boat. A reduction in work load resulted, partly from abiding by the fishing rules, allowing for greater participation in other fisheries or farming. The initial arrangement of pooling boat catches developed into a fishery-wide pooling scheme. Based on this and similar experiences, Hirasawa et al. (1992) concluded that some degree of financial equalization was a critical part of co-operation among fishermen.

> In order to raise the efficiency of the coastal fisheries management system, active and close participation among all fishermen is absolutely essential. In order to obtain the co-operation among fishermen, the distribution of income among fishermen must be equalized (Hirasawa et al. 1992:146).

The co-operatives' role in monitoring fishery performance

Under the Japanese inshore system, monitoring the success of fisheries management operates at two basic levels. First, fishermen view the results of past decisions through informal monitoring of gear group effort/catch results and changes in the average body size of harvested animals. (In Japanese markets, value of the catch increases with body size.) Second, the FCAs' role as marketing agents also has broad monitoring functions. Marketing activities and linkages with regional co-operative federations informs on market demand and quality issues at local and national levels. These two types of information (biological and economic) are the basic data set required to assess the success of longer-term strategies.

The fishermen are directly in contact with both types of data. Results from catch efforts come from their own activities. The understanding of product demand, on a daily basis, comes through the FCA's marketing role. FCAs arrange daily actions or tender of members' catch, taking a commission off the top and depositing the rest to member's accounts. The auctions play a major role in management as monitors for demand. There is a quick market feedback for fishermen. It also reinforces, on a daily basis, the relationship among fishermen and between fishermen and the FCA.

> This auction is thus the best opportunity for exchange of views among fishermen and FCA staff with respect to their mutual interest in the price of fish, the catch fluctuation, the size of fish caught, the location of fishing grounds and even their daily life (Hirasawa et al. 1992: 135).

The depth of these types of relations among fishermen, and in particular the rapid and direct feedback, also promotes compliance to self-imposed fishing rules.

6.3. Rules and regulations to manage the fishery

Rules are the agreements through which participants in an enterprise operate. The legal rules of the Japanese inshore fishery clearly define who has access to fish in a given area. If you do not have local FCA membership, commercial fishing is illegal.

The FCA also has a more fine-scale rights geography, in which individuals have rights to portions of the FCA territory to fish for particular resources or use a type of gear. The details of how the rights are structured are laid out in the FCA Rule Books. In some instances the rules specify that the fishing group holds joint use rights to a common territory. Rules for the use of stationary gear, on the other hand, tend to be highly developed. In some cases, individuals have exclusive rights to specific areas, such as highly productive trap sites. In others, the rules specify that use of specific sites belong to first comers for a designated period and itemize details of the kinds of adjacent use which are considered unacceptable interference (e.g., Akimichi 1984).

These arrangements solve one kind of fishery problem, but leave others. The example of the problem in the Isobe hen clam fisheries sector is very similar to problems experienced in BC. An authority imposes a set of regulations focused on stock conservation (albeit, in this instance with a high degree of consultation) and fishermen engage in creative efforts to subvert the measures. Part of the motivation to ignore the regulations is the subtraction dilemma. A fixed quota for the fishery means that one fishermen's catch reduces another's ability to benefit. The solution, however, came from the fishermen themselves. The attractiveness of the solution, besides reducing risk of penalty and to the resource, was reduced costs of competitive capitalization and greater amounts of time available for other enterprises. Equitable sharing of profits and jointly manning boats meant that fishermen did not have to be worried about 'free riders' taking advantage of the system or about becoming 'suckers' by following rules when others do not.

Many of the Japanese inshore fisheries, however, do not operate under technical stock assessments or quota measures. From the literature it is not clear what limits these fisheries. Reduced catch for a level of effort has been the traditional monitoring method for small scale, low technology fisheries. Theoretically, these measures should be effective if: 1. fishermen have alternative fisheries or economic activities to which they can switch, 2. others can be excluded from fishing the reduced stocks, and 3. market scarcity does not significantly increase the value of the resource.

6.4. Putting it all together: the dynamics, of working relations

To an extent, the rules governing the Japanese inshore fishery concentrate on orderliness within the fisheries rather than on such technical issues as catch quota. And that difference is the most distinctive thing about the Japanese case study compared to open access fisheries. The literature is free of wrangles between government biologists arguing for low quotas or fishery closure and fishermen posturing for more time and greater TAC.

The dynamics of working together in Japan is based on social linkages. Partying is a regular part of working life and serves to establish and maintain social linkages important for comfort in the give and take necessary for consensus decision-making. Decision by consensus is the way

throughout Japanese enterprise. Although not discussed in detail in the fisheries case study literature, it undoubtedly also operates in the fishing sector. The larger-scale fisheries conflicts which have proven difficult to resolve are primarily between groups without internal relationships, such as inter-prefectural boundary problems, high seas licensed fisheries gear-type conflicts, etc. (Matsuda and Kaneda 1984). Groups that have regular relations evolve sets of rules to deal with . internal and regular conflicts. The rules governing the deployment of set-nets on coral reefs in Okinawa developed within a community that required methods to maintain social order. Similarly, the ritualized drinking parties of Otaru fishing groups developed as methods to preserve social peace following intense conflict resolution sessions.

6.5. Policy, goals, and process within management planning

Goals in the Japanese fisheries are essentially socio-economic and community oriented. Community-owned fishing rights provide a foundation for fishing communities to set goals and make decisions about their future. Many factors play within such goals, including the broad objectives of community stability, peace, order and sustainable prosperity.

The time-depth in the available case study literature is instructive about change, continuity and broad socio-economic goals. Resource abundance changes because of a variety of influences, including fishing effort and natural conditions. Markets and demand change. Social conditions change as urban growth and industrial development make demands on fisheries habitat. The goals are not short-time. There are short-time strategies, but the overall goals for Japanese fishing communities can best be summed up as simply continuing as fishermen within their traditional waters. In order to accomplish these ends, to remain local inhabitants, fishing communities have -made significant and, in some instances, quite innovative changes. In some cases the changes were responses to experiences with non-sustainable resource use.

Yusu (in Ehime Prefecture) is a small fishing village in which people have a long tradition of operating net fisheries on equal investment, equal labour, and equal profit basis (Anon. 1989). During the 1950s, the village fishermen fished sardines until both the resource and its value collapsed. The Yusu FCA had invested in a fleet of 8 seine boats after WW II. At the time the fishery collapsed, they incurred debts larger than the total value of village boats, land and houses. A large scale emigration to cities to seek employment ensued. Village leaders decided to concentrate on proven aquaculture techniques to rebuild their fisheries economy,

In 1989 the Yusu FCA had 310 members, involved in finfish and pearl aquaculture, as well as small-scale boat fisheries. The base for the fisheries economy was yellow tail and sea bream culture. Eighty-eight families raised yellow tail, with a combined annual production of about 40 tons (13,000-14,000 fish each). The rebuilding effort resulted in high levels of profits from finfish culture.

The effort required the use of planning and skills to keep within the course of broad socio-economic goals. The FCA applied for and kept the necessary rights and licences. New fisheries were organized, as were the producers in each sector (Fig. 10a). Rules were established to equalize the scale of each fishery and the use of the fishing grounds. Fishermen were educated in both money and fisheries management. To deal with intensive labour requirements during particular stages of culture operations, the co-operative strengthened ties between members and built mutual aid practices between different fisheries groups.

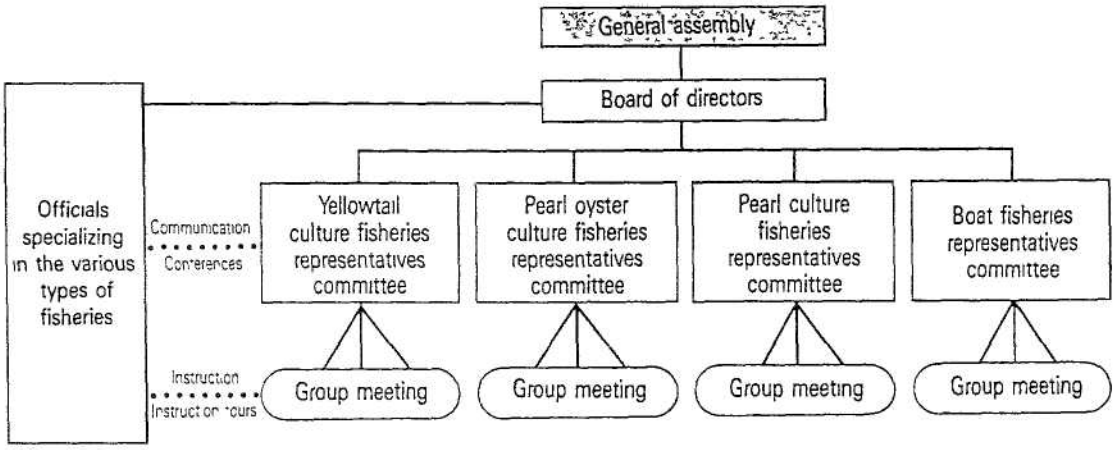


Fig. 10 a. Organization of different fisheries sectors of the Yusu Fishery Cooperative. (from Anon. 1989)

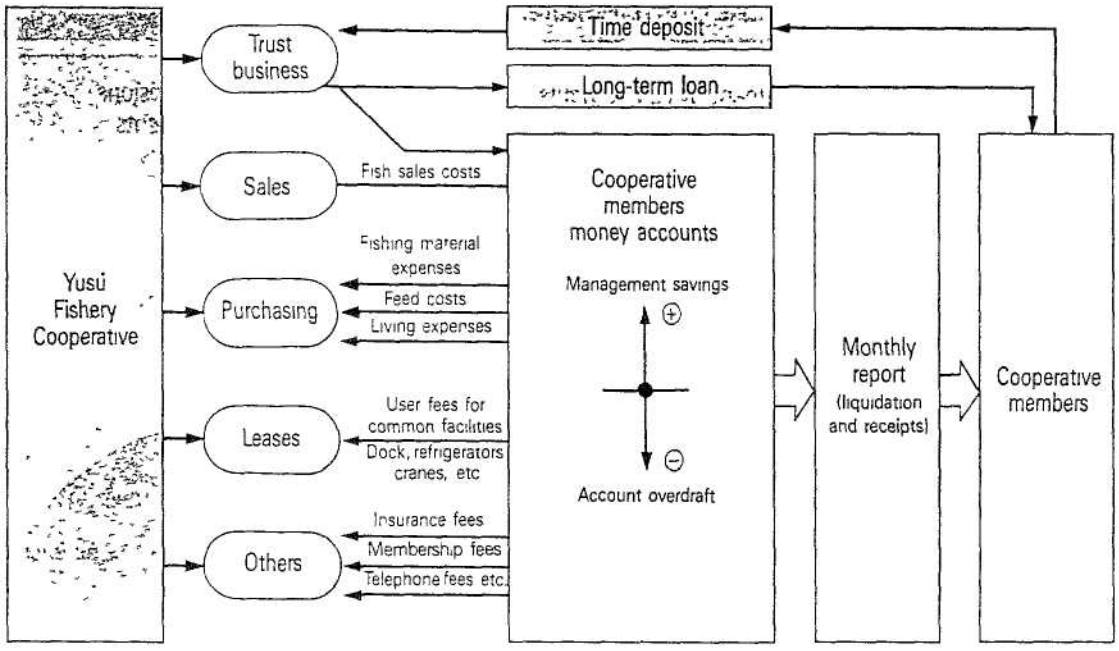


Fig 10 b. Organization of Yusu Cooperative members' money accounts. (from Anon. 1989)

The most startling practice (from a Canadian point-of-view) has been the development of broad earnings equalization by the FCA. They started with a philosophy that the grounds belong equally to all co-operative members and a recognition that some use of the grounds were more profitable than others due to differences in resource productivity and market demand. Equalization works through a system of internal allocation of fishing ground or culture grounds to approximately equalize family earnings. The group's overall goal for household incomes is to provide earnings equal to those of urban wage labourers. The integrated function of the FCA as planning body, marketing agent, and corporate/household financial agency facilitates monitoring the effectiveness of the equalization program (Fig. 10b).

7. Contributions of Working Groups to Management

An outsider might consider that co-operative members contribute considerable volunteer labour to management efforts. Indeed, the discussion above indicates that members are involved in many types of activities with a management consequence. Due, however, to their ownership of legal rights to inshore fisheries, co-operative members cannot be considered as volunteering labour to management any more than farming families' more general activities can. A fisherman's non-harvest activities might include anti-poaching watches, predator removal, collection and deployment of plant foods for herbivores like urchins and abalone, and attendance at a wide variety of meetings—from local gear and resource groups and home FCAs to regional, prefectural, and national level meetings of co-operative federations and advisory/regulatory committees and commissions. Fishermen are both direct managers and beneficiaries and have to live with the consequence of their decisions

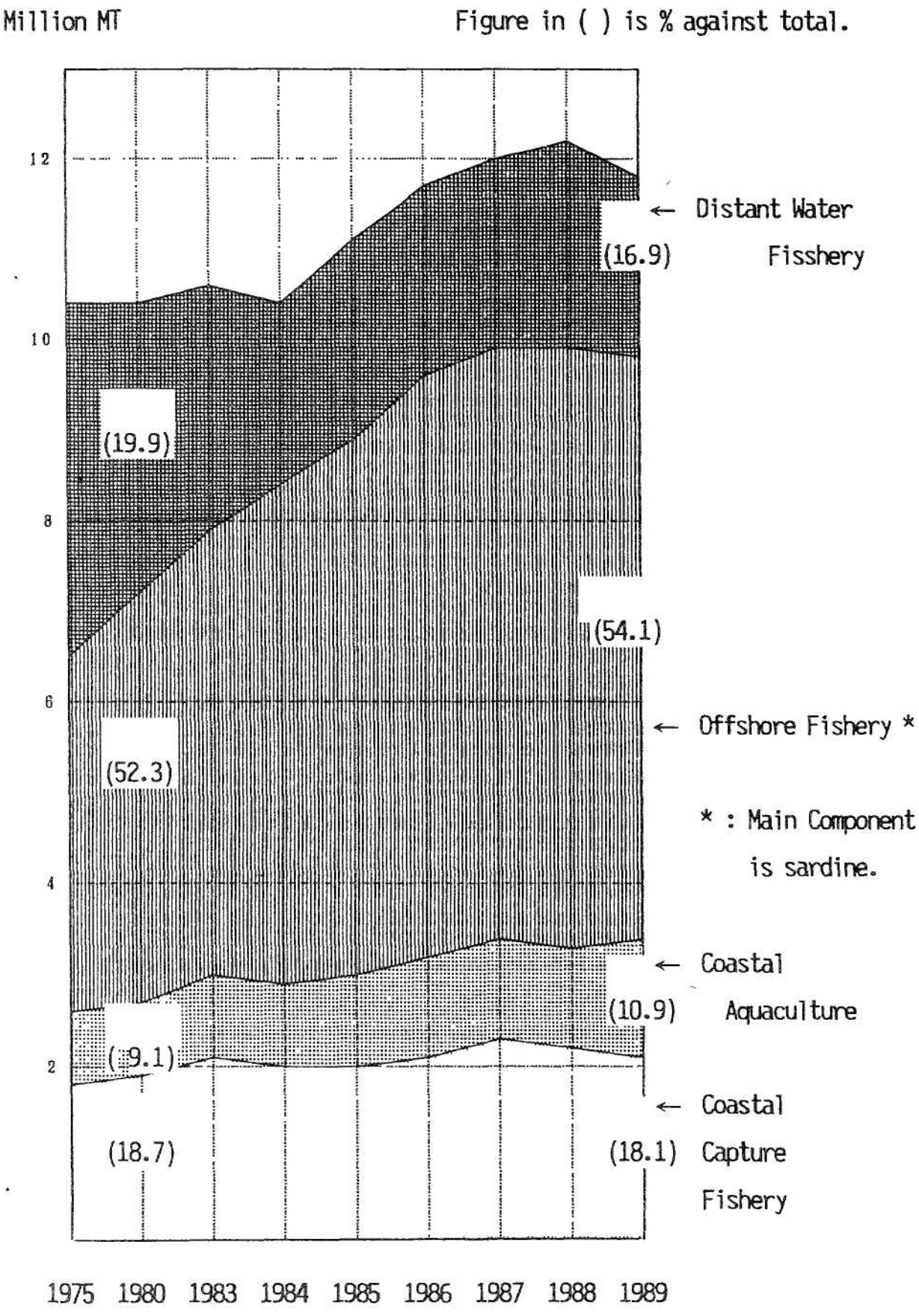
8. Outcome: Does this Model Lead to Sustainability?

The outcome of the Japanese case of fishing community self-management depends on where the temporal snapshot ends. One of the fascinating things about the Japanese case studies is the extent of their time breadth. They show an economic commitment to the resource that spans, in at least one case, a thousand years (Kada 1984) and, in nearly all, decades. With this kind of perspective, social change, historical human events, and market, environmental and resource changes cannot be discounted.

The individual case studies documented, in the English language literature represent a very limited selection of the thousands of communities involved in tenure-based management of inshore fisheries. The literature provides examples of both success and failure. Given, the very limited sample, it is impossible to make conclusions about representativeness.

However, the recent information available in this literature indicates that a high proportion of the Japanese national catch and an even higher proportion of its value comes from the inshore fishery (Yamamoto 1992). The significance of the inshore has increased over the last 2 decades, especially after many coastal countries established 200 mile EEZs, severely restricting the operation of the Japanese distant water fleet.

On the one hand, production in the inshore fishery increased only slightly since 1975, and some of the change came from the aquaculture sector (Fig. 11). However, the nearly steady production from the coastal capture fisheries is a macro-level indicator of the success of sustainable management of wild-stock inshore fisheries.


Million MT
Figure in ( ) is % against total.
12
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6
4
2
(16.9)
← Distant Water
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* : Main Component
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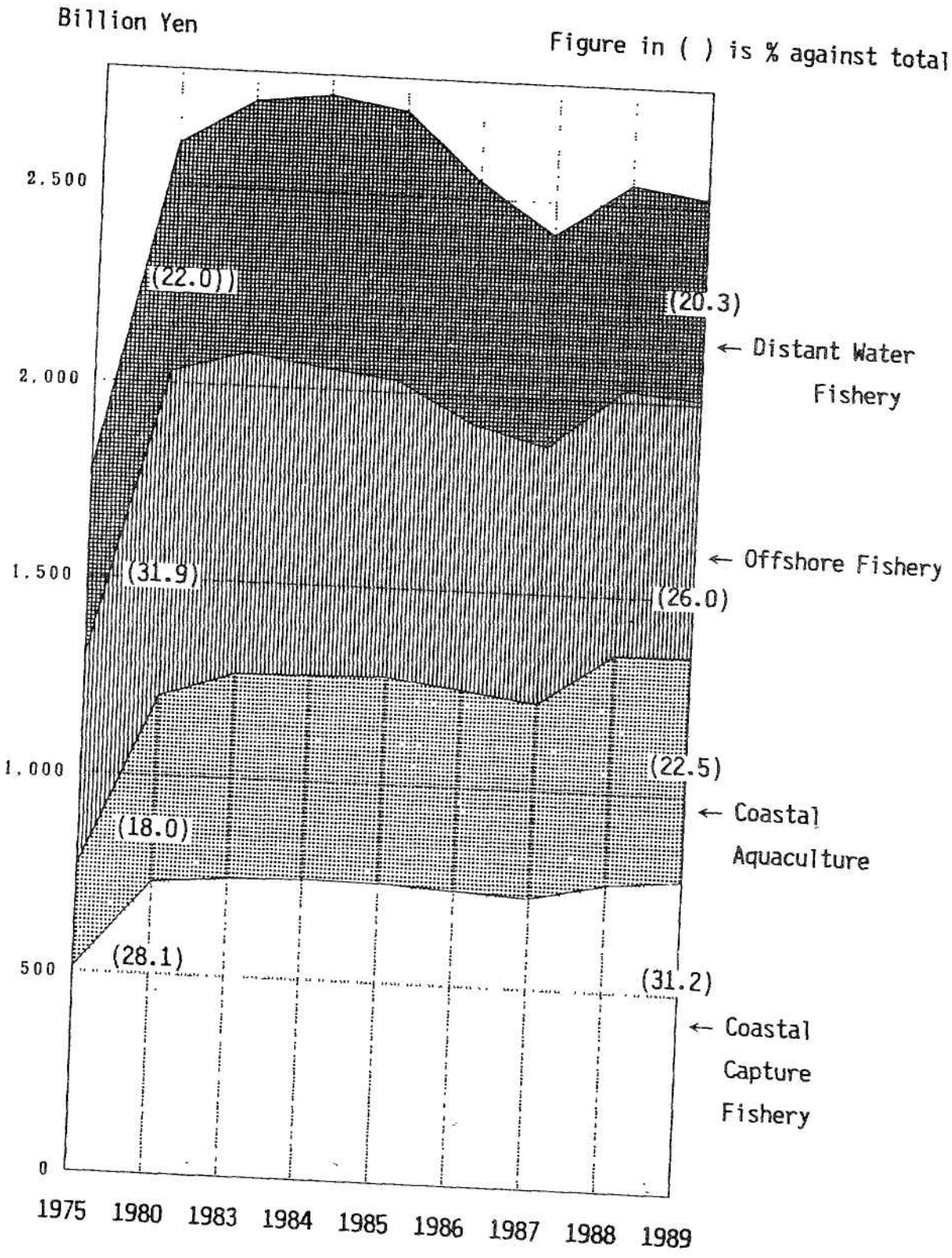

Fig. 12. The value of the annual marine Japanese fishery production (in billions of yen), 1975-1989. (from Yamamoto 1992).

On the other hand, the status of the inshore in terms of its contribution to overall value of the fishery increased significantly (Fig. 12). While offshore fisheries contributed 71% of the 1989 production tonnage, they were responsible for only 46% of the value. The inshore fishery concentrates on high value resources. The co-operatives cater, to a large degree, to the fresh fish market, which is the highest value seafood market in Japan. Premiums are paid for high quality sea food. Tonnage are relatively low, but these fisheries were responsible for 54% of total value. The large increase in value between 1975 and 1989 is due to a combination of consumer affluence and value-added efforts by FCAs to increase the quality of the sea foods they market.

Participation statistics indicate a degree of change in the coastal fisheries. At the national level, over a 15 year period, there was a 17% decrease in the number of households involved in the inshore fishery (Yamamoto 1992). Some of the change has been due to problems of recruitment of younger family members into the coastal fisheries. The average age of fishermen is becoming older due to a decline in sons following fathers into fisheries. At the same time, total incomes of fishing households remained above those of salaried employees; and the contribution of the fishery to household incomes of fishing families remained fairly stable at about 50% (Yamamoto 1992).

8.1. Evaluation

The available macro-level indicators speak powerfully of the recent success of Japanese inshore fishery. The 200 mile economic zone restrictions threw the fishery sector into a crisis. Distant fleet production crashed. The Japanese zone offshore fishery is based on large stocks of low value resources, so catch volume is high and value low (Figs. 11 and 12). During the late 1980s, about 50% of the value of national fisheries came from the tenure-based inshore fisheries. Capture fisheries value was about 30% and culture about 20%. The value of culture fisheries was increasing. Inshore fisheries production is probably at historic levels even with significant loss of habitat in some areas because of industrial development and residential construction. This speaks for change and innovation resulting in increased efficiency through the use of aquaculture, ranching and habitat enhancement technologies.

It also speaks for some degree of improved success in environmental health, perhaps not universally, but adequate to support inshore productivity within an intensely industrialized nation. The Japanese went through an environmental crisis during the mid-1970s. The problems included contamination of fish by industrial pollutants, loss of tidelands and estuaries, alteration of rivers, contamination of the seabed, eutrophication due to agricultural fertilizers and sewage, oil contamination, and floating solids (Wigen 1989). Certainly, they have not cleaned up entirely. But, there have been improvements in many areas due to improved pollution control and sewage treatment. Some of the improvement, however, also results from unconscionable decisions by some industries to export the more serious polluting problems to 3rd world countries (Wigen 1989).

The inshore fishing sector remains large, with thousands of communities and a labour force in the hundreds of thousands involved in community resource management. There are, however, indicators of social change (such as the 17% decline in households involved in the fishery). Nonetheless, production and value remains high, indicating increased efficiency. And household livelihoods of fishing families remain good, with a major portion coming from the fisheries.

8.2. Issues not successfully addressed

All of the above is not.intended to say that the Japanese inshore fisheries lack problems. The system of management is particularly successful in dealing with internal matters within the

fisheries, especially where formal linkages have been created. The two notable problems, pollution/loss of habitat and public demand for recreation opportunities, result from conflicts with non-fishing interests.

Industrial and residential development conflict with fisheries in Japan just as they do elsewhere. The Japanese tenure-based fisheries, however, have a recourse to compensation for loss of livelihood not enjoyed in Canada. As enviable as this might seem, in some instances the results have worked against both fishing community and environmental interests. Some FCA's in the more heavily industrializing areas were caught in a compensation game during the intensive development of Japan's heavy industries in the 1960s and 1970s. Norbeck (1978) and Befu (1980) describe fishing communities in the Inland Sea which lost fishing areas to coastal zone land fills and both routine and catastrophic pollution. Dependence on compensation for damages to fisheries rights and loss of livelihood, available to affected FCA members under Japanese law, replaced the fishery. Fishing communities readily accepted compensation in exchange for permanent loss of their fishing rights. In such instances, critics have viewed the compensation measures as making the rights into a commodity for sale to despoilers.

The legal rights give fishermen some ability to protect habitat. In some instances developers have to enter into an agreement with the FCA to purchase the fishing rights. This is not full rights to habitat protection, but it potentially gives co-operatives a powerful say in the development of the coastal zone. At times, however, the use of these powers has been more a consideration of self-interest than broad concern for the public-interest or environmental stewardship.

For example, McKean (1981, reported in Ruddle 1987), describes a bitter internal conflict over a proposal to construct a cement plant and compensate for the lost fishing opportunity. Fishermen tied to low value resources in the local seas, and consequently impoverished, were eager to see the development for the compensation and employment opportunities it promised. The other group of FCA members were younger distant water harpoon fishermen who were relatively well-to-do because of the high value of their fish. The affluence of the latter group allowed them to see value in the local environment beyond immediate need. The case was resolved in a precedent setting legal decision, ruling that fishing rights were protected by the Japanese constitution and the agreement for sale to a private party required consent of all holders of the rights, not the two-thirds consent rale of the FCAs. The implications of this are certainly sweeping. No information is presently available on the subsequent consequences of this decision to the impacts of development on the coastal environment.

The case studies do not deal with accommodation of other interests, such as recreational use of resources or the 'public-interest' in the local environment. Indeed, environmentalists complain that rights holders' perspectives are limited to harvestable resources and led by self-interest. A major unresolved issue results from the increasingly affluent Japanese public seeking recreation opportunities in coastal waters. Recreationalists feel locked out of certain types of activities (sports fishing, scuba diving and marina development) by the powerful fishing rights of the FCAs. Both recreationalists and environmentalists feel that rights holders' interests and the interests of the general public do not always coincide and that fishing rights holders often do not steward the environment that produces their resources (Wigen 1989).

Certainly, the notion of protection of the 'public interest' in the inshore environment fails in the Japanese example (e.g., Wigen 1989). On the other hand, cultural values come into play in the difference between the way that Japanese inshore fishermen and North American environmentalists view the wild. This is a large topic. Japanese nature sentiment (in the non-pejorative sense) has a very different focus than North American wilderness values. The wild is a public value, but at the level of monumental examples, like Mount Fuji, rather than uncultivated and untrodden tracts of forest. Change may be on the horizon, but fishing co-operatives represent more conservative,

labouring elements of society and the sea and resources are part of their working environment. There is care and concern, but it is more likely akin to the way North American farmers treat their land, than it is to shape of a nature sentiment based on a theoretical ecology.

9. A Brief Summary

Very simply, the problem addressed by the Japanese inshore fishery management system was how to provide sustainability (in the broadest sense—see Appendix 1) for traditional fishing communities. The intention of the design and subsequent changes was to promote sustainable harvesting, allow for innovation in capture and culture methods, control conflicts over access, avoid resource rents accruing to absentee rights holders, and avoid the dissipation of resource rents to brokers and other middlemen.

The system is indigenous in origin, representing the transformation of a traditional system of marine tenure and customary rules into a modern fisheries management structure. It went through 2 major changes—the first when Japan emerged as a nation state in the late 19th century and the second during the post-war occupation. It is an example of a mature and long-standing system of self-management with a record of successful resource sustainability. It also provides examples of adaptation as well as failures to adapt to pressures from a wide variety of forces (e.g., habitat loss and pollution from industrialization, modernization and population out-migration, etc.).

The case study provides a model for self-management in inshore fisheries for non-migratory resources as practised in a modern, industrialized nation, and as such may have utility for the management of non-migratory fisheries in the BC inshore. It is easy to imagine the BC fisheries developing along these lines if the aboriginal fisheries model had been the basis for constructing the modem, commercial fishery during the late 19th century, rather than the open-access, government managed model.

In Japanese inshore fisheries management, exclusive fishing rights to designated inshore waters are held by local Fishermen's Co-operative Associations (FCAs). The system is intended to provide maximum self-management. National and prefectural government fisheries agencies set very general rules about gear and season which are reviewed by joint committees of government and community representatives and technical experts. However, FCAs and particular fishing groups within the local FCAs often impose more stringent regulations. And they practice their own rules for such things as site allocations, often based on long standing customary rules.

Management as practised by fishing communities is different from what we often think of as fisheries management in Canada. Biological management in Canada is based on a determination of quotas. FC A fisheries management does not tend to be quota-based (although there are instances of quota based fisheries). Management rules focus on allocation of rights to fish, how many nets can be placed, where they can be used, and when. Fishermen monitor their success and effort (CPUE) and, as members of a user community with exclusive rights, they use their own experience to make decisions about appropriate types and levels of restrictions on fishing effort. This is facilitated by being members of a fishery community sharing the same ground, being dependent on local resources, and regularly monitoring the resources, its environment, and the economic benefits of the fishery.

The FCAs have hired staff. Meetings are held by co-operatives at all levels: national, prefectural, regional, and local. FCA members sit on management committee and commissions, again at various levels. (The FCAs are also marketing and banking establishments.) Fishing groups.(i.e., gear and resource groups) meet formally and informally to discuss problems and make decisions. The contributions, of fishermen to the system include both time and money. Money requirements

for FCA management and staff are paid through royalties from catches. Time is not volunteered. Rather, benefiting from the ownership of the resource rights requires contributions of time which do not result in immediate gain, in a similar way to farmers planting their fields. Time spent in planning and dealing with conflict is part of the task of managing the right and its benefits.

There are 2 basic types of management organizations, one formal and the other informal. The Fishermen's Co-operative Associations are an integral part of the national fisheries administration under the Fisheries Co-operative Association Law. Fisheries rights and some licenses are held by the co-operatives. A commercial fisherman must be a member of a fisheries co-operative in order to engage in tenure-based fisheries. The informal institutions are gear group and fisheries locals within community FCAs. These groups are in regular contact and make decisions about on-the-ground arrangements.

The Japanese inshore fisheries is the leading example of fully endowed legal rights to fish available globally. The model provides for self-management of nearly all types of fisheries management functions (Table 6).

The basic characteristics of the system include: 1.

Accountability

a) The fishing communities are highly dependent on the resources within their tenure areas and they have to live with the results of their own management decisions. (This is a very powerful form of accountability.)
b) Dock-side meetings of fishery groups allow exchange of information on performance and on grievances.
c) Regular meetings of the co-operative as a whole allow reporting of results.
d) The economic results of management are monitored through the FCA's functions in marketing and, for some groups, as bankers for the members and administrators of profit sharing arrangements.
e) The results of decisions and overall management are broadly shared through the linkages between fishery groups, the FCA council, the general membership, government agencies, the regional fisheries commissions, and co-operative associations.

2. *Representativeness*

a) According to law, each member of an FCA has a veto in decisions to abandon fishing rights in favour of compensation from parties who wish to develop the foreshore.
b) All FCA members who are affected by decisions are linked through representative bodies.
c) All FCA members have a vote in the General Meeting and thereby a voice in the selection of the governing council.
d) Fishermen form the majority on joint industry/government Fisheries Regulatory Commissions, which are responsible for coordinated regional fishing plans and recommendations about the allocations of rights and license. (The authority lies with government agencies, but they are obligated to take the advice of the Regulatory Commissions.)
e) Decisions about the regulation of fishing effort (e.g., gear and opening restrictions) are linked and informed at all levels. Government biologists make broad regulations, based on agency and fishermen resource monitoring and Regulatory Commission

recommendations. The Commissions hold hearings, gather information and rely on their own knowledge. FCA and fishery groups decide on the detailed implementation, based on their own monitoring of local conditions.

3. *Effectiveness*
   a) Macro-level indicators attest to sustainable levels of production, value, and economic benefits.
   b) Non-members are excluded from fishing by law.
   c) Members have a right to livelihood, which means that damages to the environment/fisheries habitat are compensible.
   d) Members have a right to reject conflicting development proposals.
   e) Members make decisions about equitable sharing of resources or benefits.

4. *Adaptability*
   a) Members can make new rules to deal with interception and inequitable sharing of benefits.
   b) There is a built in sharing of information at all levels, enabling problems to be identified.
   c) Competitive capitalization is easily identified through information exchange and social linkages. Mechanisms exist to raise the issue of unfairness of inequitable benefits.
   d) Methods are available to keep fishing group and FCA members playing by the agreed on rules.
   e) The focus on small scale enterprise in the inshore avoids government confusing the interests of the large and powerful for those of the many.

Summary Of Major Characteristics Of Japanese Inshore Fisheries

Major Problem Addressed: securing the benefits of local fisheries to local fishing communities

Major Management Focus: collectively held legal rights to fisheries territories; ability to exclude non-members

Scope Of Activities: full scope, including—policy, detailed harvest rules; marketing, supply strategies, investment in resources and habitat, and co-ordination

Outcomes: high levels of income; sustainable production of valuable fish

Local Institution: the Fishing Co-operative Association (FCA)

Human Scale Of Management Unit: average membership = 250

Regional Context: national law covering entire coastal region; 5,000+ fishing villages

Scale Of Unit Area: territory size variable, some 500 sq. km, taking in 25 km of coast and extending 20 km seaward

Type Of Actors: culturally homogeneous, household-based enterprises

Level Of Operation: local, regional, and national

Degree Of Institutionalization: basic system over 1000 years old

Degree Formalized: rights structure established under national law

Type Of Fishery: wide variety of fisheries; aquaculture

Economic Benefits: fishing family incomes higher than wage labourers'; co-operatives maximize benefits through economic integration

Role Of Community: participates at all levels

Relationship With Government: government provides technical services and recommendations about effort restrictions; government and fishing communities are linked through regular communication membership on joint regional Fisheries Commissions.

Possible Relevance To BC:

1. Powerful model of successful community managed fisheries.
2. A clear and powerful case of the ownership of fisheries resource tenures vested in communities. (In this case the communities of local fishermen.)
3. The scale/size of the management area is based on the interests of the fishing community, rather than political jurisdiction.
4. Because the benefits remain within the communities, investment in enhancement is encouraged, as is investment in the cultivation of young stages for planting out in the co-operative's tenure areas.
5. Case provides one model for relationships between government and resource managers and fishing communities under bottom-up management arrangements.
6. Case incorporates customary rules of access and conflict avoidance developed by fishermen. Case is adaptive to new situations and conflicts. Solutions developed by fishermen become incorporated into official rules.
7. Case provides one possible model for community management combining non-aboriginal and First Nations parties, if the criteria for membership includes a standard for residency.

Table 6. MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES

MANAGEMENT FUNCTIONS	PROPERTY RIGHTS AND DUTIES	JAPAN INSHORE FISHERIES
1. POLICY MAKING AND EVALUATION		
SCOPING PROBLEMS	Right/duty to do long-range planning	FORMAL
SETTING OBJECTIVES	Right to research key questions affecting community values;	FORMAL
LONG-RANGE PLANNING		
RESEARCHING THE RESOURCE SYSTEM	Right/duty to educate own- and larger- community re problems	FORMAL
PUBLIC EDUCATION		
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE		
MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	INFORMAL/FORMAL
	Right of access to government information	FORMAL
MONITORING OF CONDITION OF STOCK	Right to collect own information	FORMAL
	Right to interpret information in light of local knowledge	FORMAL
	Right/duty to enhance or restore	
	a) resource/resource productivity	FORMAL
	b) habitat	FORMAL
3. COMPLIANCE WITH RULES		
IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules	
	a)re harvesting activities	FORMAL
	b) re habitat damage	FORMAL
	c) re exclusion and poaching	FORMAL
4. FISHERY HARVEST		
STOCK ASSESSMENT	Right of access to government information and right to collect own	FORMAL
	Right to interpret information in light of local knowledge	FORMAL
HARVEST PLANNING	Right to make rules re:	
	a)size of overall catch	FORMAL
	b)location of the fishery	FORMAL

c) timing of fishery FORMAL o)gear types permitted

FORMAL d) size of allowable interception FORMAL

HARVEST MONITORING Right of access to government information and right FORMAL to collect own
Right to interpret information in light of local , knowledge
FORMAL

5. FISHERY ACCESS

MEMBERSHIP/ EXCLUSION Right to exclude:
a) certain classes of fishery (e.g. sport FORMAL commercial)
b) certain classes and sectors of fishers FORMAL

HARVEST ALLOCATION Right to allocate:
a) how many licenses or members in each FORMAL category or sector

b) how much each category of sector may harvest FORMAL c} areas for different uses FORMAL

TRANSFER OF MEMBERSHIP Right/duty to limit license transfer to other FORMAL community or area members
Right/duty to regulate conditions of transfer INFORMAL

6. RESOURCE USE COORDINATION

PLANNING COORDINATION OF DIFFERENT Right/duty to coordinate own activities internally and HARVEST REGIMES
AND STRATEGIES TO with neighbours who fish, enhance, or have other FORMAL USE OR ENHANCE uncoordinated uses
Right/duty to communicate problems and try to FORMAL solve with others
Right/duty to resolve disputes internal and external FORMAL

7. MARKETING OF THE HARVEST

SUPPLY PLANNING Right to manage harvest timing for optimum FORMAL production and value.
PRODUCT QUALITY FORMAL
PRODUCT DIVERSITY FORMAL

Chapter 8. Community-Management in Gulf of Mexico and Long Island Oyster Fisheries

The United States has a variety of examples of community managed inshore fisheries for sedentary marine resources. The use of self-management arrangements and their outcomes have been well documented in several regional oyster fisheries, particularly on the Gulf of Mexico Coast and on the southern shore of Long Island. Some sectors of the Gulf fishery provide a notable example of success, while the turn-of-the-century Long Island oyster fishery provides an equally notable and instructive example of failure.

During the late 19th century and into the early 20th, oysters were a major fishery and a commonly eaten food. American oysterers supplied domestic and European markets with a highly regarded and much demanded high quality product. Market demand became reduced during the early 20th century as information about the potential disease risks of eating oysters grown in sewage polluted waters became widespread. Indeed, many of the early American oystering grounds were located in areas of rapid urbanization whose coastal areas were treated as convenient locations to dispose of effluent.

1. Oystermen on the Northern Coast of the Gulf of Mexico[1]

The northern Gulf of Mexico states (Louisiana, Alabama, Mississippi, and Florida) have well-established oyster fishing communities. The species of oyster involved in the fishery is the eastern oyster, *Crassostrea virginica.* The organization of the fisheries and the incorporation of the oysterers in management differ, as do the outcomes in terms of sustainable harvesting of the resource. The differences permit comparison and some conclusions to be drawn about conditions that promote success.

Of the 4 states, Louisiana has the longest coast (approx. 400 kilometres in a strait line from the Texas border to Mississippi). The Florida northern Gulf coast is also significant (approx. 300 kilometres). Mississippi and Alabama both have very limited coastal areas (approx. 100 kilometres each).

Three of the states manage the fishery on an open-access basis. Louisiana's fishery is based on legally closed tenure structured around oyster leaseholds.

Although complete information is not available about the details of the self-management systems, there is superior data on outcomes. Dyer and Leard (1994) used nearly 30 years of data on annual oyster production and production per fisherman as indicators of both sustainability and fisherman benefits/commitment. The long time series also provides indicators of stability both within the fishery, and for the management of the oyster resource.

1.1. Yugoslav oystering communities in Louisiana

When Dalmatian fishermen emigrated from the Adriatic Coast to Louisiana during the mid-19th century, they brought their coastal Yugoslav tradition of tenure to marine harvesting areas. The social and management unit used on the Louisiana Gulf coast was the so-called oyster camp. Each

[1] Based on Dyer and Leard 1994

camp maintained a closed-access oyster fishing territory through social control during the early phase of their occupancy. Decades of working relationships between the Dalmatian oysterers and state authorities led to the creation of a Louisiana law for leasing oyster ground tenures. The law also instituted the Louisiana Oyster Commission as the state management authority over the oyster fishery, with an important place on the commission for the leaseholders and oystering community. "In essence, folk management practices were incorporated into the legal regulatory structure" (Dyer and Leard 1994:66).

Consequently, oyster ground leasing has a long history in Louisiana. The creation of legal, exclusive tenures for oyster fishing in the Gulf of Mexico, however, is largely limited to the state of Louisiana. The Louisiana oyster fishery is recognized as the most productive on the Gulf. Some oystering in the state takes place on non-leased grounds, but over most recent decades, the leased grounds have been responsible for about 80% of the oyster production. Leases cover the best oyster grounds.

Social organization

The lease-holding oyster fishing community has a high degree of social cohesion. They have a relatively long relation to the resource (>100 years) as a homogeneous ethnic network of harvesters united through kinship, culture and local history. Recruitment of young fishermen has been consistent due to the encouragement of multi-generation participation. Over the last 3 decades there has been a remarkable degree of stability in the number of fishermen involved in the fishery.

The scale of the fishery

About 1000 fishermen were involved in the fishery during the 1960s, 70s, and 80s. Average-annual production by individual fisherman varied between 5,000 and 14,000 pounds of shucked oyster. (Overall, total production of oysters from this sector of the fishery ranged from about 5 to 14 million pounds).

No information is available on the size of the total territory or on the size of individual tenure areas. Similarly, no information is available on whether the fishery is organized on an individual, family, or community basis.

The fishery and its management

Louisiana lease holders pay a fee for working a geographically exclusive oyster ground. Oysters are seeded on the privately controlled areas. Harvesting by lease holders uses relatively low cost technology, such as oyster dredges, and avoids problems of competitive capitalization.

Details about the actual management of the fishery, such as local institutions and the way fishermen's organizations are linked to state management institutions (other than the oystermen having a role on the regulatory commission), are also lacking.

Property rights and management functions

The Dalmatian-Louisiana oyster fishery is an example of a formal rights-based management system for a non-mobile marine resource. The rights provide security of tenure and a legal right to exclude other harvesters and to protect against poachers. The oystermen sit on the state Oyster Commission, and presumably, have some degree of influence over the Commission's policy recommendations.

The system's management functions include access, harvest, enhancement, compliance, policy-making, and supply management. Control of access works through the legal exclusion of non-members, a method of allocation among members, and a means to regulate the transfer of access to other group members. Harvesters decide on harvest times and locations. Harvesters are also

responsible for reseeding oyster beds. Presumably, some degree of stock and habitat assessment operates, given the sustainability of the harvest over decades of time.

1.2 Outcomes and comparisons with other regional management systems

The outcome of the Dalmatian-Louisiana oyster fishery has been remarkable for its stability in both production and the level of fisherman participation. The high level of stability in this fishery over 3 decades, as shown in Dyer and Leard's (1994) data, could serve as a paragon for sustainable resource management and use and the quantitative side of a socially stable fishery.

The Dalmatian oyster fishery as a positive model of community management becomes even more convincing by a comparison with the outcomes of other management arrangements on the Gulf of Mexico.

Mississippi

The Mississippi oyster fishery is operated by a mix of ethnic groups, including Dalmatians. Southeast Asian immigrants entered the fishery, via the processing sector, in the late 1970s and today comprise a high proportion of the industry. A strong tradition of exclusive use territories never developed in Mississippi, which has a considerably smaller coastline than Louisiana. The ethnic mix and a greater degree of access to other economic resources resulted in considerable movement between economic sectors and more part-time involvement in the fishery.

The processing sector in Mississippi has long been influential in the fishery and its organization. Mississippi processors handle oyster harvests from the other states. The state fishery was dominated by processor-owned vessels staffed with hired crews until late 1960s. The processors performed some management functions. They were involved in stock enhancement on the open common oystering ground. Historically, they stockpiled the empty shells and replanted them on open-access reefs with no assistance from government. The likelihood is that prior to the emergence of independent fishermen the processors controlled levels of harvest and acted as the managers of the resource. Competition, then, would have been between processors and might have been limited by geography or by internal agreements within the processing sector. However, information on this topic is lacking.

Demand for open-access oyster reefs in Mississippi prevented the development of a closed system like Louisiana's. The high demand for open-access oystering came from a number of factors, including the development of a powerful and influential processing sector, the processors' demand for oysters far exceeding ground production, and a high degree of economic transience in the fishing community. With alternative and attractive economic opportunities available for fishermen, the fishery functioned as a entrance way to other activities and as an economic fallback during tough times in more attractive economic sectors. The result of lack of commitment to the resource has been a high degree of instability in oyster production during the last 3 decades largely due to over-harvesting problems.

Florida

The oyster fishermen of Apalachicola Bay, on the Florida Panhandle, are descendants of Scotch-Irish settlers. Family groups have a tradition of internal co-operation, otherwise there is considerable competition between production units. Social cohesiveness and values limit occupational alternatives, making the fishery an attractive choice for young community members. Even though they are encouraged to seek an education and leave, community ties and values often bring the young emigrants back.

The oyster fishery is legally open-access, but exclusion is promoted by retention of critical knowledge about oysters, the fishery and the industry. The result is a community controlled fishery. Patron/client relations with processors, governing both loans for fishing supplies and the flow of oyster to processors, are essentially closed arrangements that limit access to the fishery. This arrangement is deliberate. Both parties are aware of the importance to the sustainability of the resource and the fishery of limiting access. This knowledge keeps the connections tight. Where Louisiana tenure is based on leasing, Florida's informal tenure is based on kinship control of knowledge and tight bonds between fishermen and processors. Florida authorities co-operate in this arrangement by limiting fishing to more labour intensive use of tongs, preventing incursions by outsiders using more efficient dredges.

Although the stability of the fishery is not as great as the Louisiana example, this is attributed to "environmental and economic factors" rather than the informal system for excluding non-members.

Alabama

The Alabama oyster fishery operates on an open-access basis, but some degree of kinship ties serve to temper totally open access. Like Mississippi, Alabama has a small coastline. A multi-ethnic harvester tradition has worked in favour of open-access; as has fear of processors owning the oyster grounds if legal ownership or leasing arrangements were instituted. The attitudes of the current fishing community of mainly independent fishermen are influenced by the experience of . Alabama's early fishery having been domination by processors. Leasing has been resisted by fishermen due to fear of loss of access to the fishing grounds. There are private grounds in some areas and they prove more productive. The ethnic mix within the fishing community increased during the last decades due primarily to the entrance of Southeast Asians. The newcomers also are in favour of open-access—in memory of the ease of their entering the fishery and perhaps wanting to keep the possibility of re-entrance if needed after attempting other economic endeavours.

Knowledge in the fishery is widely shared, so it is not a means for limiting access. The state has a broad economic base and there is considerable mobility into and out of the fishery, influencing how the fishing community views changes in the present open-access fishery. The result is similar to that of the Mississippi, low and irregular levels of total production and individual harvests.

1.3. Summary and conclusions.

The Gulf of Mexico oyster case study provides an excellent opportunity for comparison between geographically and ecologically similar fisheries that use greatly differing methods for controlling access (Table 7). Relatively simple indicators of success, each with considerable time-depth, greatly enhance the possibility for drawing conclusions.

Many of the conclusions are similar to those that follow from the Japanese inshore fishery. The immobile nature of shelled oysters make them a resource which theoretically should be simple to manage though the creation of formal or informal tenures. Interception by other fisheries is not a problem. Stock mobility is limited to the larval stage and, in the case of Louisiana oysterers, legal tenure encourages investment in regular- seeding of oyster spat. Long established social networks and family linkages also theoretically contribute to co-operative efforts, such as surveillance.

The examples of fisheries from other states provide some interesting insights into what arrangements do not contribute to stable harvests and to reasons for fishermen resistance about changing the open-access fisheries.

Table 7. Conditions which have led to outcomes of different management arrangements within oyster fisheries on the American Gulf of Mexico Coast (data from Dyer and Leard 1994).

	MISSISSIPPI	ALABAMA	FLORIDA	LOUISIANA
CONDITIONS				
ETHNIC DIVERSITY	high	high	low	low
COASTLINES	small	small	large	large
ACCESS	open	open	socially closed	leaseholds
OCCUPATIONAL MOBILITY	high	high	low	low
DEPENDENCE ON LOCAL RESOURCES	low	low	high	high
OUTCOMES				
YIELD STABILITY	low	low	high	high
RESOURCE SUSTAINABILITY	low	low	high	high
FISHING COMMUNITY STABILITY	low	low	high	high

In Alabama and Mississippi, significant sectors of the oyster fishing community have very limited commitment to the fishery or the resource. Rather, the fishery functions as an economic safety-valve for new immigrants and longer established residents seeking social and economic mobility. Resistance for change toward a closed-access, legal tenure fishery comes from a desire to keep the fishery as an economic entry vehicle, on the one hand. And on the other, fishermen with a more established relation to the resource fear that the standard methods for the creation of resource rights as private property will result, over time from successive transfers of rights, in the exclusion of the fishing community from the resource. The resource has suffered from the lack of commitment to sustainable use. The result is a fishery limited to harvests of wild oyster stocks and a lack of the guarantees that gains will be harvested by the people who make the investment, the traditional 'tragedy of the commons'.

The case study leads to the conclusion that territorial exclusive access for fisheries whose resources have limited mobility promotes:

1. sustainable use of resources;
2. an ability to assert rights to manage resources;
3. continued involvement in consensus management;
4. a willingness to invest time and other resources in management efforts; and
5. compliance with self-established fishing restrictions.

It also suggests that fishermen who use the fishery as an economic entry or safety device:

1. show a low compliance with informal rule arrangements;
2. exhibit a limited willingness to invest time and resources in a fishery;
3. have a low degree of concern about resource sustainability; and
4. seek to keep the fishery open through the use of political pressure.

The experience of these communities also indicates that an ability to move residence and employment when resource abundance is low results in independence from local resources, which, in turn, leads to treating the resource opportunistically.

The positive example of sustainability provided by the Louisiana tenures, however, is seen by other communities as more of a threat than an attractive solution because of fears that the creation of resource tenures with open rules for transfer will result in the exclusion of active fishermen from ownership/management over time. These are the same concerns frequently voiced by British Columbia fishermen about transferable tenure and quota arrangements.

2. Long Island Oystermen[1]

While the available information from self-managed oyster fisheries in the Gulf of Mexico provides insights into what kind of arrangements contribute to success, the historical Long Island oyster fishery based out of Islip in Suffolk Country gives valuable contribution toward understanding conditions that lead to failure. Many of the conditions that led to success among the Louisiana oyster fishermen were present in Long Island, but the fishery collapsed nonetheless.

The fishery in Islip was dominated by 19th century Dutch immigrants who had a past history as oystermen in Holland. As decades passed two classes of Dutch fishermen emerged: wealthy and

[1] Based on Taylor 1983.

influential oyster grower/shippers and independent fishermen, the baymen, who supplied grower/shippers with young oysters and with labour.

The Great South Bay environment consists of enclosed waters protected from the open Atlantic by sand-beach barrier islands (Fig. 13). The Bay, 8-10 kilometres at its widest, is approximately 150 square kilometres in area. During the heyday of the Long Island oyster fishery it was ecologically divided into 2 regions by differences in salinity. The Western area, with direct access to the Atlantic, had high salinity and the enclosed eastern area had low salinity. Low salinity of the eastern portions limited the populations of predatory oyster drills. Oysters in this region of the bay were subject to limited predation, but also had poor growth conditions. The opposite was true for the western area of the Bay. As the fishery developed, oyster fishermen worked out a cycle of fishing naturally seeded young oysters in the eastern Bay for transport to growout plots in the western areas.

2.1 The origin of oyster leases

The legal rights to oyster grounds within the Great South Bay were based on the jurisdiction of townships—the local level of government—over internal waters. This local jurisdiction originated with the pre-Revolutionary land grants of the British Crown, which included seabed on the Great South Bay along with the upland estates. The remaining inner coast, outside of the land grants, were considered to be legally under the jurisdiction of the townships.

Demand for local control of marine resources began in the late 18th century. As early as 1765, the Township of Islip fined non-residents for taking shellfish, finfish, and fowl from its waters. These were important resources for the mixed-economy of local farmers'. Agriculture, oystering, fishing, and fowling were all part of the settler subsistence livelihood mix — for domestic use and sale to the large New York City market.

Laws permitting leasing of township-owned sea beds for oyster cultivation were passed in the mid-19th century following demands by local residents. In 1851 the townships began to lease seabed plots for oyster farming. This amounted to enclosure of a water commons. It created two classes within the fishing society: planter/shippers and independent baymen—fishermen who seasonally alternated between fishing on their own and working as hired labour for lease holders.

A significant part of the bay remained the private property of the descendants of the original crown grantees, who had received ownership of tracts of seabed along with their large estates. A great part of the planter/shipper's seabed tenures came from private lease agreements entered into with the property owners.

2.2. Regulation by the townships

The demand for leasing resulted from the increased use of growout techniques, the large mid- 19th century oysters market, and the townships' craving for resource rents from the lucrative oyster fishery. Initially, two acre lots were leased for a 5 year period at $2/year, with a limit of 1 lot per fisherman.

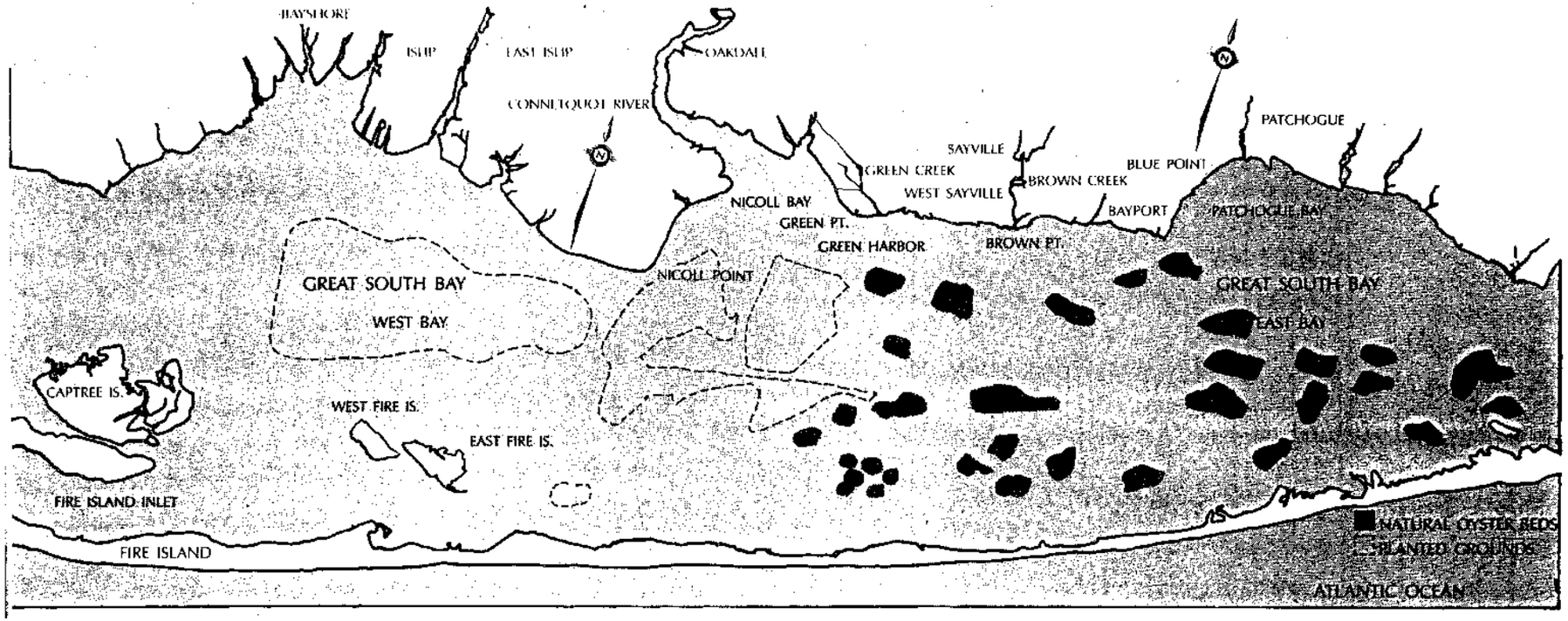

Fig. 13. The Great South Bay on the south shore of Long Island. Inset map shows Long Island circa 1850. (from Taylor 1983)

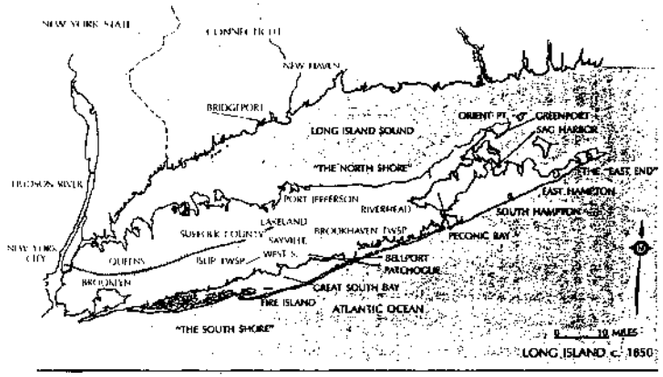

Figure 1. Map of Long Island, circa 1850

Leases were only available to township residents, although residents of adjacent townships were permitted to lease lots which bordered their owned or leased properties. Limited tenures were also created for upland property owners or lessees. These people had rights to plant oysters in waters fronting their lands for a distance of 500 ft into the Bay. The rest of the Bay commons was open to any resident for staking as oyster growout grounds, except for certain channels traditionally used for clamming.

As time passed, the maximum seabed lot size increased to 26 acres, and by late century there were even larger size leased areas (to 75 acres). Most of the growers, however, kept to small size lots. The limiting factor was marketing and shipping. People who controlled the larger areas tended to be shippers who had invested in large boats for transport to the New York City markets.

The townships also passed management regulations, including seasonal openings and closures and conservation measures requiring the return of mature oysters caught on the seeding grounds.

2.3. Leasehold as enclosure of the commons

An independent fishermen's strike in 1902 resulted from changes in the fishery during the last 2 decades of 19th century. During this period what had been a cottage production oyster industry became mechanized and specialized and the fishery changed into a company-run, labour purchase system. The fishermen, the baymen, fished seasonally and might sell their labour to the shippers, also seasonally. Independence was the principle issue of the strike, whether the waters were to remain open-access or to become fully controlled by the larger grower/shipper interests.

Demand for oysters was huge in the late century. By 1860s wild Long Island oysters were showing signs of overharvest. They were also being depleted in Europe at the same time. The newly developed culture techniques required secure tenures. In Holland the 'free-fishery' open-access commons became rare as wealthy investors pressed for leasehold closures.

The control of growout leases had largely passed into the hands of the wealthy. The East Bay, however, remained a commons for harvest of young oysters for sale to the growers. The supply of wild Long Island 'seed' oysters continued until high levels of demand in European and domestic markets resulted in threats of overharvest. Pressure to convert the East Bay nursery grounds into leased lots increased after 1860 when Connecticut converted to that system. However, the Long Island townships retained the East Bay as a residents-only commons.

Tenures and enclosure were contentious legal and political issues between the grower/shippers and the baymen. Legally, seabeds devoid of wild oysters or clams were available for leasing. The regulations, however, were not clear about the densities of shellfish that defined a wild clam or oyster bed. The decisions were left to local officials, which resulted in fierce battles often played out through electioneering and lobbying.

The law prohibiting oystering with 'dredge-trawl' on leasehold lands was repealed in 1893. Independent fishermen, however, continued to be restricted to the use of tongs on common areas. Technological change, particularly the advent of gas powered boats, made dredges more attractive. By 1901 all of the larger planters had at least one powered boat.

The reduction in areas open to the baymen and the decline in the abundance of wild stock resulted in a decrease in the levels of daily earning that an independent oysterman could expect. The independence of baymen was under great threat because the wage rate available from growers was higher than what could be earned from fishing wild oysters.

> The South Bay industry was by that time [1901] clearly in the hands of the planter, men with enough capital to lease large amounts of acreage, plant thousands of bushels of seed oyster, and run a fleet of harvesting vessels to reap their bounty in autumn and winter. Many a so-called independent bayman found a living this hard to make and in any given season might find the work for the companies more attractive (Taylor 1983:101).

However, the baymen were tied to the larger producers in any event, since they were the only market for East Bay seed oysters.

2.4. Residents only seed oyster commons

Rights of access operated on both formal/legal and informal bases. Seasonal harvest of seed oysters (April to June) on the East Bay common grounds were limited to resident fishermen. Success, however, required knowledge of the location of natural seed bed concentrations where generations of oysters seeded on the empty shells of earlier generations. Navigation was based on accurate triangulation from shore references. Limiting the transmission of knowledge to family members was the informal means of exclusion.

2.5. Open-access clam fisheries

The clam fishery was part of the seasonal fishing round for the baymen. After the seed oyster fishery closed, the baymen travelled longer distances to clam beds in more open waters of the West Bay. Generally, the clamming grounds were open to all residents of bordering townships. The Islip Dutch oystermen, coming from a greater distance, tended to remain for the entire weekly opening and were prominent fishermen on the clam grounds.

The open nature of the clam fishery and the broad participation by residents of adjoining townships to supplement income resulted in disputes and conflicts. Informal exclusion on the clam grounds was based on a tradition that fishing on a bed was on a first come basis. The presence of fishermen from different communities and townships, however, limited the degree to which people followed the rules. People working a bed resorted to threats to push off interlopers. "Typically, however, a bed seen to be yielding good catches became crowded beyond the control of anyone" (Taylor 1982:107). Being members of different fishing communities meant that sanctions and other social measures were ineffective means for censure.

2.6. Enforcement and compliance

A different definition of enforcement is required for this case of community management. In effect there were two communities or interests involved in the fishery, which made internal conflict a condition of community-management in this instance. Access to the oyster fishery in Bay waters was divided into individual leaseholds and residents-only commons. Both are examples of restricted access. The high value fishery resulted in continuous pressure by the wealthy leaseholders to convert residents-only commons into private property. Independent baymen had to remain vigilant to voice opposition to proposals to lease clamming and oyster grounds to private interests. These efforts amount to a use of voluntary labour for a kind of enforcement, but focused on access rather than the resource.

The arguments the baymen faced are very familiar to the debates within the BC fishing industry. They might be called the apparent-rationality justification for privatizing fishing grounds. First, it is reasoned, artificially cultivated grounds result in increased productivity, and the goal of

management of commercial fisheries is to increase supply. The second part of the argument claims that creating private tenures is the cure for tendencies to overfish limited commons. Much of this report describes alternative means to accomplish these ends without disenfranchising the fishing community in favour of individual benefits. Many of the case studies provide examples of accomplishing the same ends collectively. In particular, the current section (Part Four) describes powerful success stories of broad benefits from community ownership of fishing grounds. And the current case is an equally powerful example of failure resulting from the unresolved conflicts between the grower/shippers and the baymen that they were attempting to disenfranchise through enclosing the common.

An Oyster Commission was responsible for the more usual type of regulation and enforcement. They faced problems of compliance with such regulations as throwback of mature oysters on seed ground and banning of dredges (hand dredges could be easily dropped overside when commissioners came into sight). Their main activity, however, was enforcing poaching on grower/shippers oyster grounds. The conflict between the two groups made poaching by baymen a political act

> In the waters of Islip and Brookhaven no amount of thievery would detract from the ultimate victory of cultivation and the notions of private property on which such methods were based. . . . Wealth was not to be found on the public grounds; one got rich by planting one's own lots and by eventually shipping oysters oneself (Taylor 1984:112).

The shippers, however, in collusion with the dealers they supplied, controlled entrance into the markets. Holders of small lot-leases often found the oysters that they tried to ship independently to market returned.

2.7. Outcomes

The Great South Bay oyster fishery is no more. Its collapse is instructive about many of the problems with fishery management. Some of the reasons for collapse could have been avoided. The final *coup de grâce,* however, came from nature. In the 1930s a series of very powerful hurricanes created new channels into the Bay, increasing salinity and promoting an increase in the oyster drill population, greatly reducing the survival of young oysters. But that was the very end of a long process of decline;

The events that preceded the ecological changes in the Bay are instructive about failures in limited access fisheries (Table 8). The fierce class-type struggle between growers and baymen prevented the development of a common front. The rights of the baymen were under attack throughout the last decades of the 19th century. During the early years of the 20th century, it was the growers turn. A significant amount of the leased grounds held by the growers came from the private holdings of the descendants of the pre-Revolution estate owners. A large Connecticut oyster trust purchased these rights from the owners and gave notice to the Long Island leaseholders. Many of the grower/shippers who lost their leases in this fashion sold their operations to the trust owners. Younger family members went to work for the oyster trust; older members simply retired. The more successful growers negotiated partnerships.

Demand for oysters declined beginning around the turn of the century. Knowledge of the oyster as a potential carrier of human disease became widespread. Concern about growth of oysters in waters polluted by rapid residential and industrial development took the dishes off many menus. World War I also had an effect, since shipping to European markets was impossible.

Table 8. Conditions within the Long Island oyster fishery and outcome (based on Taylor 1984).

	GROWER/SHIPPERS	BAYMEN
CONDITIONS		
ETHNIC DIVERSITY	low	low
ACCESS	leaseholds from private owners & local government	formal: residency informal: knowledge
OCCUPATIONAL MOBILITY	low	low
DEPENDENCE ON LOCAL RESOURCES	high	high
OUTCOMES		
POSITION IN INDUSTRY	loss of leases, loss of businesses	remain seed suppliers and labour
CONFLICT BETWEEN FISHING SECTORS	conflict persists	conflict persists
MARKETING CHALLENGE FROM NON-FISHING SECTORS	limited ability to deal with pollution contamination problems	limited ability to deal with pollution contamination problems
ECOLOGICAL CHANGE	loss of oyster grounds, replacement by clam beds	loss of oyster grounds; replacement by clam beds

In more recent years, the Bay has become an important clamming ground. The ecological shift resulted in enhanced production conditions for clams. The industry had a US $100 million/year revenue during the 1980s. But the same problems continue. The natural Bay environment is threatened by increased urbanization and pollution. And the continuing conflict between 'planter' companies wanting to grow cultivated clams on tenured grounds and present day baymen is a continuation of the old conflict.

3.-Conclusions

For our purposes, what is most instructive about the Long Island oyster fishery is how a community with a high degree of ethnic homogeneity can fail in their fisheries management efforts.[1] The Louisiana and Florida success stories happened in homogeneous communities. The broad social linkage of the Louisiana fishermen, in particular, facilitated their acting as a powerful community in their lobbying efforts to persuade the state to incorporate their informal tenure model within a legal framework. Although the Florida fishermen operate a successful fishery, co-operation appears limited to immediate kinfolk. Information on the two groups' ability to influence outside activities that impinge on oyster production and the quality of the product, such as sewage and industrial pollution, or to obtain compensation for lost fisheries opportunity is lacking. The basic structure of the Louisiana fishery has similarities to the Japanese inshore fishery in both being based on legal rights to exclusively fish and cultivate a defined territory. In the Japanese instance, the rights belong to a locally powerful collective whose influence is enhanced through membership in regional and national organizations. And in the Japanese case, loss of livelihood opportunities within the tenured grounds due to conflicting developments is subject to the approval of fishermen and, if approved, is compensible.

Potential alliances between grower/shippers and baymen quite possibly could have influenced the township governments to impose measures making it difficult or impossible for the take-over of privately owned oyster grounds by out-of-state interests. Instead, it mattered little to the baymen who owned the leases and the grower/shipper companies. Alternatively, they might even have considered the losses incurred by their old foes as a sweet revenge.

A full-fledged community managed oyster fishery never developed on the Long Island oyster grounds (Table 9). Instead, two parties in conflict over waters of mutual interest emerged—a group with formal exclusive rights and control over market access and a group whose ability to control access was limited to the distribution of shared knowledge about the fishing ground. The growers' tenure arrangements were similar to those promoted by many advocates of resolving the dilemmas of commons fisheries through the creation of private property rights. The contemporary arguments are very similar to those used by the grower/shippers for increasing the leasehold range within the South Bay waters: potentially greater efficiency, elimination of conflict and competition leading to capitalization wars, nurture of the grounds and resource, etc.

In the end the conflict that resulted from perceptions that each group had disparate interests prevented the kind of powerful political alliance that could have prevented or reversed the two human factors responsible for the early changes and decline of the oyster fishery: non-resident take over of rights and the loss of markets due to fear of pollution contamination of the fishing ground.

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[1] Because this case study is really about conditions that have led to sustainability failures in fisheries which would appear to be good candidates for community management, the four criteria for success (accountability, effectiveness, representativeness, and adaptability) are not reviewed in a numbered list.

Summary of Major Characteristics Of Gulf And Long Island Oyster Fisheries

Major Problem Addressed: resource allocation and exclusion

Major Management Focus: resource tenures and restricted knowledge of the fishing grounds and the processing side of the industry

Scope Of Activities: Louisiana—harvest time and location decisions; oyster bed seeding stock and habitat assessment; policy making through place on Oyster Commission.

Outcomes: mixed—from decades of stable production and fishermen participation (Louisiana) to the collapse of the fishery (Long Island)

Local Institution: Louisiana = oyster camp; details lacking for others

Human Scale Of Management Unit: Louisiana = 1000+ fishermen; details lacking for others

Regional Context: Louisiana incorporated ethnic oystermen folk practice into management. Both Florida and Louisiana based on stable, long-established kin-based communities. Other Gulf states, fishing community is transient. Long Island, unresolved class-type conflicts in an ethnically homogeneous fishing community saw loss for both groups.

Scale Of Unit Area: details lacking

Type Of Actors: 3 instances of ethnically homogeneous fishing communities, and 2 mixed

Level Of Operation: details lacking

Degree Of Institutionalization: From a century long (Louisiana) involvement to transient fishing communities

Degree Formalized: Louisiana—state leaseholds; Long Island—fishery restricted to local residents; cultivation grounds leased from local government and private sea bed owners.

Type Of Fishery: oyster

Economic Benefits: mixed—from consistent levels of production and participation (Louisiana) to loss of place in the fishery (Long Island)

Role Of Community: participate on commission (Louisiana); protect group interests (Long Island); maintain closed client/patron relationship with processors (Florida)

Relationship With Government: mixed—from membership on the regulatory authority (Louisiana) to lobbying efforts (Long Island) to none

Possible Relevance To BC:

- (Louisiana) Sustainable fishery (indicated by stable production and fishermen participation) tied to long-term commitment, security of tenure, legal rights to exclude and protect against poachers, and community's place on regulatory commission.
- (Alabama, Mississippi, Long Island) Fishing community's resistance to change toward a closed-access fishery based on legal tenures comes from fear that tenures based on individual, private property will, over time, result in the exclusion of the fishing community from the resource.
- Fishing communities are willing to invest in stock and habitat when they have guarantees that they will be the beneficiaries.
- (Long Island) Class-type struggles within the fishing community prevented the development of alliances that could influence government and protect each party's interests in the fishery.

Table 9. Management functions of oyster fishers.

MANAGEMENT FUNCTIONS	*LA.*	*FLA.*	*MISS.*	*ALA.*	*LONG ISLAND*	
					Planter/ shippers	***Baymen***
1. POLICY MAKING AND EVALUATION						
SCOPING PROBLEMS	*FORMAL*	*?*	*NO*	*NO*	*NO*	*NO*
SETTING OBJECTIVES	*FORMAL*	*?*	*NO*	*NO*	*NO*	*NO*
LONG-RANGE PLANNING	*FORMAL*	*INFORMAL*	*NO*	*NO*	*NO*	*NO*
RESEARCHING THE RESOURCE SYSTEM	*FORMAL*	*INFORMAL*	*NO*	*NO*	*FORMAL*	*FORMAL*
PUBLIC EDUCATION	*FORMAL*	*INFORMAL*	*NO*	*NO*	*INFORMAL*	*INFORMAL*
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE						
MONITORING AND PROTECTION OF HABITAT	*?*	*?*	*NO*	*NO*	*NO*	*NO*
MONITORING AND PROTECTION OF STOCK	*FORMAL*	*?*	*NO*	*NO*	*FORMAL*	*NO*
3. COMPLIANCE WITH RULES						
IMPLEMENTATION AND ENFORCEMENT	*FORMAL*	*INFORMAL*	*NO*	*NO*	*FORMAL*	*NO*

4. FISHERY HARVEST

STOCK ASSESSMENT	**FORMAL**	**INFORMAL**	**NO**	**NO**	FORMAL	**NO**
HARVEST PLANNING	**FORMAL**	**INFORMAL**	**NO**	**NO**	FORMAL	NO
HARVEST MONITORING	**FORMAL**	**INFORMAL**	NO	NO	FORMAL	**NO**

5.FISHERY ACCESS

MEMBERSHIP/ EXCLUSION	**FORMAL**	**INFORMAL**	NO	NO	FORMAL	FORMAL & INFORMAL
HARVEST ALLOCATION	FORMAL	INFORMAL	NO	NO	FORMAL	NO
TRANSFER OF MEMBERSHIP	?	INFORMAL	NO	**NO**	FORMAL	INFORMAL

6. **RESOURCE USE COORDINATION**

PLANNING COORDINATION OF DIFFERENT HARVEST REGIMES AND STRATEGIES TO USE OR ENHANCE	?	?	**NO**	**NO**	**NO**	NO

7.MARKETING **OF** THE HARVEST

SUPPLY PLANNING	?	NO	NO	**NO**	FORMAL	NO
PRODUCT QUALITY PLANNING	?	NO	NO	NO	NO	**NO**
PRODUCT DIVERSITY	NO	**NO**	**NO**	**NO**	**NO**	**NO**

Chapter 9. Community **Management** of Korean Seaweed Fisheries[1]

Korean seaweed fisheries may seem very distant from the pressing issues facing BC fisheries/In terms of value and tonnage, seaweeds are not a major fishery in BC at present. There has been considerable interest in harvests at an industrial scale, for chemical extraction. Historically, some species, such as *Porphyra* or laver, have been an important part of First Nations' diets. Seaweeds are also part of the commercial fishery in the lucrative herring roe on kelp fishery and in cultivation efforts off the west coast of Vancouver Island.

The value of the Korean seaweed fishery case study for insights into possible change in BC fisheries, however, goes beyond the type of resource. First, seaweeds are another example of a non-mobile marine resource and the management methods and lessons have applicability for other types of bottom-dwelling resources, such as clams, oysters, abalone, and perhaps even crabs and other crustaceans and some types of groundfish. Second, the studies provide insights into three very different community fisheries management arrangements based on legal ownership of the resource tenures. One of the instances is particularly interesting as an example of ownership of tenures providing dual benefits to the community.

Of particular interest in the case studies are the different methods used for providing access and allocation to one of the primary resources of each village, the seaweed myok *{Undaria pinnatifida)*[2] —a Korean national food— and the consequences of each arrangement. The demand for undaria at the time of the research was very high.[3] Wild-stock harvests during the late 1960s barely met the national demand, resulting in high prices relative to other fisheries available to the villagers.

Each of the villages lies within one of Korea's three coastal fishing zones. Kagodo is a very isolated island located off the southwest coast of Korea. Larger centres are 30 hours distant by boat. The island has a population of about 1500 (288 households) living in three different villages. Kagodo Island is located in the Yellow Sea, a region of shallow sand and mud bottoms where set nets and trawls are used for resident and locally migrating fish stocks. Hamgumi, a village of about 800 (104 households), also on an island but this one with 14 villages, is far less isolated. Yosu, a seaport city, is 4 hours travel away. Hamgumi is on the Korean south coast, facing the relatively narrow channel between Korea and Japan, on the route of fish stock migrations between the East China Sea and the Sea of Japan. And Sokpyong, a village on the east coast of the Korean mainland, with about 1000 people (187 households), is in direct contact with larger towns and cities. The sea floor drops abruptly offshore of Sokpyong. Within a few kilometres of shore depths reach thousands of metes. Consequently, surface and mid-water techniques for mobile oceanic species are the rale beyond the immediate inshore.

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[1] Based on Han (1972).

[2] Myok may be more familiar under its Japanese name, wakame. *Undaria* is an important ingredient in Korean and Japanese soups as a sweetener and flavouring agent.

[3] The information for this chapter is restricted to the late 1960s. More recent information about the fisheries of the three villages discussed in this chapter is not presently available. The problem of being unable to update information is general to the use of case study research. Nonetheless, many lessons are available from the restricted time spans typically available in case study literature.

Seaweed harvesting areas are owned in all of the villages. However, the tenure arrangements are very different. Kagodo and Hamgumi myok beds are owned and managed on a community basis; whereas, in Sokpyong the grounds are privately owned.

1. Kagodo

Kagodo is a small steep and rocky island with very little arable land. The island is 14 square kilometres in area, with 20 or more offshore reefs. The rocky sea coast and sea floor supports abundant seaweeds (undaria and gellidium jelly[1]) and molluscs (abalone, wreath shells and mussels). Fishing and seaweed harvests represent the major economic activity for nearly all households.

Undaria harvesting on Kagodo is based on rights to *myok tom*, village or village-group exclusive harvesting territories.[2] There are 4 tom: one for each of the smaller villages plus 2 for different neighbourhoods of the largest village, Daeri. The shore and outer islands of Kagodo are divided into zones (Fig. 14). Each of the residential groups has exclusive rights to harvest undaria within one or more designated zone. Both East and West Daeri households also share harvesting rights to one island-reef area.

The total undaria harvest zone is about 13 square kilometres. East and west Daeri, with a combined population of 960, each have an exclusive harvest territory of about 4 square kilometres and share an additional area of about 1.5 square kilometres. Hangni, with a population of 358, has a 2.5 square kilometre harvest zone; and Daepungni, with 222 people, has a myok tom of approximately 1 square kilometre.

1.1. Rules for Kagodo *Myok Tom*

The way the rules are structured is particularly instructive. In recognition that the basic economic unit in the village is the household, membership is structured on household units. The rights are limited to one membership for each household. To qualify for a full-share membership (wonho) in the tom organization, the household must: 1. be permanent residents; 2. have lived in village for a minimum of 5 years; 3. own a house within the residential unit (tom) and; 4 be able to provide labour for harvesting undaria. Half-share membership (banho) is available to permanent residents who cannot fulfil all of the other conditions. Temporarily resident households (for example, that of a teacher or of a term-appointed government employee) are not eligible for any form of membership.

Membership is not fixed. There are rules which govern population growth. When a family has grown large enough to be considered two units, full membership rights are only granted after the new unit has its own house. Until that time the new family is limited to half-share (banho) rights. The half-share rights require an annual membership fee (W700 in 1968). Whereas full rights require a single, permanent fee payment which varies with the origin of the new member. A higher fee is required for immigrating households (W18,000 in 1968) than for a new family unit originating from a member family (W10,000 in 1968).

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[1] Used for the manufacture of agar.

[2] *Tom* refers both to the residential unit of a village and the seaweed territory.

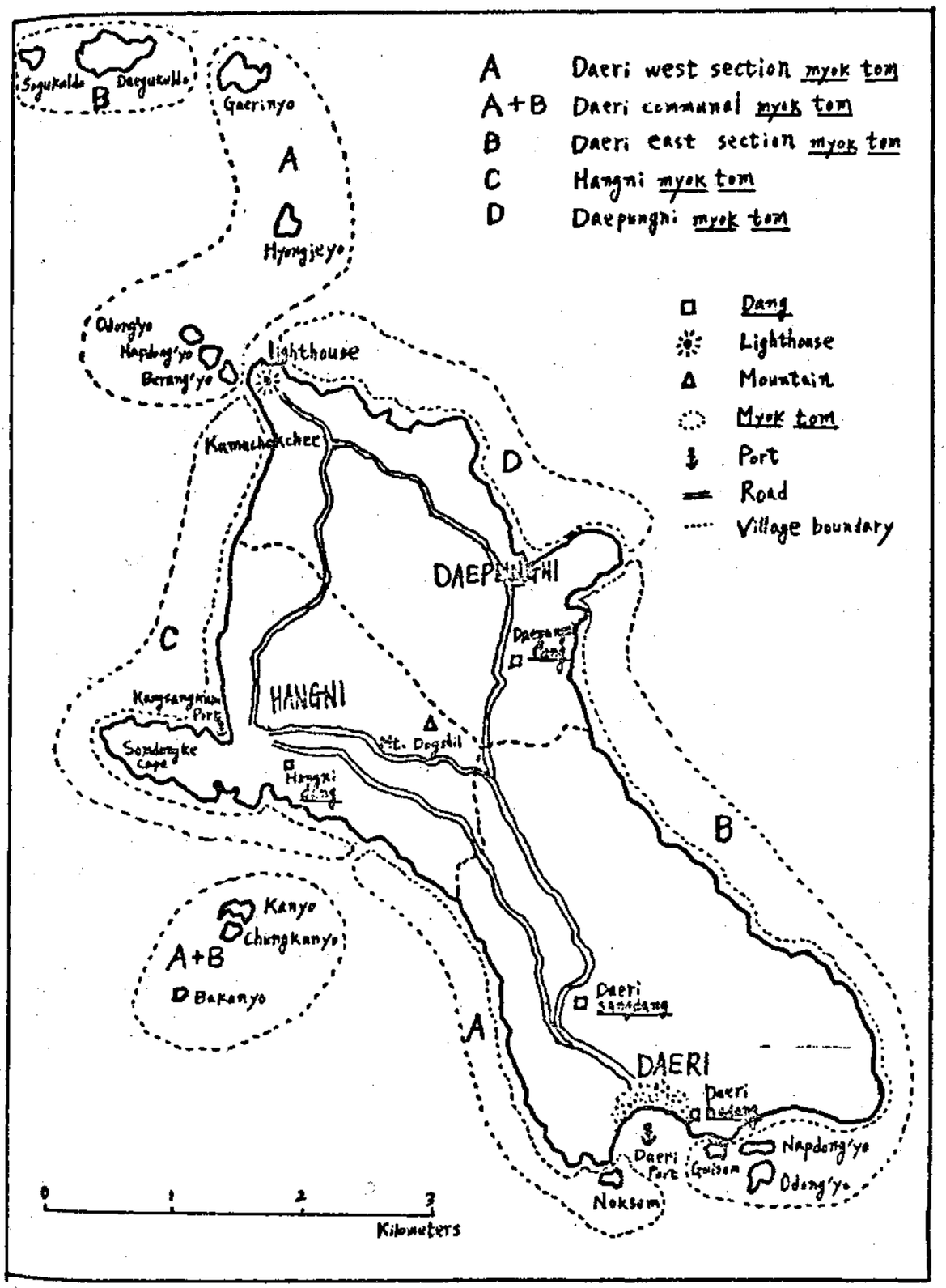

Fig. 14. Kagodo Island and the arrangement of *Undaria* tenure areas. (from Han 1973)

Harvest organization and share arrangements

Each residential ownership unit has a chief who is responsible for the organization of the undaria harvests. They assess the readiness of the resource for harvest and announce the onset of harvesting and direct the division of shares.

Harvests are organized around a boat. Harvesting is done by diving into 3-4 fathoms of water and cutting undaria stalks with sickles. Six to seven divers per boat is considered ideal. The boat owners, who out-number the available dive teams, compete for full-share members prior to the harvesting season. The owners get additional shares of myok for providing the boat and for meals and wine. Kick-backs, offered in the form of money or long-term interest-free loans, are offered to induce divers to join boat crews.

Benefits from undaria harvests on a myok form are organized on a corporate basis. It is expected that each household which is capable will supply labour for harvesting. The daily harvests of the entire corporate-residential unit are pooled and shared on a formula basis. The group's full undaria collection is daily piled on the beach and divided into shares by the group's chief. In Kagodo there are 4 types of shares, 3 are full shares and one is 1/2. Full membership, boat, and meals each get one share and half membership receives 1/2 share. Average annual household income from undaria in 1968 was about 3 times the entrance fee for new family units (W30,000).

Each full member household is expected to provide labour for the harvest, but households which are not able to provide labour, such as those with disabled or retired family members, and who have banho membership still get 1/2 share of the daily harvest. This is a system which internally provides for social welfare needs based on the ownership rights held by unit members. The system works due to close linkages between the harvesters and rights holding households. The linkage provides a monitoring function for labour contribution and for assessing whether those who do not contribute do so for legitimate reasons. The system also functions because the number of households which are ineligible for a full-share, and consequently may not provide harvest labour, are limited. For example, East Daeri had 89 full-share households and only 4 half-share.

1.2. Organization of other fisheries

Territorial rights arrangements exist only for the undaria fishery. Other bottom-dwelling resources are either harvested in small quantities for household consumption (Porphyra, wreath shell, sea mussel, snapper, and sea-bass) or have limited harvests because they are deep water species whose harvests were restricted by the capitalization costs of technology required for the fishery (abalone and gelidium).

However, Han (1972) indicates that rights to harvest abalone and gelidium may be sold to more enterprizing villagers to raise community funds for schools or road cleaning. Profits are limited due to lack of scuba or other diving gear for access to deeper waters which have a greater abundance of these resources. The comment leaves unexplained who does the selling of rights and whether the rights are legal under Korean law or customary measures of the community fishing and residential group. What is implied is that the rights are leased by a legal village entity, whether under national law or customary rule. Recent fisheries legislation, at the time, may have recognized rights to the inshore as community property under Korean law, allowing for leasing by communities to third parties.

A Fishing Co-operative Law was passed in Korea in 1962, establishing a national organization (the Central Fishing Co-operative Federation), 9 provincial branches, and—on a voluntary basis—village fishing co-operatives. In 1967 there were co-operatives in 72% of the nearly 3,000 Korean

fishing villages. At the time of the research, Kagodo had a co-operative, but It functioned in name only. The fisheries continued to be organized around the communal village structure. There was a lack of co-operative marketing, for example. The villagers continued to market their share of the harvests individually under the old, exploitative fish merchant system.

Fisheries for finfish were organized on an open-access basis. Until the 1960s unpowered boats (with crews of 2-6) were operated by single households or 2-3 working co-operatively for angling, long-lined, or near-shore drag net. Motor boats and nylon nets introduced in early 1960s resulted in more complex fisheries with larger crews and investments. New reward systems were developed to account for the size of capital investments and the amount of labour contributed to a fishery.

Markets limited investment in fin-fisheries. Stocks of some fish, such as anchovies, were abundant, but capitalization costs were high for larger boats (5-9 ton) and gear for fishing anchovy. Returns were limited by transportation difficulties for getting fresh fish to market and the high cost for transportation and marketing. And the abundance of preserved anchovies on the market had resulted in continuing decline in market value.

The island fishery was also plagued by a continued dependence on middleman-fish merchants (kaekju) who have a long history in the Korean fishery economy. The kaekju's services include financing, supply of fishing gear and consumer wares, lodging and transportation for clients who do not have other places to stay in the city as well as marketing. In return, the fishermen contract to sell catch exclusively with the merchant. Prices are set by the merchant and are usually below market value. The Kaekju also takes a commission from the sellers (3%) and another commission (5%) from the buyers.

1.3 Management institutions

Kagodo is governed by many formal and informal organizations, which are tied in various ways to the fisheries. The island has a civil government chief appointed for a 2 year term by the local township. The chief is an internal village manager and a village representative on other bodies. He works with an elected 5 member council, which operates on consultative basis, and appoints an administrator for each of the island's residential areas. This position is responsible for tax collection and organizing village meetings and mobilizing people for collective work sessions. Stipends for paid offices include a share of undaria received by the local government as tax from households. The island chief receives a stipend from the township (W1200/month) plus a quantity of undaria from the village fund (worth about W18,000 annually or a little more than 1/2 of an average year's household earning from undaria). Residential unit appointees receives an annual stipend of undaria (equal to W1800). Council members receive no compensation. They are rewarded by the prestige tied to their positions.

On the community or corporate levels, each of the island's 3 villages elects their own seaweed fishery head (tomchang) on a member household basis. The primary responsibility is the organization of the harvest and the protection of the seaweed harvest territory from use without his supervision. The latter includes both poaching by non-members and use of the grounds outside of the operation of the collective. For his services he too is paid in undaria (equal to W 1500 annually), but in this instance he is paid by member households.

A fishing co-operative was formed in the mid- 1960s, following enactment of Korean fishing co-operative law. Although the organization had staff members, at the time of the research it had played no role in the fishery.

An annual grand-village meeting operates as the primary collective decision-making body. Although not explicit in Han's study, the meeting is likely open to all. Beyond appointments, nominations and elections for office, the meeting operates as a forum for discussion of major issues, including the fisheries. Issues dealing with undaria territories and harvesting are "discussed and settled" (Han 1972:91). In addition, levels of taxation are decided. And the meeting is also the forum for bidding on an assortment of exclusive fisheries harvest and commodity sale rights, including sale of wine and cloth, and abalone and gelidium collecting.

The seaweed collective and the co-operative work pattern and benefits that accrue operate as the most powerful social linkage for the islanders. These ties are more powerful than kinship relations. Nearly everyone is related, but mutual aid operates on a village and seaweed corporate group basis rather than through kinship groups. Similarly, enforcement operates internally through collective action and customary sanction rather than through calling the national law into play. A powerful and formalized tradition of social sanction operates on the island which includes an elders' council, public trial of the offender, punishment by beating under the direction of the elders or public display, and a public apology.

Han provides one example of enforcement of exclusive rights to the seaweed grounds. A group of young men from one village collected undaria from another's grounds. Young men from the offended village confiscated 3 boats belonging to the poachers' village and demanded a large compensation (W500,000) for their return. Leaders of both villages met to discuss the situation. The elders of the offended village returned the boats when their young men were out on grounds collecting seaweed. W50,000 was paid in compensation. The group which had confiscated the boats were unhappy with elders' decision, but finally accept it.

1.4. Outcomes

Information on limitations of undaria growth dynamics and differential harvesting strategies are lacking. The algae is a perennial with a complex life history, alternating between sexual and asexual phases. The harvested product comes from the asexual phase, which has large leafy fronds. Dispersal of the spores of the asexual phase is limited by their brief planktonic life. The site of the microscopic sexual phase that results is also the location of the harvestable plant from the next asexual phase, since the fertilized egg does not disperse. Consequently, dispersal of the plant is limited. Harvest is either by cutting pieces or taking the whole plant (Bardach et al. 1972).

During the mid-1950s efficient culture techniques were developed for undaria. Japanese natural grounds were producing a sustained harvest of 40,000-50,000 tons annually through the 1960s. Production from culture in Japan in the late 1960s was around 80,000 tons (Anon. 1990)[1].

Han makes no mention of cultivation, so it is assumed that harvests were of naturally occurring seaweed. Since there is no mention otherwise and since undaria production is so critical to the island economy and is under direct supervision of the harvest chief, it is assumed that harvest levels were sustainable.

Han provides detailed information about socio-economic outcomes. The village administration keeps records of household living standards. Sixteen are upper; 99 middle, and 133 lower based on standards defined by the villagers. The richer group were all fishermen, except for 1

[1] Japanese data is used for comparative purposes because equivalent Korean production figures are not available at this writing.

merchant—all were boat owners and 5 owned motor vessels and nets. The middle represented a debtor class of store owners, other employees, and average fishermen. Thirty-four owned non-powered boats and 3 owned motored boats and nets, but were indebted to the fish merchants. The lower income group consisted of households that required government aid or village assistance. On national terms, all but 1 household would be ranked in the lower economic echelon.

2. Hamgumi

Hamgumi is 1 of 14 villages on 40 square kilometre Kumodo Island on the southern Korean coast, adjacent to the Korean Strait. In terms of more traditional communities, the island and village were only recently settled—perhaps at the turn of the century. The main sources of livelihood are farming, undaria collecting, and fishing. Of 104 households, 66 earn their principal living from fishing and cultivation, 33 mainly from cultivation, 1 exclusively from fishing, plus 2 are store owners, 1 is a carpenter and 1 a barber.

2.1. Rotational seaweed territory-harvesting

Seaweed harvesting arrangements are basically similar to those on Kagodo—except for a rotational system of undaria ground use. There are 5 residential units in Hamgumi and 5 undaria harvesting territories. The assignment of territories rotates on a 5 year basis. During the 5 year period each residential unit will harvest all territories, one each year (Fig. 15). Unfortunately, the account lacks information about the reasons for the difference in harvesting strategies and in their outcomes. This arrangement, however, would be a useful scheme for equitable sharing of benefits where territories have an appreciably different productivity.

2.2. Other fisheries

Villagers owned 9 powered boats and 14 unpowered. Besides the spring undaria collection, the fishing year was divided into 2 periods. In the early part of the year the fisheries focused on scomber, pomfret, shrimps, yellow corvina; later in the year it switched to hair tail, scomber, and shellfish. The scomber fishery, using 5-10 ton motor vessels and drift and gillnets, was the village's main deep sea fishery.

The fishermen were progressive with regard to their marketing. There was no client/broker dependence on fish merchants. Rather, fresh fish were sold through the provincial branch of fishermen's co-operative association, located in the nearby port of Yosu. The scomber catch was marketed through the Scomber Drift-Gill-Net Association, also in Yosu.

23. The development of a fishing co-operative

The village had a history of leadership problems. They had been exploited by a wealthy family who accumulated large land holdings through villagers' debts. On death of the family head, his heirs dissipated their inheritance in squabbles. They also had had problems with corrupt and incompetent leaders. This experience left the fishermen initially disinterested in the efforts of a new leadership to form a Fishermen's Co-operative Association. Persistence of visionary leadership finally resulted in the formation of a co-operative.

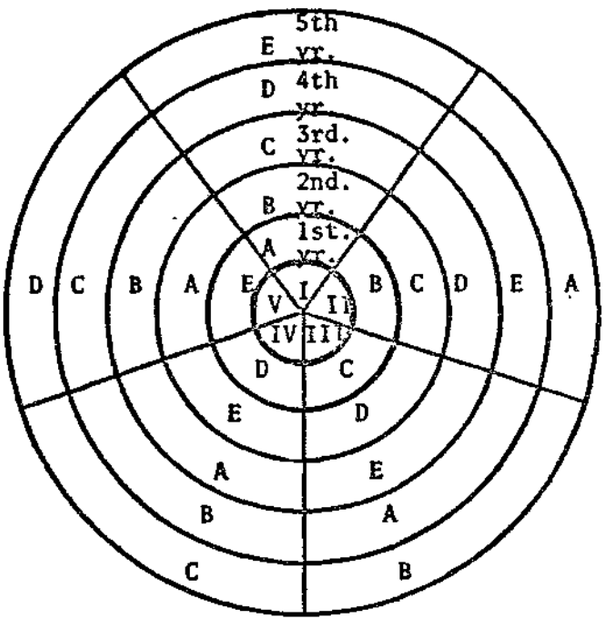

Fig. 15. The rotational harvest system of *Undaria* territories as practiced in Hamgumi. (from Han 1973)

The co-operative is a success story, mainly resulting from the energy of its dedicated leadership, the ability to make use of government funding opportunities for innovative fisheries experiments, and a recognition that funding for fisheries public works requires a great deal of courting of upper-level government officials. The co-operative sought involvement in aquaculture, which required a national license. The chief applied for permission for abalone and sea mussel culturing on behalf of the co-operative. The membership had considerable apprehension about the possible risk and expense. Finally, out of respect for the ability, vision and accomplishments of the chief the membership agreed.

The project led to a successful and nationally-known pilot example of abalone and sea mussels tenure and culture under the control of a fishing co-operative. In 1968, after 2 years of operation, the co-operative had earned a significant profit (W400,000) from its abalone and sea mussel culture.

The leasing of exclusive community rights

The co-operative began experimenting with the controlled leasing of its fishing rights. It began by entering into a time-limited lease (50 days) to harvest abalone and sea mussel with a private fisherman who owned diving gear. Prior to getting the exclusive license from government, the harvesting was open. Lease of the rights resulted in annual profits of W450,000.

At the time of writing, the co-operative also planned to lease a time-limited right to harvest undaria to a private entrepreneur. The village had previously sold rights of harvest in one of the 5 tenure areas to meet community expenses. The success or consequences of this idea are not available in Han (1972), nor is the lease plan. The author feels that there is potentially double benefit accruable from leasing out harvesting rights. The fishermen can benefit from lease payments to their co-operative and receive wages individually as harvesters working for the lessee.

Han attributes the ideas and their acceptance by the membership to the leadership of a single entrepreneur-spirited leader with community interest who gained trust of other villagers by "scrupulous social prudence, energetic application of his own enterprise, and his bureaucratic capabilities" (Han 1972:144).

3. Sokpyong

Sokpyong is a mainland coastal village (with 187 households and 1068 people) in contact with other villages and cities. Pohang, a nearby port city, is the seat of the provincial co-operative federation and is an important distribution centre for seafoods. Sokpyong is a combined fishing and farming community with greater emphasis on fishing as the primary source of livelihood. One hundred and thirty-seven of the households are headed by fishermen. The village's primary fisheries are coastal seaweed (collected by women divers), molluscs (harvested by men using 'diving machines'), anchovy (fished with lift nets employing lighting for attraction), long-lining or gill netting for cod, drift net for saury, and angling for squid.

3.1: Seaweed tenure

Tenure of the seaweed grounds is quite different in Sokpyong than in the other 2 villages. Seaweed grounds along the Sea of Japan coast had a long tradition of private ownership by the more powerful and wealthy village families. The rights were treated in the same way as ownership of farm land. They were inherited by eldest sons and they could be sold on the same basis as land. With this kind of system it is easy to see why the rights ended up in the hands of the wealthy. Over.

long periods of time, as private owners used seaweed grounds as collateral for debts, the rights would tend to consolidate in the hands of the creditors. Poor tenant fishermen rented harvest rights from the wealthy at high rates.

In 1962, at the same time that the Korean government passed the Fisheries Co-operative Law, the government also instituted reform measures, declaring community ownership of seaweed harvesting grounds to be held and managed by village fishing co-operatives. At the time of Han's research this measure had been largely ignored in Sokpyong. Only 2 undaria grounds were owned by the village fishing co-operative. Forty-three territories remained privately owned. The enforcement of the law was difficult, since it went against the interests of the most powerful and influential families.

3.2. Other fisheries

Gelidium harvesting, on the other hand, is controlled by the fishing co-operative association. A supervisor from the town co-operative office is responsible for the organization of the harvest, processing, and marketing. The regional co-operative charges 15% for its services, of which 4% is returned to village fishermen's co-operative association. The remainder of the profit goes to the women divers.

Until recently divers came from outside because the work was looked down on by local women. Within that system, the undaria harvesters got a bare 10-20% of the revenues. Gelidium was more lucrative, perhaps, because large rental fees were not paid to the private owners. Gelidium divers received 75% of the income (besides the co-operative's fee, another 10% went to the labour recruiter). During the 1960s, there was a change in the perception of social status associated with the work and local young women replaced the outside divers.

Octopus, abalone and wreath shells were harvested in the immediate, shallow offshore by diving machine crews of 6-7 fishermen supported by boat and crew. No information is available on access or management of these fisheries. Squid angling is done offshore with a 5 ton boat and 12 fishermen. The location of an angling seat is the determinant of success, so the seat location is determined by lot. The catch is not pooled. Rather, each fisherman keeps his/her own catch and pays the vessel owner a 'fee' of 40% of the catch. Food arrangements are symbolic of the system—each fisherman is responsible for their own food. Sokpyong fishermen also crew on city-based company boats.

The village continues a tradition of self-help and public works, such as the construction of infrastructure and ritual observance. Each household contributes according to its social status. The richer households return a portion of their rental revenues to public works by contributing more than others.

4. Summary

A number of conclusions are apparent about Korean undaria management. The management system is primarily community-operated in all 3 cases. The involvement of the state was a latter-day attempt to legally institutionalize, through the creation of a legal system, of seaweed ground ownership vested within community fishing co-operatives, what appears to have been a customary tenure arrangement.

Long-standing traditional tenure arrangements for the inshore fisheries appear to have been the rule for Korean villages. Brandt (1971) briefly describes the family or private ownership of large stone

tidal weirs used for domestic harvests of mullet, shad, and corvenia in a farming-fishing community. Rules for ownership detailed that fish within the trap belonged to the trap owner and any fish that escaped fell to whomever caught it. The owner distributed the-catch to immediate family, other relatives and persons to whom favours were owed. With large catches the owner paid off obligations, kept a large portion and gave the rest to the village. Prior to the Japanese occupation of Korea in 1910, commercial use of fish was limited to barter with inlanders for manufactured goods and food. Under Japanese colonial rule, a commercial fishery developed; more modern gear, such as long-lines and nets, were introduced, as well as efficient boats; and canneries were also opened.

The modern commercial fishery was highly exploitative, except for the inshore resources managed under community tenure. The more off-shore, passing stock, fisheries during mid-century were fished on an open-access basis, resulting in depletion of local waters and capital investment in larger boats for further off-shore fishing. An indicator of the over-harvest was a halving in the number of local village boats fishing and a reduction in the length of the fishing season during the late 1960s. Demand was increasing during this period due to human population growth and an expanding Korean national economy, resulting in increased pressure on fisheries resources. Supply was not satisfying demand. This resulted in a seller's market with fish buyers courting fishermen. These are events not unlike the development of fisheries in many parts of the world. Korean fishermen approached fishing for mobile stocks, many of which were seasonal migrants, as a crapshoot.

> "In contrast to farming, fishing is regarded as highly speculative, and investment, profit, and losses are often spoken of in terms similar to those used for gambling (Brandt 1971:62).

Sustainability was not an issue, since the fishing communities had no ties to any given stock. As with other open-access fisheries, there were no means to ensure that benefits from controlling harvest efforts would be reaped in the end by those who made the sacrifice.

In contrast to open-access arrangements, the commercial undaria harvest in all the villages described above operates under exclusive use tenure rules. The details of tenure ownership, sharing of the benefits, use of labour and management strategy varies among the villages (Table 10). Information on yield and stability of harvest outcomes is lacking. However, in Japan at the same period wild stock harvests of undaria had been stable for some time (Bardach et al. 1972). This may be an indication that a sedentary marine plant like undaria is manageable in much the same fashion as a terrestrial agricultural crop. The management functions for each system of seaweed management are outlined in Table 11.

The case study is of particular value for several reasons. First, there is a valuable example of one of the possible consequences of privatizing the resource and allowing the rights to be transferred. In Sokpyong, over time, ownership of the grounds accumulated in the hands of the wealthy. The community lost control of their economic resources and became exploited labour. Benefits to the wealthy few was dissipated over a number of generations. Unfortunately, the case study does not provide answers about the consequences of these problems to the sustainability of the resource and its habitat. Sokpyong is also an important example of the ability of vested interests to evade government attempts to re-allocate fisheries. In this instance, even though a law was passed the private owners were successful in avoiding its enforcement. Individual private property in the fishery persisted even though government had attempted the maritime equivalent of land reform.

Second, the case of Hamgumi's leasing arrangements indicates possibilities of benefits beyond simple harvesting in the case of community owned resource tenures. The community's leadership was able to use the other tenures they secured and leasehold earnings to further diversify the community fishery. Of particular interest is the rotational seaweed harvest system that the community devised for its own harvesting. This system may have been a necessary precursor for

combining short-termieasing and the sustainability of the resource. Short-term leasing arrangements for renewable resources tend to operate against sustainability, since it is in the interest of the leaseholder to act with immediate benefits in mind. In this case, however, the lease arrangement duplicates the rotational harvest system used by the villagers and requires the leaseholders to effectively replicate the same system.

Other leasing arrangements operated for resources which required capitalization for harvesting. In Kagodo rights to abalone and gelidium harvesting were held by the villages. Hamgumi had applied for and received grants for mollusc culture from the government. Both villages lacked the technology for efficient harvest and assessed the stocks as abundant. Both had entered into leasing arrangements for the rights they held.

This raises important question about the appropriate level of government to make decisions about alienation and management of local resources. In BC, forest tenures and such fishery tenures as aquaculture permits and oyster leases are granted by the provincial government. In the, contemporary world, Korean and Long Island local governments are rights holder and resource managers for bottom dwelling marine resources. In EC's past, aboriginal governments were the responsible authorities for most types of fisheries. The emerging law dealing with aboriginal rights suggests that to satisfy the requirements of those rights a great deal of the responsibility for resource management and benefits will have to revert to local aboriginal communities. To satisfy this legal need broadly—for both aboriginal and non-aboriginal residents—may require devolving resource rights and authority to local fishing communities or to local governments. The Korean and other case studies which provide community experience with formal or legal rights to fisheries are instructive about how such possibilities might operate.

The basic characteristics of the system include:

1. *Accountability*
   a) (Kagodo) Open public discussions of issues and problem solving at annual village general meetings.
   b) (Kagodo) Fishing chief, responsible for decisions about the fishery and-direction of the harvesting and sharing, is elected by all parties.
   c) (Hamgumi) Co-operative leadership is answerable to membership.
2. *Representativeness*
   a) (Kagodo) Representation of all households at the annual general meeting and each has a vote in the selection of the fishing chief.
   b) (Kagodo and Hamgumi) units based on households. In Kagodo each household has a share in the benefit. Each is expected to supply harvesting labour, but those who cannot still obtain a share of the benefit as co-owner.
3. *Effectiveness*
   a) (Kagodo) General meetings acting as a forum for sanctions of members.
   b) (Kagodo) Poaching not being regarded as an individual act. Rather, poaching is treated as an offence of one community's interests by another.
   c) (Hamgumi) Co-operative viewing its home water area as under its jurisdiction, and working with government to secure all available resource tenures.
   d) (All) Sustainable harvesting of seaweed.
   e) (Kagodo and Hamgumi) Equitable sharing of benefits by village households.

4. *Adaptability*

a) (Kagodo) Well-established community management structures. The other side of this is very conservative institutions.

b) (Kagodo and Hamgumi) Principal operation of mutual aid based on village and seaweed groups, rather than kinship. Seaweed rights and co-operative work creates powerful social linkages.

c) (Hamgumi) Use of short-term leases by the co-operative to finance fisheries diversification efforts.

d) (Sokpyong) Successful resistance of government attempts to reform privatized fishing rights.

Summary Of Major Characteristics Of Korean Seaweed Tenures

Major Problem Addressed: consequences of different resource tenure arrangements

Major Management Focus: exclusive rights to harvest *Undaria* held within communities

Scope Of Activities: planning, coordinated use, harvest planning, allocation, exclusion and enforcement

Outcomes: sustainable fisheries for a valuable resource and social equity within 2 of the communities

Local Institution: (Kagodo) village group; (Hamgumi) Fishermen's co-operative; (Sokpyong) private/individual property

Human Scale Of Management Unit: (Kagodo) 288 households; (Hamgumi) 104 households; (Sokpyong) 187 households

Regional Context: details uncertain; customary ownership is likely national in character

Scale Of Unit Area: (Kagodo) 13 sq. km.

Type Of Actors: local residents; ethnically and historically homogeneous communities

Level Of Operation: village. Tenure rights held by household units

Degree Of Institutionalization: (Kagodo) long-established; (Hamgumi) more recent community—undergoing transformation from customary rules to co-operative entrepreneurship; (Sokpyong) well-established

Degree Formalized: Formalized, initially under customary rules and in modern times under national law

Type Of Fishery: Seaweed

Economic Benefits: (Kagodo) regular source of household income; also used to finance local government and public works: (Hamgumi) income from both lease of rights and labour; co-operative earnings used to finance the co-operative's development of aquaculture leases; (Sokpyong) benefits belong to private owners; non-owners share crop at low rates of return.

Role Of Community: (Kagodo) planning, allocation of benefits, enforcement; (Hamgumi); planning, allocation of benefits, economic development; (Sokpyong) labour

Relationship With Government: (Kagodo) co-ordination with different levels of government; (Hamgumi) co-operative working with government agencies to secure all tenures to home waters and to obtain funding from fisheries public works to finance aquaculture sector; (Sokpyong) struggle to keep private tenures private

Possible Relevance To BC:

- Consequence of privatizing the resource and allowing the rights to be transferred, in the one village in which this was the form of tenure, was an accumulation of rights by the powerful and the larger community becoming exploited labour.
- In the above case, even when government instituted ownership reform, the influential owners of the privatized rights were successful in avoiding the reforms.
- In one of the communities in which rights were collectively owned, short-term tenure leasing was used to develop capital for fisheries diversification while ensuring that members continued a livelihood from the resource. This model is similar to government creation of resource tenures, but in this instance the rights remain within the fishing community.
- The success of the Hamgumi co-operative resulted from the co-operative working with government to secure all government created marine resource tenures within its home waters.

When tenures belong to communities, poaching is treated as an offence of one group against another. This is a system which enables social sanctions to operate. Fines come from the group rather than from the individual responsible.

Table 10. Differences in the tenure and management of Korean undaria fisheries.

UNDARIA HARVEST	Kagodo	Hamgumi	Sokpyong
Tenure	Community ownership	Fishing Cooperative ownership	Private (small number of territories owned by the cooperative)
Fishery use	Community	Community and leasing by the Fishing Cooperative leasing	Private and Fishing Cooperative
Management form	??	Rotational territories	??
Management authority	Elected harvest territory chief	Head of fishing cooperative	Family heads
Labour	Communal	Communal, wages	Import wage labour; Village wage labour, Communal
Harvest allocation	Equally divided to member households, with extra shares going to boat owners and meal providers	Lease: to leaseholder Community: to households	Private: share-cropped, with large rents to owner Cooperative: among fishermen

Table 11. MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES: KOREAN SEAWEED FISHERIES

MANAGEMENT FUNCTIONS	PROPERTY RIGHTS AND DUTIES	Kagodo	Hamgumi	Sokpyong[1]
1. POLICY MAKING AND EVALUATION				
SCOPING PROBLEMS	Right/duty to do long-range planning	FORMAL	FORMAL	NO
SETTING OBJECTIVES	Right to research key questions affecting community values;	FORMAL	FORMAL	NO
LONG-RANGE PLANNING				
RESEARCHING THE RESOURCE SYSTEM	Right/duty to educate own- and larger- community re problems	FORMAL	FORMAL	NO
PUBLIC EDUCATION				
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE				
MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses (right of compensation)	?	?	NO
	Right of access to government information	?	?	NO
MONITORING OF CONDITION OF STOCK	Right to collect own information	FORMAL	FORMAL	NO
	Right to interpret information in light of local knowledge	FORMAL	FORMAL	NO
	Right/duty to enhance or restore	FORMAL	FORMAL	NO
	a) resource/resource productivity			
	b) habitat	FORMAL	FORMAL	NO
3. COMPLIANCE WITH RULES				
IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules	FORMAL	FORMAL	NO
	a)re harvesting activities	FORMAL	FORMAL	NO
	b) re habitat damage	?	?	NO
	c) re exclusion and poaching	FORMAL	FORMAL	NO
4. FISHERY HARVEST				
STOCK ASSESSMENT	Right of access to government information and right to collect own	FORMAL	FORMAL	FORMAL
	Right to interpret information in light of local knowledge	FORMAL	FORMAL	FORMAL
HARVEST PLANNING	Right to make rules re:			
	a)size of overall catch	FORMAL	FORMAL	FORMAL
	b)location of the fishery	FORMAL	FORMAL	FORMAL

[1] For Sokpyong management functions and rights/duties have been interpreted in terms of the community's entire harvesting area. In this view, private ownership excludes most of the function and management rights. However, if Sokpyong were assessed on a private ownership and individually owned plot basis, the table would have a great deal of similarity to those of the other 2 communities.

	c) timing of fishery	FORMAL	FORMAL	FORMAL
	c)gear types permitted	FORMAL	FORMAL	FORMAL
	d) size of allowable interception	FORMAL	FORMAL	FORMAL
HARVEST MONITORING	Right of access to government information and right to collect own	FORMAL	FORMAL	FORMAL
	Right to interpret information in light of local knowledge	FORMAL	FORMAL	FORMAL

5. FISHERY ACCESS

MEMBERSHIP/ EXCLUSION	Right to exclude:			
	a) certain classes of fishery (e.g. sport commercial)	FORMAL	FORMAL	FORMAL
	b) certain classes and sectors of fishers	FORMAL	FORMAL	FORMAL
HARVEST ALLOCATION	Right to allocate:			
	a) how many licenses or members in each category or sector	FORMAL	FORMAL	FORMAL
	b) how much each category of sector may harvest	?	FORMAL	?
	c) areas for different uses	?	FORMAL	?
TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members	FORMAL	FORMAL	FORMAL
	Right/duty to regulate conditions of transfer	FORMAL	FORMAL	FORMAL

6. RESOURCE USE COORDINATION

PLANNING COORDINATION OF DIFFERENT HARVEST REGIMES AND STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses	FORMAL	FORMAL	NO
	Right/duty to communicate problems and try to solve with others	FORMAL	FORMAL	NO
	Right/duty to resolve disputes internal and external	FORMAL	FORMAL	NO

7. MARKETING OF THE HARVEST

SUPPLY PLANNING	Right to manage harvest timing for optimum production and value.	?	?	?
PRODUCT QUALITY		?	FORMAL	?
PRODUCT DIVERSITY		?	FORMAL	?

Chapter 10: A Multi-Party Clam Management Board, Sunshine Coast, B.C.

(Source: DFO memoranda and discussion papers, interviews)

The Problem. Clam management is still relatively new in B.C. Dramatic fluctuations in clam health and abundance due to growing numbers of harvesters and increased pollution have created a sense of urgency in several parts of the coast. Area C is one of the regions where DFO, First Nations, and non-native communities have reached agreement on what needs to be done, and are piloting new concepts.

Scale of management unit. Area C is a DFO-designated management area for clams, primarily in the Sunshine Coast and the Powell River area, including Jervis Inlet, Sechelt Inlet, Texada Island, Harwood Island, Savary Island, Hernando Island, Lund, Toba Inlet and Desolation Sound, including Okeover Inlet. (From a sea perspective, this is the land and islands adjoining Malaspina Strait from the north end of Howe Sound to Desolation Sound). The area from the Fraser River to Howe Sound is also officially part of Area C, but has been closed to harvesting for the last 30 years because of pollution. For purposes of this discussion, we do not consider it part of Area C (see Figure16).

Type of fishery. Savary Island has supported a major intertidal clam fishery for many years. Before 1970, this was primarily a butter clam fishery. After 1970, the introduced manilla clam harvest became more important. The rich beaches of Savary Island alone contributed more than 50% of the entire Area C manilla clam harvest at its peak during the mid to late 1980s.

Up to this time, clam harvesting was open the entire year on the entire south coast. Only a personal commercial fishing licence was required. In the 1980s, market demand for manilla clams increased. So did the numbers of harvesters and the time they spent digging.

In response to increased fishing effort in the early 1980s, DFO set harvest quotas limiting what could be taken from the south coast. DFO also limited the digging season to two periods in each year: January to March and October to December.

These measures alone did not appear adequate. Up to 400 diggers, including many transients, harvested Savary Island at one time, before moving to other areas. The high harvest rate, winter kills in 1985 and 1989 (due to very low temperatures), and a significant harvest of undersized clams, all contributed to the collapse of the stock. (Some diggers take large numbers of undersized clams and distribute a portion of them to each clam sack sold. A small percentage of undersize clams is tolerated by buyers).

Owners of summer cabins on Savary Island reported increased break-ins, theft, vandalism, and littering on their property. Pressure to address the problems only increased when the Savary Island Property Owners Association complained directly to the Minister of Fisheries and Oceans. (This association was later invited to attend meetings of the Area C Clam Management Board. In light of the improved situation since the closure and the new management arrangements in 1994, they have not yet seen a need to do so).

The Savary Island clam fishery was closed in 1989. In an effort to restrict the number of diggers moving from area to area, and to facilitate enforcement, DFO introduced an area-based clam licence, and required diggers to choose one area only for a particular year. In April 1989, Area C was designated as one of seven clam management areas on the B.C. coast.

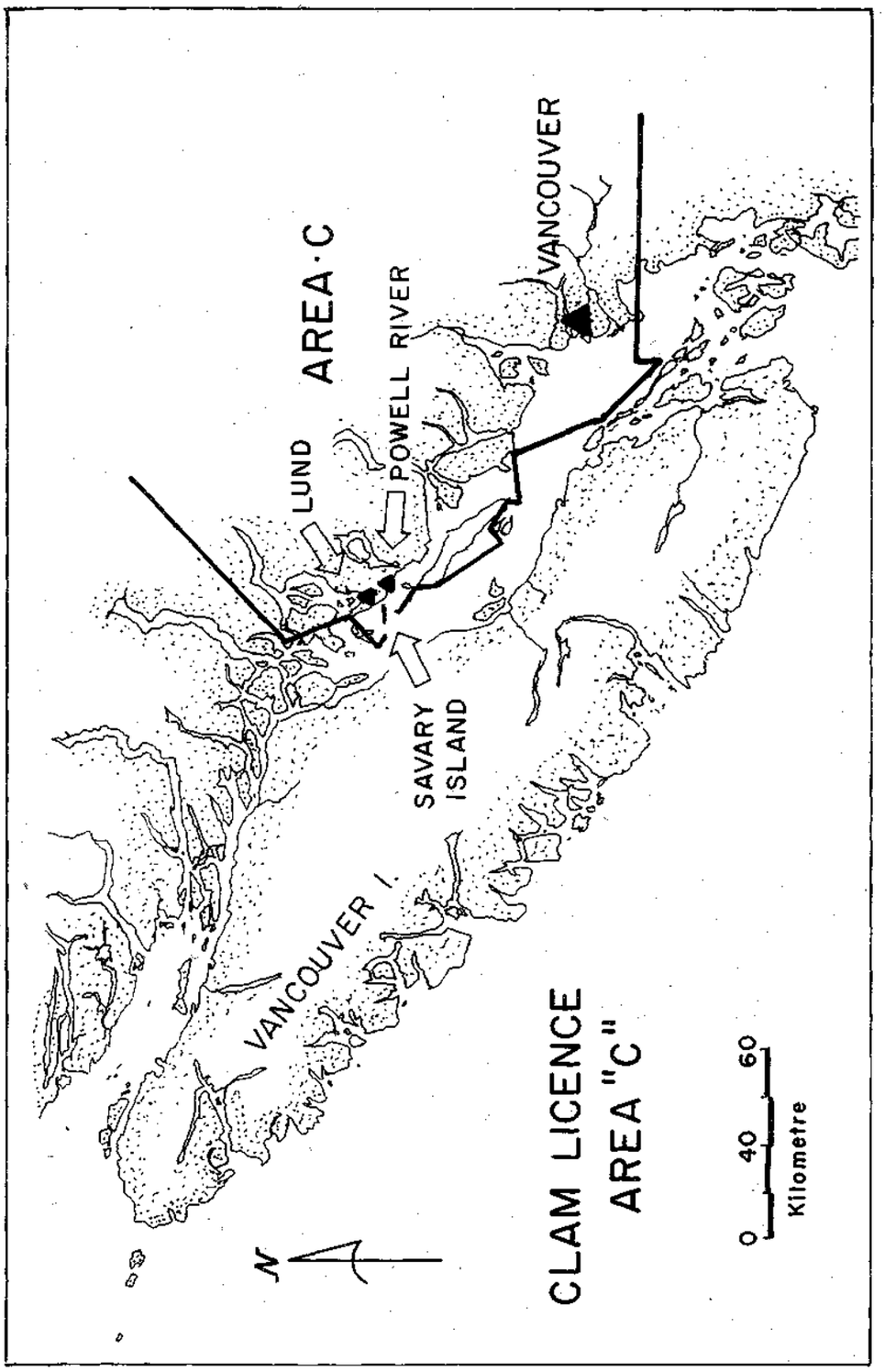

Fig. 16 Clam Licence Area "C"
Fig. 16 Clam Licence Area "C"

The other smaller beaches in Area C were less well known by non-residents of Area C, and at first this seemed to limit harvest. By 1993, however, many of the smaller beaches were harvested to the point that DFO had to restrict the harvesting season to only 16 days. DFO began to consider imposing licence limitation in the clam fishery, i.e. restricting the number of commercial licences. This policy had been advocated for several years through the coastwide Inter-tidal Sectoral meetings, where policy and allocation for shellfish are discussed on a coastwide basis.

Also by 1993, the clam population on Savary Island had rebuilt enough to allow a small harvest: 250,000 lbs. DFO wished to use the reopening of Savary Island in 1994 as an occasion to take a new approach to the problems that arose in the 1980s.

In 1993 DFO and MAFF (BC Ministry of Agriculture, Food, and Fisheries, whose mandate is to manage cultured fisheries) circulated a discussion paper on problems and opportunities in clam fishery management to harvesters, processors, aquaculturists, First Nations and coastal communities throughout B.C. The discussion paper combined a traditional concern for licence limitation with innovative ideas circulating within DFO about how to involve communities in management.

All groups who received this paper agreed on the need for reform and five groups submitted written proposals about specific changes they wanted to see in their areas. Three of these proposals focused on the creation of local management boards, some form of licence exclusion tied toriocal areas, and co-operation in management between aboriginal communities and non-aboriginal commercial harvesters' groups.

One of the three proposals described above came from Area C. It actually consisted of two similar proposals, one from the Sliammon Band and one from the non-aboriginal clam harvesters association in Area C. These groups had each had significant internal policy discussions in 1993, both before and after receiving the DFO/MAFF discussion paper. Parallel thinking allowed these groups and DFO to come together in early 1994 in a meeting which DFO asked the Sliammon to chair. Their joint plans were adopted later in the year as a DFO-sponsored pilot project which will be evaluated March-September 1995 for possible continuation.

Specific Problems. As noted above, DFO had identified the need for stronger fishing effort controls, and at least one branch of DFO favoured licence limitation in Area C as a better way to deal with the problems which had appeared in the 1980s. The Sliammon and the Area C Clam Harvesters Association also independently identified the following problems which concerned them:

(a) poaching, both in-season and out of season, by both locals and non-locals, due to an extremely high abundance of clams on Savary Island (250 clams/sq. meter), and due to inadequate monitoring and enforcement;

(b) too many harvesters (no limited entry, up to 290 licensed diggers on beaches in Area C on which 100 diggers could probably make a sustainable living);

(c) inadequate data and data-gathering methods on clam abundance. Like many local harvesters worldwide, and in our case studies, local clammers believed that DFO methods on Savary Island did not adequately sample clam abundance on their beaches. They believed there was an inherent difficulty in measuring clam abundance by the DFO random sampling method, because of the patchiness of clam distribution. (In other areas DFO used CPUE indices).

(d) pollution of many beaches in Area C. This forced the closure of traditional harvests in some areas, and caused the Sliammon to initiate the Powell River Environmental Review Committee and a community health study. Health concerns (including concern about dioxin pollution)

make it especially important to have an orderly, traceable product taken by known harvesters and sold to known processors at known times.

Parties Involved.

(a) The Sliammon First Nation, who traditionally dig clams on Savary Island, and whose most accessible beaches were being depleted by the more intense harvesting strategies of other diggers. The Sliammon have 60-70% unemployment and depend on income from commercial clamming as well as home use.

The Sliammon learned of DFO's interest in bringing in a limited entry or ITQ system in clam harvesting through the DFO discussion paper, and through hearing about recommendations made at the annual Inter-tidal Sectoral meetings. The Sliammon became extremely concerned about their future in the clam harvest. Their main experience with licence limitation programs in the past had been exclusion from species they had previously harvested commercially. They were also dubious about quotas which might be sold away from their community. They put together a series of recommendations on what a clam plan for Savary Island and Area C should include and initiated meetings with other local diggers to form a local committee.

The Sliammon also asked for support and involvement of the Sechelt and the Klahoose, the other First Nations in Area C who traditionally dug clams partly in Area C and partly in adjacent clam management areas (although not in recent years). The Sechelt First Nation now chairs the Area C board, and has received a share of the "make-up" licences, which were divided approximately equally among the Sliammon, Sechelt, and Klahoose.

(b) The Area C Clam Harvesters Association in Lund, Powell River, and Savary Island felt that they "got the industry started" and deserved a more prominent role in management. They had participated in the past in the Inter-tidal sectoral meetings as the sole commercial representatives of the area. After initial discussions with the Sliammon, they forwarded a series of recommendations on what a clam plan would contain to DFO. Their recommendations closely paralleled the Sliammon proposals.

(c) DFO, which at first wanted limited entry, and possibly ITQs. DFO was on the point of announcing a limited entry program, when the Sliammon and other First Nations intervened. At meetings it became evident, however, that local parties also wanted to limit the number of licences. However, they wanted to participate in drawing up the criteria for how many licences there should be, who would receive them, and how appeals and transfers would be handled. By an agreement in principle, all parties supported a plan for the 1994-95 season.

The Process of Forming a Local Institution

The Sliammon called a meeting with local non-aboriginal clam diggers in early 1994. This group decided to call themselves the Area C management committee. They agreed to meet once a month in 1994 to hammer out the principles of clam management on which they could agree. These principles eventually became the following, most of which have been implemented to some extent in 1994:

(1) A 50/50 split on the board of aboriginal/non-aboriginal seats. The board became six to eight members, three or four from the local First Nations, the other three or four from the Area C Clam Harvesters Association, from a part-time local processor, and from DFO.

(2) The board and the clam diggers should be limited to local area residents and to those able to make a livelihood from clamming.

(3) An annual sustainable harvest from Savary Island and Area C should be determined over time with local participation. The process should start with the current best estimate of DFO of 250,000 lbs. for Savary Island, and another 250,000 lbs. for the rest of Area C. At $1.35 a pound (up to $1.70 on Savary Island), only about 100-110 people can make a living). The number of local licensees should aim at this figure.

(4) A stock assessment index should be based on different criteria than those currently used. A CPUE index should be used, based on what a reasonable local person would dig in one day, "a median harvester effort/production" (100 lbs) instead of an arbitrary quota. (A quota is not used for the rest of Area C: 250,000 is an estimate of the harvestable clams of legal size). This suggestion was made by a non-aboriginal clammer, but parallels the aboriginal conception of acceptable abundance levels. If CPUE falls below this, a closure would be triggered.

(5) A stock assessment workshop should be held jointly (Sliammon, Area C Clam Harvesters Assn, Savary Island residents, DFO, provincial scientists) in order to arrive annually at a better approximation of a sustainable harvest rate. A clam harvest should not be opened until there is consensus on what the rate of harvest should be. (A workshop of this sort is already planned).

(6) The method of allocating licences to local residents should be the following: Those local residents who held licences for Area C in 2 out of last 3 years (1991-1993) should be allocated licences on a pilot basis. This would make 55 non-aboriginal licences and 55 aboriginal. On the aboriginal side, 28 licences would be based on these formal participation qualifications and 27 more "make up" licences would be allocated by the Sliammon based on their discretion. The Sliammon would be responsible for allocating any licences to other First Nations in Area C. (An agreement has been drawn up by the Sechelt for the division of the make-up licences between the Sliammon, Klahoose, and Sechelt, each to receive an approximately equal share. As a result of appeals in July-August 1994, both the aboriginal and non-aboriginal sectors now have 64 licences, making the total 128).

(7) The criteria for non-aboriginals to appeal a licensing decision should be the following: (a) They must have been a resident of Area C for 5 years, (b) They must have held a clam licence for two of the last 5 years, (c) They must show significant income from the clam fishery based on income tax returns for two years, (d) Their lack of training for other job opportunities might be considered.

(8) Licences should be non-transferable.

(9) The board should review all the results of the season post-season. At this meeting, everybody should agree on what happened and agree that poaching needs to be stopped and discuss how this can be done.

(10) A guardian is needed for Savary Island, The position should be funded from a 5% levy from the clam harvest.

(11) The processors and clam lease holders ("clam farmers") who buy Savary Island clams out of season should be brought into a discussion of the need to stop this practice, which compounds management difficulties. The digging and buying season should be Oct. 1-April 1. (Some of the offenders are Powell River residents and the process is delicate; it has not yet occurred. The clam season was October 1 to December 31st, because there were less clams than estimated).

(12) There must be a system to use the 5% levy to reseed the beaches and transport immature "high tide" clams, as well as to reseed beaches used in the sport fishery.

In addition to this program, there is also a small Aboriginal Fishing Strategy (AFS) clam fishery for Inner Squirrel Cove (inside Area C) which is managed as a food fishery site by the Klahoose and DFO for aboriginal commercial and food fish harvest Only.

Characteristics of the Multi-Party Clam Management Board Process include:

a) Accountability: DFO must agree; aboriginals and non-aboriginals must agree.
b) Representativeness: includes all local commercial fishermen
c) Effectiveness: reached agreement on principles, achieved fairness to current participants and aboriginals excluded in past
d) Adaptability: proposes to learn sustainable harvest rate by doing

Summary of the Multi-Party Clam Management Board Process

Major Problem: excessive effort in past led to overharvest
Major Focus: allocate fewer licences, exclude non-residents
Scope: enforcement, stock assessement, monitoring
Local Institution: local board, 50% aboriginal
Human Scale: 3 aboriginal, 3 non-aboriginal communities
Scale Of Area: about 125 km. long, average 10 km. wide
Type Of Actors: 2 distinct First Nations, heterogeneous others
Number Of Parties: commercial harvesters only, DFO
Level Of Operation: regional
Type Of Fishery: day harvest on low tides with hand shovels
Economic Benefits: high CPUE, low costs
Relationship With DFO: DFO participates on board, can overrule board decision for conservation, but works with community to solve problems

PART FIVE: MULTI-PARTY HABITAT PROTECTION AND WATERSHED RESTORATION

This section deals with multiple parties (aboriginal communities, non-aboriginal fishermen, and other water users) who have formed watershed-wide working groups for the purpose of protecting or restoring watershed health. These groups are particularly valuable for their potential to take an ecosystem approach to analyzing and solving problems caused by factors which affect the entire watershed. Multiple parties working together are also likely to muster the political muscle to get the problems addressed. All the examples involve aboriginal and non-aboriginal groups workingtogether, but the watershed size varies a great deal. The Mitchell River watershed in Australia is the largest, and the Shuswap example deals with a very small sub-basin. The Kennedy River system in BC is a more complex case, because part of the group is also involved in larger issues affecting sustainable harvest levels.

Chapter 11: A Multi-Party Watershed Management Working **Group On The** Mitchell River, Queensland, Australia

(Source: Cordell 1991, Carr 1993, Smyth 1993, Carr pers. com.)

What do aboriginal fishing rights mean? Australia and Canada are both struggling with the issue of aboriginal fishing rights. Both countries have recent court decisions which recognised, but did not clarify, the right. Both countries are searching for new institutions to express the right. There is also some very general parallel to Canada in Australia's north/south split. While the aboriginal fishing issue has little play in Australia's more urbanised four southern states, the three northern states of Western Australia, Northern Territory, and Queensland recognise aboriginal fishing rights to varying degrees. Queenland is the only state so far to involve Aboriginals formally in fisheries management. The forms of involvement include (a) representation on local advisory committees, (b) bag and size limit exemptions for aboriginal subsistence fisheries, (c) preferential aboriginal communal access to commercial fishing licences, and (d) aboriginal participation in enforcement of state regulations.

The Kowanyama aboriginal community. The evolution of formal recognition of aboriginal fishing rights provides a context for the leadership of the Kowanyama aboriginal community (population 1000). Living at the mouth of the Mitchell River in western Cape York Peninsula, Queensland, members of this community took the lead in forming the Mitchell River Watershed Management and Working Group in 1990 (Fig. 17). This group has caught the attention of government and stimulated policy development in Queensland. The structure and activities of the group demonstrate the unifying role that aboriginal communities are in a position to play in promoting a focused and united effort on watershed and fisheries habitat protection problems.

Focus. The working group had its origin in the Northern Fisheries Resource Conference organized by the Kowanyama community in 1988. The conference provided a forum for the airing of their concerns to the Queensland Commercial Fishermen's Organization and to government bodies. The concerns included not only the aboriginal role in fisheries management and aboriginal rights of access, but also the need for all parties to work together on issues such as the decline of fish populations over the preceding decade and the lack of good fisheries data, adequate enforcement of existing protective laws, and an integrated analysis of cumulative effects of watershed activities on fisheries. The need to incorporate local knowledge and experience into government planning was also a major concern of the conference.

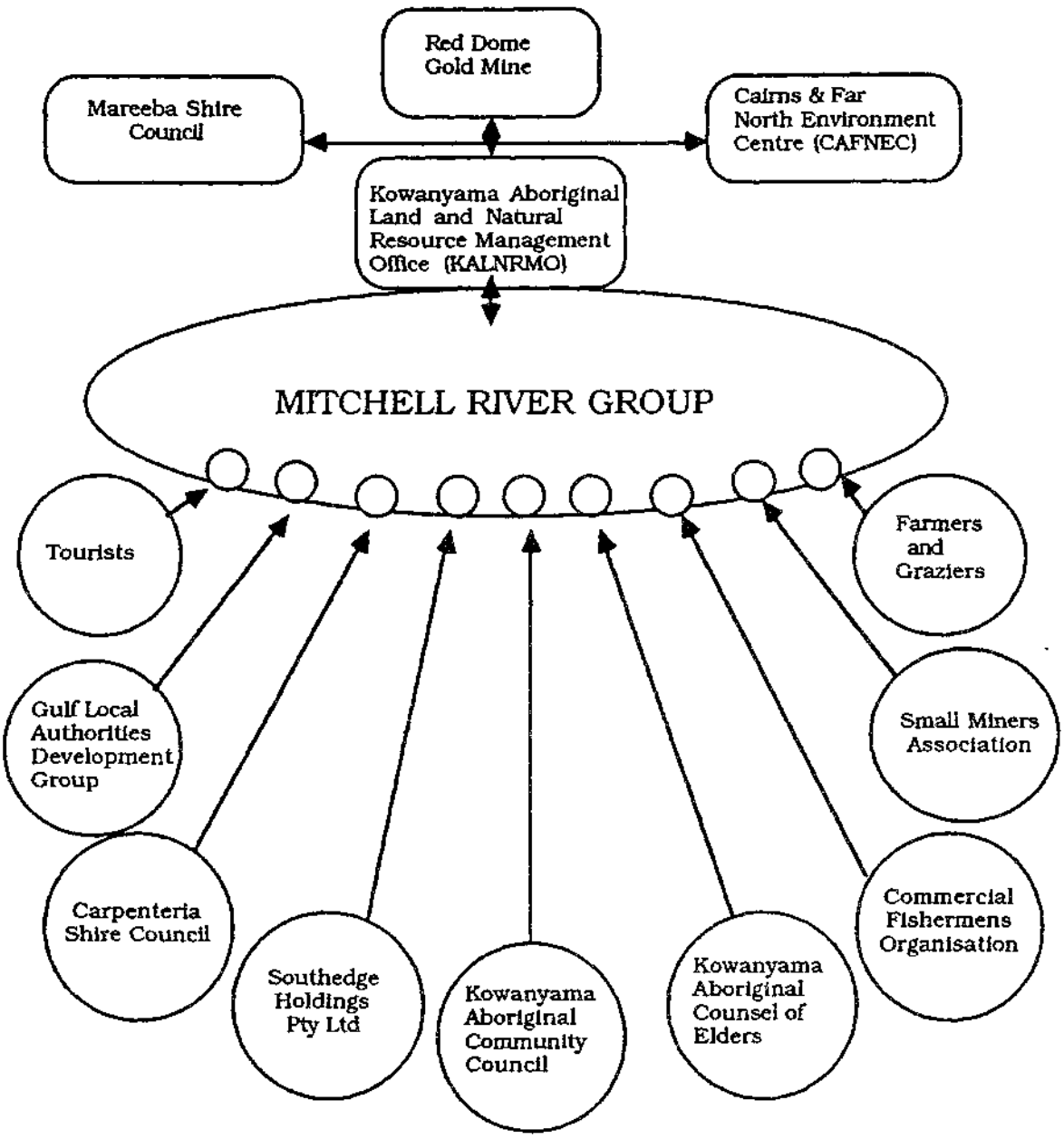

Fig. 17. MRWMWG community network

The Kowanyama Council had already worked successfully with the local branch of the Queensland Commercial Fishermen's Organization since 1986. The leaders from these two organizations had formed a strong alliance with one another, based on a shared vision of the need to protect the fisheries habitat and to better monitor fishing on the river. Together they had successfully lobbied government to close significant areas of the lower Mitchell River system to commercial and sport fishing.

Scale of unit area. The Mitchell River runs west for 500 km across the widest part of the Cape York peninsula in northern Queensland (Fig. 18). The watershed encompasses 72,000 square kilometres and has a humid to sub-humid tropical climate with well defined wet and dry seasons, including floods and droughts. Woodlands, open savannahs, and wetlands cover most of the watershed, where grazing has been the predominant land use since Europeans settled the area in the late 1800s. There is also some small crop and dairy farming in the higher elevation top of the watershed.

Type of fishery. The Mitchell River contributes the biggest commercial fishing harvest in Australia and is an important subsistence fishery for the Kowanyama community at its mouth. Barramundi (a sea bass or giant perch weighing up to 60 kg.) is taken commercially in set gillnets in the tidal reaches and estuaries of the river and nearby coastal mud flats. (In other rivers it is also trapped). Barramundi is also a recognized game fish valued by anglers, especially in fresh water. The river provides the major habitat, since barramundi are catadramous: they spawn in estuaries and tidal flats but live much of their adult life in freshwater.

Human scale of management unit. Small communities are scattered throughout the watershed, but a large part of the watershed population of 7,500 is in the upper watershed, where the town of Mareeba, the Red Dome Mine near Chillagoe, and a number of smaller gold and other mining operations are located.

Type of actors. The predominantly rural population in this isolated region-with almost no all-weather roads and electric power lines-is skewed toward young males labouring in agriculture, fisheries, mining, and grazing. There is a higher proportion of Aboriginal and Torres Straits Islanders living in the watershed than there is elsewhere in Queensland.

Major problem addressed. From a fisheries perspective, the major watershed problems are:

1. siltation into the river, caused by alluvial mining and overgrazing, leading to stream bank erosion; wild pigs contribute also to the problem by disturbing wetland plants bordering lagoons, resulting in eroding banks;
2. the spread of rubber vine, an introduced noxious weed which causes extensive degradation of riverine vegetation throughout the whole watershed, destabilizing riverine vegetation and killing mature trees, causing river banks to collapse and erode;
3. declining water quality, caused by the run off of agricultural chemicals, and town sewage effluents, in addition to leaching arsenic and cyanide from old mines at the top of the watershed where small miners drive caterpiller tractors;
4. the proposed damming of the upper watershed, related to the development of a major irrigation works and tourist centre of 150,000;
5. illegal fishing and the alleged use of unlicensed airstrips, barges, and seaplanes to remove fish from the upriver watershed area, which is almost inaccessible to either enforcement officers or the Kowanyama community during high water at the beginning of the fishing season;
6. poor data on river fish populations.

Some watershed residents at the top of the watershed are also concerned about these issues. In addition, they are worried about the capacity for dryland salinity to affect sugar, tobacco, and horticultural crops.

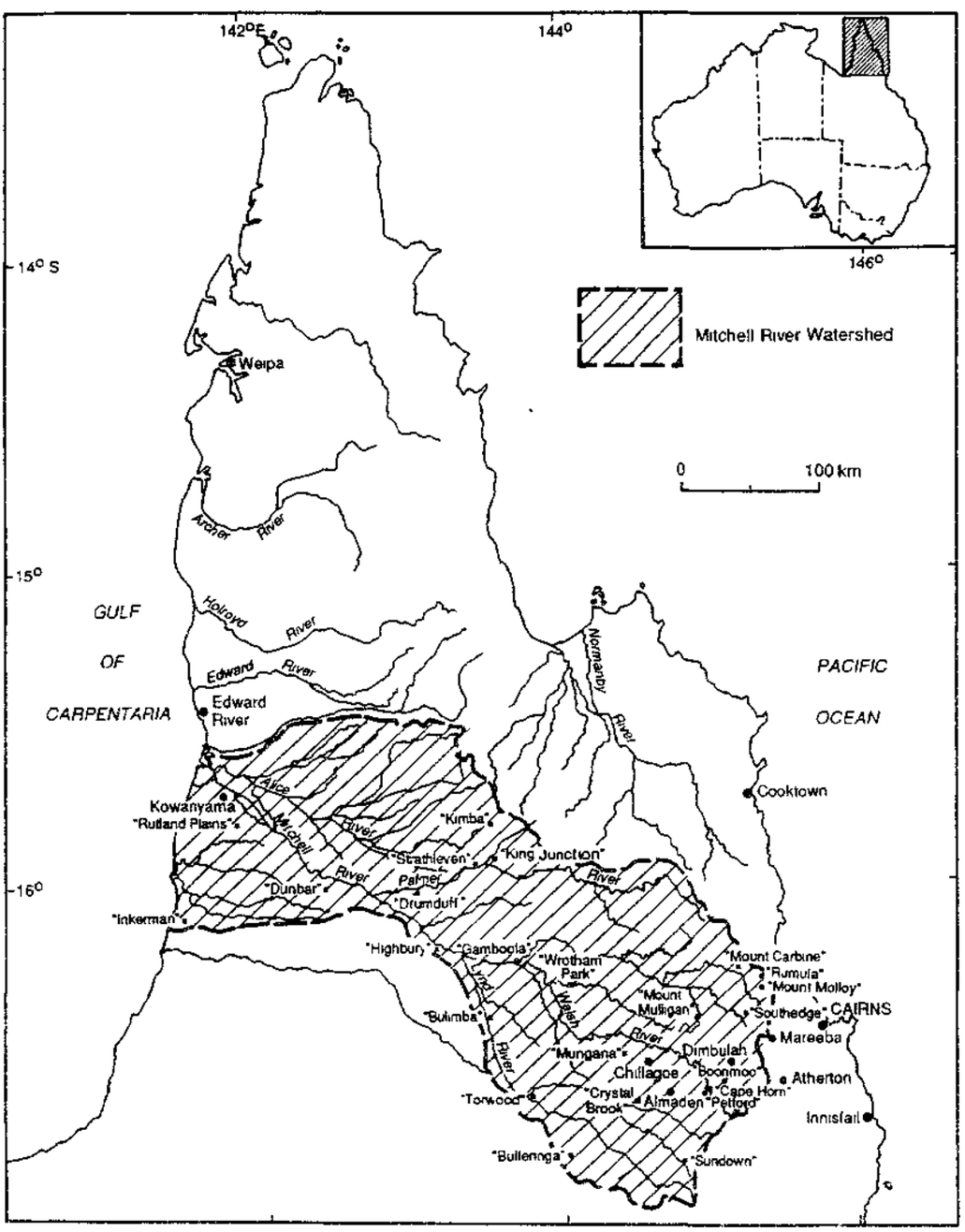

Fig. 18. Geographical location of the Mitchell River Watershed. Source: Carr 1993.

The Mitchell River Watershed Management Working Group (hereafter called "the group") was formed following a conference hosted by the Kowanyama Land and Natural Resource Management Office (KALNRMO) in June 1990. Those attending the conference agreed on the vision, goals, and objectives for the group, as well as a recommended list of participants.

Local management institution. The working group was composed of 13 community representatives (Fig. 17) and 16 governmental representatives. Community representatives came from aboriginal community associations (Kowanyama Aboriginal Community Council, - Kowanyama Aboriginal Counsel of Elders), from the aboriginal regulatory authority (Kowanyama Aboriginal Land and Natural Resource Management Office), from the Queensland Commercial Fishermen's Organization, from grazers and farmers, from the tourist industry, from two or the three Shire (county) Councils within the watershed, from a regional environmental centre, and from the Red Dome Gold Mine.

Relations with government. State government agencies with representatives on the group include: Queensland Department of Primary Industries (DPI), (the lead agency in this group and the umbrella agency for the Division of Agricultural Production, the Division of Water Resources, the Division of Land Use and Fisheries), Department of Environment and Heritage, Department of Business, Industry, and Regional Development, Department of Minerals and Energy. The watershed obviously does not escape the conflicting jurisdictions problems, but does go some distance in dealing with it through the leadership of the QDPI, which has primary responsibility for watershed management and is a major supporter of the group. In early 1993 the QDPI and the group jointly hired a facilitator for the group to run the meetings and to take on the bulk of its growing administrative responsibilities.

The group was originally organized and run by the community members in 1990, but by 1993 it invited the government representatives to become full participating members instead of observers. However, governmental members still act mainly in an advisory role to the group and strive not to influence group decisions. Government's observations of this group's work were influential in the development of a state policy on watershed management, in Australia called "integrated catchment (watershed) management", introduced by Queensland in 1993. Using the Mitchell River group as a model, Queenland's (and now even Australia's) ICM program recognizes the linkage between social and natural systems and supports a bottom-up approach to achieving sustainability. Government recognition of the importance of this approach to watershed problems has enabled the Mitchell River group to attract funding for the projects it has undertaken.

Most important outcomes. The group has conducted a series of field trips which allow members to get to know each other in an informal setting while learning more about the specific problems in different parts of the watershed. Trips have included: a tour of a wolframite mine, a traditional feast at Kowanyama with speeches by tribal elders underscoring the importance of co-operation, a trip to the development project at the head of the watershed to discuss concerns about the proposal. Local projects of the group include:

1. working with the Tropical Weeds Research Centre to identify places where rubber vine rust can be released to control the spread of rubber vine;
2. establishing a demonstration site in the upper part of the watershed to illustrate land degradation control measures used to stop an advancing gully, and erecting signs to promote public education about this process;
3. sponsoring a salinity workshop in the upper watershed agricultural belt, leading to the formation of a sub-committee of 14 local growers and industry representatives now meeting regularly to develop an action plan for ground water management;
4. producing educational materials about the concerns and activities of the group, in an attempt to involve the larger public.

Fisheries management activities being conducted by the fisheries interests which have implications for the work of the watershed group include: joint projects to generate more data on fish abundance, genetics surveys, the hiring of an aboriginal enforcement officer, helicopter surveillance, and the closure of particular parts of the river to fishing. Since these activities are not sponsored by the watershed wide group at this point, we do not include them in the assessment of the group. Nevertheless, they clearly constitute local management activity in stock assessment, harvest management, and enforcement; the group has the potential to be more involved in this work.

The full group meets every three months in a location which rotates from the bottom to the top of the watershed. Group members share rides to the meetings, as travel is costly, and travel is unfunded. Meetings are open to the public, but follow a structured agenda, with a process which moves forward energetically through the dynamism of a well-respected chairperson who "keeps the ball rolling". Members elect the chair, secretary, and treasurer, although the facilitator has taken over most of the latter two functions. A smaller executive committee makes routine decisions by telephone and fax.

In summary, the management rights being exerted so far by the group are in the policy area of scoping problems and identifying major concerns as being in the public interest. The group appears to be putting itself in a position to begin addressing three major problems from a fisheries perspective: (1) the problem of externalizing the costs of habitat protection, (2) the confusion of public values with dominant economic interests, and (3) enforcement of regulations. In addition, three other problems are on the table: (4) the uncoordinated use problem, (5) the undervaluing of human capital problem, and (6) inter-jurisdictional conflicts.

Broad array of actors: risks and opportunities. The way these problems are approached will be influenced by group structure. Group structure in the Mitchell River differs from the others discussed so far in its inclusion of a much larger array of actors, and especially non-fishing actors. Since the fisheries habitat protection concerns are being discussed with the parties who are the cause of some of the habitat degradation, the group structure offers two potentials.

Potential 1: Interests such as mining, tourism, urban development, grazing, and farming which either directly or potentially conflict with fish habitat protection may inhibit the degree of activism on these issues which might otherwise occur.

Potential 2: When non-fishing interests learn more about fisheries habitat issues, and the vital concerns of fishing parties and the government agency charged with the protection responsibility, they may be more willing to discuss and support regulatory and remedial measures. The remedial and regulatory measures may be more appropriately designed as the best trade-off in protecting habitat with the least possible impact on the industries. It is in the interests of non-fishing parties to be involved at the very beginning stage of regulation, and also to appear as public spirited as possible. To the extent that fish are viewed as public, and aboriginal, resources, the debate is framed at least partially as a case of the public interest vs. private rights.

Government **and** private interests. The participation of government agencies as observers is very important in this process. Without this kind of public process, private lobbies of government agencies might have more influence. With a public process, private parties have to make the case that their private interests in the watershed are also-at least to some extent—in the larger public interest. This means that the inevitable trade-offs that will be made by governments will be under far greater public scrutiny and more subject to public debate and public policy principles. It is likely that far more information will be demanded and generated about the state of the resource and the known and unknown impacts of various other activities. All this is more likely to favour better habitat protection as seen through the potential 2, rather than potential 1 scenario. Group structure

is also likely to create unusual and potentially positive alliances, because of some significant overlapping interests.

Group structure may be particularly interesting to British Columbians in the way it represents the aboriginal community at several levels: the resource management governing body, the elders, and the larger community. The group seems to feel that these three different aspects of the aboriginal community play valuable and different roles at the table, and are all important catalysts in addressing fisheries habitat problems.

In summary, the Mitchell River Watershed Management and Working Group in this first developmental stage is already involved in the following management functions (see Table 12):

2. policy making:
a) informal scoping of problems
b) informal setting of objectives
c) informal research of key questions affecting community values
d) informal public education

3. monitoring of habitat:
a) informal accessing government information
b) informal collecting own information
c) informal interpreting information in light of local knowledge

4. resource use co-ordination: informal communicating problems and trying to solve them with others

The characteristics of communities involved in this process are:
1. A high level of dependence on watershed resources.
2. A high level of vulnerability to non-sustainable use of at least one watershed resource on the part of most players (miners are the exception).
3. A strong identification with the area on the part of fishing, grazier, and farming interests.
4. An unwillingness to alienate the resource from the community on the part of fishing, grazier, and farming interests.
5. A considerable degree of overlap in the interests of the parties most oriented toward sustainable management; the possibility of strategic alliances in addressing the need for local influence on decisions.

The characteristics of the Mitchell River working group are:

1. accountability:
a) open public discussion of issues
b) agreement on existing problems and willingness to research causes of problems
c) a process including government and watershed communities which can lead to a balancing of public and private interests.

2. effectiveness:
a) likely to generate much better data on watershed resources as a group than as parties alone
b) important alliance between commercial and aboriginal fishermen
c) other overlapping interests in water quantity and water quality management which can lead to significant alliances and common interests in moving on issues
d) energetic leadership and professional facilitation
e) group where resident communities take the lead, while government participates as sympathetic advisors and supporters
f) willingness to work together in testing a new model likely to attract considerable funding for local projects.

3. representativeness: all parties who are affected by decisions are at the table, including parties which will suffer from fisheries habitat damage, and those which have been passing the cost of their activities onto the public or fishing communities. Aboriginal communities represented in three ways (as government resource agency, as elders, and as community of users), as a way of expressing within a multi-party context their special rights of access and management.

Summary Of Major Characteristics Of Mitchell River Working Group

Major Problem Addressed: poor data on causes of fish decline
Major Management Focus: monitoring of habitat destruction, poaching
Scope Of Activities: co-ordinate uses, education, regional planning
Outcomes: mutual commitment to co-ordinate activities, generate data
Local Institution: representatives from all watershed interests
Human Scale: 7,500 watershed residents.
Regional Context: Northern Australia recognizes aboriginal role in fisheries management
Scale Of Unit Area: 500 km. long, 72,000 sq. km.
Type Of Actors: heterogeneous, local, multiple fishing sectors, sectors which potentially threaten fish habitat
Level Of Operation: regional
Degree Of Institutionalisation: trust-building, goal setting stage
Degree Formalized: informal
Type Of Fishery: in-river fixed gear subsistence and commercial, inshore fixed gear commercial
Role Of Community: aboriginal and non-aboriginal fishermen seek to educate other residents about habitat protection
Role Of Government: financially and morally supportive, treated as pilot project
Possible Relevance To BC:
- Multiple role of aboriginal interests on Working Group is a way to express their special position and rights in the fishery.
- Non-fishing interests have an opportunity to understand habitat protection issues and consider public policy implications of their actions.
- Task orientation of Working Group offers hope of concrete achievements, even in absence of broad agreements.
- Development of fishing-based alliances and the discovery of overlapping interests among different parties offers hope of at least some united actions being taken.

TABLE 12 MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES- Mitchell River Watershed

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	PROPERTY RIGHTS AND DUTIES	MRW
1. POLICY MAKING AND EVALUATION			
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS	Right/duty to do long-range planning	Informal
	SETTING OBJECTIVES LONG RANGE PLANNING	Right to research key questions affecting community values	Informal
	RESEARCHING THE RESOURCE SYSTEM	Right/duty to educate own and larger community re problems	Informal
	PUBLIC EDUCATION		Informal
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE			
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION	MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	NO
		Right of access to government information	Informal
		Right to collect own information	Informal
		Right to interpret information in light of local knowledge	Informal
UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF CONDITION OF STOCK	Right/duty to enhance or restore a) resource/resource productivity b) habitat	NO
3. COMPLIANCE WITH RULES			
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules re: a) harvesting b) habitat damage c) exclusion and poaching	NO
4. FISHERY HARVEST			
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own	NO
		Right to interpret information in light of local knowledge	NO
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re: a) size of overall catch b) location of the fishery c) timing of the fishery d) gear types permitted e) size of allowable interception	 NO NO NO NO NO

CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	HARVEST MONITORING	Right of access to government information and right to collect own	NO
UNDERVALUING OR IGNORING HUMAN CAPITAL		Right to interpret information in the light of local knowledge	NO

5. FISHERY ACCESS			
DEFINING BOUNDARIES AND ACCESS: EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude: a) certain classes of fishery (e.g. sport, commercial) b) certain classes and sectors of fishers	NO
	HARVEST ALLOCATION	Right to allocate: a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to redistributive mechanism	NO NO NO NO
	TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members	NO
		Right/duty to regulate conditions of transfer	NO

6. RESOURCE USE COORDINATION			
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNING THE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses	NO
		Right/duty to communicate problems and try to solve with others	Informal
		Right/duty to resolve disputes internal and external	Informal

7. RETURNING OPTIMUM VALUE TO FISHERMEN			
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING	Right to manage harvest timing for optimum product value	NO
	PRODUCT QUALITY		NO
	PRODUCT DIVERSITY		NO

CHAPTER 12. SHUSWAP MULTI-PARTY WATERSHED PLANNING COMMITTEES

(Source: Pinkerton, Moore, and Fortier 1993)

The problem. Uncoordinated land use practices in the Fraser River and Thompson River drainage have led to the gradual erosion of fish habitat and the productive capacity of many tributaries. Flooding (which damages rangelands), landslides, soil erosion, and simplification of stream channels (loss of quiet pools for migrating salmon to rest or spawn) have led all parties to the conclusion that united and co-ordinated action is required (see Figure 19).

Focus. Co-ordinated and integrated planning of local sub-basins by all local actors is the means by which local residents hope to restore their fisheries, farmland, forests, rivers, and rangeland to some kind of sustainable pattern of management. Aboriginal and non-aboriginal actors feel equally powerless in getting government departments to work together on this problem, and especially to generate the data needed for planning.

Scope. Local parties intend to produce sub-basin plans for their local area, through which all local resources can be managed sustainably. So far they have assembled the political will and the committees in two local pilot project areas, and carried out habitat restoration work and salmon escapement enumeration work.

Human scale of management unit. A small band in one sub-basin has a population of 200, while scattered rural non-aboriginal households are also under 200. Aboriginal and non-aboriginal population are about double in the second pilot.

Geographic scale **of unit** area. The smaller pilot project is located in a 20 mile long valley of about 80,000 acres. The larger pilot area is about twice as large.

Regional context. The Shuswap territory as a spawning and rearing area supports an annual average production of about 57%. of all Fraser River sockeye salmon, as well as 25 to 34% of Fraser River chinook and coho salmon respectively. Some 110 different salmon stocks reproduce in Shuswap territory, and an additional 40-50 stocks migrate through the territory to spawn in tributaries of the upper Fraser. This is one of the most important spawning and rearing areas of the province.

The Shuswap regional body which initiated the policy of local watershed planning through multi-party committees is the Shuswap Nation Fisheries Commission, which draws its mandate from Shuswap Nation Tribal Council, the governing body of chiefs for the Shuswap territory. The policy was ratified by the SNTC on the understanding that the local bands which initiated pilot projects would develop clear terms of reference, for their watershed committees.

Level of operation. Local only

Type of actors. All parties are local long-term residents of rural communities, mostly at least third generation, with a strong place orientation. Aboriginal and non-aboriginal actors have similar ways of making a living (ranching, logging, sawmilling), except that aboriginals are also involved in small-scale fisheries enhancement and research and in food fishing.

Number of parties. Local parties involved in the planning committees are aboriginal and non-aboriginal land-owners in the smaller pilot. Regional sport fishermen have participated in co-ordinated restoration work.

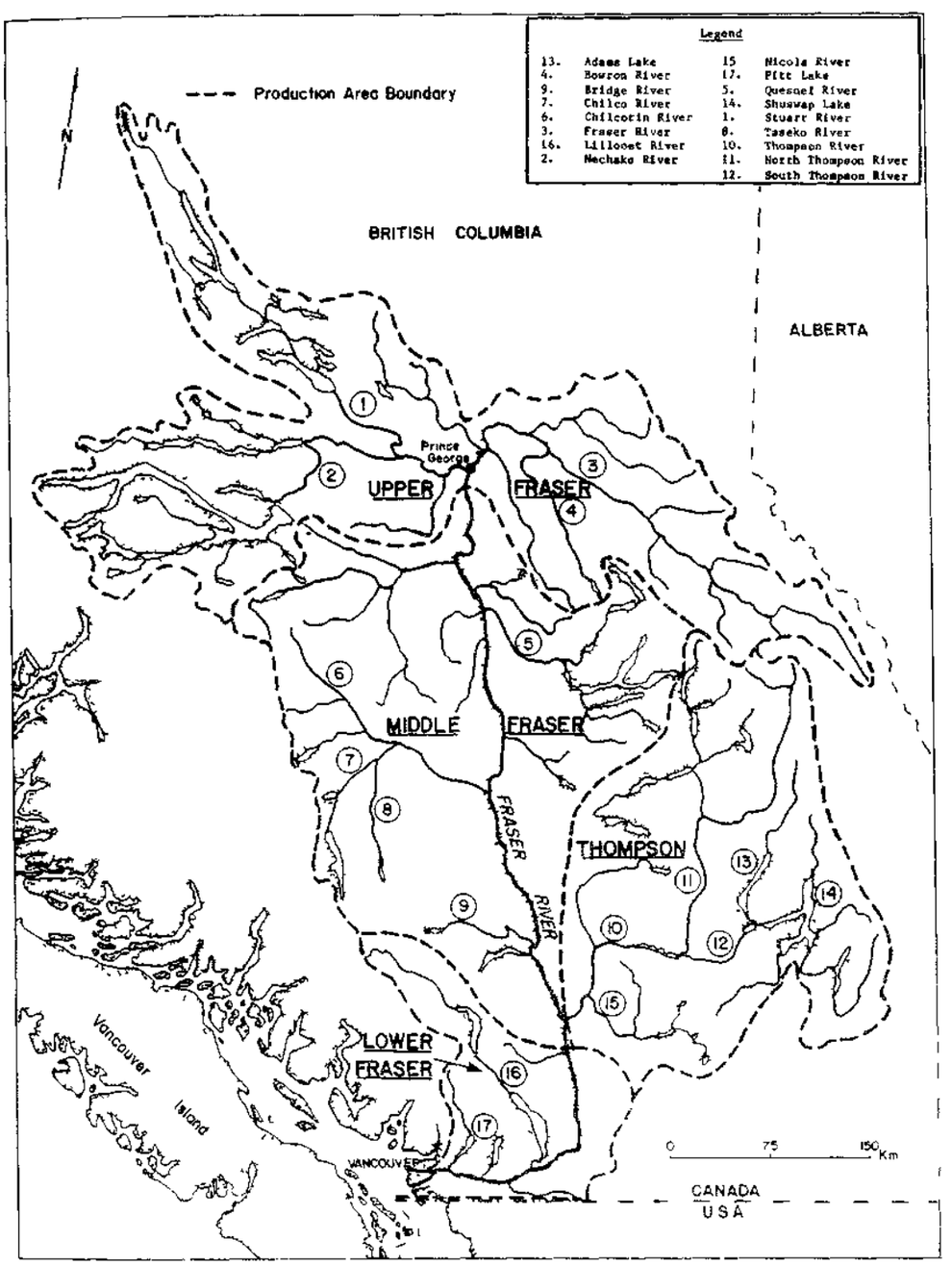

Fig. 19. Location of watershed committees are at 10 and 11.
Source: Salmon Stock Management Plan Discussion Document 1988.

Local Institution. The Shuswap band in each pilot area assembled a committee of self-selected non-aboriginal neighbours who represented the diversity of occupations in the valley. In a strictly legal sense, these committees are only advisory to a First Nation with more clearly defined rights. However, the Shuswap realize that the committees will not operate effectively if they feel powerless. Therefore, the committees operate on a consensus basis, and there are pressures to clearly articulate any disagreements among parties in terms of principles which all parties support. The committees are in the process of spelling out these principles, and see the need to articulate a common vision for their area.

The importance of significant overlapping interests. Perhaps the main reason the watershed committees are likely to be successful is that many local parties really do have important interests which overlap. For example, if a watershed is logged too fast, flooding will occur more frequently and be more difficult to control. Flooding causes damage to both fish habitat and to fields. In the past, both aboriginal and non-aboriginal ranchers tended to clear fields up to the stream banks in order to maximize pasture. Now ranchers see the importance of a forested riparian zone to stabilize stream banks and a sustainable rate of logging which will not radically destabilize water flow for irrigation and domestic water supplies in the entire valley.

Relationship with government. The centre around which each local committee has built its activities is a small DFO research hatchery operated as part of DFO's Community Economic Development Salmon Enhancement Program. These facilities have enabled some staff time to be dedicated to the watershed committee meetings, which are hosted by the bands. One committee has worked partially through the Ministry of Forests' regional planning process; the other committee has operated independently of government. Both committees are stand-alone bodies which have no formal or informal connection with government at this point, other than the Shuswap regional government. ,One band did obtain funds from Ministry of Environment for a habitat restoration project, and participated in an MOE post-flood streambank assessment.

The management functions to be performed by the Shuswap watershed planning committees are the following:

1. coordinating conflicting uses. This is happening to some degree through small projects dealing with specific problems around water supplies, the spraying of herbicides, and to a larger degree through the creating of a common vision.
2. habitat protection and restoration. Projects sponsored by the band.
3. data collection and analysis, habitat assessment. This is occurring on a wide range of projects related to different kinds of conflicting use.

CHAPTER 13: THE KENNEDY LAKE SALMONID TECHNICAL WORKING GROUP AND THE WEST COAST SUSTAINABILITY ASSOCIATION

(Source: Bouillon and Marmorek 1994, Parnell and Marmorek 1994, unpublished materials, meetings, interviews 1995)

Major problem. The actions of the group attack a persistent problem: the failure of formerly significant sockeye salmon stocks in the Kennedy Lake system to recover from a historic low point in abundance, and a lack of data on which to base any analysis and management prescriptions for dealing with this problem. This case shows the potential for co-ordinated local action.

Management focus. The group is analyzing the problem in enough detail to be able to take the specific actions needed to bring the sockeye stocks back to the level of abundance that can be supported by the system.

Regional context. The Kennedy Lake system is a grouping of connected lakes and rivers within Clayoquot Sound on the west coast of Vancouver Island, about 25 kilometers from Tofino and Ucluelet (see Figure 20). Before 1970, the Kennedy Lake sockeye stock size ranged from 20,000 to 160,000 returning adults. The Kennedy system supported commercial harvests of mostly sockeye salmon until 1972, when declines indicated closure of the fishery was necessary to sustain stock status. The stock size since 1970 has ranged from 7,000 to 60,000 returning adults. In 1982 the Tla-o-qui-aht First Nation (TFN) in Clayoquot Sound voluntarily ceased their food fishery for sockeye because of low abundance.

The Tla-o-qui-aht First Nation suggested the restoration of Kennedy Lake salmon stocks in response to a request from Ecotrust International of Portland, Oregon for ideas on community economic development projects to sponsor in the area. (Ecotrust had been active in promoting land status changes in Clayoquot Sound, and believed that environmental conservation occurs best in the context of economic development activity with low environmental impact).

The Clayoquot Sound regional fisheries biologist for the Nuu-chah-nulth Tribal Council (in which the Tla-o-qui-aht is one of 14 member bands), who works closely with the TFN, asked ESS A Technologies Ltd, a consulting group, to assist in developing a restoration strategy through their adaptive environmental management approach. ESS A organized the workshops, built the first simulation model of the Kennedy system, handled arrangements, data modelling, and report writing. ESS A chairs the group meetings as a neutral co-ordinator. Ecotrust covers the cost of meetings, data modelling, and report writing. Working group members donate their time. At the first workshop, the above parties assembled the names of others who could contribute to this approach and formed the full working group.

Political context. The working group now operates within the context of the 1994 Interim Measures Agreement between the province of British Columbia and the hereditary chiefs of the First Nations in Clayoquot and Barkley Sound near Tofino and Ucluelet. This agreement followed a protracted controversy over whether, how much, or in what manner Clayoquot Sound should be logged. It set up "a joint management process dealing with resource management and land use planning" with a mandate to "conserve resources for future generations of the First Nations...without prejudice to aboriginal rights and treaty negotiations" and (among other things) "to restore and enhance levels of fish and wildlife and damaged stream and forest areas within Clayoquot Sound, and protect rebuilt stocks." The Kennedy Lake Technical Working Group has now established linkages with the Central Region Board (the joint management body with final authority to implement the Agreement) and its Scientific Panel, and expects these bodies to play a major role in the implementation of its findings.

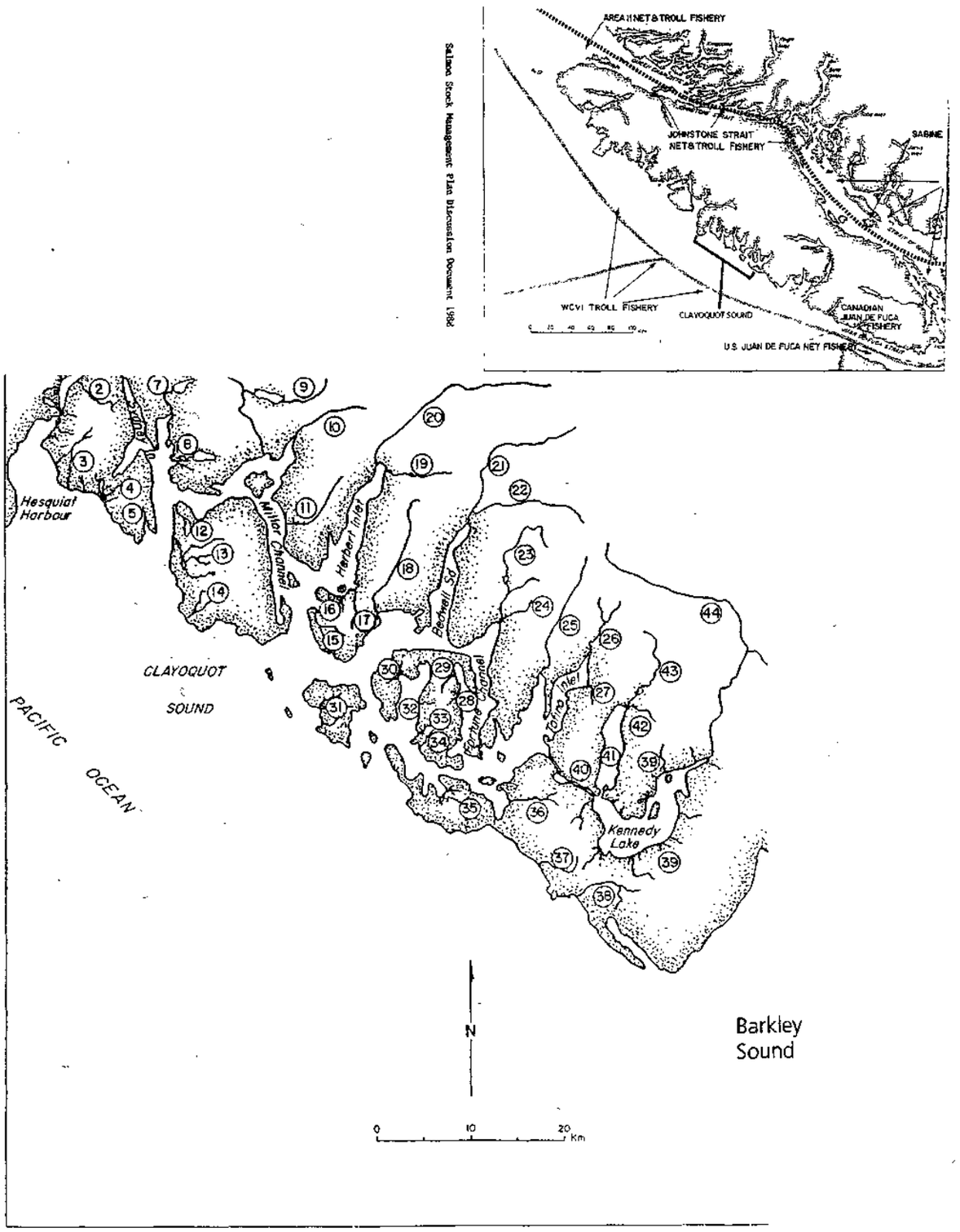

Fig. 20. Statistical Area 24, showing location of salmon-producing streams. Source: Salmon Stock Management Plan Discussion Document 1987.

Number of parties. The group includes local parties resident in Clayoquot Sound and Barkley Sound (immediately south of it), primarily from the aboriginal and non-aboriginal commercial salmon fishing and salmon enhancement sector, and from a local environmental research organization. Regional and province-level parties include DFO, Ministry of Forests, Nuu-chah-nulth Tribal Council (centered in Port Albemi), and MacMillan-Bloedel, a major forest company with headquarters in Vancouver.

Type of actors.

1. local, the Nuu-chah-nulth Tribal Council's Clayoquot Sound regional fisheries biologist
2. local, Tla-o-qui-aht First Nation (TFN) elders, councillors, and guardians (undergoing fishery officer training), who do spawning escapement counts on the streams and habitat surveys as part of their duties
3. local, head of the TFN Kennedy Lake hatchery, focused on restoring Kennedy River system chinook stocks
4. local, representatives from the Thornton Creek Enhancement Society, who have been doing spawning escapement counts and enhancement projects on the Kennedy system, and many of the streams in Clayoquot Sound and Barkley Sound for over 10 years. Commercial fishermen from the area and the Ucluelet and Toquaht First Nations support and participate actively in this society, which is a DFO Community Economic Development project in the Salmon Enhancement Program.
5. local, the retired local DFO fisheries officer in Clayoquot Sound who held that position for 30 years and holds a generation of accumulated knowledge on local stocks and their habitat. He also represents the Tofino Enhancement Society, which works closely with its sister organization in Ucluelet.
6. local, 5-10 representatives and some non-local volunteers from the Clayoquot Biosphere Project in Tofino, initiated in 1992 to study local ecosystems. It has funded the setting up and operation of two field stations on the Kennedy system in areas formerly too remote to monitor. A first generation of studies on the Clayoquot River (part of the Kennedy system) was conducted by two fish biologists on a volunteer basis. Later they received funding to continue the studies into a second phase. Student volunteers have staffed the field stations and provided important monitoring services. The Clayoquot Biosphere Project has a local board, some start-up funding, and an office building donated by a Tofino businessman,
7. regional government, DFO representatives, notably a research branch sockeye salmon specialist at the Nanaimo Pacific Biological Station who has been studying the west coast Vancouver Island sockeye systems for the last 15 years, and a habitat specialist
8. regional government, Ministry of Forests research branch specialist continuing the study of fishery/forestry interactions on Carnation Creek and a parallel newer study on Henderson Lake, both in Barkley Sound.
9. forest company, fish biologist for McMillan-Bloedel

Scale of unit area. The Kennedy Lake system drains an area of 53,500 hectares, with 116.4 kilometres of total streams and 78.4 kilometres and at least 110 known tributaries accessible to salmon.

Scope of activities. Since 1992 when the group was first formed, four workshops have been conducted. These began with the construction and critiquing of a stock model and the assembling of data on all possible factors contributing to stock decline. Stickleback predation on and competition with juvenile sockeye may be an important factor. When sockeye declined to a certain level, stickleback may have filled their ecological niche. The group considered several ways to test hypotheses about this relationship, as well as actions which could be taken to change it.

Another key factor may be the degree of clearcut logging in the watershed. About one quarter of the watershed had been recently logged; greater than 50% of the lakeshore and about 30% of the total stream length have been logged. The Kennedy system also contains an unlogged sub-basin

(Clayoquot River and valley) which can be compared to a logged river of similar scale within the system.

In order to properly test any hypotheses, consistent system-wide measuring of sockeye abundance is important. It is equally important to be able to measure differences in abundance in different parts of the system related to specific causes. The most recent workshop in September 1994 focused on coordinating data collection and data analysis of spawning escapement and juveniles by different parties in different parts of the system.

One strength of the process is that it combines local and traditional knowledge with scientific studies. The parties jointly reviewed the full range of enumeration techniques in use, and agreed on co-ordinated and standardized methods to minimize the overlap of different efforts and to permit comparisons across various survey results. In so doing, they discussed problems, issues, and questions which had arisen during their past enumeration efforts, and learned from each other.

Another strength of the process is the rare opportunity to co-ordinate and focus such an extensive array of efforts on a single problem. The Tla-o-qui-aht First Nation, DFO, Thornton Creek Enhancement Society, and Clayoquot Biosphere Project working together should enable an understanding of the system to be assembled which would be beyond the resources of any one group.

In September 1994 the Kennedy Lake Technical Working Group sponsored a representative sub-group of its members (called the Kennedy Restoration Group) in their application for funding from the Watershed Restoration Program of the BC Forest Renewal Plan. The application was successful, and now the Working Group will be able to extend its stock assessment work more effectively into habitat assessment and habitat restoration.

The management activities performed by the Kennedy Lake Technical Working Group and the Kennedy Restoration Group are the following:

1. data collection and analysis: including the use of local and traditional knowledge, and including having access to any information held by any party which can help with the analysis.

2. stock assessment: measure abundance and variations in abundance.

3. set harvest levels (via target escapements): When the Working Group has completed its analysis, it should be in a position to set target escapement levels (what portion of the stock is needed to rebuild it to a sustainable level of abundance), and thus to set acceptable harvest levels on the stock. Because data and analysis is shared by all parties, it is in a strong and credible position to make recommendations which no other party is in a position to contradict or overturn.

4. co-ordination of conflicting uses: if conflicting uses (such as logging in key parts of the watershed) contribute to the decline of sockeye stocks, the group will be in a good position to make the case that the salmon should receive more protection.

5. monitoring of habitat: assessing what habitat is used and what potential habitat is not used and why.

6. habitat restoration: restoring habitat which was once used and has been degraded.

7. research, scoping problems, setting goals and objectives: In addition to becoming part of fisheries management, the group also has the potential to influence fishery/forestry interactions through the Central Region Board and its scientific panel.

8. education and training: Part of the funding obtained by the Kennedy Restoration Group is dedicated to training local aboriginal and non-aboriginal people in stream restoration and in silvaculture, and in informing the local communities about these processes. The 1991 unemployment level was about 12% in Tofino and Ucluelet. Unemployment rates are far higher in local aboriginal communities.

The Kennedy Lake Salmonid Technical Working Group shows strong characteristics of the following:

2. *accountability*.
   a) producing information on resource status and subjecting its interpretation to debate by all parties
   b) scoping problems and reaching agreement on what real problems are, what further information is needed
   c) likely to reach agreement on what management actions are needed to address the problem
   d) likely to have clear, publicly articulated standards for evaluating management actions
   e) if some funding can be maintained, the group is likely to have timely feedback on management actions

3. *effectiveness*. Able to get parties to invest enough time and energy into researching the problem to be able to address it

4. *representative*. Local and regional governmental bodies, local environmentalists, local commercial sector, forest company

5. *adaptiveness*. If funding can be obtained, group is well-positioned to receive clear feedback signals from management actions taken, and to respond to problems and opportunities.

Summary Of Kennedy Lake Salmonid Technical Working Group

Major Problem Addressed: failure of stocks to recover after fishery closed

Focus: consider and test all possible causes of failure

Scope: data collection and analysis, stock assessment, set escapement targets, co-ordinate conflicting uses, monitor and restore habitat, scope problems, research, set goals and objectives, education and training

Local Institution: technical expertise from all local sectors and from regional government agencies

Human Scale: 5 aboriginal communities of 500-1000 each, and 2 non- aboriginal communities of 1000-1500

Regional Context: Clayoquot and Barkley Sound = 120 km.

Scale Of Unit: Kennedy system = 78 km. of stream

Type Of Actors: local aboriginal and non-aboriginal technical bodies involved in enhancement and protection of stocks and habitat, non-local government agencies and major timber company

Number Of Parties: local aboriginal, regional aboriginal, local environmental, local enhancement societies (non-aboriginal), DFO (federal), Min. of Forests (provincial), timber company

Level Of Operation: regional

Economic Benefits: external funding focuses effort to cause stock recovery which will have local and non-local economic benefits

Relationship With Government: partnership of local and governmental experts will make recommendations to Central Region Board about implementing their joint findings

The West Coast Sustainability Association

The West Coast Sustainability Association shares some of the same membership and many of the concerns of the Kennedy Lake Technical Working Group, but is an entirely local, grass-roots organization. It originates partly from long-term joint discussions about salmon enhancement, and stock rehabilitation strategies between individuals and organizations in the non-native communities of Tofino and Ucluelet and a number of Nuu-chah-nulth communities, chiefly in Clayoquot Sound and Barkley Sound. These groups were concerned about the depletion of major groupings of stocks which have supported the local commercial troll industry.

In the early 1980s these discussions centred particularly around the activities of the Thornton Creek Enhancement Society, a DFO Community Economic Development Project and facility near Ucluelet. This society's board included residents of Tofino and Ucluelet as well as members of the Toquaht and Ucluelet First Nations. Members of this society included resident commercial salmon trailers and others who donated substantial time and labour to identifying depressed stocks and enhancement opportunities in the area. They then collected brood stock, incubated eggs in the Thornton Creek hatchery, and returned the fry or fed fry to their stream of origin. A Tla-oqui-aht First Nation facility opened in 1984 on the lower Kennedy River to rehabilitate the severely-depleted Kennedy system chinook salmon. The Tofino Enhancement Society was organized in 1986 as a DFO Public Involvement Project under the Salmon Enhancement program. All these entities discussed co-ordination of their projects.

In the early 1990s the Thornton Creek Enhancement Society began proposing and discussing various joint activities with local First Nations and Nuu-chah-nulth Tribal Council fisheries staff. These proposed activities included: joint rehabilitation of a chum salmon stock in Ucluelet harbour, joint hiring of a Toquaht band member to collect broodstock, and joint and co-ordinated use of Nuu-chah-nulth fisheries guardians (enforcement personnel), Thornton Creek staff, and local sport fishing volunteers to patrol various creeks against poachers in the fall. Although only the first proposal has been implemented so far, important lines of communication were established.

During the initial implementation of DFO's Aboriginal Fishing Strategy in 1992, there was considerable tension between aboriginal and non-aboriginal members of the local commercial troll fleet—who fished in approximately equal numbers out of the same ports. (The Nuu-chah-nulth were one of three aboriginal groups in BC who entered into agreements with DFO to sell a specified number of fish caught outside of the usual commercial fishery regulatory framework. The Nuu-chah-nulth/DFO agreement provided this benefit for two of the 14 Nuu-chah-nulth First Nations. Interim agreements were to prepare the way for treaties and claims agreements).

Despite this tension, leaders on both sides resolved not to let good will be destroyed, nor the substantial tangible and intangible benefits they could enjoy from working together. They maintained communication through the existing channels, and enlarged it to involve more local trailers and other concerned residents. This communication helped ease the tension somewhat.

During 1993 and 1994, five well-attended meetings occurred to explore common ground between aboriginal and non-aboriginal fishermen. One important concern shared by all local trailers was the fear of being forced out of the industry by recent coastwide allocation agreements about where harvests were planned. Most of the local trailers were too small to travel safely to harvest openings in the north. The urgent need to participate in these agreements led them to seek formal representation on DFO's Outside Troll Advisory Committee. This need spurred them to formalize their structure and goals through a constitutional sub-committee, whose work was ratified in January 1995, as outlined below.

Structure; executive board of 4 aboriginal, 4 non-aboriginal

Composition: fishermen and community-at-large representatives, local sport fishing groups also included
Decision-making: consensus as goal; double majority as fallback (majority of both aboriginal and non-aboriginal)
Geographic area: Nuu-chah-nulth territory under claims negotiation (west coast of Vancouver Island, excepting about 1/8 of coasts at north and south ends of island
Purposes and principles: several principles of sustainability were adopted at the outset, and it was agreed to develop a common vision of sustainability from these. For example, the association adopted the five components of sustainable use of the International Convention on Biological Diversity, signed by Canada in 1992.

The discussion of sustainability was deepened by the previous involvement of the region in nearly a decade of debate about sustainable management in Clayoquot Sound, and a heightened awareness of the need for human communities which depend on local resources to develop a relationship of stewardship with local resources. The involvement of local resource users in this discussion is a key component of the development of stewardship, as discussed below.

First, both aboriginal and non-aboriginal local trailers have been enumerating and enhancing the creeks in the area for the last 10 years, mostly as volunteers. If they are forced out of the industry, it will be difficult to find others willing to do as much work stewarding the local productive capacity of the resource. The point is that commercial fishermen-when they understand their own long-term self-interest in sustainable management and can develop institutions which support this—are likely to be those willing to contribute the most to management over the long term. The literature suggests that their incentive to insure sustainable management will be stronger—under appropriate institutional support—than the incentive of those who wish merely to protect a resource from human use in order to preserve the integrity of the resource. This is exemplified in the willingness of the TFN to close their Kennedy River food fishery when they believed the resource could no longer sustain a fishery.

Since it formalization, the West Coast Sustainability Association has actively sought participation and opened discussion with a number of other bodies. These include: DFO's Outside Troll Advisory Committee, the Pacific Trailers Association, the Fraser Panel of the Pacific Salmon Commission, the Survival Coalition, the local sport fishing community, the Ministry of Environment, Lands, and Parks, and the Ministry of Agriculture, Food, and Fisheries. The WCSA has formed three agenda planning committees: one troll, one sport, and one focused on rehabilitating wild salmon from both a habitat and harvest management perspective. (In other words, habitat and enhancement improvements will be meaningless unless the group can co-ordinate these activities with appropriate harvest planning). The latter committee recently met to co-ordinate a discussion among all the enhancement activities in the region.

The existence of the WCSA, particularly in combination with the Kennedy Lake Technical Working Group and the Kennedy Restoration Group, enlarges the scope of involvement of local-bodies in management activities. The WCSA is likely to contribute in the area of harvest planning, co-ordination of conflicting uses, co-ordination of area-wide enhancement activities, and possibly co-ordination of local enforcement activities.

Community Development Quotas. Another way in which the WCSA could promote sustainable management of local marine resources and community survival is through community development quotas (CDQs). CDQs developed in western Alaska in the early 1990s as a way of linking fishing-dependent coastal communities with an offshore groundfish fishery. Some of the off-shore/inshore power-sharing and accountability aspects of CDQs are discussed in the next chapter in the context of the Newfoundland inshore and offshore fishery. Here we discuss the potential management, and allocative role of CDQs in a somewhat different context.

Canadian plants in Ucluelet on the west coast of Vancouver Island began to process locally-caught hake into surimi in 1991. Hake had previously been an underutilized species within Canada's Extended Economic Zone, and was taken by foreign factory trawlers up to this time. As interest in the fish and final product increased, the Ucluelet plants received an allocation of hake, eventually processing 28,000 metric tonnes in 1994, and creating some 130 shorework jobs in Ucluelet. Two Ucluelet plants and a Port Alberni plant have now made a substantial investment in upgrading to process a larger portion of the hake quota. (The quota is currently shared with two processors in the US). The Minister has the authority to allocate a quota to Canadian plants through an Enterprise Allocation system similar to that used on the east coast. The Minister could also allocate a quota as a CDQ to a local association with goals similar to those of the WCSA, based on the association's plan for improving management of other fisheries, or furthering a broad spectrum of community goals-including sustainable management.

A community-based association could legitimately choose to have its quota processed locally, as long as it did not act in a discriminatory fashion. Discrimination is not allowed under the Articles of the General Agreement on Tariffs and Trade (GATT), and the North American Free Trade Agreement (NAFTA) which adopts the same principles. It is likely that the community association holding a CDQ would consider a broad range of issues and goals when considering where to process. It is also possible and even likely that the choices made by a community-based association which furthered its stated goals and plans, would not be judged to be discriminatory. If this were the case, a group such as the WCSA could explore options for funding local management activities through a percentage of cost recovery from its CDQ or Enterprise Allocation.

PART SIX: A CANADIAN POLICY FAILURE

The by-passing of a sustainable and longstanding community-based inshore trap and handline fishery in Newfoundland is a Canadian tragedy. Human capital was overlooked in two ways. The inshore fishery could have been a valuable source of data for analyzing impacts of offshore fishing. The inshore fishery was also valuable in itself: it employed thousands of local people in a sustainable way with low capital investment and low management costs. This story is analyzed as a policy failure, because it resulted from political choices which led to an unsustainable fishery. This case study shows how the outcome could have been different.

Chapter 14: Newfoundland Inshore Cod Fisheries

The rejection of European notions of private rights. Newfoundland was settled chiefly by people from Ireland and west country England who, along with most other North Americans, firmly rejected the idea that rights of access to fish could be possessed by only a few wealthy landlords holding access to fish as a private right (cf. McCay 1989). But neither did residents of the Newfoundland fishing outports believe in either simple open access or extensive regulation by government authorities. The latter were usually seen as being too far away to matter. Instead, Newfoundlanders evolved forms of community regulation which worked well for them for many decades. This discussion will focus on the main staple, Northern Cod.

Regional context. Research by maritime anthropologists and rural sociologists in a number of Newfoundland outports from the 1960s through the 1990s provide a rich and varied record of community fishing rules. In some cases these were adopted into formal government regulations; in other cases, community practices were not even thought of as rules but simply custom (Faris 1966, Martin 1973, Shortall 1973, McCay 1976, Andersen 1979, Powers 1984, Sinclair 1985, 1990, Neis 1992, Matthews 1993). These varied from community to community, depending on the situation, but the common thread is summarized below. It represents practices which were known to have been in use for at least two or three generations in most cases.

Degree of formal rights. In 1890 Newfoundland passed legislation enabling communities to regulate the use of local inshore fishing space (McCay 1976). Although many communities used informal rales or custom, some exercised this formal legal right.

Technology and level of capitalization. The primary technology was the stationary cod trap. It was widely acknowledged as the most efficient method for taking cod where they migrated inshore seasonally, past Newfoundland's eastern shore (Figure 21). The catch-per-unit-effort is the highest, and the level of capital investment is the lowest, compared to other technologies for catching cod. Various low-capitalized hook and line techniques were also in use until the 1960s, when gillnets began to replace some hook and line activities. The development of other technologies was driven by the desire to access more stocks of cod, closer to their spawning grounds (hence available for a longer period and in greater numbers).

Type of fishery. The cod trap was placed every spring in a "berth", or favourable spot generally close to shore and within a few miles of the community. Each berth became a named location which was reserved for cod trap use (see Figure 22). The cod trap came into use in Newfoundland in 1870 (McCay 1976). The cod spawned in several offshore areas, including the Grand Banks off Newfoundland's southeast coast, but migrated inshore every spring in pursuit of capelin.

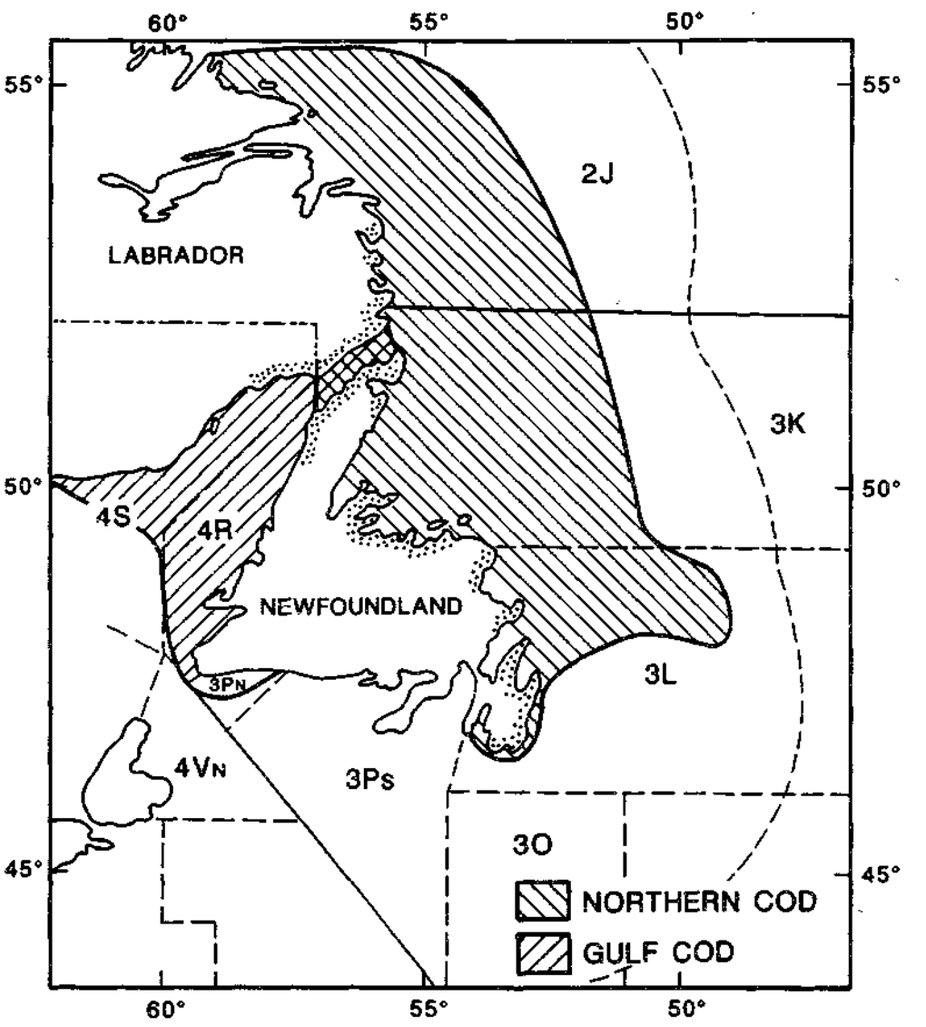

Fig. 21. Dotted areas show cod trap locations. Source: Rose 1992.

Major problem addressed at origin. There were only a limited number of spots close to each outport harbour that lent themselves to the placement of cod traps. Some communities pressured government for the formalization of rales allocating space to traps and other gear, to avoid conflict over use of limited fishing space (Martin 1973). Some communities, for example, attempted to ban the use of gillnets in certain inshore areas, and to reserve certain areas for handlines (see Figure . 22). As in many locally managed systems, mechanisms to allocate fishing opportunity became a way to exclude outsiders and thus to control fishing effort (e.g. Japan, Lake Titicaca, Gitksan).

Scope of management activities. Communities governed fishing effort first by rules about what fishing spaces could be used by which gear. Communities also regulated the space they required to be left between berths and the space surrounding berths where other gear could not be set.

In addition to space use, some communities also set time rales about when other gear such as salmon nets had to be out of the water so that they would not conflict with berths and hand lines. Both space and time rales could be called harvest planning rales, which had the effect of limiting fishing effort.

Second, communities regulated who was eligible to fish the local cod berths. In some communities, access to a cod berth was acquired by inheritance; in others, customary use and putting out one's gear each spring on the spot just before the season was enough to claim the use of the spot. In communities where the competition for space became intense, the fishermen's committee would hold a lottery draw for berth space each year (Matthews 1993, Martin 1973).

Some communities required a one year residence period before a fishermen was eligible for a cod berth lottery. Others allowed only those who had already fished a cod berth in the community to participate in the draw. This second general category of rales governed access rather than harvest These rules also governed allocation, especially if some berths were more productive than others (Matthews 1993).

The foregoing harvest, access, and allocation management rales devised by community fishermen's committees were legalized in Newfoundland law by 1919. Newfoundland Fisheries Regulations named the cod trap berths and specified how a cod trap "draw" would be conducted. Inshore territories reserved exclusively for handliners and cod trap fishermen according to local regulation were also demarcated (Martin 1973). (see Fig. 22)

When the development of an interception gillnet fishery in nearshore and inshore areas (carried on "longliners") was encouraged and subsidized in the 1970s, some communities were able to ban or severely restrict the use of this gear in inshore areas. In this limited way, they attempted to regulate conflicting uses, at least in parts of inshore areas. Some communities also practised a degree of habitat protection by banning the dumping of offal into harbours (McCay 1976).

In summary, the fisheries management functions performed by outport communities included: (see Table 13)

1. harvest regulation: formal
a) setting a number of areas for one gear type, traps
b) setting a general area for jigging and traps in which most other gears were forbidden

2. coordinating uses: formal, setting times when other gear could be used

3. regulating access: informal, deciding who could use a berth

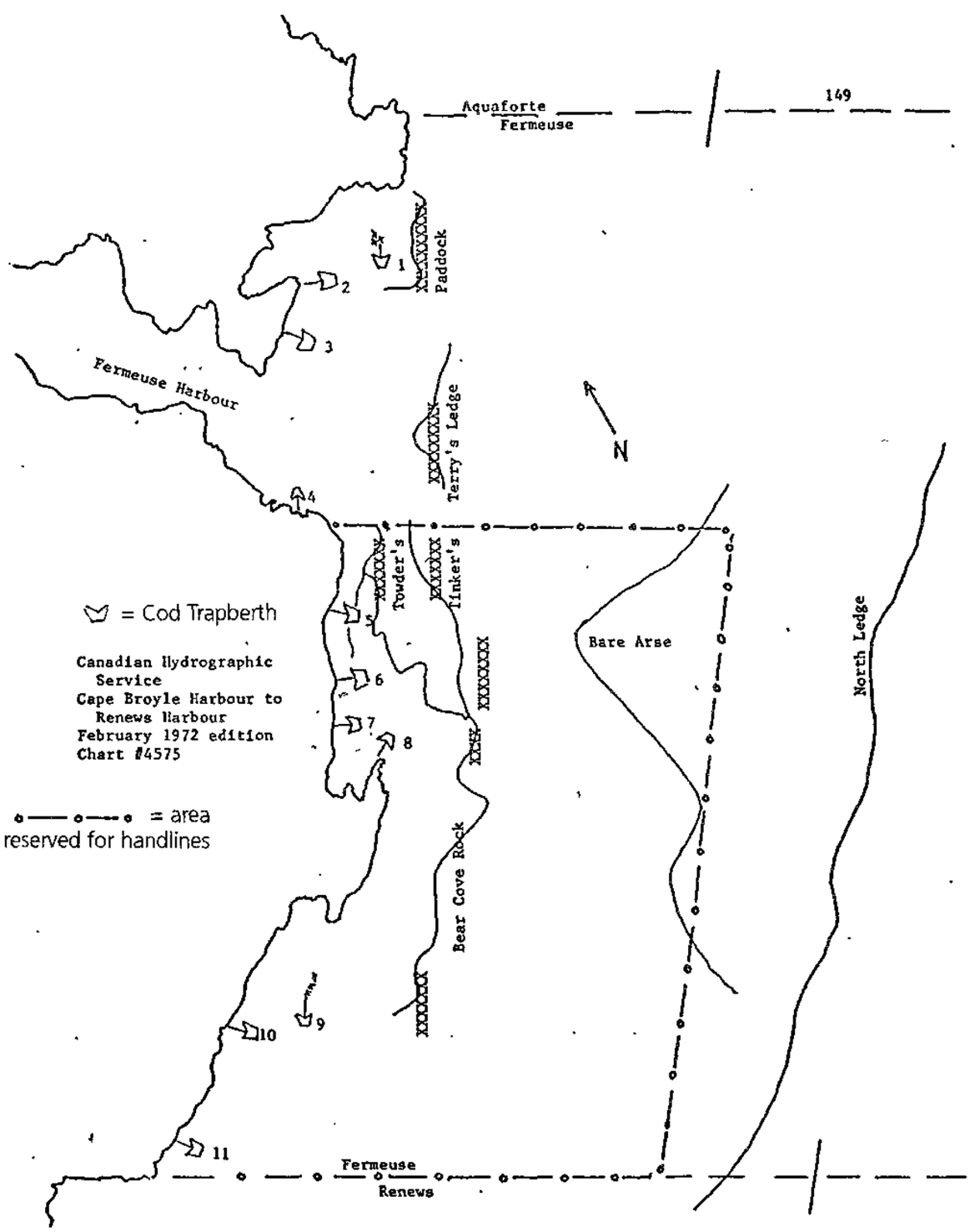

Fig. 22. Major Fermeuse Fishing Locations. Source: Martin 1973.

TABLE 13 MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES- Newfoundland Inshore Fishery

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS -	PROPERTY RIGHTS AND DUTIES	NIF-
1. POLICY MAKING AND EVALUATION			
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS	Right/duty to do long-range planning	NO
	SETTING OBJECTIVES	Right to research key questions affecting community values	NO
	LONG RANGE PLANNING	Right/duty to educate own and larger community re problems	NO
	RESEARCHING THE RESOURCE SYSTEM		
	PUBLIC EDUCATION		
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE			
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION	MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	Informal
		Right of access to government information	NO
		Right to collect own information	Informal
UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF CONDITION OF STOCK	Right to interpret information in light of local knowledge	Informal (Court Case)
		Right/duty to enhance or restore a) resource/resource productivity b) habitat	NO
3. COMPLIANCE WITH RULES			
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT.	Right/duty to enforce rules re: a) harvesting b) habitat damage c) exclusion and poaching	Informal (Enforced by government)
4. FISHERY HARVEST			
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own	NO
		Right to interpret information in light of local knowledge	Informal
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re: a) size of overall catch b) location of the fishery c) timing of the fishery d) gear types permitted e) size of allowable interception	NO Formal Formal Formal NO

CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	HARVEST MONITORING	Right of access to government information and right to collect own	NO
UNDERVALUING OR IGNORING HUMAN CAPITAL		Right to interpret information in the light of local knowledge	Informal

5. FISHERY ACCESS			
DEFINING BOUNDARIES AND ACCESS: EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude: a) certain classes of fishery (e.g. sport, commercial) b) certain classes and sectors of fishers	Informal
	HARVEST ALLOCATION	Right to allocate: a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to redistributive mechanism	Informal NO Formal Informal
	TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members	Informal
		Right/duty to regulate conditions of transfer	Informal

6. RESOURCE USE COORDINATION			
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNING THE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses	Formal
		Right/duty to communicate problems and try to solve with others	NO
		Right/duty to resolve disputes internal and external	NO

7. RETURNING OPTIMUM VALUE TO FISHERMEN			
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING	Right to manage harvest timing for optimum product value	NO
	PRODUCT QUALITY		NO
	PRODUCT DIVERSITY		NO

4. regulating allocation: informal, mechanisms for allotting a scarce number of berths and allotting berths of varying productivity

5. habitat protection: formal rule forbids dumping

6. enforcement: informal, mostly at community level, with occasional use of DFO officer, state regulations

Management scope too limited for external problems arising. Unfortunately for the outports, three critical areas of management were beyond their control. (1) They had little power to control the interception and eventual overfishing of "their" cod stocks by the offshore dragger fleet. (2) They had little power to make DFO stock assessment scientists take their observations and analysis of stock decline seriously. (3) Even though their fishery was highly efficient and not highly capitalized, they had little power to capture the benefits of fishing, and were thus dependent on transfer payments and perceived as "backward" and "undeveloped."

The history of Newfoundland shows that these three areas of management are intimately related. While an in-depth analysis of their relationship is obviously beyond the scope of this report, a brief sketch is necessary.

Patronage and subsidies. The power of local fish merchants and eventually the larger companies which bought out many of the locals and built processing plants meant that much of the value of the fish did not end up in the pockets of the inshore fishermen (Brox 1972). A community which wished to develop its own co-operative fish plant was systematically discouraged from doing so, and offered subsidies to build bigger boats instead (McCay 1976). In other words, inshore fishermen were discouraged from taking action to get better prices for their fish, and encouraged to go further from shore to get more fish.

The system of political patronage which supported this system was never seriously challenged in Newfoundland (Cohen 1975, Sider 1986, Finlayson 1994). As a result, policies for improving the lot of the inshore fishermen or promoting economic development in general tended to result in repeated subsidies to existing fish plants which threatened to close.

Corporate concentration through economic development. Developmental policy for Newfoundland was set in close collaboration with the fish companies, which received subsidies to amalgamate into two supercompanies and/or subsidies to construct bigger boats and exploit nearshore and offshore grounds. As the plants amalgamated and became even more integrated with the offshore dragger fleet, this strategy became a runaway train. In sum, government facilitated corporate concentration, in combination with the construction of too many big boats, exacerbated fisheries problem #5 of "too many big powerful boats."

Failure to exclude or regulate foreign fleets. Beginning in 1954, the rich spawning and nursery areas for cod in the offshore banks of Newfoundland were heavily fished by large trawlers. This mainly foreign fleet was gradually supplemented by Canadian trawlers, as Canada extended jurisdiction to the "200 mile limit", which came to encompass most of the Grand Banks in 1976. Canada had no choice but to develop its own offshore fleet: international agreements required any species "underutilized" domestically to be allocated to other nations. However, Canada's failure to adequately regulate either foreign or domestic overfishing by a company-owned trawler fleet-and even a subsidized nearshore longliner fleet-contributed to the eventual decimation of the cod stocks and the closure of cod and other groundfish fisheries, beginning in 1992.

Alternative economic development strategies. This economic development strategy stands in sharp contrast to that of fishing nations like Japan and Norway (Wadel 1969, Andersen and Wadel 1972). These countries had important offshore fleets, but saw value in making their inshore fishing communities prosperous and self-supporting (less dependent on state subsidies, transfer payments such as unemployment benefits, etc.). In Japan, the inshore fishery in fact generated more revenue than the offshore.

These countries' development policies allowed inshore fishermen and their communities to become more self-sufficient by letting them capture more of the benefits from fishing. This was accomplished by one or more of the following policies: (1) forbidding the ownership or control of fishermen's operations or access to fish by processing companies; (2) encouraging fishermen to collectively sell their products through unions and/or co-operatives; (3) allowing harvest planning which encourages supply management and the delivery of a fresh, high-quality product; (4) producing a diversity of value-added forms. Except for attention to quality in the dragger fleet, Newfoundland and (after confederation in 1949) Canada pursued largely different strategies from these countries. The Japanese case study deals with the development of inshore fisheries in greater detail.

The Value of a Sustainable Inshore Fishery

Community rights to interception agreements. There are two separate stories of relevance here. One story is about the value of a sustainable, low-impact fishery, and its right to persist. In order to survive the offshore and nearshore interception of the stocks it traditionally fished, the inshore communities would have needed the right to negotiate enforceable interception agreements with the offshore sector and/or a government policy which recognized their right to an adequate allocation to survive. Although the inshore sector theoretically had an allocation, in practice there was not enough fish for both the offshore and the inshore allocation. The inshore sector was last in line, and therefore did not receive its allocation. As previously mentioned, rights to regulate a passing stock inshore fishery are meaningless unless a community can have some effect on how outsiders intercept the fish which seasonally migrates into their shores.

Community Development Quotas. Another mechanism for allowing communities to capture some of the benefits of an offshore fishery is the Community Development Quota used in western Alaska. This case is unlike Newfoundland, in that inshore communities in Alaska do not fish the. pollock (groundfish) stocks taken by the offshore trawler fleet. However, this fleet does have considerable by-catch of halibut and salmon which are taken by the inshore communities. The example has value as a model for how benefits can be shared when inshore communities are negatively impacted by offshore fishing. In western Alaska, six community associations (including one on the lower Kuskokwim River) receive an allocation of a percent of the total allowable catch of pollock: a community quota. The offshore fleet must then bid on the privilege of using the community quota. In the process, they enter into partnerships with community associations, and must take community concerns about sustainable harvest rates and by-catch into account in the way they fish. There are numerous other benefits for communities: partnership agreements may include delivery of much of the fish to onshore processing plants, as discussed in Chapter 13 (E3 Consulting 1994).

Attitudes toward the traditional inshore fishery. Why have policy makers not seen greater value in maintaining the inshore fishery, based as it is on low-impact sustainable harvest levels? Part of the answer lies in attitudes toward large scale development and economic expansion, which perceive low-impact fisheries as "outdated" or "having no gumption." Economists and others have seen the increasingly impoverished life of the inshore fishermen in outport

communities (Sinclair 1983) as something to leave behind-either as a fishing strategy, or as a place of residence. Of course, there is a certain pragmatism in this, since the traditional inshore fisheries were being starved for fish.

Yet outport residents in general did not see poor prices or simple gear as their main problem. Matthews' (1993) surveys of five outports in the 1980s reveal a high degree of satisfaction with community life and a desire to stay in the community, even in the face of gloomy predictions for the future of the fishery. Fishermen complained to Matthews mostly about the lack of fish and the lack of wisdom in government regulation, which had made their inshore regulations almost irrelevant. They felt that their fishery had simply been appropriated, and that the entire fishery was being destroyed. Many resisted the original attempt to resettle them in regional centres (Matthews 1976). Many who left in search of jobs returned home, convinced there was a better life for them there (Sinclair and Felt 1993).

Patronage and the offshore fleet. Obviously there is more to this story than simply a narrow or misplaced concept of good management and sound economic development on the part of government and economic consultants. Patronage politics continued to operate in Newfoundland. The more powerful interests, who did not need a sustainable cod fishery to survive, were able to represent their own interests in intercepting the inshore fish as being synonymous with the public interest (fisheries problem #2). This is not to say that an offshore fishery should not have existed. It is to say that good public policy would not have allowed a viable inshore fishery to be eliminated by an offshore fishery, and would have considered strategies like Norway's or Japan's to make this sector more self-sufficient.

The Value of Inshore Fisheries for Stock Assessment

Community fisheries as a data source. The second story is about the failure of government to use data from the inshore fishery as a separate and independent source of information on stock abundance (fisheries problem #1). Only some of the cod stocks which spawn offshore migrate to Newfoundland's shores (Gomes 1993). But the declining abundance, size, timing, and location of these stocks reflected the overall overfishing trends on the offshore banks (Rose 1992).

These trends were especially detectable by inshore fishermen, because cod have a more interesting sex life than—for example-salmon; Cod reach breeding age at six years and then continue to breed and spawn annually for many years. The inshore trap fishery removes multiple year classes, and thus gives fishermen the opportunity to observe the characteristic spread of year classes. The high and growing percentage of smaller fish in their catches was a strong indicator of overfishing.

It is also worth noting that stationary cod traps probably have a stable effect on cod stocks that is similar to that of a predator in the natural world. Their catch fluctuates as a more faithful indicator of trends in natural abundance. (Thus, incidentally, the control of access to space-as opposed to control by fixed quota of fish that can be taken annually-promotes a pattern of fishing effort which more closely approximates the way ecosystems function).

Some communities were so alarmed about declining catches that they began to warn government of the dangers in the 1970s (Martin 1973, McCay 1976). After a brief recovery in the late 1970s, related to the new 200 mile limit, catches dropped again. By the early and mid 1980s communities were thoroughly up in arms. In 1982, inshore fishermen and plant owners began to question the accuracy of DFO assessments because of the high percentage of small fish in their catches and the fact that the Total Allowable Catch had been raised from 135,000 mt in 1978 to 260,000 mt for 1983 (Finlayson *1994).* Inshore catches continued to fall as offshore catches climbed through 1987. However, the offshore catch did not increase in proportion to fishing effort (Harris 1990).

DFO claimed the drop in inshore catch was probably due to environmental and other factors, and remained optimistic about predictions of substantially increased productivity (Finlayson 1994). Although an observer program on about 10% of dragger trips reported a substantial increase in discards of smaller cod between 1981 and 1985 (up to about 24% of the number of fish caught), these discards were not counted by DFO as fish removed from the total cod stock. Anecdotal accounts from other sources suggested that discards were much higher on unobserved vessels (Kulka and Stevenson 1986).

Attempts to exert rights to participate in stock assessment. Finally the Newfoundland Inshore Fisheries Association and Cabot Martin launched a court action in 1989 against the Minister of Fisheries and Oceans and the Minister of Environment to attempt to force an end to overfishing and destruction of the nursing grounds (NIFA v. MOE, FC#7.2719.89). Cabot Martin's comments to Finlayson suggest one dimension of the gulf between DFO science and inshore traditional knowledge: "I don't think that anywhere in their training, or anywhere in the internal culture of DFO, would you find a discussion about the social responsibility of scientists to explain and account....The worst thing that has happened is that they have been shown to be incorrect. I've heard scientists say, 'We can't afford to know how little we know because if we admitted that then no one would listen to us.' That's twisted..." (Finlayson 1994).

In their protests and court action, communities could be seen as attempting to exert rights of stock assessment, based on their long historical memory of trends in size, location of catch, and timing of catch in the inshore fishery. They observed that fish were getting smaller, that their seasonal availability covered a shorter time span, and that jigging locations which used to guarantee many large fish in the 1970s had no fish at all by the mid 1980s (Neis 1992, 1994a). Inshore fishing offered opportunities to analyze the effects of winds, tides, salinity, water temperature, and the presence of other species on fish abundance. The multi-generational and consistent position of their berths on the migration path of some of the cod stocks also put them in a unique position to note the patterns of stock decline, different from that of the trawlers who took fish at all stages, before and after migration and during spawning (Neis at al. 1994). Inshore fishermen also noticed the relationship between inshore fish abundance and offshore effort.

Why did DFO fail to use the traditional knowledge and catch record contained in the inshore fishery as a useful independent index of cod abundance and cod stock structure? Some DFO scientists (e.g. Rose 1992) believed collection of scientific data from the inshore sector was both critical and achievable, "...we said it was of paramount importance to include catch and effort data from inshore fisheries into the assessment process....And you don't have to give every fisherman a logbook. You take half a dozen in La Scie and half a dozen in St. Anthony and a sample from other major fishery centres. That'll pretty well give you a fix. That'll tell you what's going on" (Finlayson 1994).

Government science and powerful actors. However, throughout this period, DFO's official position was that the inshore analysis was "anecdotal;" it would not consider organizing any stock assessment effort with inshore communities. It preferred to rely exclusively on data collected from the offshore fleet of supercompanies Fishery Products International (FPI) and National Sea Products, which was very willing to supply whatever scientists requested. Finlayson (1994) found that DFO scientists were far more comfortable using data which was delivered to them neatly packaged from a small number of offshore draggers, which fit simply and elegantly into their computer models. They shrunk from the prospect of sampling the logbooks of inshore fishermen, which they disdained as unreliable, for catch per unit of effort data.

However, some fisheries scientists advocate use of survey indices of abundance trends as an important adjunct to CPUE data- which can be unreliable in situations such as the Grand Banks (Walters 1994). CPUE data were unreliable for several reasons. One of these was that over time the draggers used sophisticated technology to find all the congregations of cod and eventually

fished out the spawners. Their CPUE might not reflect declining abundance if they fished where the stocks congregated most of the year, and kept finding new "hot spots".

DFO scientists were also influenced by their perception of the offshore trawlers as the modern, dynamic, wave of the future-the people who had power and deserved to have it. In contrast, DFO scientists tended to view inshore fishermen as unambitous, ignorant throwbacks who deservedly had little power. The task of translating inshore traditional knowledge of stocks into anything scientifically reliable and usable was viewed as altogether too messy and distasteful (Finlayson 1994).

The companies and the large boats they owned insisted publicly even as late as 1991, the year that the last fish of breeding age were taken, that there was plenty of fish out there, that the problems were caused by foreign overfishing, weather, water temperature, and low DFO quotas (Globe and Mail, Oct. 19,1991, Feb. 29, 1992, Finlayson 1994). In retrospect it is impossible to deny the private assertions of former DFO employees (interviews) that the companies and their political supporters pressured DFO to ignore overwhelming evidence that the cod stocks were being systematically overfished.

In other words, Newfoundland faced a classic case of management problem #2 "confusing public policy with the interests of powerful actors". This problem was compounded by the related problem #5 "too many big and powerful boats."

Coincidence of economic streamlining and corporate concentration. In Newfoundland, the "big boats owned by big companies who throw their weight around" problem had ironically intersected with a legitimate concern to get beyond the traditional pork barrel subsidies to—and traditional patronage relationships with—(many small) fish plants. The 1983 Kirby Commission suggested that overcapitalization of fish plants was the problem (instead of the more fundamental pork barrel politics and patronage) and pointed the way to a grander swan song subsidy to consolidate smaller companies into Fishery Products International and National Sea Products. This subsidy (intended to end all future subsidies) combined generous Enterprise Allocations (quotas) to the new super companies (which already owned boats) with a policy to issue no new licences to more fish processing plants, whether private or co-operative. Reaction from the Canadian press, from fishing co-operatives and unions, favouring a small-scale community-based alternative approach (Jackson 1984) was ignored.

Finally, Newfoundland suffered also from problem #8, inter-governmental conflict. Throughout the 1970s and 1980s, the DFO "war room" in Halifax tracked the activities of foreign vessels within the 200 mile limit, including known pirates and vessels known to be overfishing their quotas. However, DFO could not take action against foreign overfishing without a green light from External Affairs, a signal almost never given (McCay 1976, interviews). Unlike Iceland, whose fisheries' co-operative organizations forced it into a reluctant fish war with England, Canada was able to escape significant political pressure from fishermen to deal with a well-known problem. Happily, this situation has changed recently.

Alternative scenario. Let us consider what kind of scenario might have been possible if the communities had formal or even informal rights to do stock assessment. This would have given communities greater access to, and co-operative research relationships with, DFO scientists. The first result would have been that DFO scientists interested in investigating the community perspective on the stock issue would have received some political support. The position of the supercompanies and their fleet that "there's plenty of fish out there" would not have been the only politically allowable perspective.

A co-operative working relationship with DFO based on some real community power would allow new resources to be mobilized. One could expect the kind of co-operation and volunteer help with

such research that was forthcoming in Little River, Nova Scotia and elsewhere that such partnerships are developed (Loch et al. 1994, John Kearney, pers. com.). Logbooks would be shared, catch per unit of effort data would therefore be obtainable, free transport to view the grounds would be available, etc. But with no sense of community rights, and no co-operative working relationships, many inshore fishermen were even loath to share logbooks with DFO, and thus reinforced the alienation between the inshore fishery and DFO science (Finlayson 1994).

Finally, developing the political will and the constituency to practice sustainable fisheries management in a political climate such as Newfoundland's would require that DFO take greater responsibility to publicly disclose data, data analysis, and data uncertainty, in forums such as regional round table's which include inshore fishermen and their communities. This would give more chance for the public, which stands to suffer the consequences of unsustainable use, to make public policy choices about the level of risk it is willing to take with the fishery. There are hopeful signs in the establishment in 1993 of the Fisheries Resource Conservation Council (FRCC 1994), an advisory body reporting directly to the Minister of Fisheries and Oceans (bypassing the rest of DFO). This body consults with communities and is to act as a watchdog. It is certainly one important component of a new strategy for achieving sustainability.

Accountability problems. The current call by the Fisheries Council of Canada (1994), for Individual Transferable Quotas as the solution to Newfoundland's fishery problems does not address several of the management problems identified in this report as leading to non-sustainable use. (The Fisheries Council of Canada includes the two super companies Fisheries Products International and National Sea Products, and 14 smaller companies).

First, public policy is being made chiefly by actors who do not suffer the greatest consequences of unsustainable use. (Recall the ability of Fishery Products International to do very well in 1993 and early 1994). Second, these actors fuelled the unsustainable level of harvest which created the current crisis. Third, there has been no mechanism suggested whereby these actors can be made accountable for either past or future behaviour. Allowing processors to make new policy would be like putting foxes in charge of henhouse fencing after they had taken the first batch of hens. (If foxes lived permanently in henhouses, of course, they would likely figure out how to harvest hens sustainably. The problem is not so much having foxes as having foxes with little attachment to or dependence on place).

Private rights vs. community rights. Incentives for sustainable use. Of course, the fox/henhouse analogy is often made about fishermen making fisheries regulation, so let us look more closely at how incentives, deterrents, and accountability are differently structured under this particular system of private property and systems of community property as discussed in this report. This is particularly appropriate, because the call for ITQs to solve Newfoundland's fisheries management problems is fundamentally a call to let the private sector and market forces handle what state regulation has botched. For simplicity we contrast the community based regulatory system as described above to the proposed ITQ system and company ownership of Enterprise Allocations (a modified form of ITQ allocated to companies which owned boats in 1982) along the following dimensions. The contrasts are summarized in Table 14.

TABLE 14 KEY DIFFERENCES **BETWEEN A COMMUNITY BASED** REGULATORY SYSTEM **AND THE PROPOSED SYSTEM OF** ITQs COMBINED WITH **"'ENTERPRISE ALLOCATIONS"**

CHARACTERISTIC	COMMUNITY BASED REGULATION	ITQs
1. Dependency of actors on the resource	Cod traps and handlines yield over 50% of fishermen's incomes; no alternative access.	Proposed ITQ holders may have any level of dependence on the resource; companies competing internationally may have none.
2. Vulnerability to non-sustainable use	Cod trap and handline fishermen are highly vulnerable, having no other options in their communities	Companies holding EAs are not vulnerable, having survived the fisheries closures relatively well
- 3. Orientation toward the local area	Identification with and long-term commitment to the area and their community	Companies can transfer quota from a plant in one area to a plant in another area
4. Willingness to alienate the resource from local area	The fishery is critical to the existence of the community	Mobility (transferability) of ITQ; little deterrent to overfishing
5. The degree of equitable sharing of the benefits of, sustainable use	Equitable access allocated by fishermen's committees; benefits accrue to their heirs and are also widely shared in the community.	Benefits accrue to private holders only
6. The degree of accountability to sustainable use plans and principles	Overfishing prevented through regulation of access and by limited technology	Fishing behavior a function of business conditions; fishery asset may be liquidated to finance more lucrative opportunities
7. Effectiveness of enforcement	Highly effective at ensuring compliance	Little accountability; ability to escape monitoring and sanction
8. Availability of information on the resource	Widely shared in communities	More closely held; may be used to manipulate favorable quota size determinations
9. The promotion of efficiency	Cod berths and hand lines are efficient if interception levels by other gear are not too high	ITQ holders are motivated to be efficient; also with cod, the "race for first capture" is not eliminated
10. The promotion of stewardship	Traditional knowledge and concerns, e.g. for "mother fish", suggests the presence of stewardship	Dependent on the absence of illegal activities in others; sustainable harvest rates vulnerable to financial conditions
11. The degree of legitimacy of a system	Widely supported	ITQs/EAs strongly opposed by inshore fishermen; resentment of access to the fishery based on access to capital

In the 1990s, this comparison has become more ideal than real on the community side, because so much of what used to be "inshore" catch was by then intercepted by nearshore longliners and small draggers.

1. The levels of dependence on the resource.
   a) God trap, handline, and other inshore fishermen earn well over 50% of their income from the resource available in a specific location. They have no alternative access.
   b) Some companies holding Enterprise Allocations in groundfish have been able to operate profitably on the international market and are not totally dependent on local supplies. Proposed ITQ holders may have any level of dependence on the resource.

2. The level of vulnerability to non-sustainable use.
   a) Cod trap, handline, and other inshore fishermen are highly vulnerable and have very limited options if they remain in the community.
   b) Some companies holding Enterprise Allocations were able to survive and do well after cod and other groundfish stocks were overfished and the fishery closed. They are less vulnerable. The Fisheries Council of Canada advocates free transferability of ITQs from fishermen to companies.

3. The degree of identification with the area, place orientedness.
   a) Cod trap, handline, and other inshore fishermen have a powerful identification with the area through land ownership, kinship, custom, and closely-knit multi-generational communities.
   b) Companies holding Enterprise Allocations granted on the basis of keeping a fish plant running have been able to close one plant and transfer the EA to another area. There would be no limits on the location of where ITQ catches are taken.

4. The level of willingness to alienate the resource from the area.
   a) Cod trap and handline fishermen are unwilling to alienate the resource or resource use from the area. Access rights are not viewed as saleable or transferable. They are a critical part of what makes it possible to live in that place.
   b) Since ITQs are mobile, there are no deterrents to overfishing one area or stock and moving to another area.

5. The degree of equitable sharing of the benefits of sustainable use.
   a) Inshore fishermen's committees allocate equitable access, and the benefits of sustainable use are enjoyed by those with access as well as the communities which depend on the fishery and the heirs of trap fish berths. Kinship dictates a significant degree of sharing of benefits.
   b) Sustainable use benefits accrue to private holders only.

6. The degree of accountability to a sustainable use plan or principles.
   a) Technology and regulation of access prevent overfishing in community-based fisheries.
   b) Fishing behaviour is driven by profit and alternative investment opportunities only under an EA and ITQ system. Market forces may dictate overfishing and sale of ITQs if more lucrative opportunities are perceived elsewhere.

7. The effectiveness of regulation, monitoring, and compliance.
   a) Community regulation, monitoring, and compliance are highly effective!--
   b) Industry expects that "the shift to ITQs will lead to a measure of self-policing" (FCC 1994). However, there are no measures for private holders to monitor each other, except for some degree of dockside monitoring financed partially by the fleet. Highgrading (discarding smaller, lower value fish after they are dead) and other problems remain

unsolved (Copes 1986). In halibut ITQs in BC, observers failed to report illegal deliveries by quota holders in the first year of the program (Cruickshank 1993).

8. The availability of reliable information on the status of the resource.
   a) Information on abundance trends and catches tends to be widely shared in communities.
   b) Information may be more closely held as part of private business by ITQ holders. EA holders in the past did not withhold information from government on observed vessels, but dumping of small fish was reported in communities and on unobserved vessels to be larger scale (Kulka and Stevenson 1986, Neis 1994). EA holders also lobbied government to interpret the information as not constituting overfishing.

9. The degree to which efficiency is promoted.
   a) Cod berths and hand lines are low-cost and highly efficient operations as long as the interception levels of cod by other gear are not too great
   b) ITQ holders are motivated to reduce their costs and focus on efficiency. The "race for first capture" is not entirely eliminated, however, since the first harvesters have lower costs because fish are more concentrated (Wilson 1994).

10. The degree to which stewardship is promoted.-
   a) Multi-generational knowledge and concern for the persistence of "mother fish" suggest the presence of stewardship, although this is not identified per se in the literature.
   b) Sole ownership may promote stewardship among ITQ holders if there are no unregulated illegal activities by others. There is an assumption that stewardship will develop automatically in all ITQ holders, and no proposals for harvest monitoring. Sole ownership has led to unsustainable harvest rates in the presence of high profit opportunities in the fishery or good investment opportunities outside the fishery (Schworm 1983).

11. The degree of legitimacy of the system.
   a) Community-based systems enjoy high legitimacy and strong support.
   b) ITQ systems are strongly opposed by inshore fishermen in the Maritime provinces. There is resentment of access to the fishery being based on access to capital.

Any policy which purports to address the causes of the Newfoundland fishing crisis and the situation of some 20,000 inshore fishermen and their communities must weigh the considerable differences between private property systems and community based systems in the incentives they provide to practice sustainable management. As we have seen in the Newfoundland case, federal regulators were unable to withstand political pressures from private interests, pressures which resulted in allowing overfishing. A private property system such as ITQs and the existing Enterprise Allocations cannot be assumed to already offer or be likely to offer strong incentives to harvest sustainably. Community-based systems of property seem to offer the greatest possibilities of building in the incentives and deterrents which will ensure sustainable management. Community-based systems are also likely to work best when an enlightened government can play an oversight role, to correct potential excesses if they occur.

Major Features Of Newfoundland Traditional Inshore Fishery

Major Problem At Outset: competition for fishing space
Major Management Focus: regulate access to limited space
Scope Of Activities: harvest regulation, co-ordinate uses, allocation, habitat protection, enforcement
Outcomes Up To 1960s: stable, sustainable yields since 1870s
Local Management Institution: village fishermen's committee
Human Scale: small village of 200 to regional centre of 4,600
Regional Context: neighbouring outports respect local rules
Scale Of Unit Area: up to 8 km. from shore, protected harbour shoreline
Type Of Actors: homogeneous, kin-based, immobile
Level Of Operation: mostly local; DFO presence on enforcement
Degree Institutionalized: 2-3 generations in some communities, recent in others
Degree Formalized: most local regulations adopted into law
Type Of Fishery: fixed gear (cod trap), captures migrating cod traps emptied in one-day trip
Economic Benefits: high CPUE, low capitalization, but low prices (collective bargaining and co-operatives discouraged)
Role Of Community: community values influence rules adopted, monitoring, enforcement (reputation)
Possible Relevance To BC:

- vulnerability of small-scale locally-based sustainable fisheries to interception by big powerful vessels; need for agreements or contracts to maintain local inshore fisheries.
- contrasting incentives to conduct sustainable fisheries and contrasts in accountability to communities and public for non-sustainable harvests.

PART SEVEN

Chapter 15. Synthesis And Conclusion: Principles For Success

*Why Do Community-Based Management **And Co-Management** Systems **Tend** To Achieve Sustainable Use Patterns?*

This question has been addressed in this report in the following ways:

1. We have shown that sustainably managed systems exist in a number of different situations, based on a variety of management functions performed by communities. Our case studies illustrate a range of possibilities for dealing with the nine great fisheries management problems outlined in the introduction (also see summary table at the end of this chapter).

2. We have shown that the tragedy of the commons and the predator/prey models currently in use do not represent universal truths, but are situation bound. Management strategies which are based exclusively on these models are failing to use valuable resources for addressing management problems.

3. We have analyzed what features the managing or co-managing **communities** have in common across these different situations, as indicators of what are likely to be good **situations** for attempting community-based management. These are summarized below.

4. We have analyzed what features these management **systems** have in common across these different situations, as indicators of what are likely to be good **general predictors** of sustainable management. These are summarized below.

5. We have noted some of the major differences between institutions for managing mobile/migratory species and immobile/inshore species. These occur in contrasting regional and more local systems, and also in a local community in Lake Titicaca which uses different mechanisms for managing both sedentary and migratory species.

6. We have noted what aspects of these examples and findings may be most relevant to British Columbia in particular.

7. We have noted key aspects of the process of developing community-based management. These may teach us more about ways to get started than about what long-term outcomes or best arrangements are likely to result. We learn more of the latter from a case such as Japan, where we know less about the process of getting started and more about fully institutionalized and legalized arrangements.

The Range of Case Studies: Dimensions of the Variation

The cases of community-based management or co-management described here varied in at least nine critical ways:

1. Focus. They each responded to or dealt with at least one major issue or problem. Sometimes there were two related problems: one related to the particular history of that country or region, and the other a local problem. Usually the local problem was one of the "nine great fisheries problems."

In Lake Titicaca, for example, the larger problem (at least in modern times) was the lack of resources for the Peruvian government to regulate the fishery. This particular failure of government to regulate the harvest required communities to take action to prevent overfishing. On the other hand, there was a local allocation or access problem. The focus of the local system was control over access to local territories—through the exclusion or regulation of non-local fishermen.

In Japan as well, the major focus at the local level was on the exclusion of non-local fishermen. The centuries-old system grew up around the rights of local villages to protect their territory.

But the Japanese system grew into a formalized, state supported, and bureaucratically-integrated one when it also began to solve a major nationwide problem in Japan: post-war rural poverty in the late 1940s. The country needed rural villages to be self-supporting, and needed every possible sector of the economy to be a generator of wealth. It could not afford to subsidize any sector. The village-based cooperatives and federations of cooperatives were correctly seen as a very effective way to address this national problem.

2. Scope. Each of our cases dealt with a different range of management functions and activities carried out to perform those functions. Some cases involved only the regulation of membership and the exclusion of non-members from the local area. Others involved almost all seven areas of management. The table at the end of each case study indicated which management functions were performed by the community in that case. The summary table allowed the reader to compare which cases addressed which areas of management and which of the nine great management problems.

3. Scale of management unit. In our cases, management unit size varies from only 6 kilometers of shoreline to 360 kilometres of shoreline, from 320 to 800 kilometers of river. A management unit refers to the geographic area within which people cooperate to perform some management function and make some management decision.

4. Level(s) of Operation. They operate only at the local level, or only at the regional level, or at several levels at once: local, regional, national. Lake Titicaca community management, which works informally and secretly at the local level, is part of a regional system recognized informally by other lakeshore villages. However the system is isolated from most government institutions, and hence unknown at the national level.

Some systems, such as the Kuskokwim River, Mitchell River, and Skeena River working groups, and the Alaska Regional Enhancement Associations, have no local level of operation, because they are confronting regional problems on a regional basis. These systems function on both the regional and state levels. At the other end of the spectrum are Japanese inshore fisheries, where

the local village cooperative association works closely with (sub-local) fishermen's gear groupings, with sub-regional regulatory commissions, with the prefectural (regional) government, and even the national level of government. In the middle are Dalmatian oyster growers in Louisiana who operate at the local level and at the state level, with no regional level.

5. Degree of Institutionalization. A system is institutionalized when it has become the accepted way of dealing with decision-making, and functions in a well-understood manner. The degree to which a system is institutionalized is usually a direct result of its longevity. It is important to contrast this aspect of systems with a separate but related aspect, degree of legalization.

6. Degree of legalization. A system is legalized when it has a legal mandate to carry out certain management activities. The Alaska regional enhancement associations were legalized by statute before most of them got started. However, it took at least a decade for them to be institutionalized, and some aspects of how they intersect with the mandate of Alaska Department of Fish and Game, are still being worked out.

On the other hand, the Kuskokwim Working Group has no legal or formal authority, even though it has been working closely with regional, and state levels of government for a number of years. It has become institutionalized, but may never be legalized.

7. Type of-actors. There was a range of types of actors involved, from ones who share kinship, culture, long-term community of residence, and gear type to ones who share only residence, but still include some outsiders.

8. Number of Parties. There was a range of number of communities, sectors, or parties involved. A simple case involved one homogeneous community which entered into a co-management relationship with a government agency. A complex case involved a multi-sectoral community, or several different communities coming from different commercial, sport, or aboriginal sectors attempting to catch the same fish, in a co-management relationship with more than one government agency.

9. Type of Fishery. There was a range of types of fishery from fairly immobile shellfish to highly mobile and migratory species such as salmon or cod. We were able to reflect some of these differences in the grouping into Part Three (salmon as a migratory species) and Part Four (inshore and less mobile species). Of course, Newfoundland cod and catadramous fish on the Mitchell River are mobile in different ways than salmon.

Common Features of Communities Which Successfully Manage Resources

We have acknowledged the diversity of types of communities which manage with some degree of success. Let us summarize the common features shared by the "managing" communities themselves. As we have seen, these communities are all:

- highly dependent on the fishery
- highly vulnerable to non-sustainable use
- highly identified with their fishing place
- unwilling, or unable to transfer access rights out of their area
- willing to use mechanism for equitable resource access or sharing
- able to assert management rights on an informal, if not formal, basis
- willing to invest resources in management if they have a real voice in decisions

In long-established systems, the last three characteristics may appear to be features of the community. In newer systems, or ones being initiated, it may be more useful to think of these as features of a system which the community is learning to use, part of the accountability mechanisms, checks and balances, or contract in the setting up of co-management.

Despite these commonalities, it is important to note that:

a) NOT all the communities are homogeneous, kin-based communities with completely stable residence patterns.
b) Multiple parties can manage collectively if they are willing to work together, as evidenced in the Kuskokwim, in Prince William Sound, in the Skeena Watershed Committee, and possibly in the Mitchell River watershed. These four cases are regional-level systems, which do not operate on the local level. The Japanese case, even though based on homogeneous communities, shows the complexity of parties, rights, and situations which can be dealt with on the local and regional levels.
c) The scale of the area and of the community or communities can vary a great deal, depending on the task at hand and the resources available to assist communication over distance. More important is the degree of overlapping interests and the willingness to work together, to communicate effectively.

Does Effective Management Require Format Rights?

Although the communities share an ability to assert some kinds of management rights, not all have formal or legal rights. At first glance, it might seem obvious that the more formalized the rights, the more effective and stable the management system. Indeed, analysts have suggested that, the greater the rights (which is likely to coincide with legalization), the more communities appear willing to invest in the resource, because they have greater assurance of enjoying the benefits (Schlager and Ostrom 1993).

However, the communities on Lake Titicaca, whose rights are arguably the narrowest (exclusion) and least recognized (illegal), appear to have effectively asserted their rights informally for about four centuries. Their fishery is stable and efficient; they enjoy a high CPUE. And they invest heavily in monitoring, enforcing, and fulfilling community obligations.

It may be less important what kind of rights are asserted (whether formal or informal) and how narrow these rights are (only one or two areas of management) than whether there are significant benefits from asserting them. In the case of Lake Titicaca, the benefits are all-important, and so people continue to put in the extra work of maintaining an extra-legal system.

But informal rights are adequate only in certain situations. The Lake Titicaca fishermen do well because the government does not have the resources to impose other rules or introduce conflicting fisheries. For example, no one has been foolish enough to put larger vessels into the lake which might intercept and soon eliminate the migratory stocks. Informal systems can do well only when they are free of external threats from more powerful actors.

Informal systems like the Kuskokwim working group also do well when they genuinely solve problems by mobilizing scarce resources and focusing them on the problem. Even though they do not have legal rights like the sea tenure arrangements in Japan and Korea, or the leasehold arrangement in Lousiana, the recognition by government of their importance means that they might as well have legal authority. Solving a data problem delivers a benefit to the community by keeping a fishery open. From a government perspective, solving a problem also has a benefit in simply resolving conflict over data.

It is also important to note that informal rights are more likely to involve political and social accountability rather than legal accountability. The point here, however, is that the ability to assert either formal or informal rights is a common feature of managing communities. And that all rights-based systems have accountability of one sort.

Common Features of Sustainably Managed Community-Based Fisheries

Except for Lake Titicaca, all of the management systems described above have:

1. mechanisms of accountability such as:
   a) common access to information on the status of the resource
   b) the ability to have public discussion to debate and scope out what "the real problems" are
   c) the ability to reach agreement on what the most basic problem is and what me basic strategy should be
   d) the ability to identify the need for new data if existing data is inadequate
   e) the ability to have clear, publicly articulated standards for evaluating management actions
   f) the ability to have timely feedback on outcomes of management actions

2. mechanisms for effective management such as
   a) the ability to make appropriate rules
   b) the ability to monitor compliance with rules
   c) the ability to. enforce the rules, and to censure non-compliance
   d) the ability to garner support as a legitimate management system
   e) the ability to get members to invest enough time and energy into management to address the problems
   f) the ability to promote efficiency (lower transactions costs)
   g) the ability to promote stewardship

3. mechanisms for equitable representation of groups such as
   a) different gear groups
   b) differently situated fishermen (subsistence/commercial, aboriginal/non-aboriginal)
   c) community-at-large as well as fishermen
   d) other parties whose interests overlap with fishing communities, depending on the goals of the institution

4. mechanisms for adaptiveness such as
   a) the ability to receive clear feedback signals about success or problems
   b) the ability to change in response to new problems or opportunities
   c) the ability to accumulate knowledge and learning about local resource and environmental relationships, and to tap human and traditional knowledge of these

Traditional systems developed in the first place by learning what the carrying capacity of the local environment was. They almost certainly learned by trial and error, and encoded the lessons in cautionary myths, rituals, taboos, and prohibitions. The process is the same today, but with new tools, and hopefully much shorter feedback loops.

It is important to note that NOT all the successful systems are centuries old. Even though time depth is obviously a valuable indicator of success, there are far newer systems which have the hallmarks of success.

One of the most important helpful indicators of success, when time depth is lacking, is the spirit of stewardship. Stewardship is the essence of community-based management. Management systems based on stewardship focus as much on the DUTY of fishing communities to manage the resource for future generations as they focus on the RIGHT of communities to manage. Rights and duties are two faces of the same coin, but the difference is essential. A right is oriented toward the benefit of the current users; a duty is oriented toward future generations.

In the most developed form of stewardship, communities exercise the management right in order to carry out their duty to steward the resource for their children. The resource is seen as a fundamental part of the welfare of their children. The management system driven by the duty to practice stewardship is oriented toward the needs of the resource to sustain itself (adequate habitat, adequate reproductive capacity) rather than the needs of people to expand their use. This is the ideal to which designers of sustainable systems should aspire.

When communities become stewards, a large percentage of community residents as well as fishermen enforce the system as fundamental to the values of the society, or at least of the local community. When fishermen and communities are stewards of the resource, they think of good management as a part of their religion, and defend it furiously.

Accountability Safeguards for New Situations

Communities in post-industrial society do not become stewards overnight. Likewise, communities which were stewards in the past do not automatically remain so under new conditions.

Residents may not even easily agree on the nature of the problem(s). In some communities, a number of members may be in a very different position regarding the fishery than their pre-industrial ancestors were. Some residents may see fish and rights of access to fish only as commodities to be traded for more desirable goods. In this situation, how do we know whether a community might become capable of collectively seeing the benefits of sustainable management?

We have already suggested that some kinds of communities are likely to develop sustainable management rules and practices more easily than others. These "easier" communities are those which have the characteristics outlined above.

However, this does not mean that communities lacking these characteristics cannot develop rules for sustainable use. They may not all become stewards, but it should be possible for most communities to become rational managers, simply because it is in their self-interest to do so in the relatively short term. The benefits to be derived from well-managed sustainable fisheries are so much greater than the benefits of depressed stocks, declining fisheries, or no fisheries at all.

But in the process of learning how to be rational managers, the "more difficult" communities which lack all the "natural" characteristics of self-managers need safeguards. They are far, more vulnerable to forces pushing them toward non-sustainable use patterns. Therefore, they are likely to need multiple checks and balances to make them accountable to sustainability principles in more formal ways. They also need to be constantly monitored, and there should be fall-back mechanisms if these systems appear to be going off track.

This is especially important if individual actors have incentives to treat the fishery as a short term commodity. Examples of such actors include:

1. Fishermen with no identification with the area, who are not averse to selling their fishing rights (and therefore have less incentive to insure its sustainable long-term management if they can reap benefits in the short term). This is especially true if the long-term impacts of today's use would not be evident for several years.

2. Fishermen or processors who can escape the costs of non-sustainable use, either because they have other options, or because they operate in a global market where local resources are of minor importance. These types of actors can still be part of the system, but it must be recognized that they have no particular incentives to obey the rules. They obey the rules only if they are closely monitored.

Furthermore, these kinds of actors tend to look for opportunities to pressure the system to bend the rules in their favour. This raises the question of who needs to be part of the process. How many parties without incentives to manage sustainably can a process afford to include? Where communities feel that such parties need to participate, they must be clearly checked and balanced by other parties and by sustainability guidelines to which they can be made accountable. Examples of how such accountability to sustainability guidelines can be structured include:

a) The community can generate a fishing plan following sustainability guidelines, which spell out all assumptions, use publicly available data, and has a fallback position such as an appeal mechanism, in the event that any of these conditions are lacking.

b) The community plan must be approved by a governmental body, or by a non-governmental body outside the community, which verifies that the guidelines have been followed. When communities have established a track record of good management, this exercise will be more and more a mere formality. For example, when PWS AC worked out its allocation plan, and the Kuskokwim River working group designed its harvest plan, these were reviewed by the Board of Fish. The review process now consists of a report, a question period, and a rubber stamp.

c) Decision-making at the regional level has become routinized and institutionalized.

d) In highly contentious situations, a plan with clearly defined responsibilities may be adopted by the court. Revised plans may be reviewed by the court. Blomquist (1992) shows how both individual users and large companies with long-established groundwater rights in California had a solution imposed by the court. The court ruled that all parties had to decrease their groundwater consumption, "sharing the burden of conservation" equally in order that all might enjoy a sustainable water supply. The parties jointly hired a government agent from the county water department as "water master" to monitor the use of all parties. Years later the parties went back to court to revise the plan when they had figured out a better way to reward those who helped recharge groundwater basins.

e) The Japanese case illustrates the important role of commissions made up of elected community representatives and government technical experts, which could together make a balanced decision.

f) Strategic, alliances between parties "naturally" committed to sustainable management, as judged by the criteria discussed above. A weighting of boards and committees so that those parties outweigh or outnumber members who are not so committed. The US shellfish cases illustrated the disastrous consequences of failing to form strategic alliances.

Legal, Political, and Social Accountability

Government departments of fisheries usually express fears about the liability of government, if communities or boards to whom power has devolved make mistakes. For example, DFO has the constitutional mandate to conserve and protect the fisheries resource. Is DFO then responsible for mistakes which might be made at the local or regional level? If communities have rights, they also share accountability for mistakes. While we do not pretend to speak from legal expertise, it may be useful to think in terms of three general levels of accountability.

1. Communities which manage under formal legislated mandates like the Japanese inshore cooperatives and the Alaska regional enhancement associations, or mandates such as those of First Nations with constitutionally-protected rights. Such communities would likely have legal accountability similar to that held by government departments or national governments. Such communities also have political accountability. They are likely to damage the institutional arrangement if they fail to carry out their mandate.

2. Communities which manage through a delegation of powers by formal co-management agreement or contract are legally liable according to the terms of the contract, and/or are politically accountable when it becomes a question of renewing or continuing the contract

3. Communities which manage through an informal delegation of powers to solve problems. Groups such as the Kuskokwim working group have no formal power even though they exercise considerable influence. It is unlikely they are legally accountable, but they are still politically accountable to the state and socially accountable to their communities. They could be disbanded by the citizens Board of Fish or the Department. Individuals could be discredited in their communities.

Of course, other forms of accountability are often also built into the structure of working groups or co-managing boards. In the case of the Kuskokwim, the Alaska Department of Fish and Game sometimes has to overrule the wishes of the rest of the working group.

It is important to distinguish between a mere advisory body and a co-managing body, however. An informal co-managing body will cease to operate if its decisions are overturned frequently and without principled and clearly articulated reasons. If it ceases to operate, the problems it was set up to solve will return. For these bodies also hold government accountable to the principles of management, or of their particular management plan.

Devising a Workable Process

Some of our discussion has been about the process of developing a local institution after government and local parties agree there should be one. Process is critical. It is possible for a community or region to quality, to fit the general criteria for a good "candidate", but still not be a good candidate for a launching sustainable management system. The following questions are additional indicators of whether a cooperative process is likely to succeed:

1. Are there enough human, financial, and biological resources?

2. Do interests overlap sufficiently to find common ground?

3. Are there highly incompatible hidden agendas driving the most important actors? Each actor or sector of players may be responding to a perception of a problem which so dominates his or her vision that it is not possible to look beyond it to the sustainability of the resource.

4. Is government willing to "level the playing field" among actors with conflicting interests enough so that their common interests can emerge? If not, the more powerful party will
   • dominate the process and it will fail.

Sociologist Barbara Grey's (1991) discussion of the development of collaboration among parties is quite compatible with ours. She also adds a few more process rules to the pathways we have already charted. We summarize below those of Grey's rules which are relevant to this discussion:

1. The convenor of the process must be perceived to have appropriate stature, power, and purpose.
2. Adequate representation must be obtained from all relevant sectors.
3. Participation must be based on legitimacy criteria which are locally accepted.
4. The style of facilitation must be appropriate to the local situation.
5. A shared definition of the problem must be established.
6. There must be clear expected outcomes.
7. Joint tasks should be undertaken, such as information searches, and assigning tasks to subgroups.
8. Each party should articulate values which guide its interest in the process.
9. A common sense of purpose must be established and enlarged.
10. Formal rules should eventually be established about how decisions are reached.
11. Groundrules for conduct with one another (and the general public, the press) should be established, and reevaluated from time to time.
12. All technical, financial, and human resources accessible to the collaborators should be inventoried.
13. Collaborators should negotiate agreements.
14. Collaborators should decide how to implement and monitor the agreements.
15. Collaborators should create a local constituency to support implementation.

Grey's findings, based on years of study on inter-organizational collaboration (mostly NOT in natural resource management), support the findings of institutional analysts cited earlier, and add a few new suggestions about process.

Logistical Issues: How Can We Learn What Works Best When There is Such Diversity?

Fisheries management does have very particular problems in B.C., and in different regions of B.C. Our B,C. case studies suggest that local parties are usually the best judges of what is likely to work in their area. Since laws or the mobile nature of stocks often require that locals share and coordinate in some way with non-locals, government involvement is also essential.

If more areas of B.C. decide to develop local institutions of the sort described in this report, they may wish to participate with other communities in finding answers to the following difficult questions by "twinning" with other communities or areas attempting to deal with similar problems.

Such living experiments would help government agencies and other communities evaluate in the future which developments are the most appropriate for which situations.

1. Appropriate scale. What is the appropriate scale geographic area or institution for adequately carrying out any particular management function? It would be helpful to compare two or three initiatives which-take on a smaller or larger scale area in attempting to address a similar problem. What sort of difficulties arise at different scales?

2. Permeability of Boundaries. How rigid does the boundary around a management unit have to be? Lake Titicaca has a permeable boundary, depending on the resource and the distance from shore (the costs of enforcement).

3. Flexibility of membership. How local does the membership have to be? Alaska Regional Associations have flexible membership not confined to local residents.

4. Buffer zones. How could some reasonable level of stable resource access be achieved in any particular region, given differential fluctuations in abundance in different areas of the coast? What opportunities might exist for "in common areas" which could buffer low abundance years for particular areas?

5. Interception agreements. What opportunities exist to reduce interception and increase dependence on local stocks? What trade-offs could be negotiated between areas which protect, rehabilitate, and enhance habitat or stocks and those which intercept stocks but do not contribute to their well-being?

6. Research partnerships. How can fishing communities and/or organizations work as full partners in research by outsiders? How can local knowledge be included in research? How can we get beyond the dilemma of "the experts" getting the funding and proceeding at their own pace without working closely with, or adequately informing, the other participants in these processes? What trade-offs in."efficiency" are most effective in the long run? Does time Invested in communication which raises transactions costs at the front end successfully lower transactions costs at the back end, as Hanna (1994) has suggested?

7. The role of government. The concept of co-management is now being advocated In such circles as the World Bank, the International Monetary Fund, and ICLARM. Sometimes co-management is seen as a way of downloading costs onto communities, as government resources shrink. While communities are certainly willing to contribute considerable volunteer labour (or mobilize It from other quarters for key periods of research) when they have a real voice in management, there are limits. The tension of perspectives between governments .and communities will probably always be necessary. Government agencies in B.C. are already learning how to creatively share information and power. And groups such as the Skeena Watershed Committee are learning how to make a contract with government: in exchange for the effort fishing sectors put into reaching agreement, government commits to honouring the agreement.

8. The role of professional facilitation. In the process of making a contract with government, the principles of professional facilitation can be extremely helpful. As the general public and the fishing community has become more sophisticated about computer modelling, the fundamentals of fisheries science, and the limits to government's ability to manage effectively—they have also become-more aware of how to use the science of mediation. This tool can be used effectively by communities to establish principles of sustainability and fairness In the beginning of a process. Depending on the resources of the community and the type of conflicts, the communities may learn how to rotate the role among themselves.

9. The definition of community. Our case studies have discussed both geographic communities (all the people living in one area, whatever work they do) and communities of interest (all the people interested in fish and fishing in one community or region). Many of the cases show a creative combination of these two aspects of community. But there are dilemmas and trade-offs. People who work well on local or regional boards must be well informed about issues particular to the fisheries. If all the actors who might potentially be involved in local management actually became involved, there might be too many interests for a workable process.

Some degree of balance and compromise is needed between these two aspects of community.

Different Ways of Addressing the Nine **Great Fisheries Management Problems**

The report began by laying out nine great fisheries problems which are addressed in the cases here and by many other examples in the world literature. We end the report by summarizing how each of the problems was addressed by at least one of our case studies. Into this summary, we also integrate our four basic criteria for workable, sustainable management systems: accountability, effectiveness, representativeness, and adaptability.

1. The problem of undervaluing or ignoring human capital. Almost every case showed how the knowledge and willingness to contribute of fishermen was tapped, focused, and mobilized by a local institution. Incorporating human capital into the management systems made them more effective.

2. Confusing public policy/public values with the interests of powerful actors. The Japanese inshore fishery, the Alaska Enhancement Associations, the Kennedy Lake working group, and probably the Mitchell River working group were examples of fishermen and other local actors being able to show how fishermen's interests coincided with the public interest, and being able to act on those interests. Cooperation and power-sharing made policies more representative of a broader range of interests.

3. Passing on (externalizing) the costs of fish habitat protection onto the fishing communities and the public. The Mitchell River working group is the prime example of a regional attempt to spread the responsibility for habitat protection very broadly, and to create public awareness of the need for many actors to share the costs. The working group made all parties more accountable for wise habitat protection (and other) decisions.

4. The compliance/enforcement problem. Lake Titicaca and the Japanese inshore cooperatives are the most powerful examples of truly effective enforcement of fishing regulations.

5. The problem of too many big and powerful boats. The Japanese cooperatives and Lake Titicaca fisheries are again the best examples of systems which do not create incentives to overcapitalize. The relatively small size of territories, the ability of local fishermen to monitor and enforce regulations in the inshore territory, and (in the case of Japan) to be very involved in planning the fishery and marketing-all these factors together created a situation in which a fisherman could make a reasonable and predictable living and had no incentive to capitalize. The management system was effective at promoting other goals.

6. Defining boundaries and access: the exclusion problem. Virtually all our examples practiced a more radical form of exclusion than that found in most B.C. fisheries. Exclusion was an effective way of limiting fishing effort enough so that the remaining fishermen could innovate.

7. Uncoordinated strategies and uses. The Alaska regional enhancement associations, the Skeena Watershed Committee, the Mitchell River Working Group, the Kennedy Lake Working Group, and the Shuswap Watershed Committees were all good examples of effective systems which made all the parties accountable to planning different management activities within a common framework.

8. The problem of inter-governmental conflict. The Skeena Watershed Committee, the Mitchell River working group, and the Japanese inshore cooperatives were all effective at bypassing or resolving inter-governmental conflict.

9. The problem of supply management, product quality, and product diversity. Japanese cooperative and Alaska regional enhancement associations were especially adaptive in finding ways to return maximum value to fishermen.

Finally, after our review we are encouraged about the ability of communities (both those of local residents and of fishermen) to engage in resource co-management and to achieve the broad goals of sustainability outlined in Appendix 1. The cases we reviewed showed both success and failure. The conditions that in-common led to success elsewhere are available in B.C. Therefore, we are also encouraged about the possibility of learning from pilot efforts at community managed fisheries in B.C., a number of which are already underway. The case studies presented above include many types of solutions to problems similar to those which have plagued B.C. fisheries. Our hope is that this report will function as a useful menu for the selection of creative ideas for further pilot projects that will use adaptive learning techniques to arrive at solutions for sustainable fisheries.

SUMMARY TABLE MANAGEMENT FUNCTIONS AND COMMUNITY RIGHTS AND DUTIES- Comparative Case Studies

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	RIGHTS AND DUTIES	Lake Titicaca	Newfound land Inshore	Kusko-kwim River	Alaska Regional Enh Assc	Mitchell River	Japanese Inshore	Louisiana Oysters	Hamgum (Korea) Seaweed
1. POLICY MAKING AND EVALUATION										
CONFUSION OF PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	SCOPING PROBLEMS	Right/duty to do long-range planning	NO	NO	Informal	Informal	Informal	Formal	Formal	Formal
	SETTING OBJECTIVES	Right to research key questions affecting community values	NO	NO	Informal	NO	Informal	Formal	?	Formal
	LONG RANGE PLANNING	Right/duty to educate own and larger community re problems	NO	NO	Informal	NO	Informal	Formal	Formal	Formal
	RESEARCHING THE RESOURCE SYSTEM									
	PUBLIC EDUCATION		NO	NO	Informal	NO	Informal	Formal	Formal	Formal
2. PRODUCTIVE CAPACITY OF THE FISHERY RESOURCE										
EXTERNALIZING COSTS OF FISH HABITAT PROTECTION	MONITORING OF HABITAT	Right/duty to protect fish habitat against other harmful uses	NO	Informal	Informal	NO	NO	Comp-ensation	?	?
		Right of access to government information	NO	NO	NO	NO	Informal	Formal	Formal	Informal
		Right to collect own information	NO	Informal	Informal	NO	Informal	Formal	Formal	Formal
UNDERVALUING OR IGNORING HUMAN CAPITAL	MONITORING OF CONDITION OF STOCK	Right to interpret information in light of local knowledge	NO	Informal	Informal	Informal	Informal	Formal	Formal	Formal
		Right/duty to enhance or restore a) resource/resource productivity b) habitat	NO	NO	NO	Formal	NO	Comp-ensation	?	Formal
3. COMPLIANCE WITH RULES										
COMPLIANCE	IMPLEMENTATION AND ENFORCEMENT	Right/duty to enforce rules re a) harvesting b) habitat damage c) exclusion and poaching	Informal	Formal	NO	NO	NO	Formal Comp Formal	Formal ? Formal	Formal ? Formal

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	RIGHTS AND DUTIES	Lake Titicaca	Newfound land Inshore	Kuskokwim River	AK Regional Enh Assc	Mitchell River	Japanese Inshore	Louisiana Oysters	Hamgumi (Korea) Seaweed
4. FISHERY HARVEST										
UNDERVALUING OR IGNORING HUMAN CAPITAL	STOCK ASSESSMENT	Right of access to government information and right to collect own	**NO**	NO	Informal	Shared	NO	Formal	Formal	Formal
		Right to interpret information in light of local knowledge	**NO**	Informal	Informal	Informal	NO	Formal	Formal	Formal
TOO MANY BIG UNCONTROLLABLE BOATS	HARVEST PLANNING	Right to make rules re								
		a) size of overall catch	NO	NO	NO	NO	NO	Formal	Formal	Formal
		b) location of the fishery	NO	Formal	Informal	Informal	NO	Formal	Formal	Formal
		c) timing of the fishery	NO	Formal	Informal	Informal	NO	Formal	Formal	Formal
		d) gear types permitted	NO	Formal	Informal	Informal	NO	Formal	Formal	Formal
		e) size of allowable interception	NO	NO	Informal	NO	NO	NO	N/A	N/A
CONFUSING PUBLIC POLICY WITH THE INTERESTS OF POWERFUL ACTORS	HARVEST MONITORING	Right of access to government information and right to collect own	NO	NO	Informal	NO	NO	Formal	Formal	Formal
UNDERVALUING OR IGNORING HUMAN CAPITAL		Right to interpret information in the light of local knowledge	NO	Informal	informal	NO	NO	Formal	Formal	Formal

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	RIGHTS AND DUTIES	Lake Titicaca	Newfoundland Inshore	Kuskokwim River	Alaska Regional Enh Assc	Mitchell River	Japanese Inshore	Louisiana Oyster	Korean Seaweed
5. FISHERY ACCESS										
DEFINING BOUNDARIES AND ACCESS EXCLUSION	MEMBERSHIP/ EXCLUSION	Right to exclude a) certain classes of fishery (e g sport, commercial) b) certain classes and sectors of fishers	Informal	Informal	State Policy	State Policy	NO	Formal Formal	Formal Formal	Formal Formal
	HARVEST ALLOCATION	Right to allocate a) how many licenses or members in each category or sector b) how much each category or sector may harvest c) areas for different uses d) access to redistributive mechanism	NO NO NO NO	Formal NO Formal Informal	NO NO NO NO	NO Informal Informal NO	NO NO NO NO	Formal Formal Formal Formal	Formal Formal Formal Formal	Formal Formal Formal Formal
	TRANSFER OF MEMBERSHIP	Right/duty to limit license transfer to other community or area members Right/duty to regulate conditions of transfer	Informal Informal	Informal Informal	NO NO	NO NO	NO NO	Formal Formal	Informal Informal	Formal Formal
6. RESOURCE USE COORDINATION										
UNCOORDINATED STRATEGIES AND USES INTER-JURISDICTIONAL CONFLICT	PLANNING THE COORDINATION OF DIFFERENT HARVEST REGIMES AND DIFFERENT STRATEGIES TO USE OR ENHANCE	Right/duty to coordinate own activities internally and with neighbours who fish, enhance, or have other uncoordinated uses Right/duty to communicate problems and try to solve with others Right/duty to resolve disputes internal and external	NO NO NO	Formal NO NO	NO NO NO	Formal NO NO	NO Informal Informal	Formal Formal Formal	Informal Informal Informal	Formal Formal Formal

MANAGEMENT PROBLEMS	MANAGEMENT FUNCTIONS	RIGHTS AND DUTIES	Lake Titicaca	Newfound land Inshore	Kusko-kwim River	Alaska Regional Enh Assc	Mitchell River	Japanese Inshore	Louisiana Oysters	Hamgum1 (Korea) Seaweed
7. RETURNING OPTIMUM VALUE TO FISHERMEN										
SUPPLY MANAGEMENT/ PRODUCT QUALITY/ PRODUCT DIVERSITY	SUPPLY PLANNING	Right to manage harvest timing for optimum product value	NO	NO	NO	NO	NO	Formal	?	?
	PRODUCT QUALITY		NO	NO	NO	Informal	NO	Formal	?	?
	PRODUCT DIVERSITY		NO	NO	NO	Formal	NO	Formal	?	?

APPENDIX 1

CRITERIA FOR SUSTAINABLE USE OF RENEWABLE RESOURCES

1. Defining Sustainability

The efforts of the International Association of Ecology generated a broad definition and a set of criteria for sustainable resource use which fit very well with the way we see the goals of sustainable fisheries.

> The concept of sustainability (Table 1) implies the use of ecological systems (the biosphere) in a manner that satisfies current needs without compromising the needs or options of future generations.[1]

Table 1. The Guiding Principles of Ecologically Sustainable Resource Management[2]

- Inter-generational equity: providing for today while retaining resources and options for tomorrow.
- Conservation of cultural and biological diversity and ecological integrity.
- Constant natural capital and 'sustainable income'.
- Anticipatory and precautionary policy approach to resource use, erring on the side of caution.
- Limits on natural resource use within the capacity of the environment to supply renewable resources and assimilate wastes.
- Qualitative rather than quantitative development of human well-being.
- Pricing of environmental values and natural resources to cover full environmental and social costs.
- Global rather than regional or national perspectives of environmental issues.
- Efficiency of resource use by all societies.
- Strong community participation in policy and practice in the process of transition to an ecologically sustainable society.

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[1] International Association of Ecology. 1991. "A Sustainable Biosphere: The Global Imperative. Reports from the International Sustainable Biosphere Initiative Workshop and the Ecology Society of America". *Ecology International* 1991: 20. Special Issue.

[2] adapted from Hare, W.L, J.P. Marlow, M.L. Rae, F. Gray, R. Humphries, and R. Ledgar. 1990 Ecologically Sustainable Development. Australian Conservation Foundation, Fitzroy, Victoria.

The authors recognized that these are ideals which are far from being met in most situations in the real world. They also recognize that-approaching the ideal will require "trade-offs between meeting current needs and maintaining a diversity of options for the future, (p. 7)."

The essence of sustainability, however, is continuance. That is the short and simple definition of sustainability. Fisheries and other biological resources are called renewable. But, the world is replete with examples of fisheries which have collapsed due to over-exploitation or habitat destruction. An additional concern is reduction of adaptability. Narrowing of the genetic diversity of fish stocks is. problematic over the long term. Species' resilience, their ability to adapt to environmental change, results from genetic diversity. When we lower the diversity, we also lower resilience.

2. Criteria for Measuring Sustainable Use

Sustainability cannot be measured by itself. To assess whether the goal of sustainable use has been achieved requires, measurements that can be applied as tests. The required indicators for sustainable fisheries unfold from our definition of fisheries management as a comprehensive social and biophysical system.

For fisheries as a comprehensive system, indicators of sustainability need to include biological, fisheries production, social, and economic measurements. Ideally, we need to know if the resource continues to reproduce itself, if the resource's adaptive resilience is being maintained (i.e. its genetic diversity), if harvests of the resource are continuing; if the value of the fishery is maintaining itself (before and after costs are subtracted), and if the human community which has depended on the resource in the past continues its relationship. These are admittedly rare measurements. Some of these indicators are available in the case studies we reviewed and some (particularly the biological side) are only available in short-hand form: the stock has collapsed or the stock has maintained itself. Future management efforts require that the types of indicators necessary for the measurement of sustainability be taken more seriously. And, management will require investment in monitoring the components of fisheries chosen as indicators of sustainability.

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