Sewell, W. R.
Recreational fisheries evaluation, institutions and problems.

RECREATIONAL FISHERIES EVALUATION, INSTITUTIONS, AND PROBLEMS

Papers presented to the Second Sport Fisheries Statistics and Evaluation Workshop, Victoria, B.C., November 22-23, 1972.

Edited by

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PREFACE

The need for sounder methods of evaluating sport fisheries has become increasingly urgent in many parts of Canada in the past decade. The reasons are not hard to find. The demand for this form of outdoor recreation has grown enormously, and in some areas has more than doubled in this period. It has brought with it an increasing number of conflicts, both with the commercial fisheries and with other uses of lakes, streams and coastal waters. It has also been accompanied by growing demands for public investment in sport fishery development programs and in the provision of access to such fisheries.

The crude, and sometimes conceptually invalid methods used in the past to furnish indications of the value of sport fisheries are being rejected by planners and decision-makers for a variety of reasons. A search is underway to devise methods, at least comparable, and preferably sounder, than those frequently used for evaluating other water uses, such as hydro-electric power development, flood control, or waste disposal. The Fisheries and Marine Service of the Department of the Environment has encouraged this search both by carrying out and funding studies and by sponsoring symposia and workshops to discuss problems of evaluation.

In 1965, for example, the then Department of Fisheries of Canada, convened a Symposium on the Economic Aspects of Sport Fishing which brought together sport fisheries managers, experts and others variously concerned with economic evaluation from Canada and the United States. The proceedings were published in the Canadian Fisheries Report No. 4, 1965. The first national Workshop was held in Ottawa in 1970 and was notable on two counts. It represented the first time that all provincial and federal sport fisheries management agencies had been invited to jointly review and disucss common problems especially those relating to the need for nationwide information on the size, value and potential of recreational fisheries. Second, the recommendations made at the Workshop led to the Fisheries and Marine Service accepting responsibility for working with the support of all agencies in developing such nationwide data.

This volume presents the papers given at this second Workshop, held November 22-23, 1972, in Victoria, British Columbia. Here an attempt was made to bring participants up to date with the developments in methodologies that have occurred since the first Workshop, and to determine as specifically as possible, priorities for the allocation of resources for the collection of data and the carrying out of related studies. Besides representatives from Canada's sport fisheries management agencies, an important input was made by a number of invited

participants from Europe, including the Acting Secretary of the European Inland Fisheries Advisory Commission, Jean-Louis Gaudet of FAO, a number of representatives of fisheries agencies and interests from Ireland, and an expert on the evaluation of sport fisheries from Sweden. Their descriptions of problems and approaches in European countries should be valuable to those concerned with sport fisheries management in Canada and elsewhere.

A list of those attending the Workshop is included as an appendix to the volume. The Steering Committee for the Workshop was composed of Mr. R.C. Thomas, Assistant Chief of Fisheries Management of the British Columbia Department of Recreation and Conservation, Victoria, B.C.; Mr. R.F.A. Roberts, Manager, Special Economic Programs and Intelligence Branch, Fisheries & Marine Service, Department of the Environment, Vancouver 9, British Columbia; Mr. G. Bowden, Vice-President, Pearse-Bowden Consultants, Vancouver, B.C.; Dr. W.R. Derrick Sewell, Professor of Economics and Geography, University of Victoria, Victoria, B.C.; and Mr. A.L.W. Tuomi, Chief Recreational Fisheries Branch, Fisheries & Marine Service, Department of the Environment, Ottawa.

Ottawa November 1973

ACKNOWLEDGMENTS

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W.R.D. Sewell

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CHAPTER I

CHANGING APPROACHES TO THE EVALUATION OF SPORT FISHERIES

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Abstract. Growing conflicts between fisheries and other resource uses, the increasing demand for outdoor recreation opportunities, and mounting pressures for environmental protection are making it increasingly essential to develop improved methodologies for the evaluation of sport fishing. There are at least four possible approaches to such evaluation, namely the ascription of infinite values, statements of the extent of use, indications of willingness to pay, and indications of perception, motivations and values. In general, there has been a gradual progression from the first to the last of these, but in most cases the concentration has been on the first two. Experience suggests, however, that the first two provide insufficient information for comparisons with other uses of fishery resources or with other competing uses of the waters used by fisheries.

This volume contains papers presented at the Second Sport Fisheries Statistics and Evaluation Workshop. The papers fall into four groups. The first puts the matter of evaluation into the broad perspective of resources and environmental management. The second consists of a series of chapters reviewing the problems and approaches to evaluation in different countries and descriptions of the institutional framework within which the fisheries are managed in these countries. The third presents a discussion and critique of actual techniques of analysis, and the fourth offers some suggestion as to the kinds of action that might be taken to put these into operation.

Sommaire. Les conflits croissants entre la pêche et les autres utilisations des ressources, la demande toujours plus grande de récréation en plein air et les pressions croissantes qu'on exerce pour la protection de l'environnement rendent de plus en plus nécessaire la mise au point de méthodes améliorées d'évaluation de la pêche sportive. Il existe au moins quatre approches possibles pour une telle évaluation: attribuer une valeur infinie aux ressources de pêche, en déterminer le degré d'utilization, déterminer le montant que les utilisateurs seraient disposés à payer, et déterminer les conceptions, les motivations et les valeurs qu'on y rattache. En général, il y a eu une progression graduelle de la première à la dernière de ces approches, mais dans la plupart des cas, l'accent a été mis sur les deux premières. L'expérience tendrait à montrer, cependant, que les deux premières n'offrent pas assez d'information pour qu'on puisse effectuer des comparaisons avec d'autres utilisations des ressources de pêche ou avec d'autres utilisations concurrentes des eaux utilisées pour la pêche.

Le présent volume rassemble des communications présentées lors du deuxième colloque sur l'évaluation et les statistiques de la pêche sportive. Les communications appartiennent à quatre groupes. Le premier étudie la question de l'évaluation sous l'angle de la gestion des ressources et de l'environment. Le deuxième consiste en une série de chapitres passant en revue les problèmes et les approches de l'évaluation dans différents pays et décrivant les cadres institutionels à l'intérieur desquels les pêcheries sont gérées dans ces pays. Le troisième présente une discussion et une critique des techniques actuelles d'analyse et le quartrième présente quelques propositions quant aux mesures que l'on pourrait prendre pour appliquer ces techniques.

Among the various problems facing fishery managers today, few are more difficult to deal with than the evaluation of sports fishing. The need for such an evaluation stems from three main factors: growing conflicts between fisheries and other resource uses; the increasing demand for outdoor recreation opportunities; and mounting pressure for environmental preservation or revival. In several regions of Canada, for example, decisions have to be made as to whether certain rivers should be preserved for the maintenance of particular fisheries or whether part of the latter should be sacrificed to enable the management of these water bodies for other purposes, such as waste disposal, log driving, or hydro-electric power generation. The conflicts on the Fraser River in British Columbia,[1] and the St. John River in New Brunswick[2] are illustrative.

There are also conflicts between commercial fishing and sports fishing, as in British Columbia and Manitoba. Decisions have to be made, for example, as to how much of the salmon fishery shall be reserved for recreationists, and more specifically, which areas shall be reserved for this purpose. Such decisions are not simple for they involve trade-offs between the income-earning opportunities of one group and the psychological satisfactions of another.

Governments are also under pressure to provide an increasing range of recreational opportunities. In some cases this pressure stems from populations which have a growing amount of leisure time and more money to spend. In others it stems from a desire to increase national or regional income by developing recreational resources. Whatever the motivation, there seems to be a growing expectation that governments will provide new access roads, more camping grounds, and additional docking facilities. The question arises as to how much investment in the provision of such opportunities can be justified as compared with the competing claims on the nation's purse.

Beyond this there is a mounting concern about the preservation or the revival of the environment. In this connection, fish are seen not merely as a source of food, income or a source of recreation, but as an important element in the physical milieu. Preservation or revival, however, can only be purchased at some cost. The challenge then becomes that of determining the value of the gains from preservation (or revival) as against the costs of other opportunities foregone, such as the development of new factories, roads, or mines.

All of the foregoing matters call for a rational assessment of the values of sport fishing in terms that can be compared with the values placed on other resource uses or other

uses of capital. Evaluations of sport fisheries have often been weak or unconvincing, largely because fishery managers have failed to develop techniques of evaluation comparable in sophistication to those used by other resource managers, such as those relating to hydro-electric power generation, waste disposal or irrigation.

In some ways this deficiency is understandable. Outdoor recreation differs from many other goods and services derived from the exploitation of resources, in that it is typically made available free or at only a nominal charge. In the absence of a price for its use, there is no ready measure of its value that can be compared with other competing uses for individual's income, the nation's capital, or alternative uses of the resource in question, in this case the fishery resource or the water body which it inhabits. Other means must be used, therefore to determine values of recreation desired.

POSSIBLE APPROACHES TO EVALUATION

There are four main types of approach presently used in the evaluation of sport fisheries in Canada. They might be describe as:

(a) the ascription of infinite values

(b) statements of the extent of use

(c) indications of willingness to pay

(d) indications of perceptions, motivations and values

Reviewing experience over the past decade in various parts of the country, there seems to have been a gradual shift from (a) and (b) to (c) and attempts are now being made to search for means of measuring the attributes in (d).

Ascription of Infinite Values

For many years fisheries agencies in Canada responded adversely to attempts to place specific values on sport fishery resources. The rationale offered was that satisfactions gained from sport fishing are "intangible" and "personal" and "not amenable to measurement in terms that can be aptly compared with values attributed to competing uses."

This position was reinforced by legislation and policies relating to fisheries management. The Canada Fisheries Act provides protection for fisheries against competing alternative water uses by forbidding the construction of control works on streams used by migratory fish, and the dumping of wastes that would harm fish populations. Thus protected, fishery managers possibly regarded evaluations as irrelevant. In addition, there was little pressure on the part of agencies allocating funds for sport fishery enhancement or protection programs to obtain assurance that the benefits of such programs not only exceeded their costs but also represented the most advantageous use of the capital involved.

The consequence of the lack of formal evaluation was to ascribe, implicitly at least, an infinite value to the preservation of a sport fishery. Where decisions had to be made about expenditures for enhancing sport fishery opportunities, the tacit assumption seems to have been that the benefits were at least equal to the costs.

Increasing conflicts in the use of water resources and growing claims on the public no longer permit the ascription of infinite values or tacit assumptions that benefits equal costs. More and more, fisheries agencies are under pressure to substantiate their case.

Extent of Use

The extent to which a sport fishery is used is often regarded by fisheries agencies as a measure of its value. In fact, one of the earliest steps taken in developing evaluations is usually the collection of data on numbers of fishermen, the frequency of their visits to fishery sites, and the number of fish they catch. Fisheries agencies in most parts of Canada now gather information on these matters. Some of it is obtained by the Fisheries and Marine Service of the Department of the Environment and is published in reports issued from time to time.[3] A recent monograph on The British Columbia Sport Fisherman is illustrative.[4] Provincial agencies also gather information on the extent of angling, based on creel censuses, and data collected from surveys conducted at the time when licenses are issued. In addition to information on angling by residents, these surveys frequently furnish data on angling by Canadians from other provinces, and tourists from elsewhere.

Data on the extent of use provide a useful indication of consumption of sport fishing opportunities. They furnish only a partial guide, however, to the demand for, or the values derived from participation in this activity. They say nothing about 'potential' or 'latent' demand. Moreover, since in most cases fishery opportunities are provided free of charge, they do not force the consumer to weigh them against other uses of his leisure time for which fees have to be paid. As a consequence, they do not furnish a measure of the relative importance of sport fishing in the range of activities considered by recreationists. In addition, data on participation do not indicate by themselves the values sought and derived from the sport fishing experience. They state only that so many fishermen were there, and in some cases they caught fish. They do not show what motivated them to go to a fishing site, whether catching a fish was critical to the experience, or how valuable the fishing experience is to them.

Willingness to Pay

The approach used in most evaluations of uses of resources is based on principles of economics. The economist views natural resources as one of a number of inputs into the producing goods and services to satisfy human wants. The value of such inputs, and the goods and services which they help to provide, is registered by the prices which people are willing to pay for them. The economist treats outdoor recreation the same way he treats any other resources use. True, as pointed out earlier, outdoor recreation is typically made available free of charge. But this does not prevent a market price being placed on it. Surrogate values, representing what customers would be willing to pay rather than forego a given recreation opportunity can be developed.

Two methods of estimating surrogate values have been devise, described as direct and indirect methods. Both have been used in estimating recreation values derived from sport fishing. Direct methods generally use interviews and surveys to determine a user's willingness to pay. They confront the consumer directly with questions about this. Indirect methods are based on data on expenditures in gaining access to a fishing opportunity. These are used as a proxy to the price that a user would be willing to pay. Generally travel costs, at-site expenditures, and frequencies of trips are used as indications of demand and hence of values derived.

Both types of methods have advantages and disadvantages, and these are discussed later in this volume, as well as elsewhere.[5] The "willingness to pay" approach is much superior to many of the other approaches to recreation resource evaluation attempted to date. Most importantly, it makes possible a comparison with values attributed to competing alternative uses of a resource. But present methods have a number of deficiencies. One of these results from the concentration on present consumption as a measure of demand. This provides little guidance as to what demand would be if additional opportunities were provided, and it may be an unreliable indicator of the social losses that would be sustained if a given fishery were removed. Much more needs to be known about the factors which condition consumption if satisfactory estimates of values derived from sport fishing are to be made.

Perceptions, Motivations, and Values

A fourth approach to the evaluation of sport fisheries is based upon the determination of satisfactions sought in the exploitation of these resources. It recognizes that different individuals perceive recreational activities in different ways, and that motivations for engaging in them may differ also. Some fishermen, for example, may perceive sport fishing as an opportunity to relax with a congenial companion while others may view it as an opportunity to test one's skill against that of other fishermen. Some may perceive it as a means of getting away from family responsibilities, whereas others see it as a means of recreation together with one's family.

Not only do perceptions of the activity vary but so also do the values attached to given fishing opportunities. Such values particularly to the environmental attributes of such opportunities, such as the relative abundance of fish, the presence (or absence) of other fishermen, or the access to related recreational activities, such as camping or hiking.

Knowledge of perceptions, motivations, and values is essential to the understanding of the demand for outdoor recreation in general, and for sport fishing in particular. Without such knowledge, prediction of shifts in consumption patterns or social losses (or gains) from changing supply conditions must remain very much a matter of speculation or guesswork. It is an area to which both researchers and fishery managers are beginning to give increasing attention in Canada and elsewhere. A recent report of the U.S. National Academy of Sciences Advisory Committee on Outdoor Recreation recommended that the behavioral dimensions of recreational activities be given top priority in future research programs. In Sweden the psychological aspects of sport fishing have become one of the principal foci of research towards the development of evaluation methodologies.

ORGANIZATION OF THE VOLUME

This volume contains the papers presented at the Second Sports Fisheries Statistics and Evaluation Workshop, held in Victoria B.C., November 22-23, 1973. Its contents fall into four main sections. The first puts the matter of evaluation into the broad perspective of resources and environmental management. The second consists of a series of chapters reviewing the problems and approaches to evaluation in different countries. The third presents a critique of actual techniques of analysis, and the fourth offers some suggestions as to the kind of action that might be taken to put these into operation.

There has been a gradual shift in the approach to evaluation of sport fisheries in Canada in the past decade from ascriptions of infinite values or presentation of statements on numbers of fishermen to the development of estimates of values derived. This shift has resulted in past from increasing competition for the use of water bodies, and from growing claims on the public purse. It has doubtless been stimulated too by a recognition of two major social concerns: the concern about the importance of environmental quality as an aspect of the quality of life, and the desire of the public to be consulted about the management and use of natural resources. These concerns are of particular interest to managers of sport fishery resources, as Lloyd Brooks points out in his chapter on changing perspectives in sport fishery management. Reviewing past approaches to the latter and noting the need for a people-oriented approach, Brooks calls for the development of close contacts with the public in planning and policy-making.

The dominant emphasis in Canadian sport fishery management in the past half century has been on the development of the resources. There seems to be a shift away from this emphasis in many parts of Canada today, with attempts to determine the extent to which the resource is used and the preferences that people have for fishing as against other types of outdoor recreation. Tuomi and Whiting describe this shift in viewpoint and note the implications for sports fishery management, particularly in connection with the provision of basic data on the economic, social and psychological dimensions of the demand for this activity.

Canadian experience in sports fishery management is not unique. Other countries have had to accommodate increasing pressures on the resource, and have had to deal with various

conflicts in use. They too have had to devise mehtods of evaluating the sports fishery. Some o f these problems and adjustments may well have relevance to the Canadian scene. Gaudet provides a detailed review of problems and responses in various Europeon and African countries, noting in particular the rapid growth in sport fishing, and the various systems used for allocating fishing rights. O'Kelly furnishes a further discussion of ownership and fishing rights, based on a survey undertaken under the auspices of the European Inland Fisheries Advisory Commission (EIFAC).

Problems and adjustments in managing the Irish sport fishery are reviewed by O'Connor. He notes that while this fishery is presently underutilized, it is not clear how it might be used to provide an additional source of income for the Irish economy. He discusses in particular the problems of deciding what fees should be charged. Hadoke focusses upon the problems in one region in Ireland, the Foyle River Basin. The critical question here too is the provision for a rational basis for charging for the use of the fishery. Should fees be based on the cost of services provided by the Foyle River Commission or the current value of the fish caught? Should the government subsidize the maintenance of a recreational pursuit such as sport fishing when it shies away from the support of other kinds of recreational activity? Norling discusses the development and use of sport fishery evaluation in Sweden. He notes in particular the need for greater understanding of the factors which affect the formation of recreational preferences.

Given the growing need for rational evaluations of the sports fishery, what specific methods are currently available? These questions provide the focus for the chapter by Bowden. Stressing that economic analysis only does what people do unconsciously in any case in weighing alternatives, he points out that the bargaining position of sports fisheries would be considerably enhanced by a more rigorous application of techniques based on principles of economics. He discusses some of the methods used in British Columbia an d elsewhere for evaluating sport fisheries, notably those which hav e sought to identify preferences on the basis of expenditures on this activity.

The various discussions in the volume make it abundantly clear that there is an urgent need for sport fisheries management agencies to undertake more sophisticated evaluations. They also indicate that methodologies are available for this purpose. What needs to be done then to ensure that the latter are put to effective use? More specifically, what kinds of data are required, and what kinds of personnel are needed? And what role might the federal government play in developing techniques and

collecting information? These questions provide the focus for Sewell's discussion in the final chapter of the volume.

FOOTNOTES

1. The Fraser River is one of the world's largest salmon spawning streams, supporting a commercial fishery having a plant value of more than $36 million, and a sports fishery in which more than 150,000 people participate. Each year more than 250,000 Fraser River salmon are caught by sports fishermen. These fisheries, however, are threatened by growing pollution from industries and municipalities along the River, and by proposals to construct dams to control floods and generate hydro-electric power. See Fraser River Board, Final Report on Flood Control and Hydro-electric Power, Victoria, B.C., 1963, pp. 83-93.

2. Rowley, H.J., The St. John River Basin, Resources for Tomorrow Conference Background Papers, Queen's Printer, Ottawa, 1961, Vol. 1., pp. 311-323.

3. See, for example, Canada, Department of the Environment, Fisheries Service, Sport Catch and Effort Statistics, Vancouver, B.C., published annually.

4. Sinclair, William F., The British Columbian Sport Fisherman, Department of the Environment Fisheries Service, Pacific Region, July, 1972.

5. See, For example, Norling, Ingemar, Economic Evaluation of Inland Sport Fishing, European Inland Fisheries Advisory Commission, Food and Agriculture Organization, May 1968; Smith, Robert J., The Clawson Method in Practice, Urban Studies, Vol. 8 No. 2, June 1971, pp. 89-102; Clawson, M., Methods of Measuring the Demand for and the Value of Outdoor Recreation, Washington D.C.,; Resources for the Future, Inc., Reprint No. 10, 1959; Department of Fisheries, Canadian Fisheries Report No. 4, Ottawa, May 1965; and Spargo, R.A., Evaluation of Sport Fisheries; An Experiment in Methods Canada, Department of the Environment, D.C., June, 1969.

6. U.S. National Academy of Sciences, A Program for Outdoor Recreation Research, Washington, D.C., June, 1969.

7. Karrholm, Marianne, et al, Technical Research based on Consumers' Needs, Demands, and Wishes; Food, Clothing, Housing, Recreation, Swedish Board for Technical Development, Stockholm, 1972.

CHAPTER 2

CHANGING PERSPECTIVES ON SPORTS FISHERY MANAGEMENT

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Abstract. The approach to sports fishery management and recreation in Canada appears to be changing. In the past it was characterized by the provision of opportunities that planners and policy-makers believed would offer the kinds of satisfactions that recreationists seek. There was little communication, however, with the latter. In the present era the move is towards a greater degree of public participation in decisions about resource management, as illustrated by the Man and Resources program.

The need for several other adjustments has also become clear in recent years. One is that planners must learn to communicate more effectively with each other; the biologist, the engineer and the economist must find ways of understanding and melding their approches. Another is that there can be no uniform standard for the entire country on recreation planning; the needs and characteristics of the different regions require a diversified view.

Sommaire. L'approche de la gestion de la pêche sportive et de la récréation au Canada semble évoluer. Dans le passé, ceux qui prenaient les décisions offraient au public ce qu'ils estimaient que celui-ci attendait. Mais ils ne le consultaient pas. De nos jours, la tendance est à une participation plus grande du public aux décisions sur la gestion des ressources, comme l'illustre le programme l'Homme et les Resources.

Au cours des dernières années, le besoin de plusieurs autres modifications s'est aussi fait sentir. L'une d'elles est que les planificateurs doivent apprendre à mieux communiquer les uns avec les autres; le biologiste, l'ingénieur et l'économiste doivent trouver des moyens de comprendre et de fusionner leurs approches respectives. Une autre est qu'il ne peut exister aucune norme uniforme pour l'ensemble du pays en ce qui concerne la planification de la récréation: les besoins et les

caractéristiques des diverses régions exigent une vue diversifiée.

The present era has been called the age of atomic energy, the age of the environment, and the age of all sorts of other things. Perhaps it is much more the age of public awareness. People are becoming remarkably sophisticated and very critical of what is done, particularly in government, and in big industry; they do not take for granted any more that what others decide on their behalf is best for them.

Some professions, foresty is a good example, have erred in believing that what was good for the profession was good for the people. Such attitudes have tended to prevail throughout resources management. The challenge is to find out what people expect of resource managers. The significance of this challenge has been underlined by political events throughout Canada in the last couple of years. Several governments have fallen or nearly fallen, suggesting that people are not getting what they want. Governments and government agencies appear to have been out of touch with the people, and not really aware of their needs.

Last month, the Canadian Council of Resource and Environment Ministers sponsored a conference at Montebello. The basic idea of this Conference was to bring people together from all over Canada to determine what they want and what they really expect of society. There were over 300 people at the meeting, representing four interests in environmental management. Everything from the long-haired and blue-jeaned youth to sophisticated businessmen and company presidents were present. It was rather chaotic at first. But it provided an opportunity for the many groups involved in the management of resources to communicate with each other.

At the end of a week, these people from all walks of life started to crystallize their thinking and finally identified twelve main issues which they felt were real conference points of concern for the coming conference in 1973 on "Man and Resources". It was in effect a workshop for the "Man and Resources" conference. And these questions kept coming up time and time again: Where are we going as a people? Are the standards that we have today really valid standards? Is the growth ethic a valid ethic? What does environment mean to us? How much are we going to sacrifice in terms of worldly goods for a better environment, and so on, and so on. These were not far-out people. They were generally thinking people.

Watch this program and participate in it. It will doubtless lead to some significant new objectives and new administrative procedures in Governments which will provide the public with a new role in resources management. It could well shatter illusions previous held by particular professions.

The problem of assessing public preferences is illustrated by a recent TV documentary on the North in which a CBC roving reporter went around and interviewed native people. The reaction and the comments these people made on what they thought was wrong in the way the North was developing was highly constructive. The responses were often quite amusing and quite surprising. One was particularly amusing. The reporter was questioning a native housewife. She was an educated woman but quite clearly still bore the imprint of her uninhibited native ancestry. She was asked: "What do you think about this idea of bringing in brothels to the North? She looked at the interviewer and said: "I think it's a hell of an idea, think of what that's going to do to our own girls here. They're amateurs and you're going to bring in a bunch of professionals. They are not going to be able to compete at all:" Obviously it is impossible to predict what people want either from personal experiences or from particular training. Decision-making, however, is often in the hands of those who have had little experience beyond their own agency or area of specialization.

The other matter of priorities relates to the gathering of statistics and the undertaking of research. Obviously, priorities must be set. At present these relate only partly to people needs. The emphasis in sports fishery management has been on the resource itself. And this has been reflected in the kinds of data gathered and in the types of research undertaken. Obviously a change in laws is required. The urgent need is for greater understanding of people's preferences and the priorities they attach to them.

Of course it is not possible to provide everything that people want. Priorities must be assigned. Not only must economic costs be weighed but social costs must be taken into account as well. It is not possible to leave all our streams in a natural condition. We have to log, we have to mine, and we have to utilize other resources. What is the trade-off going to be here? How can we really practice integrated resource management and how does the sport fishing requirement relate to the need of other products. How do social needs relate to needs for wood, fiber and food?

A third point relates to the jargon of specialists. Specialists talk specialists' language. It is usually a conversation from specialist to specialist, and nothing beyond. When they try to communicate with the public, they frequently fail. They also fail with the politician. The doctors were once the most expert at this, and they developed jargon to a fine science. Most other professions have unfortunately followed the same pattern of developing their own speciality language. This is a very serious mistake in today's world for two basic reasons:

Firstly, one must communicate with the public to get the support of the public. To do so one must speak in their language. Beyond this, one must communicate with other resource users. It is the era of environmentally-oriented integrated resources development. It is the era of inter-disciplinary communication and the era of inter-group communication. Specialized jargon must give way to a desire to understand the views and the desires of different groups involved in resources management.

Like all eras, the present one is transitory. The picture will change. People will go on to other things. There will be other big issues in the world. Always the public holds the trump card. But their views change over time. Right now people look very favourably on parks and the preservation of the woodlands, pure water and pure air. When they start to get affected directly in terms of loss of the other good things in life, and are confronted with the hard facts of life, will they still be supporting the view that fishery resources should be preserved? The realities of this environmental concern have not really struck home to the public. You just cannot have it both ways entirely. When the public does finally realize, perhaps with a rude shock, that they can only have one car in their garage, or maybe none, maybe a bicycle instead; that they can only have one home instead of two. If we go the full route in environmental concern, then, maybe, we will not be in such a popular situation. According to the Club of Rome, the average world income should be 1,800, to spread everything around. What would it be like to live on $1,800 per year? Not a month, a year! This is what the Club says total environmental awareness and concern will cost us if social justice is to be done.

Another concern is the recognition of regional differences. The needs in British Columbia, and our methods of meeting those needs are not necessarily the same as those in the Maritimes, or Quebec, or Ontario, or the Prairies. Simple national solutions may not be feasible. There are at least five different regions in Canada; economically, socially and culturally, embraced by a federate system.

The National Parks policy of the federal government illustrates many of the problems that now face resources management in Canada, when applying national standards. The general view of the National Parks Branch has been that uniform standards should be applied across the country. All parks, in other words, should provide the same kind of amenities. This view should be seriously questioned. There are in fact major differences in views as to what kinds of parks should be provided. Not everyone seeks the same kinds of satisfactions. Uniformity, in this sense, could result in serious social losses.

In summary, there is a need for a new approach to the evaluation of recreation resources. The challenge is to dertermine more precisely what people need. This may not require a great deal more data than are now available. But it may require a lot of hard thinking. It will require an assessment of priorities in relation to needs and money available. It will require greater communication with other professions, with the general public and with the politicians and the avoidance of technical jargon. And it means adopting great caution in recommending national solutions in such a varied country as Canada.

CHAPTER 3

CANADA'S SPORT FISHERIES, 1972

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Abstract. The management of recreational fisheries in Canada has been shaped by many forces since Confederation. Three key management problems now face fisheries managers across Canada: adequate information on the size, value and potential of sport fisheries is lacking. There is an ongoing shifting in the orientation of sport fisheries management. And progress in economic and social evaluations of "demand" is needed so that sport fisheries can be better managed.

Sommaire. La gestion de la pêche récréative au Canada a été façonnée par de nombreuses forces depuis la Confédération. Les gestionnaires de la pêche doivent maintenant faire face partout au Canada à trois principaux problèmes: on manque d'information adéquate sur l'importance, la valeur et le potentiel de la pêche sportive. Il se produit une évolution dans l'orientation de la gestion de la pêche sportive. Et il faut effectuer des progrès dand l'évaluation économique et sociale de la "demande" pour mieux gérer la pêche sportive.

The organizational structure of Canada's sport fisheries has been shaped by many forces since Confederation. The jurisdictional impalement of the then prevailing federal sport fisheries policies occured in 1882 with the Supreme Court ruling in The Queen vs. Robertson case. This ruling ended some fifteen years of federal leasing of Atlantic salmon and trout waters in Quebec and New Brunswich rivers.[1] However, the ruling did not resolve the anomaly of a double claim to jurisdiction over the same waters. Moreover, a further ruling in 1898 by the Judicial Committee of the Privy Council did not completely clarify the situation. As a result of the 1898 ruling, it was confirmed that the federal government has exclusive legislative authority for fisheries regulations and restrictions, per se, in all waters, including provincial freshwaters. At the same time, it was established that provinces can legislate in respect to property and civil rights aspects of fisheries in their own waters. In management terms, the result is that there are two "masters" in provincial waters: the federal government having legislative authority over the "managing" of fish in their natural state and the provinces having authority for management of fisheries users and use as socially and economically productive provincial assets.

The federal government still retains full fisheries authority in all tidal waters, in the freshwaters of Yukon and Northwest Territories, in all National Parks and in various federally owned waters within provinces (e.g. within the bounds of national harbour areas).

However, the administrative mosaic of federal-provincial agreements and arrangements that has evolved respecting actual fisheries administration in provincial waters has no common pattern. In Quebec, the Province administers its sport fisheries and the Fisheries Service does little but enact regulations that are proposed within the framework of the Fisheries Act. At the other end of the spectrum, the Fisheries Service exercises full operational responsibilities for all aspects of management of fisheries in several of the Maritime Provinces, except for revenue licencing of anglers (i.e. confirming the prevailing federal-provincial division of authority between "production" and "marketing").

There are twelve licencing agencies in Canada - 10 provincial agencies, National Parks and the Fisheries Service - representing eleven governments. Actual licencing of anglers varies among jurisdictions with many different kinds of licences available and/or required. The single largest area where no licence is required to angle is that of oceans and tidal waters.

Three key management problems come to light from this limited survey of Canadian sport fisheries managers, namely:

(1) an overall lack of information respecting the size, value and potential of the Canadian sport fisheries;

(2) the fast changing role and varying goals of sport fisheries; and

(3) the managerial problem of making decisions so as to optimize benefits in the face of limited social and economic data and the absence of clear quidelines.

Information on the Size and Value of the Fisheries

The lack of information on the size, value and potential of sport fisheries was clearly identified as a key issue at the 1970 workshop, sponsored by the federal Department of Fisheries and Forestry. The reasons for the situation were likewise reviewed at the Workshop and numerous separate as well as co-operative endeavors to develop better information have been taken since then by the sport fisheries agencies represented here. Yet, it must be acknowledged that only a start has been made, and the need to better inform Canadian decision-makers and the public regarding the size and role of sport fisheries ranks as an issue of growing national importance.

A few selected statistics emphasize the importance of the sports fishery in Canada. It is estimated that in 1970 there were 3.2 million anglers (16 years of age and over) in Canada who together spent $600 million on items attributable to sport fishing.[2] This is close to three quarters of one percent of the Gross National Product. Angling by some 2.3 million Canadians accounted for $360 million of these expenditures, that is, over $100 million more than Canadians spent on domestically produced fish for food at the retail level.[3] Angling by some 900.000 non-Canadians, largely from the United States accounted for an "export" balance of $240 million - equivalent, in total, to close to fifth of Canada's receipts on travel account from all countries for the year.[4] Both Canadian and non-Canadian angler numbers and gross expenditures have essentially doubled in the decade 1960-70.[5] With nothing to suggest any decline in the

growth rate of recreational demand, in the future, it is also pertinent to note that in 1970 fishing and hunting headed the list of Canada's travel attractions.[6]

Many reservations can be expressed regarding these figures. They are first and foremost measures of size rather than worth. They are understatements because many major costs of access are not always reported on, or incurred annually (e.g. waterfront property, boats). Conversely, there are questions of attributio which can result in double counting where inter-industry comparisons are attempted. Notwithstanding the inadequacies to which gross figures can lead, Table 1 gives an estimate of the relative distribution of anglers in Canada in 1970-71.

TABLE 1

ESTIMATED ANGLER DISTRIBUTION IN CANADA, 1970-72

Province	Percentage of Anglers	Residence of Anglers	
		Resident	Non-Resident (b)
		%	%
British Columbia	10.7	65	35
Alberta	4.6	88	12
Saskatchewan	4.1	81	19
Manitoba	4.1	71	29
Ontario	42.8	51	49
Quebec	20.3	84	16
New Brunswick	3.4	89	11
Nova Scotia	2.7	95	5
Prince Edward Island	0.4	77	23
Newfoundland	1.5	91	9
Yukon	0.3	55	45
Northwest Territories	0.2	33	67
National Parks	1.9	(c)	(c)
Atlantic Ocean (d)	0.8	41	59
Pacific Ocean (d)	2.2	72	28
Canada	100.0%		
Number	3,209,000	2,095,000	1,053,000

a These estimates were formulated on the basis of licence sales, angler surveys and other information supplied by all sport fisheries licencing agencies.

b Includes non-Canadians

c The National Parks fishing licence does not require residence to be stipulated.

d Represents anglers who fish in tidal waters only.

However the inadequacy of data is an effect rather than a cause, and the second and really central issue confronting

fisheries managers is that of the changing role and goals of sport fishery management.

The Shifting Orientation of Sport Fishery Management

The division between the federal and provincial governments based on "supply" and "demand" responsibilities has been at least partially dealt with through a mosaic of federal-provincial agreements for sport fisheries administration as mentioned earlier in this paper. But despite these arrangements, the foundation was laid, nevertheless, for what amounts to a supply oriented management of fisheries that has prevailed in most jurisdictions until recently. Somehow, in the process, the foundation was also laid for widespread public belief that sport fisheries are and should be treated as a public good, despite the fact of historical precedent and the uninterrupted existence of fisheries being treated as a private good in Quebec and New Brunswick to this day. In this respect, it is also worth noting that there is nothing immutable about angling being either public or private good: both federal and provincial laws governing this can be changed.[7]

These two historically evolved factors (supply-oriented management, and the federal-provincial sharing of responsibilities) that have shaped the role of sport fisheries until recently, are now being subjected to forces of change. The reasons, while both varied and complex in terms of their specifics, are unmistakably related to and reflected in supply and demand. For some highly-prized species that are sought for by both sport and commercial fisheries (e.g. salmon), the costs of protection and enhancement borne by taxpayers in the face of competitive demands on all resources are at a level where purely supply-oriented management is no longer enough. Allocations of use have to be considered in terms of their economic and social merits and the actual amount and distribution of returns. The rationale for protecting the fishery environment has to be expressed in terms that can equate angling with kilowats, board feet and payrolls. There are also other species in still abundant supply for which there is reason for concern from the viewpoint of rising private costs being imposed on Canadian anglers for access to ever-receding wilderness quality of opportunity. Similarly, there is a leap-frogging of air access into slow regenerating northern waters that yield only nominal returns to the resources involved from the taking of trophy fish which are almost impossible to replace.

The broad result of the current supply-demand interaction is that, for most of Canada's sport fisheries, management has to become progressively more demand-oriented.

This includes, for instance, the need to obtain at least as much knowledge regarding anglers and their wants as has been obtained hitherto on fish and their requirements. For costly and beleagured species like Atlantic salmon, the equivalent of an integrated, industrial management approach is needed to ensure net benefits result from the matching of finite and endangered supply with growing demand.

While the role of sport fisheries is thus being shaped by many forces, the development of fisheries goals depends to a great extent on the provision of the kinds of data and concepts that will enable governments and decision-makers to perceive and articulate society's needs and wants in this respect into publically understandable policies and programs.

Effects of Data Limitations

The third major problem confronting fisheries agencies and managers is that of making ongoing decisions that will serve the public interest in face of limited data and the absense of market established information and resultant performance indicators of the type generally available to other resource managers.

Theoretically, decisions from the viewpoint of economic efficiency should be fairly readily made where angling is marketed and recognized as a private good (or, for that matter, where the capability for such exists.) But economic efficiency as a goal for this kind of activity is running counter to growing public interest and expectations regarding access to recreational opportunity regardless of ownership.

The problem is even more acute where sport fishing access is either free or, at most, only nominally priced. In this case simulation of economic values has to be used in decision making. Unfortunately, economic evaluation is neither easy nor cheap, and even where conceptually valid figures do result, and are used in revenue for the management of the resource from hypothetically priced benefits remains.

Considered in aggregate, the three problems posed are formidable. But broken down into their specifics, many avenues for either mitigation and/or resolution are apparent. It is likewise obvious that all three of these problems are a matter of concern to all fisheries agencies, and progress by one agency in resolving an issue represents the promise of progress for all.

The rapid development of a basic system of information is an obvious first requirement for effective sports fishery management. Similarily, a thorough-going study of the manifold attitudinal, social, economic and insitutional aspects of both actual and simulated pricing is a related requirement. The various papers in this volume help to shed light on the specific needs in both respects.

REFERENCES

1. In 1867 the Federal Department of Marine and Fisheries was receiving an annual rental of over $4,000 from some 22 exclusive angling leases on Atlantic salmon rivers in Quebec and New Brunswick, as reported in Rowan, John, J., The Emigrant and Sportsman in Canada, Edward Stanford, London, England, 1867, pp. 404-415.

2. Estimated by the authors on the basis of angling licence sales in various parts of Canada and licencing agencies.

3. The landed value of Canada's fisheries in 1970 was $205.4 million, Economic Intelligence Review of Canadian Fisheries, Vol. 3 Fisheries Service, Department of the Environment, Ottawa 1971, p. 25. The retail value of the 30% domestically consumed fish is approximately four times landed value, or about $246 million.

4. Statistics Canada, Travel, Tourism and Outdoor Recreation. Information Canada, Ottawa, 1972, p. 49, Table 4.1. See also Table 4.7 (pg. 54) which shows non-resident travel as second only to automotive vehicles and parts when compared with Canada's leading merchandise exports.

5. Estimated by the authors on the basis of an updating of figures in D.A. Benson's Fishing and Hunting in Canada: 1961, and information from the 1960 and 1970 editions of the United Stated National Survey of Fishing and Hunting.

6. From a survey of travel agents in seven countries as reported on in the First Canadian Travel Trade Congress, Accommodation Task Force Report, Office of Tourism, Department of Industry, Trade and Commerce, Ottawa, 1970.

7. See discussion by Dale Gibson, The Constitutional Context of Canadian Water Planning, Background Paper prepared for Canadian Council of Resource Minister's Water Workshop Seminar, Victoria, British Columbia in 1968, p. A3-1.

CHAPTER 4

ECONOMIC ISSUES FACING EUROPEAN SPORT FISHERIES

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Abstract. Sport fisheries appear to be of growing importance in many European countries, particularly France, Sweden and the United Kingdom. Whereas in some countries the proportion of population engaged in angling is 2 percent or so for the total population, in a few it is as high as 18 percent. Some areas have become especially attractive for sport fishing, both because of natural advantages and because of declines of fish stocks in other areas. In certain countries there are major programmes underway designed to increase stocks for sport fishing.

Ownership and rights to fish varies from country to country. In some countries ownership of fisheries in inland waters attaches to ownership of land adjacent to the stream or lake, but in many there is no ownership: the fishery resource belongs to the state. A wide variety of licensing systems prevail, designed both to regulate the fishery and to provide revenues for fishery management.

Statistics on the value of sport fishing are collected in some countries, based primarily on gross expenditures on the activity, the sales value of the catch, numbers of anglers and so on. In certain countries the sport fishery is a major tourist attraction and is being promoted by their governments, There are problems in some countries arising from this. Another major problem is rooted in the increasing pollution of waters supporting sport fisheries. Action to deal with this problem has varied from country to country and so has its effectiveness.

Sommaire. La pêche sportive semblre revêtir une importance croissante dans de nombreux pays européens, en particulier la France, la Suède et le Royaume-Uni. Tandis que la proportion de la population qui pratique la pêche à la ligne est de 2% environ de la population totale dans certains pays, elle atteint 18% dans quelques-uns. Certaines régions sont devenues particulièrement attrayantes pour les pêcheurs sportifs, à la fois à cause de leurs avantages naturels et à cause du déclin des populations de poissons d'autres régions. Dans certains pays, on s'efforce, par des programmes de grande envergure, d'augmenter les stocks en vue de la pêche sportive.

La propriété et les droits de pêche varient d'un pays à l'autre. Dans certains pays, la propriété des pêcheries des eaux intérieures se rattache à la propriété des terrains adjacents au cours d'eau ou au lac, mais dnas bien des pays il n'y a pas de propriété: la ressource de pêche appartient à l'Etat. Il existe une grande variété de systèmes d'octroi des permis, qui servent à la fois à réglementer la pêche et à offrir des revenus à l'organisme de gestion.

Certains pays établissent des statistiques sur la valeur de la pêche sportive; celles-ci sont basées principalement sur les dépenses brutes effectuées pour cette activité, la valeur de vente de la prise, le nombre de pêcheurs à la ligne et ainsi de suite. Dans certains pays, la pêche sportive est une attraction touristique importante et fait l'objet de publicité de la part du gouvernement. Cela soulève des problèmes dans certains pays. Un autre important problème provient de la pollution toujours plus grande des eaux ou l'on pratique la pêche sportive. Les mesures destinées à faire face à ce problème varient d'un pays à l'autre, de même que leur efficacité.

The need to develop measures of the value of sports fisheries to individuals, the economy and society as a whole is gradually being recognized in European countries. This was clear from the discussions at the First European Consultation on the Economic Evaluation of Sport and Commercial Fisheries.[1] It is also emphasized by data gathered in a survey undertaken for the purpose of this paper.

For a variety of reasons (such as politics, need for foreign exchange, social need to develop recreation for nationals) a few countries have made definite progress in attempting to assess the importance of their sport fisheries. The others are still in total darkness or at best have only very general data. Ireland and Sweden have probably gone further than the other European countries. Detailed discussions of evaluations in these latter countries appear elsewhere in this volume and so no elaboration is attempted here.

NUMBERS OF FISHERMEN

The number of sports fishermen in Europe is very high as indicated by Table 2.

Table 2

Country	Number of sport fishermen (in thousands)	Population (in millions)	Percentage
Austria	200	7.4	2.7
Belgium	230	9,6	2,4
Cyprus	few	0.6	-
Denmark	300	4.9	6.1
Finland	750	4.7	16.0
France	5,000	50.3	10.0
West Germany	622	58.7	1.1
Ireland	50	2.9	2.0
Italy	850	53.2	1.6
Netherlands	740	12.8	5.8
Norway	242	3.8	6.4
Poland	400	32.6	1.3
Roumania	200	20.0	1.0
Spain	450	32.9	1.4
Sweden	1,500	8.0	18.7
Switzerland	250	6.2	4.0
United Kingdom (England and Wales)	2,800	55.5	5.8
Yugoslavia	158	20.3	0.8
Total:	15,542		

Excluding the U.S.S.R., there are over 14 million sport fishermen in Europe and indications are that this number is rapidly increasing. In fact, Poland reports an annual increase of 8 percent while Spain mentions 12 to 16 percent yearly. In Europe, with a total area no larger than Canada but with 25 times its population, increasing popularity of sport fishing evidently means increased pressures on limited resources.

The social composition of the sport fishermen varies greatly although the majority come from the working class.

Nevertheless, it is reported in Sweden that there is little class difference in the distribution of sport fishermen in that country.

AREAS FISHED

In spite of increasing industrialization and resulting water pollution which has ruined hundreds of rivers in Europe, there are still a fair number of salmon and trout streams and plenty of coarse fish water bodies. Poland which considers itself poor in inland waters with a fishing density on one angler 1.23 ha. of lakes, rivers and reservoirs nevertheless reports 1,100 lakes totalling 110,000 ha. in the Mazury Lake District alone. Note: 1 ha (hectare) = 2.47 acres; 1 km = 0.621 miles; and 1 m3/sec = 35.3 w/ft/sec. The southern European streams which are shorter and more tempestuous than the large European rivers (Volga, Danube, Rhine, Elbe) are nevertheless plentiful, particularly in Spain where they stretch over 100,000 km, including 20,000 km of trout streams and 2,000 km of salmon waters. Finland, Norway, Sweden and all of Ireland have thousands of lakes where fishing can take place. In the recent survey, Finland in fact reports 60,000 lakes covering an area of about 32,000 km² with a shoreline of about 160,000 km. In addition, the long coast and numerous islands off the coast and the great archipelago in the south-west region add another 50,000 km of shoreline. Northern Ireland, like the Republic of Ireland, is fortunate in having a plentiful supply of freshwater which is generally unpolluted. There are some 1,200 miles of river, large lakes like Lough Neagh and Upper and Lower Lough Erne and over 200 small lakes. Norway claims 150 large salmon and sea trout rivers.[2] In the Netherlands, the quantity, if not the quality of surface waters, is increasing. Polders, reservoirs, rivers and lakes increased from 104,700 ha. in 1958 to 109,000 in 1965, exclusive of Lake Ijssel 200,000 ha.; the Lauwerszee 2,000 ha. - reclaimed in 1969; the Grevelingen 11,000 ha. - reclaimed in 1971 and the Haringvliet and Holland Diep 13,000 ha.

In Europe, the Netherlands is unique in that it experiences great difficulties in procuring, storing and processing a sufficient quantity of water suitalbe for the supply of drinking water and because the surface water is not good in many places, water quality has become a limiting factor for the development of fish stocks, and also horticulture. Early in 1972, the discharge of the River Rhine was so low (800m³/s) that the salt content of the waters was dangerously high. Fortunately it rained subsequently, but this serves to illustrate the delicate balance that now exists in some European waters.

Cyprus which, until recently, had no freshwater bodies, now claims 12 small reservoirs where trout fishing can take place with proper stocking because they are emptied every year.

In addition to fishing in the inland waters, there is also sports fishing on the sea of Europe. On the northern coast of Finland a study has been carried out which showed that 62.4 percent of those replying to a questionnaire considered themselves (sea sport fishermen in that the cost of their hobby exceeded the value of their catch.

SPECIES CAUGHT

The species caught for sport in Europe vary with the quality of water from salmon, sea and freshwater trouts in the clearer waters to cyprinids such as the common carp, roach, rudd, bream and coarse fish predators in the more eutrophic waters. In the Netherlands, rainbow and brown trouts are even found in two large lakes in the sourthern delta (lake Veere 2,000 ha. and Grevelingen 11,000 ha.) where salinity ranges from brackish to that of sea water.

A recent study of the inland freshwater fish of Europe lists 396 species[3] many of which are caught by sport fishermen. There appears to be a definite correlation between the quality of fishing waters and the density of populations. Unlike Canada, angling for the elusive cyprinid is fairly popular in Europe.

OWNERSHIP, RIGHTS AND LICENSES

Fishing licenses, fishing rights and fishing water ownership are extremely varied and complex from country to country or even within one country.

Inland fisheries, unlike international sea fisheries, usually come under the political control of one single government and, consequently, should give rise to less controversy or governmental intervention. This is not always the case because hereditary rights, documentary titles, methods of defining fisheries limits, separation of fishing rights from the ownership of land, etc., do create many administrative and legal complications.

As a general rule, in Europe[4] (except for some countries in eastern Europe and Spain) inland water fishing rights belong to the owner of the adjacent land whether it is the State, a province, a municipality, an organization or an individual. Incidentally, Roman law made it clear that fish living in probate waters belonged to the owner of that water area. Poachers could be sued on two grounds: trespassing and theft.

In Finland the primary ownership is the village and each farmer or land-owner has his share in the collectively owned water area and enjoys fishing rights according to the size of his farm. However, in that country, the collectively owned water area may be parcelled or divided between the farmers according to

their shares. It is easy to imagine the controversy that this system may engender between landowners and industry in cases of dam building and water pollution. In Israel, fisheries are also owned collectively in kibutzim.

In Denmark, Finland and the Netherlands, the separation of fishing rights from landownership is forbidden. There is one exception in Finland where, irrespective of ownership, the government monopolizes salmon and trout fishing in the rivers flowing into the Gulf of Bothnia. In England and Wales, in non-tidal waters, the fishing rights are presumed to belong to the owner of the soil thereunder, but the owner may sell or leasr these rights separately from the land.

In tidal waters, in Ireland, England and Wales, fishing rights are in favour of the public but again, there are exceptions in cases of historical or immemorial rights.

In Scotland, all salmon and sea trout fisheries are subject to proprietorship and there is no such thing as public fishery for these fish even if the land is owned by the Crown. A proprietor of a salmon fishing area has no right to the fish until they are caught, but he has exclusive right to catch them within the boundaries of his fishery. Under law, however, salmon and sea trout fisheries in the Orkneys and Shetlands are pertinent to the ownership of land as in the case of ordinary freshwater fishery.

Fishing rights of water areas owned by the State in Turkey are normally publicly auctioned, while in France they are leased for five year periods.

In Hungary, Poland and Yugoslavia, fisheries in open inland waters belong to the State. In Poland, commercial fishing rights may be given to any legal (or natural) person with proper qualifications. Sport fishing rights may be given on the condition of being a member of an anglers' association and on paying for a fishing license.

Very little information is available on the licensing systems in use in the various European countries. From the data at hand, it appears that licensing serves both to regulate the fishing effort and to assure some revenues for the improvement of fisheries in general.

To finance the protection services in Ireland, the Boards of Conservators may impose a fishery rate on all fishery hereditaments. In addition, they obtain revenues from license duties which are fixed by statute at uniform rates throughout the country and from grants from the Salmon Conservancy Fund which is

fed by a levy on sales of salmon and from a levy on salmon rod licenses.

In Poland, a license has to be paid by anglers for particular types of fishing. Membership in the Polish Anglers' Association is compulsory. To fish in lakes of State fish farms, permission from the farm manager is necessary.

In Scotland, there is no fishing license at all, either for sport or commercial fisheries. The same is true in Denmark, where anybody can fish freely for sport or commercially, provided the fisherman pays the owner of the water for the fishing rights.

Angling for brown trout in Ireland is not subject to licensing control.

THE VALUE OF SPORT FISHING

In Europe, while no precise figures have been placed on the value of sport fishing, the indications are that it is very high indeed, certainly in terms of numbers of fishermen and the money they spend on the sport.

A National Survey of Angling[5] estimated the number of anglers in England and Wales at 2.8 million: they each spend on average about £80 per annum, and over half of these fish at least once per week. Although not an ideal measure of the value of a recreational resource, their gross expenditure - of £200 to £250 million, about two-thirds of it relating to inland waters - is the only measure so far available for angling and activities associated with it.

According to the report, the travel element of the gross expenditure, about £70 million, could be reduced substantially if water with lower levels of pollution, or better fish stocks, were to become available nearer at hand. Not surprisingly, therefore, the national value of fisheries is very high. In England and Wales, the sale values of salmon fisheries, based upon the average catches during the last five years are from £500 to £750 per fish caught. Thus, a fishery in which the 5-year annual catch was 100 salmon would fetch between £50,000 and £75,000 on the open market. Trout fishing values, based mainly upon quality, length of bank and whether one or both banks are involved, may rise on a first class river to as high as £7,600 to £10,900 per km. Fisheries for coarse fish can also fetch surprisingly high figures in the open market and recently a mixed fishery, one bank only, for salmon and coarse fish in which the latter predominated, sold for the equivalent of £11,200 per km[6]. Fisheries suitable for large-scale match fishing, such as national or international championships, can command much higher prices even than this. Although the above figures are likely maximum values they point towards a very high national value for inland fisheries.

Indeed, sport fishing has become so important in some countries that the suggestion has often been made for the abolition of commercial fishing (mainly nets) for salmon and sea trout, so that the entire stocks of these fish could be available for exploitation by anglers for sport. This suggestion was considered by the Bledisloe Committee for Salmon and Freshwater Fisheries in Britain in 1961[7] but after some discussion it was rejected despite the fact that commercial fishing in England and Wales employs comparatively few people (2,000 as against 560,000 salmon and trout anglers in 1958).

A most important aspect of the angling resources of a few fortunate countries in Europe such as Scotland, Northern Ireland, the Republic of Ireland, Norway, Denmark, and Finland is the potential value as a tourist attraction. Millions of anglers live next door to them and the countries have everything required for the enjoyment of angling - in particular, numerous underfished accessible waters holding large stocks of fish. It should be possible to attract larger numbers of angling tourists there, particularly with the advent of a larger Common Market.

In Finland, according to a very rough evaluation, sport fishermen invest at least $25 million annually in sport fishing. In Poland, the powerful Polish Anglers' Association keeps many hotels, inland harbours and camping centres. In 1964, it operated 60 places of that type with sleeping quarters for 1,300 persons. For the five-year plan 1966-70 estimates of capital outlays were for over 50 million zlotys for tourist facilities (21 million), economic expansion (24 million) and public facilities in angling (5 million). An idea of the importance of sport angling in that country is evident in the fact that in 1965 it employed 96 fishery guards and 7,489 honorary guardians. Weekly fishing radio broadcasts are also the fashion. The fees collected for fishing licenses amount to substantial sums of money when viewed for Europe in general. In Italy, revenues from fees amount to at least $5 million, $2 million in Switzerland, $700,000 in Belgium, and $400,000 in Norway. In addition, Belgium reports 800 sport fishing shops.

The social value of sport fishing in Europe is probably greater than the monetary value. It was said at the First EIFAC European Consultation on the Economic Evaluation of Sport and Commercial Fisheries (The Hague, 24-25 January 1972) that labourers refused to move to and work in industrial centres without recreational fishing facilities. In fact, the detailed planning of recreation and sport fishing facilities in the Netherlands forms an integral part of the overall planning of new reclaimed areas. That is why the Dutch sport fishermen look upon the invading fishing foreigner from the southwest with mixed feelings. They feel the freedom of international travel brought about by the Common Market deprives them of important stretches of fishing shoreline developed for them. The situation is exactly the reverse to that of Ireland where fishing tourists are seriously courted.

The amount and value of fish which are caught by sporting methods and are consumed is also not negligible. In Belgium a total of 440 tons are caught in rivers and canals alone for a fishing intensity of 14.5 kg/ha/year. In Poland as much as 20 kg/ha/year are reportedly caught by sport fishermen, while in Finland the inland sport fishery represents a catch of 10 to

12,000 tons a year. In Spain as many as 21 hatcheries are needed to re-stock salmon, trout, carp and black-bass in Spanish streams.

MANAGEMENT OF SPORT FISHERIES

In Europe, the management of sport fisheries is usually the responsibility of the Ministry of Agriculture although, in some cases (Denmark, Ireland, Norway and Sweden) it falls partly under the Ministry of Fisheries. In some countries fishery administration is historically linked with water, wild game and forestry administration (France, Spain, Italy). In France this association dates back to the 13th century at which time the "Maitre des Eaux et Foret" was responsible for supplying the king's table with fresh fish. Biologically, fish and wild game are closely related, particularly from the point of view of management of natural resources. Both have affinities with forest and national park management, water control (irrigation, drainage, flood control) and other general problems of land use.

The machinery set up in each country to manage sport fisheries varies. In the United Kingdom the executive control of fisheries is vested in the 27 River Authorities and 2 River Conservancies which are responsible for pollution prevention and fisheries management. Each Authority has a Fisheries Department, staffed by a Fisheries Officer and a variable number of water bailiffs. Their task is to ensure that the various byelaws which are proposed by the Authority, and confirmed by the Minister of Agriculture, Fisheries and Food, are adhered to. Owners of private fisheries also employ water-keepers and bailiffs for the management of their fisheries. A reorganization of these bodies into 10 Regional Water Authorities is being considered; the executive framework which will cover fisheries, however, is not yet known.

Ireland, Norway, Sweden and Scotland have boards which fulfill similar needs. In Norway, Inland Fisheries Boards organized in each of Norway's 450 communities cooperate with district Salmon Fisheries Boards to supervise and improve inland fisheries. In Sweden, the bulk of the executive administration is carried out by boards which enjoy a high degree of independence from the Department of Agriculture. In Denmark, fisheries administration is oriented commercially and the relevant laws emphasize the commercial exploitation of inland waters.

In addition to river authorities and boards, the management of sport fisheries in Europe is facilitated through a variety of Fishery Trusts (Ireland), Fishery Commissions, Trust Funds, Conseil Superieur de la Peche, etc., etc. They can be private or subsidized partly or completely by Governments. In Belgium the Fonds Piscicole is administered by the Ministry of Agriculture in collaboration with representatives of the

fisherment from various provinces. This Fund is financed by 55 percent of the returns on fishing permits. In Spain the final responsibility is vested into the Instituto Nacional para la Conservacion de la Naturaleza (ICONA) in the Ministry of Agriculture which includes two sub-divisions on sport fishing.

In Northern Ireland, the Ministry of Agriculture is responsible for the supervision and protection of fisheries and for fostering the establishment and development of fisheries. Two statutory bodies are responsible for the conservation, protection and improvement of the salmon and inland fisheries - the Foyle Fisheries Commission (established jointly by the Governments of Northern Ireland and the Fisheries Conservancy Board for Northern Ireland for the rest of the country. In the exercise of its responsibilities, the Ministry of Agriculture has acquired or leased fishing rights in a number of waters and can now offer to the public angling in over 40 lakes and stretches of rivers. These waters are stocked as necessary with fish from the Ministry's own fish farm and shore development works (provision of fishing stands, stiles, bridges and paths and clearance of weeds and shore vegetation) are carried out. A wide range of first-class angling is therefore, available to local fishermen and tourists and all at a very reasonable cost. The Ministry in the execution of its management and administrative functions is backed by a modern research laboratory, which is staffed by scientists widely experienced in fisheries development.

Because of previous low exploitation, especially with regard to coarse fishing, there was little tradition of management of fishing in Northern Ireland. However, management experience and expertise is increasing throughout the whole field of angling in the country as the Ministry, in addition to developing its own waters, is opening up hitherto inaccessible waters and providing access and necessary facilities and amenities and is cooperating actively with angling clubs involved in the development of their waters.
The Ministry is currently concentrating on developing an interest in and knowledge of coarse fishing in Northern Ireland. Instructional courses and schools angling competitions have been organized and more are proposed in the future. It is considered that a solid foundation of local knowledge will be invaluable in providing tourist coarse fishermen with the information they require about fishing in any locality.

In Sweden courses are offered for the different owners of fishing waters as they have to manage their waters by themselves. A considerable amount of work is currently being done on the management of impoundments and on the regulations concerning power stations. National planning is treated in

various departments. Recreational activities form a very strong part of it with fisheries playing an important role.

In Finland there is no central national administration over sport fisheries. The Department of Game and Fisheries, the Ministry of Land and Forest and the National Water Board are jointly doing the planning for the rational development of sport fishing. In that country, the fishing rights as a rule belong to the owner of the water area. The proprietary unit is the water area of the village, the joint owners are the farmers of the village, each according to the assessment unit of land. Every farm in the village has its share in the joint ownership, adjacent to the water or not. If the joint owners so desire, the joint ownership may be split and each farm given its separate share.

According to the Fisheries Act, the management of water areas (fisheries) under joint ownership has to be organized by the meeting of owners. The meeting defines the extent of fishing rights for different shares. The owners also are responsible for conservation and management of the area. The costs of the management are partially paid with the fisheries conservancy fees. The State is the sole owner or a shareholder of water areas exceeding 560,000 ha. These areas are administered by the National Board of Forestry.

A licence is also needed for the water areas owned by the State. In licensing and leasing out fishing rights in these waters the Forestry Administration has to give preferential treatment to the local inhabitants, especially to those who do not have any fishing right of their own.

It should be noted in passing that in Federal States such as the Federal Republic of Germany, Switzerland and in Austria sport fishery management is completely decentralized. This complicates the collection of standardized data and seems to cause some duplication of effort.

To assist the governmental unit and the various boards and commissions to manage sport fisheries in Europe, a popular and effective tool is the angling association. In Poland membership is compulsory and it appears to greatly simplify the management task. In other countries, participation in voluntary angler associations deceptive. In Finland less than 10 percent of the anglers belong to angling associations while in Belgium almost 20 percent do. Some associations receive financial assistance from the State. These associations often help in or administer re-stocking of sport fishing waters.

The Polish Anglers' Association with a membership of about 400,000 members is powerful indeed. It dates back to the National Fishing Association founded in Krakow in 1879 when the mountain streams were alloted to anglers and the lowland waters to net fishermen. There is still a considerable amount of controversy between anglers and commercial fishermen but the Association helps in smoothing out difficulties. It employs various specialists, fishery biologists and fishermen. It has an ambitious programme of re-stocking, building of facilities and with the cooperation of ORBIS (State tourist agency) the creation of facilities for foreign visitors. Its statistical service appears to be very efficient and it has made a number of studies on the management problems in that country.[8] It also breeds fish for stocking in state-leased open waters (lakes and rivers) and conducts selective catches in those waters. It has numerous fish ponds and some hatcheries.

One management tool which should be underlined is the "cotos" system used in Spain.[9] The term "coto" literally means "refuge" but in the context of American fishery management[10] would be more accurately difined as managed stream section. In 1971, there were a total of 523 cotos in Spain: 66 for salmon, 322 for trout, 18 for crayfish, 50 for trout and crayfish and 67 for other species. The programme of fishery management includes stocking, population surveys and careful creel censuses. The principal activity on the fishing streams themselves has to do with improvement of accessibility. The effort to make the fishing experience more attractive to the angler is perhaps best exemplified by the provision of fishing shelters (refugios) and fishing piers. The shelters are well constructed and the local "guardas pesca" (fish wardens) apparently are in competition to determine the champion landscape gardener. Fishery activities on the streams are greatly facilitated by State ownership of the stream, including the river banks on both sides of a distance of three metres above the high-water mark. Exclusive state control was established early in the history of the management programme. The guards keep minute records on the catch of fish from various areas, the movement of fish, size, weight of fish caught and bait used. License fees vary according to residence, fishing location, and the class of fishing-society membership to which the angler subscribes.

Membership in a society endows the angler the right to fish in special areas and to receive special treatment genrerally. A local resident who fishes in a section of a stream set aside in a coto with unlimited permits would pay only about 50 pesetas (72 cents). Fishing in a coto where permits are limited would cost twice that amount. License fees those who are not members of societies are substantially higher.

At the international level, one body is particularly active in Europe; that is the Confederation Internationale de la Pêche Sportive (CIPS). The Chairman, and Secretary are presently Italians. It brings together 28 countries (all European except for one in South America. While the CIPS has not been involved so far in measuring the importance of sport fishing, the machinery exists to at least strongly encourage such studies at the national level through the existing network of anglers' associations. EIFAC is in close collaboration with CIPS.

THE IMPACT OF POLLUTION

The problems facing sport fisheries in Europe are many and complex and include water ownership, increased fishing pressure causing changes in the character of the fishery and continuing controversy between sport and commercial fishermen. This is further complicated by the increasing level of industrial and domestic pollution, the lack of adequate means to quickly assesss the stocks, and the rising cost of stock improvement.

In countries where waters are not publicly owned one of the first problems encountered by the authorities responsible for management and development programmes is the difficulty of establishing the ownership of fishing rights. Apart from certain salmon waters, fishing rights in Northern Ireland, for example, were for many years regarded as having little value. Consequently, they are hard to acquire and are often fragmented. The Ministry has no vested powers and has to rely on acquisition by negotiation. The only exception to this is a power conferred by the Fisheries Act to take over on trust and develop any waters which appear to be derelict.

Having acquired rights, access has to be negotiated. As there are almost invariably a number of riparian owners involved at any water, this can be a tedious process, although fortunately most land-owners are reported to be cooperative.

In the Republic of Ireland, also, there is growing evidence that the fisheries are not used to their full economic potentialities[12] and this one tends to attribute to lack of clear responsibility on the part of owners whether they be of the private enterprise class or of a cooperative development association type such as a trust. When sport fisheries are either entirely in private hands and managed according to the dictates of private enterprise or, alternatively, where exclusive fishery rights are not asserted there is often no management as such. The exception to the matter is where waters have been entrusted by local assent for development to an Inland Fisheries Trust, as is the case in Ireland, then an orderly regime of fishing emerges based on good will and cooperation rather than on enforcement of management regulation.

Increased population density, particularly in large urban centres, and the resulting fishing intensity and pressure on limited stocks may change the character of the fishery. Until about 50 years ago in the Netherlands, inland fisheries were nearly completely in the hands of professional fishermen and the fishing effort was well spread over all species of which the fish stock was composed. Three factors have, however, changed this

picture completely. Pollution has put an end to the salmon fisheries and has affected athe well-being and economic values of other species. Secondly, fishing has become more and more selective. Apart from a certain amount of roach and bream, cyprinids are hardly caught commercially because there is no market for them. This opens the road to unbalanced fish populations with all its dangers. Finally, the development of recreational fisheries has been explosive, expecially since World War II, involving almost one million sport fishermen out of a total population of 13 million people. Apart from Lake Ijssel, the area of inland waters that can support the fish stock is certainly not more than 150,000 ha. Hence, fishing pressure, especially in the rest of Holland, is severe and the Government policy now tends to separate eel fishing from fishing for other species, eels being mainly reserved for professional fishermen and other species for anglers.

In Ireland the problems caused by competition and controversies between sport and commercial fishermen were in fact instrumental in bringing the severity of this problem to the attention and study of an international audience at the EIFAC Fourth Session (Belgrade, 1966)[13] and subsequent ones. The First European Consultation on the Economic Evaluation of Sport and Commercial Fisheries, which culminated from these early efforts, is also substantial proof that this problem is now in the foreground.

In Poland, pressure from anglers and from the existing organized commercial fisheries in inland waters creates considerable controversy between anglers and professional fishermen. Solutions are being sought in legal limitation of fishing both for sport and market depending on the location (access for city population) and the character of water bodies.

Even in Finland, fishing pressure is evident near large population centres. Fifty percent of the whole population of Finland live in the south and south-west coastal region, which comprises 15 percent of the total area of the country. With limited leisure time, mobility is rather restricted. The demand for sport fishing waters is greatest in southern Finland and especially in the vicinity of the biggest cities. Industry also centres around this area. It has been estimated that 10-15 percent of the Finnish lake area is more or less polluted and the shorelines near larger population centres are generally polluted. Due to changes in the quality of the water the annual catch per sport fisherman has decreased in many areas; fishing trips have become longer, the composition of the catch has changed (population of valuable sport fishing fish species has decreased and that of unwanted, worthless species has increased), flavour

defects have been noted in fish caught from the polluted waters, etc.

Some species have disappeared altogether. In the 17th, 18th and 19th centuries in Amsterdam, the maids and servants, before signing a new contract, stated that they did not wish to eat salmon more than three times a week. Today, however, very few maids ans also very few Directors, Director-Generals and Ministers in the Netherlands can eat salmon from the Netherlands. Increasing population and migration to already large cities and urban centres in Europe not only increases the pressure on limited stocks but also leads to a disastrous increase in water pollution. The countries covered by the survey discussed in this paper were unanimous in classing water pollution as the most serious and expensive problem.

In less industrialized areas like the Republic of Ireland, Northern Ireland, Scotland and Norway, water pollution is relatively light, but nevertheless remains a problem. There, enrichment of waters by land drainage, high fertilizer concentrations and pollution emanating from silage pits, poultry and/or pig farms does occur in fertile agricultural areas. This fact was seriously brought home at the FAO/EIFAC Symposium on the nature and extent of water pollution problems affecting inland fisheries in Europe (Jablonna, Poland, 1970). In Northern Ireland, where benefit to the land is the major criterion on which decisions about drainage are based, the value of fisheries at risk is taken into account in the cost/benefit analysis which precedes each drainage scheme.

Eutrophication of lakes resulting from domestic pollution is doing severe and lasting damage in most European countries and is high on the priority list of fishery problems even in Switzerland which is renowned for its clear mountain lakes. In Spain industrial development and the torrential character of the rivers have necessitated the construction of numerous barrages blocking the ascent of migratory species but at the same time enlarging by as much as 500,000 ha. the water surface available for fish. In Holland and the Federal Republic of Germany, water shortage creates very serious conditions. In Holland, salinity increases at times to dangerous levels and the minimum water flow of the Rhine, which occurs too often, increases the effects of pollutants.

Inland waters are not alone in being affected by pollution and the seashore of most of Europe is also polluted. The effect of changes in the quality of the water on fishing in a study area in Finland was shown as mainly detrimental. The main influencing factor is the sewage from the City of Helsinki. In

1970 the annual catch per leisure time fisherman was only 35 percent of what it was twenty years ago.

The fishing grounds have changed. In 1950 leisure time fishing was practised mainly in the inner bays, while nowadays the grounds are shifting or have partly shifted to purer areas further from the city, necessitating longer journeys. The change in fishing grounds is also reflected in the composition of the catch. The percentage of Baltic herring, cod and flounder in leisure time fishing catches, for example, has become significant. On the basis of the study, it has been estimated that changes in the quality of the water and surroundings have been an obstacle to leisure time fishing.

Population, fishing and pollution pressures call for radical action and strong management measures. But the tools available are not the best. One serious drawback is the difficulty of obtaining information on existing stock levels. It is obviously very difficult to apply rational conservation measures without knowing the size and composition of the fish population which is to be conserved. A second major and related problem, which depends upon satisfactory information being obtained on present stock levels is that of stock improvement. Both these problems call for research. In the United Kingdom, the laboratories of the Ministry of Agriculture, Fisheries and Food are actively engaged in research in the field of migratory fish counters.[14] In France, Poland, the Federal Republic of Germany and Ireland substantive work is being done on electric fishing as a management measure.[15]

Stocking of reservoirs lakes and rivers is necessary and of course very popular. But the operation of hatcheries is costly and, in fact, Denmark, one of the few countries without fishing licenses, is seriously considering its imposition partly to defray the expenses of stocking lakes and rivers. A related problem in that country is that of fish diseases. The Communicable Fish Disease Control Act requires guaranteed non-contaminated fish for stocking rivers heavily exploited by trout farms.

INCREASING STOCKS AND FISHING OPPORTUNITIES

Despite the alarming situation caused by water pollution, European countries are generally optimistic for the future of sport fisheries. An example of this attitude in the Netherlands, is the planned improvement of the oldfashioned fish passes in River Meuse by replacing them with modern fish locks. If water quality were not to improve, it would be a mere waste of money. There is also hope that the modern fish passes in the delta works and in the three recently constructed barrages in the River Rhine will serve their purpose successfully, which will mean giving passage to important fish species, such as salmon.

To increase its water area and reduce mounting fishing pressure, Italy is building small lakes and stocking them regularly. Likewise, the Federal Republic of Germany is building new fish ponds and restoring old ones.

The importance of the sport fishery problems and need for improved management have resulted in the Netherlands in the formation of a Federation of anglers' clubs. The responsibility for the management of scaly fish is shifting to sport fishing organizations. It also creates a situation in which anglers can fish many different waters without being faced with the necessity of becoming members of several clubs and associations.

Similar action is being contemplated in Switzerland but there the problem, as in the Federal Republic of Germany and Austria, is further complicated because of the federal structure of the country. However, discussions with a view to arriving at a national fishery association aimed at improved management practices are promising. In that country, it is felt that a positive step in water pollution control will be the opening of purification stations in the near future and the application of a new law on fisheries tailored to modern needs.

To help smooth over the controversy between sport and commercial fishermen, it is felt that dissemination of objective information on fishery resources, fishery management; hence, some influence on public opinion is essential. It is also felt that commercial fishing methods should be generally understood as management measures in sport fishing waters.

In less industrialized countries it is more and more realized that the wealth of sport fishing resources should be better protected partcularly since they presently have small commercial value and are, therefore, vulnerable to other conflicting interests.

With respect to water pollution control the establishment of water quality criteria for European freshwater fish is given the highest priority on the programme of EIFAC.[16] In fact, major studies have been completed on suspended solids, pH, water temperature, dissolved oxygen, ammonia, and monm-hydric phenols. Work is continuing on chlorine, zinc, copper, mercury and others. The Commission at various times has reasserted its feeling that water quality criteria for freshwater fish are a first, basic and absolutely necessary step, in the management of sport and inland fisheries. Once the criteria for various species of fish and various pollutants are in the hands of the administrators, it will be possible for them to decide the water quality needed in various areas in their country and to enforce required standards with adequate legislation. Similar criteria are felt necessary for marine fish species and interested international bodies are moving in the same direction as EIFAC in that regard.

Intense research in stock assessment, particularly on those techniques necessary for the rapid assessment of fish population is being coordinated by the Commission. An international Symposium on Methodology for the Survey, Monitoring and Appraisal of Fishery Resources in Lakes and Large Rivers is being organized in conjunction with the Eighth Session of EIFAC (Scotland, 1974).

The cautious optimism of EIFAC members is due to their recent awakening to the value of the sport fishing assets which, belatedly, they are attempting to protect and develop for full realization of their potential.

Some European countries have now recognized the need to evaluate their sport fishing resources not in isolation but in the framework of the total planning of the use of water, recreation in general and the social needs of their population. It is clear that all of the costs involved in transforming resources into outputs, even social costs must be identified. As in the case of stock assessment, techniques need to be developed for this important task. This calls for international coordination.

FAO and EIFAC are playing an increasing role in assisting governments in the effective management and conservation of their natural resources and those of the oceans. A sound balance between environmental requirements, the limited availability of resources, the need for economic growth and social amenities need to be established. Data collection and monitoring techniques will play an increasing role in coping with accelerated changes in resource use. It will be essential to ensure that these data are fully utilized both to assist

governments in natural resource planning and management and also to forecast and prevent possible detrimental effects of accelerated development on natural resources and the environment.

FOOTNOTES

Opinions expressed herein are those of the author and not necessarily those of the Food and Agriculture Organization.

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CHAPTER 5

ECONOMIC ISSUES AND OPPORTUNITIES FACING AFRICAN SPORT FISHERIES MANAGEMENT

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SPORT FISHING IN AFRICA

Abstract. There has been a considerable growth of interest in the sports fisheries of Africa in the past few years, associated particularly with the development of tourism, and especially with the developement of national parks and multiple purpose reservoirs. Sports fisheries have come to be recognized as a major contribution to national income in many African countries.

The chapter reviews sports fishing in various African countries, noting the species caught, the intensity of the activity, and the administration framework that relates to it. Il also describes the formulation of plans for sport fishery management in these countries and the manner in which these are being integrated with various other plans for economic and social development. Finally, it draws attention to the urgent need for programmes of systematic data collection and the institution of evaluation procedures. The potential role of FAO and CIFA in the latter connections are also described.

Sommaire. On a assisté ces dernières années en Afrique à une croissance considérable de l'intérêt porté à la pêche sportive, ce qu'on peut surtout attribuer à l'expansion du tourisme et encore plus à l'aménagement de parcs nationaux et de réservoirs à usages multiples. La pêche sportive est maintenant reconnue comme une importante source de revenu national dans bien des pays d'Afrique.

Le chapitre passe en revue la pêche sportive dans différents pays d'Afrique, notant les espèces prises,

l'importance de l'activité et le cadre administratif dans lequel elle s'inscrit. Il décrit aussi la formulation des plans de gestion de la pêche sportive dans ces pays et la manière dont on les intègre aux différents autres plans de développement économique et social. Finalement, il attire l'attention sur le besoin urgent d'établir des programmes de cueillette systématique de données et de créer des mécanismes d'évaluation. On décrit aussi à ce sujet le rôle pctentiel de la FAJ et du Comité des pêches continentales pour l'Afrique.

SPORT FISHING IN AFRICA

In Africa the development of sport fisheries is closely linked with the growth of tourism in general and in particular with the development and management of national parks (including the various aspects of recreation in water, forest and wild lands) and reservoirs. It is an accepted fact that tourism based on national parks, marine parks, sport fishing along the coast or in rivers, lakes and reservoirs, regulated trophy-hunting and wild life viewing in general, etc., contributes a substantial amount of the national income of many African countries, particularly in East Africa.

No one can put a figure on the present value of wildlife nor even make a reasonable guess. One can only point to examples of figures of known value, different in kind but sufficient to demonstrate that wildlife is a resource of considerable economic importance to Africa, even in the present early stages of its development. In Botswana there was a tremendous increase in revenues from wildlife as a result of the introduction of new legislation and the application of simple management and control procedures, initially over as short a period as three years in the early 1960s. In Kenya various aspects of tourism based on wildlife are worth $50 million annually. It is said to represent the highest single item of foreign exchange earnings of that country. In East Africa, back in 1965, ivory exports alone were worth over $1 million. In Ghana, wildlife is the source of 65 percent of the protein consumed in rural areas. A recent FAO report, quoting a report by the Nigerian Department of Statistics on the value of game meat in southern Nigeria, estimated the values of game meat at not less than $50 million for 1966, the year of the survey.

Kenya

In the specific field of sport fishing Kenya is a good example because some data are available. In that country, sport fishing is fast becoming world famous and a big attraction to overseas visitors who also benefit from unbeatable scenery teeming with wild animals, and exotic birds. Inland, in the north, there is Lake Rudolf. Here 300 lb. Nile perch (Lates nilotious) are not uncommon and tiger fish (Hydrocynus vittatus) reach 25 lb. The black bass (Micropterus salmoides) of Lake Naivasha - with a record of 91/2 lb. - is also famous. In addition, there are more than sixty trout streams, some of which run through the Aberdare National Park - (where fishing is allowed after paying the normal park entrance fee). These are

gaining considerably in popularity. Fishing for coarse fish is also possible in most rivers other than cold streams and in the lakes.

Although the Kenya coast line is just 280 miles in length, it embraces some of the best big game fishing grounds in the world. The list of species easily caught is most impressive. Apart from the internationally recognized tuna, marlin and sailfish fishing, as many as eight species of shark, barracuds, king fish, dolphin fish, snappers, bonefish, black runners, rainbow runner, etc., are found. Fishing is carried out from four main centres: Malindi, Kilifi, Mombasa and Shimoni. Although all have fishing hire centres, hotels and catering facilities, sports equipment shops, further important improvements are needed and planned. All need better landing facilities and boat anchorage. The marinas need to be enlarged and designed along modern lines such as those found in the Mediterranean and North American holiday centres. Ancillary facilities are badly required such as sea rescue and radio communication centres, chandlery shops, showrooms, provision centres, car parks, etc.

Malawi

In Malawi, sport fishing is organized through the Malawi angling club. Haplochromis, Barilius, Hydrocynus and other fishes can be found in Lake Malawi and the Upper and Lower Shire River. Bass fishing in small privately owned dams in the highland areas is popular as well as trout fishing in Mulanje area. Good trout fishing in three well stocked dams and streams in the Nyika National Park made it very attractive to tourists. Trout licenses are available on a daily, weekly or yearly basis. Generally speaking, however, sport fishing is not tourist-oriented but is mostly for residents, mainly foreign groups. Trout fishing is administered by the Game Department with the assistance of the Fishery Department.

Uganda

Uganda also offers excellent angling in most of its lakes and rivers, which is capable of greater extension by intelligent management. As an example, since the stocking of Lake Kyoga and the Victoria Nile with Nile perch, and subsequent catches by anglers, the sport fishery between Namasagali and Bujagali Falls has grown in six months, to a major recreation activity, supporting three motor boats for hire, a dozen dug-out canoes, and employing large numbers of fishermen as guides and ghillies. Over one ton weight of fish is landed by anglers in this stretch of river in an average weekend.

The recent introduction of Nile perch into Lake Victoria is worth mentioning. These fish are now appearing in great numbers in commercial catches and while very few have as yet been caught on rod and line, a number of anglers have begun exploratory fishing trips, some going as far as to order boats and engines ready for the explosion that is sure to result once the first fishes are landed in numbers. Once angling for perch is established on Lake Victoria, the boom in fishing tackle, boat and engine sales will be enormous. Hotel and travel firms will benefit and the overall build up of angling could be staggering. Lake Victoria is ideal in every way as an angling resort, once the fish are there, then the sport may well reach the popularity it has done in the U.S.A. and elsewhere.

The effect of this as a tourist attraction can scarcely be overestimated. The Entebbe area particularly, is readily accessible in normal times from all parts of the world. Excellent accommodation is available and all kinds of coastline, scenery and fishing waters - sheltered, offshore, deep, shallow, etc., close at hand. The Nile perch is an excellent angling fish and the chance of landing a very large one, always a distinct possibility, seems an irresistible lure to American anglers in particular. Given the proper promotion, Lake Victoria could become one of the major angling centres of the world.

Angling in Uganda as in most of Africa, however, remains a very minor sport, and is almost entirely the preserve of expatriate Europeans. There is no adequate handbook or guide to angling and the fairly extensive knowledge of the sport in Uganda is locked up in the heads of those few expatriates who are, now, leaving the country taking this knowledge with them.

The Fisheries Department has done what it can to popularize angling, but has always been handicapped by the shortage of finance and staff. Staff are in any case generally fully engaged in the development of the commercial fishery. Nevertheless, Uganda is the only country in Africa, to my knowledge, that has a course in sport fishing at the Entebbe Fisheries Training Institute. It tries to familiarize students with the various sport fishing methods and equipment. This course is of minor importance in the curriculum of the school but it is an excellent start. Also, a post of sport fishery officer has been established and should be filled by a trainee who has had the chance of visiting Canada.

Other Regions

Tanzania has a very strong angling club in Moshi for trout which is exploited mainly by expatriates resident in the

country. The possibilities of further development are superb. At Mbeya a resort is being developed around sport fishing facilities to cater for tourist from the south. At Dar es Salaam there are already some facilities. These could be further developed to exploit the fabulous sea fishing grounds of the Mafia islands.

In Zambia, fishing for Nile perch or cichlids in Lake Tanganyika or spinning for goliath tiger fish (Hydrocynus goliath) in the Chambeshi and Luapula rivers, probably the best in Africa, also offers tremendous possibilities.

In South Africa, recreation sport fishing has a high value indeed for the economy. Trout fishing is highly developed as well as surf fish and goggle fishing. The latter is rapidly gaining in importance and offers good opportunities in other African countries both in fresh and sea water.

Wildlife, including fisheries, is a valuable resource in many other regions of Africa. The building of new large reservoirs often increases the tourist potential, for example, fishing for tiger fish below the spectacular Kainji dam is a real attraction since success can be almost guaranteed in these waters, because the fish which formely were able to travel upstream are now prevented from doing so by the dam and so congregate below it. Cruising and sport fishing on the Kainji Lake have not been yet organized but could raise modest revenues. Then there is the Borgu Game Reserve between the Kainji Lake and the Dahomey border which offers good possibilities of development.

PLANNING AND DEVELOPMENT

Among the important economic issues to be considered in the development of sport fishing in Africa, early planning is a basic one. There is no doubt that in Europe a major obstacle to sport fishing development has been the lack of adequate early recognition of the importance of the resource. Africa has a decided advantage here.

No less than 30 countries in the region are now implementing their development plans. The number of trained agricultural planners is steadily increasing and requests for external assistance continue. Planning units are becoming an established part of ministries of agriculture. Among the various countries, plan objectives generally remain the same, although emphasis and policy stategies differ. Rural development and employment are common objectives, as are food self-sufficiency, agricultural diversification and the earning of foreign exchange. The development of sport fishing, particularly in East Africa is not only the result of good natural conditions but also the early recognition of sport fishing as an important element of foreign exchange earnings.

Water resource development in the African continent is, however, increasingly recognized as a complex, multi-disciplinary undertaking. We know, for example, that in the long-term planning of outdoor recreation, man-made lakes are bound to play an important role. But the rapid change necessitated in the creation of a reservoir from a dynamic riverine ecology into a relatively stable lacustrine ecosystem makes it absolutely essential to adopt, in the early planning stage, a multi-disciplinary approach.

Altering ecology as they do, and often isolating islands or long peninsulas, such new lakes also offer an opportunity for conservation of open spaces and natural beauty and preservation of natural areas for study and enjoyment.

In addition, forests within these areas, just like reservoirs such as Kariba and Kainji, may often be managed for multiple use including wildlife utilization, recreation and tourism. Unless there is planning, feasibility and recreation development at an early stage, economic losses may be incurred in the management of and investment in wildlife, recreation, and tourism.

How, by planning, can different uses such as tourism, recreation, and wildlife utilization be developed, coordinated, and itegrated with other aspects of the management of the new

lake or of the entire drainage basin of which the lake is a part? Planners need to identify the existing resource and the potential for its development; in particular, national parks, game reserves, forest reserves, and other game and forest management areas that may be devoted to various recreational uses, such as camping, hunting for game and wildfowl, fishing, boating, swimming, and water skiing.

Infrastructure for recreation and tourism development, such as tourist roads, harbours of refuge, marinas, and tourist accommodation, should be constructed with overall lake development in mind, and sited so as to preserve and take advantage of features of natural beauty. If fact, Rhodesiea did just that prior to the building of Kariba dam and now has important tourist facilities for sport fishing in particular.

All these considerations require the early formulation of policies for wildlife, recreation, and tourism, the designation of an appropriate administration, and enactment of suitable legislation.

Investments in the development of reservoirs for recreation need especially careful prior appraisal. In much of Africa and Asia, recreational development would probably be aimed today at the tourist trade. Nationals are little interested. However, this does not imply that long-range planning for future recreational use by local populations should not enter into early consideration of the development of new man-made lakes on these two continents. Financing the development of tourism in the vicinity of new man-made lakes may be national or international, private or public. National or regional tourism organizations will be able to advise on co-ordination with tourism development plans on a wider basis.

As is true of every successful type of revenue-earning activity, particularly where foreign exchange is involved, there is a natural tendency to increase accommodation for tourism in such promising areas and thereby obtain a greater income by providing tourists with different kinds of facilities in the hope of attracting an ever-greater number year after year. To facilitate increasing tourism, new hotels, more roads and other constructions are being planned or erected, new types of tours are being programmed, and, of course, new types of pressures are exerted on the natural resources which are the basis of the industry. It can already be seen also here that sound planning and intelligent management are necessary to prevent the degradation and depletion of what were thought to be unlimited resources on other continents.

THE PROVISION OF DATA

An essential requirement to sound planning with respect to the place of sport fishing in the multi-discipline approach to development is statistical data. In Africa, this is an acute problem. While catch statistics by sport fishermen may have been estimated fairly accurately in some African countries, there is an almost absolute dearth of data on the number of sport fishermen (national and foreign) and on their contribution to the national economy.

More progress has been made in this field in hunting than fishing. Many African countries require every hunter to endorse all animals shot during safari or elsewhere and return this information within 24 hours of the permit's expiry to the nearest game warden. Trophy dealers must keep a day-by-day diary where all dealings in game products have to be entered. A duplicate of the diary, together with a bi-monthly return showing in detail all trophies bought and sold, has to be submitted to the Chief Game Warden. The hunter returns are coded and transcribed onto punch cards to facilitate an analysis of the data.

Wildlife biologists have gone a step further than the fishery experts in their efforts to standardize statistical information, particularly in the African continent. An Ad hoc Working Party on wildlife management of the African Forestry Commission which met in Nairobi in February this year has designed a schedule for stantdardizing the reporting of wildlife statistics. This schedule, does not include edible marine or freshwater invertebrates because the Working Party assumed (rightly or wrongly) that such data would be included in the fisheries returns, but it does account for inedible marine products as well as underwater parks. The latter are included because, although their main attraction is fish, the administration of such conservation areas is usually in the hands of the wildlife authority and not those of the organization responsible for fisheries.

The schedule is designed to record the primary returns from a country's own wildlife resources and for that reason only wild animals and the products of wild animals originating in that country are taken into consideration. The schedule has been drawn up to group the financial returns from wildlife under the principal methods of exploiting that resource (sport hunting, commercial hunting, subsistence hunting, trade in wild live animals, wildlife farming, touristic returns derived from

aesthetic enjoyment of wildlife, etc.) The term tourism based on the aesthetic enjoyment of wildlife is used in the schedule to cover all forms of tourism in which the principal attraction is the viewing and photographing of wild animals in their natural surroundings but excluding tourism based on sport hunting which is included elsewhere.

THE ROLE OF FAO AND CIFA

So far, no substantial efforts have been made at the international level for the improvement of sport fishery statistics nor for the amalgamation of sport fisheries and wildlife statistics. Two important recent developments, however, will facilitate this task at the continental level. One is the recent creation of the FAO Committee for Inland Fisheries of Africa (CIFA) and the other the increasing role being played by FAO in the development of the aquatic resources on the continent in its function as Executive Agency for the United Nations Development Programme.

The Committee for Inland Fisheries of Africa (CIFA) has been created at the insistence of the African countries. It is a subsidiary body of FAO whose overall purpose is to promote improvements in inland fisheries and advise Member Governments and FAO on inland fishery matters. One specific function envisaged for CIFA and incorporated in its statutes is "to assist in the collection, interchange, dissemination and analysis of statistical, biological and environmental data". The First Session of CIFA took place at Fort-Lamy, Chad, in December 1972.

One of the major functions of FAO in the field of inland fisheries in Africa has been to assist its Member Nations in the assessment and management of their aquatic resources, and to promote international action that will enable the fullest utilization of the resources to the benefit of all concerned. The creation of CIFA is tangible evidence of the seriousness of these aims.

Even though the Organization fully realizes the importance of sport fisheries, it has concentrated most of its attention, so far, on the conservation and development of commercial and subsistence fisheries for food fish in the tropical and sub-tropical regions because of the immediate need for increasing food production in these areas. Within the financial sources available to it, FAO has endeavoured, to provide assistance to Member Governments in planning and conducting investigations and management in this field. Cognizant of the neglect suffered by inland fisheries in many developing as well as developed countries, the Organization has urged appropriate consideration of their value in national development plans.

Several African nations have embarked in recent years on large-scale natural resource research and development projects (many of which dealing with fisheries) with assistance from the

United Nations (UN), bilateral aid programmes, and private foundations. The United Nations Development Programme is the Agency with which UN supported projects are arranged. The basic intent of such a UN project is to assist a member government in the research and planning necessary for resource development and to help in actual development of the resource. The expected results are that the nation will be able to carry forward the work of the project after termination of the UN contract and that supplementary projects and financial help will have been brought into effect as needs are disclosed by the project. For UNDP projects on large man-made and natural lakes in Africa, the Food and Agriculture Organization (FAO), in Rome, has become the executing agency with primary responsibility to its Department of Fisheries. These projects are large in scope, with teams of experts, counter-parts and adequate field and laboratory equipment. The first of these in inland fisheries for which FAO was made the Executing Agency was the Lake Kariba Fishery Project on one of the largest man-made lakes in the world. Similar ones have been started on Lake Victoria (Kenya, Tanzania and Uganda), Kainji Lake (Nigeria), Volta Lake (Ghana), Nasser Lake (Egypt), and Kossou Lake (Ivory Coast).

It is important to note that most of these projects include in their plan of operation a certain number of man-months for wildlife, wildlife ecologist or tourism experts and one such project in Latin America some man-months of experts on sport fishing.

In addition, one should not forget FAO is also Executing Agency for a large number of field projects with a substantial tourism element in Africa in connection with wildlife, national parks annd forest management.

The essential rcle of FAO's as well as that of CIFA is to promote ideas, to stimulate action, to function as an international catalyst, to assist countries in learning to apply techniques. It is important that this be done not through a piece-meal approach based purely on subject-matter, but through programmes aimed at fully integrated and balanced development placing more emphasis on social and organizational requirements.

Although much more investment in the field of sport fishing in Africa is needed, the challenge there is not so much lack of funds as the difficulties faced by governments in preparing for international support projects and programmes which will have a beneficial impact on a large part of the economy. Often, this difficulty can be traced to the lack of statistical data.

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CHAPTER 6
OWNERSHIP AND ADMINISTRATION OF INLAND SPORT FISHERIES IN EUROPE

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Abstract. The growing demand for sports fishing opportunities has stimulated the European Inland Fisheries Advisory Commission to encourage a survey of the nature of ownership of fisheries and the administrative structures relating to the latter in various countries. This chapter presents a review of the results of this survey. It notes that in some countries the rights to fish are publicly owned, whilst in others they are in the hands of private individuals or groups. In some instances the nature of ownership varies with the types of species that may be caught. Comparison is made in the chapter between the various situations in Europe with those prevailing in Ireland. A detailed presentation of data upon which the chapter is based appears in the appendix to the volume.

Sommaire. La demande croissante de pêche sportive a poussé la Commission européenne consultative pour les pêches dans les eaux intérieures à appuyer une enquête sur la nature de la propriété des pêcheries dans divers pays et sur les structures administratives qui s'y rattachent. Ce chapitre passe en revue les résultats de cette enquête. Il note que dans certains pays le poisson est la propriété du public, tandis que dans d'autres il appartient à des individus ou des groupes privés. Dans certains cas, la nature de la propriété varie avec les types d'espèces que l'on peut prendre. On établit une comparaison dans ce chapitre entre les différentes situations en Europe et celle qui prévaut en Irlande. On trouvera en annexe au volume une présentation détaillée des données sur lesquelles ce chapitre se fonde.

In many European countries where there is growing pressure for increased sport fishing opportunities, the matter of ownership rights has become an especially urgent question. In Ireland, where systems of both private and public ownership prevail, ownership of tidal waters is generally presumed to be in favor of the public. Where private rights exist they usually derive from ancient grants through conquests or expropriation. In some tidal water fisheries claims to ownership have been successfully challenged, in some cases with a declaration by the Courts against a quondam private fishery owner. No general test of title is recognised or established by the Courts in Ireland; but it is common to a few of the recent judgments in favour of the public right that no title to a private fishery can be sustained without documentary evidence dating from before Magna Carta.

To conclude this sketch of the Irish position about title in tidal waters, legislation has been in operation since 1934 for controlling fisheries where title has been successfully challenged by the public or an owner surrenders his title - ex-gratia compensation has generally been awarded by the State in such cases. With this historical background we have naturally been interested in studying regimes of control over the use of fisheries in other countries, particularly in tidal waters, with in mind the evolution of measures with optimum application for the future.

This tentative step of assuming State control of tidal water fisheries as distinct from acquiring ownership on behalf of the public-has not led to any further development of intervention by the Fisheries Authority. Any recommendations to be made in this regard will be in keeping with the experience of just 40 years working of limited state control.

A SURVEY OF EXPERIENCE IN VARIOUS COUNTRIES

Interest in the problems of ownership of sport fishery rights stimulated the European Inland Fisheries Advisory Commission to undertake a survey of experience in sixteen European countries and Canada. The results of the survey are presented in the Appendix to this volume. The analysis of the data gathered has still to be completed. However, a brief review of the situation in various countries seems pertinent.

Finland

A system of joint ownership prevails in most parts of the country. It features a village water unit which holds and administers fishing rights in the relevant water area. To a limited extent lakes have been sub-divided and the divisions recorded on official maps. Under law co-operatives are given requisite authority if formed for management of divided fisheries.

Free time fishing - methods, types of fish and approach to conservation differ materially from the sport fishing concepts of Western Europe generally.

West Germany

Fishing rights may be vested in the federal or state authority, in the country or municipal authority, in companies or individuals. No attempt is made at synthesising such varied regimes, but taking Bavaria as one of the leading sport fishing states of the Republic, private ownership predominates; where ownership of a water is divided, an association is usually formed to divide shares, regulate methods of fishing and prescribe conditions for leasing of sporting rights to associations and so forth.

Luxembourg

Dating from a law of 1874, the right to fish in traditionally public waters - the "navigable and flotable" waters of the interior-derives simply from holding a state fishing licence. Otherwise the fishing rights belong to the riparian owners with no right of fishing under the licence. With the passing of laws in 1934 to control destructive fishing practices a detailed management regime was planned on the basis of syndicated action by riparian owners. The intervention of World War II delayed implementation which has now been effected by laws of 1947: steadily growing increases of rents in the meantime seem to indicate the general success of these measures.

Norway

Apart from state-held fisheries (notably Finnmark) fishing rights in freshwaters usually belong to the owners of riparian land and cannot now lawfully be severed from it. A riparian owner can sell land and the fishing rights with it to any Norwegian or to a foreigner - with permission under law - but there are administrative difficulties in obtaining permission. In the larger lakes marginal waters belong to riparian owners and deep water fishing to the state. Fishing rights may be held under law collectively where many owners have claims to particular water: the formation of associations for management purposes is a matter for voluntary agreement but where such associations are formed decisions can be made by law by a simple majority.

The public have a right of way (not for fishing alone but for general outdoor pursuits) along the banks of all rivers and lakes. They also have a right to use boats on rivers and lakes. This ancient custom has been formalised by law.

Scotland

There are no public fisheries for salmon and sea trout in freshwater or at sea within 3 miles off shore. The salmon sea fishery within the former 3 mile exclusive fishery limit (which is presumably still the limit of jurisdiction) is all in private hands and fished by bag nets, stake nets or more recently the undesirable hang net (which relies on a meshing action).

The salmon and sea trout fisheries which do not belong to private persons or corporate bodies belong to the Crown as part of the former private estate of the sovereign. These are now administered by the Crown Estates Commissioners and are not public fisheries. Salmon fisheries can be held separately from the adjoining land as a separate estate. The owner of a salmon fishery is deemed also to be the owner of the brown trout fishing within the confines of the salmon fishery (the greater includes the lesser).

Ownership of brown trout and coarse fisheries cannot be severed from that of the adjoining land, (the Orkney-Shetland system of tenure), giving rise to dual ownership of the brown trout fishing in waters containing both salmon and brown trout, where the salmon fishery is held separately from the adjoining land.

Each riparian owner holding brown trout fishing rights in a portion of a lake can exercise his right to fish from boats over the entire lake. This is a traditional right applying to non-salmon fisheries and has no statutory basis.

Unlike the disposition in Ireland, land in Scotland is still held in very large estates by landlords with the result that salmon and sea trout fisheries are held for the most part in large units, covering either long stretches of river or wide areas of sea or both. Even where the estates are tenanted, the ownership of brown trout fisheries and coarse fisheries, where they exist, remains with the landlord, as riparian owner.

Spain

All fishing rights with monor exceptions are held by the State: the law declares that all fisheries belong to the public domain unless a private owner can prove the contrary. Those rights which were originally held by the Church were taken over by the municipalities and are now vested in the Minister of Public Works. They are managed by the Instituto Nacional para la Conservacion de la Naturaleza (ICONA - a National Institute for the Conservation of Nature) which is an offshoot of the Ministry of Agriculture.

The minor exception the State's ownership is that a farmer at the source of a river owns the fishing rights within the limits of his farm. This does not in practice result in the private control of any worthwhile fishery insofar as could be ascertained in the survey.

Under general direction of the Ministry of Agriculture, ICONA is responsible through 50 Provincial Chiefs for the coordinated management of fisheries, forestry and hunting - with apparently adequate staffs of wardens, well trained and uniformed, backed up by a wide range of professional officers as part of an integrated management organisation for the wildlife and fisheries in the respective provinces. A detailed code of law and omnipresence of uniformed personnel with authority to impose "on-the-spot" fines seems to keep illegal fishing under control, but control of pollution is still in doubt.

A basic feature of conserving sport fish is the system of Cotos Nacionales which has attracted much attention in European sporting journals. Rod fishing in the better angling waters (no netting is permitted) is available either to home or visiting anglers only on a limited permit system, the issue being determined basically by lottery. In practice a large measure of discretion resides in each Jefe Provincial both in regard to permit issues and within-season adjustments as necessary as between open fishing waters and santuary closures for purpses of conservation.

IMPLICATIONS FOR ALLOCATION OF OWNERSHIP RIGHTS IN IRELAND

A Government Commission is examining questions of use and ownership of freshwater fisheries in Ireland (including those for salmon whether found in internal waters or in the sea) and is expected to make recommendations as to any changes in the ownership system that may be considered desirable in the public interest. At this point it is pertinent to ask, what can be learned from experience elsewhere? Does it suggest desirable modifications of the present system in Ireland: The first thing to recognise is of course that such changes can not be made or dictated in doctrinaire fashion by the apparent success of certain systems in other countries. It is pretty certain that economic considerations will need to be seen to point the need for change and point the way in which solution should be sought. This can well entail the evolution of substantial changes in management objectives and in the means of attaining them. Further, the requirements of the new structure may call for the changing of traditional customs and the substitution for old relationships of codes of behaviour which better lend themselves to co-operation in the desired management regime. These changes cannot be installed overnight. Indeed it was suggested recently in the fishery context that any substantial change of a sytem should preferably evolve over a period of possibly up to 50 years and even when it has fully attained its new form must be subject to another period of proving before judgment can be made on its full public acceptance. The system of fishery ownership in Ireland is lacking in elements of order and sophistication which one would expect to be present in a role tending towards long-term management. This may be so largely because the more highly prized rod fisheries for salmon have been held traditionally in the hands of the wealthier landed class who on the whole have not encouraged widespread use of the amenity. This attitude has often been adopted to point of the fishery being run at a loss in order to ensure its availability as required for the owner' friends or occasional favoured acquaintance. The quantity of good class salmon fishing that has become available for more general use has increased somewhat since the former large estates have passed through the process of land purchase and division but to a great extent such fishing, according as it has become available has come under the control of salmon angling associations, some of them in effect no more than thinly disguised fishing syndicates which do not offer membership privileges in any way freely. This and other restrictive factors have in some way resulted in the situation just described. The interest in salmon angling is by no means as general as that for brown trout and as a form of recreation is subject to little or

no demand such as one envisages when considering a market situation.

One final comment should be made about the management of inland fisheries in Ireland. Although, in the eyes of the law all fishing rights in inland waters must be the property of some person or other - that is there can be no public fishery in such waters - ownership is in fact asserted only rarely to sport fishing rights other than those for salmon. In fact there is defacto fishing for brown trout and coarse fish in most of the larger lakes and in other waters not posted by the putative owners, whether they are game or coarse fish waters. It is also true that a most elaborate code of regulations and statutes applies to a great extent to salmon only. Some of this imbalance must be redressed if the sporting potential of brown trout and coarse fish as recreational and tourist amenities - a potential probably greater than that of the salmon - are to be realised through the medium of orderly management.

CHAPTER 7
ORGANIZATION AND PROBLEMS

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THE IRISH SPORTS FISHERY

Abstract. Sport fishing has long been important as a recreational activity in Ireland. It is estimated that of about 470,000 acres of fishing type waters, some 352,500 acres (0r 75 percent) are currently used by sport fishermen. While much of this activity is undertaken by local fishermen. Irish fishing areas appear to be a growing tourist attraction. In 1971 more than 86,000 non-resident anglers fished in Ireland.

The major problem faced in the administration of the Irish sport fishery is the mounting cost of management, unmatched by a corresponding increase in the amount of revenue derived from the sale of licenses. Important decisions have to be made as to what fees should be charged, whether there shoud be a differential for non-resident versus resident fishermen, and which species should be emphasized.

The chapter describes various attempts that have been made to estimate the value of the Irish sport fishery, and notes the deficiencies of some of them. It points out in particular the challenge of finding simple, low-cost methods of data collection.

Sommaire. La pêche sportive est depuis longtemps une activité récréative importante en Irlande. On estime que, sur un total d'environ 470,000 acres d'eau propice à la pêche, quelque 352,500 acres (ou 75 pour cent) sont en ce moment utilisées par les pêcheurs sportifs. Même si la pluspart des utilisateurs sont des pêcheurs locaux, la pêche sportive en Irlande semble être une attraction touristique en expansion. En 1971, plus de 86,000 pêcheurs non-résidants sont venus en Irlande.

Le principal problème auquel doit faire face la pêche sportive irlandaise est l'augmentation des coûts d'aménagement, qui n'est pas équilibrée par une augmentation correspondante des

revenus de la vente des permis. Il faut prendre d'importantes décisions quant aux droits à imposer, quant au surplus à exiger ou non les pêcheurs non-résidants par opposition aux pêcheurs résidants, et quant aux espèces à exploiter de façon plus particulière.

Le chapitre décrit diverses tentatives d'évaluation de la pêche sportive en Irlande, et note les lacunes de certaines de celles-ci. Il souligne en particulier le défi, que pose la mise au point de méthodes simples et économiques de cueillette des données.

Including river estuaries, there are about 470,000 acres of fishing type waters in Ireland (26 counties). It is estimated that angling is carried on in about 75 per cent of these waters but that if necessary up to 95 per cent of the water area could be developed for this purpose. In addition to the inland fishing a certain amount of sport fishing is carried on in the surrounding sea by both tourists and native anglers. Two main types of sports fishing are practised, namely game and coarse fishing. Game fishing which is especially popular with the native population is for salmon, sea trout and brown trout. Coarse fishing is for species like pike, perch, bream, rudd, roach, dace, carp and tench. This type of fishing is very popular with tourists, particularly those from Britain. In 1971 it was estimated that 86,000 sports fishermen visited Ireland and in the course of these visits spent an estimated £ 4 million. Sea fishing attracted the highest total of 40,000 visitors with about 29,000 each for inland coarse, anf game fishing, though some were involved in more than one kind of fishing. It is estimated that of the game fishermen about 3,000 fished mainly for salmon and sea trout.

Brown Trout Fishing

Brown trout are the favourite quarry of the Irish angler and a major attraction for the visiting tourist anglers. They occur in every stream and river, in all the big lakes and most of the small ones. The largest trout are found in the limestone lakes of the central plain and the smallest in the more acid lakes of the coastal regions. Trout fishing is free on many of the big lakes and also on many of the small lakes and rivers. The Inland Fisheries Trust, a State agency working in co-operation with angling clubs, controls many lakes and rivers. Membership of the Trust is open to all anglers (home and foreign) for an annual subscription of £2. and members have free fishing in all Trust waters. Other trout waters are controlled by angling associations with an annual subscription ranging from 25p to £2 per year. A state rod licence is not required for brown trout fishing. From the administrative point of view this is a great disadvantage as in the absence of such licences there is no record of the exact number of people who fish for brown trout in any year, and reliance must then be placed on rather crude estimates. According to the best estimates available, the potential rod use for brown trout waters has been increased from about 12,000 in 1960 to 60,000 at the present time.

Coarse fishing

As with brown trout, a state licence is not required for coarse fish angling and for that reason accurate records of the number of coarse fishermen are not available. According to the best estimates, the potential rod use has increased from 10,000 in 1960 to 50,000 at the present time, but the scope for increase is much greater as coarse fish are to be found in all the limestone waters of the state. Pike are very distributed, and while the average 30 lb is the minimum weight accepted for claims by the Irish Specimen Fish Committee. Carp are at present found in only a few Irish waters but are being introduced to others. Coarse fishing is free in practically all cases.

Salmon fishing

Salmon are caught in all the larger rivers of Ireland, in many of the smaller rivers and in a number of lakes. The best salmon fisheries are preserved and are let by the week or month, though day tickets are available on some. Many salmon fisheries are owned by hotels and reserved for their guests. Angling clubs control other water. There is free fishing on some lakes but in general the 'free fishing' is not very good.

A state rod licence is required for salmon fishing. The cost of such a licence varies from £1 for seven days to £3 for a full season in a single fishery district and £4 for a full season for all fishery districts. The possession of a state licence however does not mean that a person can fish wherever he chooses. Unless the fishery chosen is free, the fisherman must pay a rental to the fishery owner which may be as high as £4 per day in very good waters. The total number of salmon angling licences issued in 1970 was 11,210. About 7,000 of these were issued to home anglers and the remainder to visitors.

Sea Trout Angling

Sea trout or white trout as they are usually called in Ireland are plentiful in the small lakes and lesser rivers of the coastal regions, especially west Cork, Kerry, Connemara and Donegal. They run as early as May in some waters but July, August and September are the sea trout months on most waters. Many western waters provide a combination of salmon and sea trout

fishing during the summer months. A salmon rod licence is required for sea trout fishing.

Sea Angling

The south and west coasts of Ireland provide some of the best sea angling in Europe. The species fished are bass in the estuaries and shallow beaches. Mullet are to be found in creeks and harbours while there is rock fishing for pollock, wrasse and conger. In some areas there are large numbers of tope and porbeagles while blue shark fishing has become popular in Achill, Kinsale, Ballycotton and Dungarvan. Sea fishing is free but visitors usually have to purchase bait and hire local boatmen.

CONTROL AND ADMINISTRATION OF FISHERIES

The Department of Agriculture and Fisheries controls the administration of all Irish fisheries (sea and inland) and makes laws and regulations governing them. The origin of much of the present fishery law may be traced back to 1848 when an Act of Parliament was passed consolidating existing fishery laws and establishing comprehensive regulatory codes particularly for salmon. It laid the foundation of the present day system of administration by creating fishery districts and providing the machinery for setting up Boards of Conservators who are authorised to employ and collect licence duties to meet the expenses of these activities.

As a result of this act the state was subsequently divided into 17 fishery districts based on major river catchments with a Board of Conservators for each district. The Boards are elected by the salmon licence holders and fishery ratepayers, the number of votes available to each elector being in relation to the value of the licences held plus the value of the fishery rates paid by him in the election year. A licence holder who is also a rated occupier of a fishery could therefore have a maximum of up to 8 votes, 4 in respect of the licences held and 4 in respect of rates paid.

The major original enactment of the past 50 years has been the Fisheries Act of 1939, which among other things provided for the acquisition and operation of several exclusive fisheries in tidal waters, (not implemented) the prohibition of fresh water netting, the licensing of brown trout angling (not enforced), the prevention of pollution, the regulation of fishing weirs and the securing of the free passage of fish over water dams.

Up to 1954, Boards of Conservators relied entirely for revenue on licence duties, fishery rates and some small amounts from miscellaneous sources such as sale of fry and fines on poachers. An Act of 1954 established a Salmon Conservancy Fund which is used to supplement the income of the Boards by way of state grants for administration and for the cost of river improvement schemes. This fund which is built up partly from levies related to catch and partly from the Exchequer has been of considerable help to Boards and now accounts for about 40 per cent of their incomes. Expenditure of the Boards goes on salaries, water keepers' wages, legal expenses, travelling and various miscellaneous expenses. The proportions of receipts and expenditures coming from different sources in 1970 are given below. These figures do not include the administrative

expenditure of the Fisheries Branch of Department of Agriculture and Fisheries.

Receipts	%	Expenditures	%
Licence duty	19	Salaries	21
Fishery rates	32	Water keepers	51
State Grant	43	Law costs	2
Miscellaneous receipts	6	Travelling and Miscellaneous	26
Total (£164,000)	100	Total (£172,000	100

PROBLEMS CONFRONTING MANAGERS AND ADMINISTRATORS

As in most organisations the main problems confronting Irish managers and administrators of fishing waters stem from lack of funds; and it is difficult to convince the Legislature of the necessity for extra expeniture. More specifically it is probably true to say that the most pressing problems are of a technical nature, relating principally to breeding and stock maintenance, disease and pollution control, control of predatory species (chiefly in the case of brown trout), and the improvement of shore and fishing facilities. These problems have been discussed at length elsewhere by technical experts. Attention here is focused on a number of administrative problems, particularly to those of economic evaluation. The solution of the latter seems to me to be of crucial importance. Unless we can convince the government that the industry is worthy of support and that funds spent on it will yield worthwhile returns, then it seems that Irish sports fishing will never develop to its true potential and indeed may be allowed to languish through apathy and inattention.

In the Irish context the economic evaluation of angling waters is a particularly difficult undertaking because of low visitation rates. With a total populaltion of only 3 million people and a total land area (including water) of 27,000 sq miles the population density is only about 110 per sq mile to total land area and is only about 6 people per acre of inland water. Considering that in addition to the inland waters there are about 2,000 miles of coast it is at once obvious that the pressure of population on fishery resources is rather low and that the demands by local people for extra fishing expenditure are not very enthusiastic.

Beyond this we have also tended to be very complacent about our environment and in many cases have allowed angling resources to be destroyed by industrial and agricultural enterprises. This is one of the most serious challenges to the maintenance of sports fisheries in Ireland. Policy-makers are having to weigh the trade-offs between employment and environment. To do so, objectively, however, requires the development and use of better tools of evaluation than have employed to date, on either side of the Atlantic.

One of the most popular methods for evaluating recreation is that proposed by Clawson.[1] Here an attempt is made to determine the consumer surplus enjoyed by those who live near the recreation opportunity over those who come from afar. The method, however, does not seem very appropriate to the Irish situation where visitation rates are low and where a large

proportion of the visitors are overseas tourists. The author has attempted several studies using the Clawson method but the numbers coming from different zones were too small to be of any use for the derivation of statistical demand curves.

In the studies in Ireland to-date, angling resources have been regarded as earners of tourist revenue and the gross expenditures of the tourist anglers (expanded by suitable multipliers) have been used as measures of the benefit which tne angling confers on the state. In one sample survey drawn from the population of licence holders it was found that a total of 3,300 out-of-state salmon anglers visited the Republic of Ireland in 1970 and that 85 per cent of these came specifically for salmon angling or for salmon angling combined with a family holiday.[2]

The average length of stay was estimated at 17 days and total expenditures was £190 per angler. Of this £43 was spent travelling to and from the Republic and £26 on travel within the state. The remaining £121 was spent on various non travel items as follows: accommodation and meals £74, tackle and lures £3, boats, boatment and gillies £8, fishery rental £10, gifts £8, licence fees £2, and other £15. The latter item which includes alcoholic beverages and tobacco is likely (as in all expenditure surveys) to be understated. When expenditure figures are adjusted for expenditure by anglers who did not come specifically to fish and for payments to non-Irish carriers, the multiplied effect of the total expenditure is estimated at £750,000 which is the estimated benefits accruing to the state from the expenditure of the visiting salmon anglers.

A study of coarse fish and brown trout anglers made for the Irish Tourist Board for 1969 showed that on average each visiting angler and his family stayed 11 nights in the country and during that time spent £105 on various items.[3] Of this amount about 30 per cent was spent on accommodation 27 per cent on fares to the country, 9 per cent on transport in Ireland, 8 per cent on entertainment, 5 per cent on souveniers and the remaining 11 per cent on boat expenses, spirits, fishing tackle, clothes etc. The total expenditure in the state for all these types of anglers is not giben in this report but it is probably in the region of £3.5m. for 1971. Further studies in this area are required but it should be pointed out that in the absence of fishing licences grave sampling problems arise.

In the above study the procedure adopted was to visit a selected sample fishing waters on specified days and interview those found fishing at each visit. This is a troublesome and costly method of interviewing and gives rise to considerable problems of interpretation of results. It assumes, for example,

that the areas visited are representative of all fishing sites. This may not be the case.

A rather ingenious system of sampling adopted in a recent large scale British study was to locate anglers first by means of a postal survey and to follow this up with personal interviews of those who stated in the postal survey that they had gone fishing at leaste once in the past year.[4] In this study it turned out that in order to interview one angler it was necessary to write initially to about 15 people, a rather expensive process. Means of reducing the costs of such surveys are urgently required.

POTENTIAL VALUE OF IRISH FISHERIES

If the Irish sports fishing is evaluated on the basis of present visitation rates, it does not appear to have a very high value. This seems likely to change rapidly in the near future. With entry into the European Common Market communications between Ireland and athe highly populated European countries will increase and soon there is likely to be a great upsurge in visiits by continental anglers. Also with increasing incomes there is likely to be greater demands for angling facilities from the native population. We should therefore be considering the future rather than the present value of sites and this applies particularly to sites which at the present time may not be widely used. For example 20 years ago many golf clubs in provincial areas of Ireland had to struggle hard to maintain membership. Today it is becoming increasingly difficult to become a member of a club and subscription raters have soared. The same situation will no doubt arise with fisheries. With increasing urbanisation more and more people will seek outdoor recreation of all kinds and it is inevitable that demand will grow apace for many of our presently semi deserted fishing sites. Hence regardless of the results of current evaluation exercises, potential use based on experience of similar type amenities or of developments in other countries must always be considered.

Another problem which is of concern to fishery administrators in Ireland is the competition between commercial salmon fishermen and sports anglers. One writer has stated that the value to the state in tourist spending, of a rod caught salmon is £100 and that this must be compared with the slab value of a netted or trapped fishi (about £3.00).* Other writers have argued that excessive drift netting in the sea and draft netting and trapping in the river estuaries are depleting our stocks of salmon, and if things are allowed to continue without restraint the tourist angling industry may be destroyed. Indeed a few people have gone so far as to recomment the complete abolition of netting until stocks have returned to normal.

The arguments put forward in favour of thecurtailment of salmon netting are not always realistic and indeed sometimes the reasoning is invalid, nevertheless there is no doubt but that excessive netting can deplete stocks and unless kept within safe limits could prove very harmful in the long run. It is important therefore to establish criteria for striking a balance between commercial fishing and angling so as to maintain stocks at some optimum level. The Economic and Social Research in Ireland has been working on some mathematical models for the establishment of such criteria. All of these models require a considerable amount of technical data on salmon movements, breeding rates, mortality,

and spawning capacities of rivers for their solution. Few of these data are available in the required form at present and it seems that the situation will remain thus for a long time to come. For this reason our present models are not very useable and it seems that we will have to develop simpler ones which require less technical data for their solution.

Footnotes

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CHAPTER 8
MANAGING THE FOYLE RIVER FISHERY

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Abstract. The Foyle River fishery in Northwestern Ireland is one of the most important sport fishery areas in Ireland. Angling takes place over some 500 miles of running water and about 189 acres of still water. Of this, some 10 miles are managed by the Foyle Fisheries Commission. The remainder of the area is in the hands of riparian landowners, angling associations and angling syndicates. A license is required to fish for salmon or sea trout but no license is needed for fishing brown trout or coarse fish. Those not belonging to fishing associations or syndicates need to purchase a fishing permit.

There is a growing conflict between sports and commercial fishing in the Foyle Area. It is not clear, however, which fishery should be given precedence. The commercial fishery provides a basis for the local economy but sports fishery also generates income for outfitters and others. In this case, however, most of the sport fishermen come from the local area, and the amount of additional income so generated is not as large as it might be with development of the sports fishery as a tourist attraction.

The Foyle Fisheries Commission faces a dilemma of mounting costs of management and the failure of revenues from the sale of licenses to keep pace. If the price of licenses were raised the profit margins of commercial fishermen would be reduced. Another problem is that of determining a basis for establishing license fees: should they be related to the "services" that are provided or should they be based on the "value" of the fish. Finally, decisions have to be made as to whether, and how much subsidy the government should provide.

Sommaire. La rivière Foyle du nord-ouest de l'Irlande est une des zones de pêches sportive les plus importantes de ce pays. On pratique la pêche sur 500 milles d'eau courante et environ 189 acres d'eau calme. Là-dessus, quelque 10 milles sont gérés par la Foyle Fisheries Commission. Le reste de la région est entre les mains de propriétaires riverains, d'associations et de groupes de pêche. Il est nécessaire d'avoir un permis pour pêcher le saumon ou la truite de mer, mais il est inutile d'en avoir un pour la truite brune ou les poissons communs. Ceux qui n'appartiennent pas à une association ou à un groupe de pêche doivent acheter un permis.

Il existe un conflit croissant entre les pêches sportive et commerciale dans la région de la Foyle. Il est cependant difficile de déterminer laquelle de ces pêches on devrait favoriser. La pêche commerciale est une des bases de l'économie locale, mais la pêche sportive amène aussi des revenus pour les pourvoyeurs et d'autres. Dans ce cas, cependant, la plupart des pêcheurs sportifs viennent de la région, et les revenus supplémentaires ainsi engendrés ne sont pas aussi importants qu'ils pourraient l'être si la pêche sportive devenait une attraction touristique.

La Foyle Fisheries Commission doit faire face au dilemne des coûts croissants de gestion et du retard qu'accuse l'augmentation des revenus de la vente des permis. Si le prix des permis était augmenté, les marges de profit des pêcheurs commerciaux seraient réduites. Déterminer une base pour établir les droits de pêche pose un autre problème: ceux-ci devraient-ils être établis en fonction des "services" fournis ou au contraire de la "valeur" des poissons. Finalement, il faut décider si le gouvernement devrait fournir des subventions, et dans l'affirmative, à combien celles-ci devraient s'élever.

The Foyle Area comprises the entire catchment area of the River Foyle and its tributaries. It consists of some 500 miles of rivers suitable for angling withing a catchment area of some 1,544 sq. miles. The area is situated in the North West of Ireland and the River Foyle for part of its length forms a section of the border between the border between the Republic of Ireland and the North of Ireland. (Figure 1)

The species of fish which together contribute to the sport fisheries of the area include brown trout, sea trout, Atlantic salmon (over 90% of which are grilse) and some coarse fish, mainly roach. The salmon cropping pattern, as practised over a long period of years is such that the river system is seen to give a considerable yield to the commercial fisheries while the angling waters record frequently indifferent yields and appear to attract relatively small numbers of anglers. Angling takes place not only over at least 500 miles of running water but there is also approximately 189 acres of still water which comprise the numerous natural lakes, and provide excellent brown trout fishing.

THE FOYLE FISHERIES COMMISSION

The Foyle Fisheries Commission, the statutory body responsible for managing the Fisheries, has direct responsibility for some 10 miles of angling waters, but the vast majority of rod fisheries are in the hands of riparian landowners, angling associations and angling syndicates, a position which is similar to that prevailing in New Brunswick and Quebec.

Although it is necessary to possess a licence (costing £3 or $7.00 per annum) to fish for salmon or sea trout, no licence is required for either brown trout or coarse fishing. In addition to holding a licence, however, an angler also needs a fishing permit unless he is a member of an association or syndicate. In the latter case he would be fishing in waters the fishing rights of which are owned by that associations but they usually are about £2 (or $4.80) a season, per angling association. However, armed only with a $7.00 rod licence plus the addition of $9.00 worth of permits obtained from the Northern Ireland Ministry of Agriculture he can fish over 40 miles of salmon and sea trout waters, and 40,329 acres of lakes (including most of Lough Erne) throughout Northern Ireland which are stocked with rainbow trout or brown trout.

(Table 3) gives details of the number of anglers licensed in recent years together with details of the reported rod catches of salmon and sea trout.

The actual size of the salmon resource is in fact far greater than would appear from the angling catches indicated in the Table. Ont only are anglers apparently reluctant to submit returns, (because the percentage of returns made during the past eleven years has ranged from 12% to 49%,) but a very large commercial fishery also exists which is of marked economic significance in the area. This fishery comprises three main sections. Firstly the drift net fishery which is worked by over 100 licensed fishermen in Lough Foyle and seaward of it; secondly by the Londonderry Fishery which operates in the estuary of the River Foyle upstream of its mouth, and which is managed directly by the Foyle Fisheries Commission; and thirdly the public draft net fishery operated by over 280 licensed fishermen. Details of recent catches by these three sections is given in Table 4.

THE CONFLICT BETWEEN SPORTS AND COMMERCIAL FISHERIES

It is not too difficult to appreciate the main management problem of the Foyle area because if the rod and net catches are compared it will be seen that the net fishermen's proportion of the total Foyle area catch is over 90% each year. Many attempts have been made in Canada to evaluate salmon fisheries and in recent times work has also been carried out on similar lines in Ireland including the Foyle area. In most cases it has been felt reasonable to proceed on the assumption - largely substantiated in studies to date - that the value of the sport fisheries to the local community is considerably greater than that of the commercial fishery mainly because anglers appear to spend so much more money to catch so many fewer fish than do the commercial fishermen. This contention could also be argued in the case of the Foyle area sport fisheries. It might be reasoned, therefore, that the Foyle Fisheries Commission which is responsible for the management of the Foyle fisheries should devote its energies to restricting the net fishing so as to increase the rod catch potential. However, experience suggests that in the Foyle area such a simple proposition does not in fact produce the desired results. A recent study of the domiciles of the licensed salmon anglers who fish the Foyle fisheries has indicated that over 90% of them come from the Foyle area itself. Thus it can be agreed that the lack of tourists or "out-of-state" anglers considerably diminishes the present contribution that Foyle anglers make to the economy of the local area and must inhibit the realisation of any worthwhile income in this form of angling tourist spending. Very little money is in fact brought in to be spent in the area by anglers. Again and perhaps more relevant to the management problem is the undisputed fact that reductions from time to time in commercial fishing operations on the River Foyle for reasons of stock conservation have not necessarily increased the anglers' catched of salmon.

Following the 1961 netting season the Commission was disturbed to learn that the stock of spawning salmon was one of the smallest for many years in spite of the fact that 1961 could not be considered to be a 'dry' year as had been the case in earlier years like 1959. As a result the Commission decided to increase the weekly close time period then operating (namely the statutory 48 hours) to 72 hours. It was decided that the close time period should be applied separately to two sections of the tideway; ie. no netting was to be permitted in Lough Foyle and the lower part of the tideway in the 72-hour period from 06.00 hours on Friday until 06.00 hours on the following Monday, and in the upper part of the tideway from 06.00 hours on a Saturday until 06.00 hours the following Tuesday. This procedure of

'staggering' the weekly close time period was disigned to give the maximum opportunity to fish to ascent the estuary and enter fresh water where, of course, no netting is permitted. The new regulations lasted for six years, that is until the close of the 1967 season after which a new period of 60 hours was prescribed by the Commisssion following consultation with the local angling and netting interests.

An examination of the six-year period when the 72-hours plus weekly close time period was in operation gave strong indication of considerable benefit to the spawning stocks - in so far as this can properly be deduced from the observations of the number of redds seen in the main Mourne system of rivers. Table 5 contains the details. The reason for the note of reservation just sounded will be readily understood and, to avoid any possible misunderstanding, it should be pointed out that the Commission recognizes that the counting of redds is not an accurate method of assessing the spawning stock of a river because in the first place water conditions can largely affect the number of redds observed, and in the second place it is difficult to relate the number of redds observed to the numbers of fish actually spawning.

Nevertheless it is considered that the final counts do give some idea as to the relative seze of the spawning stock from one year to another. If it is accepted, therefore, that Table 5 shows that the spawning stock increased during the period when the netting activities were considerably reduced, it might be expected that angling results would also improve. This fact is, however, difficult to ascertain due mainly to the imcompleteness of angling returns. One way to obtain more accurate information about the angling effort might be to calculate the average catch per salmon and grilse by each angler making a return; if this is done it will be seen in Table 6 that the overall 6-year average catch per rod in the period when netting restrictions were in operation was less than that for the previous six years. It is true that 3% more anglers made returns during the period of extra netting restrictions than in the earlier period, but one would have thought that the very considerable increase in the number of redds counted in the former would have produced a much better average catch per rod.

To some extent the failure of anglers to improve their catches during the six-year period when netting was restricted was also reflected in the catch returns by private fishery owners. Figure 2 shows graphically the results of two such rod fisheries which are situated on the Rivers Mourne and Strule, while Figure 3 compares the combined results of the two fisheries and the number of redds counted in the Mourne system of rivers. Figure 3 shows fairly dramatically that the angling results were just not able to match the increased spawning stock available in the second six-year period.

The information obtained from this study seemed to confirm that views of the Bledisloe Committee that: The figures----------of the report, moreover, suggest that a reduction of cessation of netting does not always result in strikingly better angling----------

ECONOMIC ISSUES IN SPORT FISHERY MANAGEMENT

The economic management of fisheries often involves the management of conflicts. In the narrow economic and social fields, within which the Foyle Fisheries Commission must operate, the main conflict is basically between the 'right' of the commercial netsman to harvest his share of the runs of the salmon and the 'right' of the angler to have enough salmon available in the rivers to ensure that sufficient sport fishing is available to him.

In addition to this conflict of interests the Commission is, of course, confronted with the problem of financing its many activities which are connected with the conservation, protection and development of the fisheries within the area. The Commission's income is derived from two main sources; namely the profits from the highly successful state-owned Londonderry commercial salmon Fishery, and the revenue from the rod and net licences it sells to the public. But a recent survey of the Londonderry Fishery's operations showed that whereas the sale value of each salmon caught increased by over 42% in the period 1959-1970 total costs of running the Fishery increased by over 61%. It was clear that unless the Fishery could increase its catch in the future "profit" ratios would diminish. Thus another social conflict is created because if the Commission was to allow its Londonderry Fishery to increase its catch this could only be done at the expense of the catch by the licensed sports fishermen.

If, as it appears likely, the Londonderry Fishery finds that in the future it can contribute less and less to the finances of the Commission it means that the Government and the Commission must make important decisions on how to solve the problem of balancing the budget. It is in this field that the fishery managers look to economist for guidance and assistance.

For instance, on what basis should rod or net licence fees be fixed; should they be related to the 'services' that have been provided by the managers e.g. protection staff, restocking etc., or should they be related to the current value of the fish that are caught? If either of these relationships is accepted what should be the ratio of the salmon, and how should that ratio be calculated?

Perhaps even more important, what should be the level of the government subsidy in respect of a fishery which supports large angling and netting interests. Should there not be some formula which allows for local revenue to provide a fixed percentage of the costs of management with the Government providing the balance - but how should this ratio be calculated? Should a governemnt in any case subsidise, however indirectly, a sport such as angling; why not ice hockey also?

Of course the difficulties connected with such problems are complex and it is appreciated that it is not sufficient just to fix licence fees in isolation. As an example, the Commission in 1967 decided to increase its seasonal rod licence fee by 50%. The effect of this during the next four years was to have the number of licences issued although the level of revenue obtained remained at the pre-1967 level. These are some of the economic problems that matter most to the fishery manager, and there are also complex biological problems to be solved. The Commisssion is facing these issues squarely. Together with the advice of some North American fisheries economists it will be drawing up an overall management for the entire fishery during the coming year, based on principles of economics as well as fishery biology.

CHAPTER 9

SPORT FISHING IN SWEDEN

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SIZE OF STRUCTURE OF SPORT FISHERIES

Abstract. Sport fishing is one of the largest and most popular outdoor recreation activities in Sweden. Today about one million of the nation's population of eight million participates frequently in this activity, and another one million engage in it several times a year. Ranked among other outdoor recreation pursuits in Sweden, sport fishing is second only to swimming in terms of popularity. Participants are drawn from all socio-economic classes and from a wide variety of regions within the country.

Various problems have arisen in the management of the Swedish sport fishing due in part to the large number of participants, and in part to the deteriorating quality of the waters of certain rivers, lakes, and the sea coasts. Some attempts to improve sports fishery opportunities are being made through the establishment of sport fishing associations.

One of the most critical needs in sport fishery management is the provision of information for the evaluation of the resource. Attempts are being made in Sweden to gather information systematically on outdoor recreation in general and sports fishing in particular. In addition, efforts are being made to improve methodologies for evaluation, particularly through the use of theories developed in the behavioral sciences.

Sommaire. La pêche sportive est une des activités récréatives de plein air les plus importantes et les plus populaire de Suède. Aujourd'hui, environ un million de personnes, sur les huit millions qui composent la population totale du pays, participent fréquemment à cette activité, et un autre million d'habitants s'y

adonnent plusieurs fois par année. De toutes les activités récréatives de plein air en Suède, la pêche sportive n'est dépassée en popularité que par la nage. Les participants viennent de toutes les couches socio-économiques et de pratiquement toutes les régions du pays.

Différents problèmes se sont posés en ce qui concerne la gestion de la pêche sportive en Suède, en partie à cause du grand nombre de participants et en partie à cause de la détérioration de la qualité des eaux de certaines rivières, de certains lacs et du littoral. On fait en ce moment des essais pour améliorer la pêche sportive grâce à la mise sur pied d'associations.

L'une des plus grande nécessités en matière de gestion de la pêche sportive est la cueillette d'information pour l'évaluation des ressources. On fait en ce moment en Suède des essais pour recueillir systématiquement de l'information sur la récréation en plein air en général et la pêche sportive en particulier. De plus, on s'efforce d'améliorer les méthodes d'évaluation, en particulier par l'utilization des théories élaborées dans les sciences du comportement.

Sport fishing is one of the largest and most popular outdoor recreation activities in Sweden. To-day about one million of the nation's population of eight million participates frequently in this activity, and another one million engage in it several times a year. Ranked among other outdoor pursuits in Sweden, sport fishing is second only to swimming in terms of popularity. It is especially popular with the male population, with perhaps one half of the latter participating in it in the country as a whole. In northern Sweden the proportion is even higher, ranging from 50-70%.

The fishermen are drawn from all socio-economic groups, and there is very little variation in numbers within age groups. This contrasts with many other outdoor recreation activities where income and age are often severe barriers to participation. The degree of urbanization also appears to have little effect on rates of participation.

A few factors, however, do appear to have some influence. People who are engaged in hard physical work are more likely to be avid sports fishermen and hunters than those who work in offices. While socially isolated people are more likely to be passive in outdoor recreation in general, many of them seem to find pleasure in sport fishing.

Sport fishing in Sweden is relatively unorganized as a recreational pursuit. Only about 8% of the active sport fishermen are members of the National Anglers Association or local angling clubs. There is no national license system. Instead there are a number of licensed fishing areas, and areas operated by fishing clubs. One pays a fee to fish in these areas. Hunters can purchase a federal license, however, or may rent or own hunting areas. In Norway one may buy a federal license to fish or to hunt.

While fishing and hunting rights in Sweden are privately owned, much of the sea coast and a number of large lakes are free for all to partcipate. One can use rods, lines and hooks, and certain kinds of removable nets in such fisheries. The management of sport fisheries in Sweden has been made difficult, however, due to the large number of owners of fishing rights, and the fact that many of them do not live in the area where fishing takes place. Another complication is the fact that there is a small and diminishing commercial fishery on some of the lakes, streams and sea coasts. This latter fishery has been protected by the 1950 Swedish Fishing Law.

The quality of fishing varies considerably among regions in Sweden. Sea coast fishing is good, and lake fishing for pike and perch is also good. Fishing on streams and rivers for salmon and trout, however, has declined rapidly due to competing uses of these water bodies --- notably the generation of hydro-electric power, and the dumping of industrial and municipal wastes --- and poor planning. In large measure the latter has suffered from the lack of satisfactory methods of evaluation of sports fisheries. The pollution problem is already serious and is getting worse. And not all of it comes from Sweden. Airborne pollution, for example, originates in England, Germany and other Scandinavian countries as well as in Swedish industrial areas. Together it has resulted in reduction in pH-values and this has caused severe declines in fish populations, particularly in the lakes of southern and western Sweden. Many of the angling clubs have spent considerable sums of money in an effort to improve pH-values. There are several bodies, however, that have not been sufficiently rehabilitated to permit sports fishing. A number of them for example, have a mercury pollution ban imposed on them.

While the overall demand for sports fishing seems to be growing in Sweden, there appear to be some important shifts in the areas fished and the species caught. Pollution of pike and perch waters, for example, may result in a long run decline in the popularity of these species. Some 'natural' fishing areas are being developed for this purpose. There has been a relative decline in interest in licensed waters and a growth of interest in club-run waters. This is doubtless a reflection of the greater attention to rehabilitating the latter. There is also a locational shift from fishing in local waters to waters adjacent to summer cottages which Swedish families own or rent. In addition, a number of Scandinavian fishermen have begun to go further and further afield to pursue their recreation --- such as to northern Scandinavia, Ireland, Scotland, and even to certain parts of Africa.

SPORTS FISHERY EVALUATIONS

Although the need for evaluations of the sport fishery resources has been pointed out frequently in Sweden, methods in use remain relatively crude and only a small amount of effort is devoted towards the assessment of the worth of these resources. Few data are collected on a systematic basis about the extent of use and the values derived. Much of the product of assessments is in the nature of guesswork.

The reasons for the lack of attention to this aspect of the decision-makeing process are numerous, but one of the most important is the limited role accorded in this process. They are even less advantaged than ladies in 19th. century and early 20th. century society. The latter were allowed to work but not to speak on matters related to their work. The social scientist thus far has not been allowed to work in fisheries management and his voice is not heard by those who do. Slow changes, however, are afoot. During 1971-1972 some evaluation studies of sport fisheries were undertaken in Sweden and Norway, initiated by governments and undertaken by social scientists.

An initial step in the evaluation studies was an extensive review of existing literature in this field, drawn from various parts of Europe and from North America. A group of three social scientists has been engaged in this phase of the work for several years, although mainly on a part-time basis. An analysis of part of this literature was prepared under the auspices of EIFAC.[1] Other reports have since been prepared for the Swedish government. Another phase of the initial studies was to determine the nature and extent of statistics on the use of leisure time in Sweden, and particularly that part of it spent on sport fishing. This review revealed that relatively little information is gathered on a systematic basis and much of what is collected is not very helpful in making appraisals of given sport fishery resources. Some general information was gathered for the report on Outdoor Life in Sweden,[2] and the report on Leisure and Recreation prepared for the Low Income Committee.[3] Both reports were completed in the last two years.

There is some dissatisfaction with the methods of evaluation currently in use in North America and elsewhere. It is not clear, for example, whether they measure the satisfactions that people actually seek, and how far present demands are satisfactory indications of what would be demanded, given the

facility to participate. There has been a shift in thinking from conventional models drawn from economics to those rooted in the behavioral sciences. The analysis of consumer behavior in outdoor recreation, and the analysis of perceptions, attitudes, motivations and social values are now occupying increasing attention of those who are trying to develop more realistic techniques for evaluating sport fishery resources. Some of the models that appear promising in this connection are those relating to time budgets and careers and social barriers. These have been described in a recent report on Technical Research based on Consumers Needs, Demands and Wishes.[4] Researchers in several European countries have attempted to relate theories of motivation and compensation, to the evaluation of leisure time and its use, and this work may be of great value to the analysis of sports fishing.

Beyond these attempts to increase the sophistication of methodologies, there have also been a number of empirical investigations relating to sport fishing, and to hunting in Sweden. Until the early 1960's there was little or no information about the characteristics of the Swedish sports fishery. Apart from scattered data, gathered on an 'ad hoc' basis by some of the anglers associations, little was known about the socio-economic status of the fishermen, the areas they fished, the numbers of fish caught, or the time and money they spent on this activity. Following the re-organization of the Swedish Anglers Association (Fiske framjandet) in the late 1950's the need for such information became increasingly clear. The Association became cognizant of the serious decline in some fisheries and the growing threats to the maintenance of others. It had little notion, however, of the characteristics of tis members, or their views on these matters. A special committee was formed to organize the collection of data from its members on such matters as the structure and organization of sport fishing, areas fished, species caught, characteristics of members and so forth.

A pilot study based on a sample of 200 members of the Association was undertaken in 1961. A more extensive survey, involving 2400 members, or 10 percent of the entire membership, was carried out in 1962. A third study, involving both this Association and a smaller one that was contemplating amalgamation with it --- the Svenska Sportfiskareforbundet --- took place in 1964. This covered some 1000 fishermen from the two Associations. The results appear in an appendix to the EIFAC report on Sports Fisheriy Evaluation noted earlier.[5]

Several other studies are now underway or have been completed recently. These include the following:

(1) Leisure patterns in different income and social groups

(2) Leisure activities among forest workers in northern Sweden

(3) Consumer studies of six licensed sport fishing areas

(4) Studies of moose hunters in Halland and Vastmanland

(5) Studies of the role of outdoor recreation as a therapeutic device

SUMMARY AND CONCLUSIONS

Sweden, like many other countries in western Europe is experiencing a rapid increase in the utilization of its outdoor recreation resources. This is especially so in the case of sports fishing resources, where a very large proportion of the population are already active fishermen and where increased income and mobility have made possible more distant journeys to fishing sites. There are major problems in sports fishery management, however, due to the lack of a national system of licensing and the lack of attention to the demand side of management. The need for greater emphasis on the latter has become especially urgent now that leisure is recognized as an integral part of human welfare, rather than as a portion of time not devoted to work. A consequence is that more effort must be spent on developing and using more sophisticated methods of evaluation. Behavioral studies in particular will receive increasing emphasis in the development of such methods.

Footnotes

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CHAPTER 10

THE APPLICATION OF ECONOMICS TO SPORT FISHERY MANAGEMENT, SOME OPTIONS AND PITFALLS

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Abstract. There is a growing need in Canada to develop more sophisticated means of evaluating sport fishery resources, particularly for the justification of expenditures on sport fishery management, the resolution of conflicts within fisheries, the resolution of conflicts between sport fisheries and other resources, and to provide inputs into environmental impact assessments. This chapter reviews some of the methods that have been used in the past in evaluating sport fishing resources, ruling their appropriateness to certain situations and their deficiencies. It emphasizes the usefulness of an economic approach to evaluation, permitting comparison with the values of competing alternative uses of resources.

The chapter also describes some common pitfalls in evaluation, notably the tendency to use average rather than incremental values in appraising resource development opportunities, the tendency to use gross rather than net values, and the failure to identify alternative courses of action, especially where unique or irreplacable assets are involved.

Sommaire. Il existe au Canada un besoin croissant de mettre au point de meilleurs moyens d'évaluer les ressources de pêche sportive, et ce pour justifier les dépenses consacrées à la gestion de la pêche sportive, résoudre les conflits d'utilization des pêcheries, et les conflits entre l'exploitation des ressources de pêche sportive et celle des autres ressources et fournir des données pour l'évaluation des effets environnementaux. Ce chapitre passe en revue certaines des méthodes utilisées dans le passé dans l'évaluations des ressources de pêche sportive, et traite de l'opportunité de leur emploi dans certaines situations et de leurs défauts. Il souligne l'utilité d'une approche économique de l'évaluation, qui permet de comparer les valeurs des diverses possibilités d'utilization des ressources.

Le chapitre décrit aussi certaine pièges communs dans l'évaluation, comme la tendance à utiliser des valeurs moyennes plutôt que des valeurs étudiées par tranche pour l'estimation des possibilités d'aménagement des ressources, la tendance à utiliser des valeurs brutes plutôt que nettes, et le fait de ne pas chercher de solutions de rechange, surtout lorsque des ressources uniques ou irremplaçables sont en jeu.

Sport fishery managers in Canada are faced with problems in areas of responsibility where more study, more research and better understanding are required. There remains a good deal to be learned about the basic biology and habitat requirements of some species of fish, the limitations to production and distribution and the capability of certain species to yield sports harvests. In addition, improved knowledge is still required in the important and costly fields of hatchery production of fish and enhancement of spawning habitat. As techniques of this nature improve, greater skill is demanded to determine which fishing waters to stock, with what species and how to distribute the catch fairly among fishermen.

Many of these problems are purely technical in nature and can be solved through the application of the skills of physical scientists - biologists, limnologists, zoologists, engineers and so forth. But the very basic question underlying the solution of these problems is in the realm of the social, not the physical, sciences. That is the question of whether the ends gained by this effort, the fish and fishing produced or maintained, are sufficiently valuable to justify the costs. Is the expenditure on fisheries management and research warranted or would society be better off if the money and effort were devoted to building more roads, schools or opera houses? Secondary to this question are others of a similar nature which can also be answered adequately only through the social sciences: Should fish be exploited by commercial or sports fishermen? Where a particular use of water or related land resources will displace fish, will the gains from that enterprise outweigh the fishery losses or should it be prevented because the fish are more valuable?

THE NEED FOR ECONOMIC EVALUATIONS

Anyone who has been charged with the management of sport fishery in recent years will have faced the need to express the value of fish or fishing in terms commensurate with those in which the value of most goods and services are expressed. This implies "economic evaluation" or the expression of the value of sport fishing in monetary terms. The various situations which give rise to the need for economic evaluation, and the reasons why there is an urgent need to improve the practice of evaluation can be usefully categorized as follow:

(a) Justification of Expenditures on Sports Fisheries

The rising demand for fishery opportunities, for improved fishery management and for costly fishery-related facilities is a well known phenomenon to anyone engaged in fishery management. The necessary funds may come directly from angling license revenue or may be drawn from general resources. In either case sports fishing competes with other social services for a limited amount of money. Chances for successful attainment of given budget goals are greatly enhanced if the fishery manager can demonstrate that the values generated justify the proposed allotment of funds. Such information will be particularly valuable to fishery managers where new programs are planned which require special financing. While established programs may be routinely approved by Treasury Boards, departures from routine are often subject to considerable scrutiny. If it can be clearly demonstrated that the cost of a management program are more than offset by the expected benefits, the job of the Treasury Board is greatly simplified. If the benefits are not likely to offset the costs we can rest assured that the funds will not be forthcoming and will instead go to an alternative and hopefully more worthy use - perhaps not very satisfying from the perspective of fisheries management but surely gratifying if society as a whole is better served as a result.

(b) Resolution of Conflicts Within Fisheries

There are many problems internal to the management of fisheries which are difficult to resolve without a consistent means of weighing and comparing conflicting demands on fish stocks. These include the competition between commercial and sports fishermen for some fish stocks, and the competition between resident and non-resident sportsmen in other fisheries. At any given time a fishery manager will also probably have to choose between alternative management and investment programs, a choice which is made easier if the results or output of each can be expressed on a common basis.

The goal of management in such situations should be to provide for the utilization of fish stocks, and the selection of management and investment programs which maximize values net of costs. The ability to establish the relative value of different uses of a given fishery, or the relative value of different fisheries, is fundamental if management is to achieve this goal of maximizing the values generated from use of the fishery resources.

(c) Conflicts with Competing Resource Uses

Water is the natural domain of fish, but it is also of central importance to man and many of the activities to which he attaches value. Fish and fishing may be highly valued, but so are opportunities to dispose of wastes, production of electrical energy, the provision of flood control, and the use of water for direct domestic and industrial consumption. Water is being put to these uses across Canada, and the many demands which are placed on water and its related land resources often take a heavy toll in terms of fish and fishing opportunities.

If decisions in the use of land and water are to reflect the best interests of society they must be based on a comparison of the values generated by competing uses. For fishery resources this means being able to express values in terms comparable with the value of other resource uses, something which is most readily accomplished through economic evaluation. But evaluation of the sport fishery resource does not in itself guarantee that land and water will be allocated to their highest or best use. It is equally important that a consistent framework be developed within which fishery values can be compared with other values and which ensures that the values are on the same basis and directly comparable.

(d) Environmental Concern

There is no need to trace the recent development of interest in and popular concern for "the environment". This certainly represents a new and welcome form of support for many of the policies advocated by those with a special interest in the fishery, but expressions of concern for the environment have, to date, been relatively unsophisticated. A reational basis for incorporating such concern in the decision making process has not yet evolved. Indeed one must wonder what is to be gained by recent trends which simply seem to substitute one set of technical criteria (biological) for those which were previously dominant (engineering). Unless we begin to question what values are to be gained or lost by various resource uses, little solace can be taken from the fact that "the environment" is being protected. There is an urgent need for a dispassionate and rather hard-nosed approach to incorporating environmental considerations in a resource management framework. Failure to do so will lead to illogical resource use in the name of "environment" which may be as costly as or more costly than past

excesses in the name of "progress" or "prosperity". The fact is that the net benefits to people can hardly be maximized unless some means of reflecting the values people place on various outcomes or products of resources is actively used to guide decision.

There is little evidence to indicate that those who draft legislation or determine policy are thinking along these lines at present. Fishery managers could certainly be forgiven if they too ignored such considerations and simply rode on a tide of opinion which tends to favor their interests and clientele. But it is to be hoped that they place as much emphasis on the total needs of society as on the needs of sport fishermen and will be prepared to advocate a rational approach to environmental questions. Nothing will be more effective in forestalling an "environmental backlash" and ensuring continued support for sound fishery management than a reasoned and rational approach to the values and the issues. Economic evaluation of fishery resources has a very important contribution to make in the achievement of this end.

While advocating an elevated role of economics in fishery management in particular and resources management in general, we acknowledge that fishery managers in Canada have survived without economists in the past and could probably continue to do so in the future. Whether an economic rationale would have improved on the past performance of fisheries management is difficult to say. Certainly the management of Canada's commercial fisheries could not have been made worse and would probably have been vastly improved. Sport fisheries have probably suffered as much from the lack of rigorous economic analysis and controls applied to competitive resource uses as from poor direct management.

Whatever may have happened in the past it is quite clear that the problems of the future will increase in complexity. If fishery managers are to accept that their responsibilities are first to people and second to fish, they must be prepared to deal with the question of what fish are worth. This compels them to enter the realm of social science and to apply the principles which have been developed in economics and other diciplines.

METHODS FOR EVALUATING FISHERIES

Those involved in the management of both sport and commercial fisheries will recognize the need for economic evaluation in dealing with some of their problems at least part of the time. It may be valuable to review the success of past strategies which have been adopted to deal with these problems, and to point out those which hold most promise for the future.

Infinite Value

The question of the value of fish, and from this the value of fishing, is frequently met with the statement, direct or implied, that fish are inifinitely valuable. This assertion rests largely on the proscriptions of law and is most commonly made when the demands of other resource users conflict with the needs of the fishery. The federal Fisheries Act prohibits the deposit " . . . of a deleterious substance of any type in water frequented by fish . . ." with no regard for the value of those fish or the values which may be served by depositing the "deleterious substance" in the water. The implication is that regardless of the value of competing demands for water or related land resources, and whatever the total number of fish involved, the fishery must have the higher value. By extension, it must be infinitely valuable.

This is clearly an absurd position, representing little more than problem solving by technical decree. The very limited success that has been enjoyed by approaches of this nature in the past and the general reluctance to enforce such laws is perhaps ample comment on the appropriatness of this legislation. The interests of society, and in retrospect the interests of the fishery, would have been much better served by the formulation of a flexible approach based on the relative value of the competing resource demands. Those who feel a responsibility to manage resources in the best interests of society as a whole must in future turn away from such absolute solutions which are unlikely to adequately represent the public interest under constantly changing circumstances.

Educated Guesses

A second approach to the question of fishery values has rested largely on the use of educated guesses bolstered by whatever data happen to be at hand. This commonly occurs when departments must support requests for funds, for a change in policy or for new management practices. Here it is common practice to use almost any available data which can be construed as justification. Head counts of the number of fishermen, their gross expenditures, the number of fisherman days and other such information have frequently been used under these circumstances. Whether on balance this approach has been successful can only be answered by those whose requests have been either accepted or rebuffed. It has probably worked reasonably well to date, as many of the competing demands for public funds must also rely on arbitrary indications of relative merit. In future, however, as governments adopt more systematic approaches to the problems of budget allocation, these measures will become less satisfactory and firmer evaluations will be sought.

Market Prices

A strategy which has enjoyed considerable success in indicating the value of sport fishing, in allocating scarce fishing opportunities among competing fishermen, and in preserving the quality of angling experience has been the reliance on market prices, employed in various forms on many of the Atlantic salmon angling rivers in northern Europe and eastern Canada. While some of these market arrangements in Canada are currently undergoing change, the basic principle of allowing only those who are prepared to pay access to the fisheries remains unchanged. This has the effect of clearly establishing the value of the fisheries, of indicating priorities for management, and of measuring how fishery values change through time in response to both supply and demand factors.

This has been a successful and effective policy in the management of highly prized sport fisheries involving limited numbers of anglers. Some economists have advocated that such policies be more widely used not only to provide decision-makers with automatic evaluations of the resources but also as a means of efficiently regulating intensity of use where congestion threatens to debase the quality of recreation[1]. Pricing offers a straightforward way of solving many of the problems of recreational resource management - rationing use, raising

revenues, ensuring that those who benefit bear the cost, as well as establishing values. It is not likely to become widely used in Canada in the foreseeable future, however, since at least two provinces have recently taken steps to do away with even annual license fees, let alone accept that charges be levied for access to particular waters.

We have also seen particularly in the last two or three years, in Canada, empirical attempts to establish the value of sport fisheries, soundly based on theories relating to value. Initially, these studies were not oriented to particular management goals or priorities but had as their objectives the testing of methodologies and satisfaction of academic interest. Many, however, have subsequently proven useful in solving practical problems. They have provided data on the value of sport fisheries necessary to certain management decisions, particularly in resolving conflict situations.

With several major water basins, management studies presently being undertaken in Canada (the Okanagan in B.C. and Saint John in New Brunswick, as well as System E on the Upper Fraser River, all federal-provincial studies), the need for more data of this nature has become evident. Studies aimed at determining the value of individual sport fisheries are becoming recognized as necessary steps in wise resource management decision making.

Since this is the case, fishery managers, who are generally trained in the physical sciences, will need considerable guidance in undertaking such studies. This is not the place to indulge in a detailed exposition of economic theory or the various methodologies which have been proposed for the evaluation of outdoor recreation. For those who wish to explore the intricate machinations of the cold and heartless economic mind there are several good references on the subject.[2]

Simulated Values

The general objedtives of recreational evaluation can be outlined, fortunately, in a rather straightforward manner. Since we deliberately choose to withhold access to sport fishing resources from the normal market processes, which would establish their value, we are faced with the need to estimate or simulate the values created. There are several ways in which this can be

done, and in selecting a suitable methodology it is important to distinguish two different conceptual bases for such estimates. We may be interested in establishing what fishermen would be willing to pay for access to fishing opportunities if in fact prices were charged. Alternatively it may be appropriate to determine the minimum amount which recreationists would accept as compensation for being denied access to a fishery. These two different approaches will give estimates of value which are both defensible on theoretical grounds, but which are unlikely to be equal because they measure different forms of the "consumer surplus" or value accruing to fishermen. Generally, what fishermen would be willing to pay for access to a fishery is the appropriate basis for evaluation when new fishing opportunities are being created and the resources which must be devoted to the creation of the fishery have to be diverted from alternative uses. On the other hand, where fishermen are presently enjoying access to a fishery which requires little cost for its maintenance, and where a competitive use of the water would displace those fishermen, it is appropriate to value the fishery on the basis of the amount required to adequately compensate the fishermen for the loss of their recreation opportunities.

Direct Techniques

There are two main approaches to the derivation of such value estimates. "Direct" techniques attempts to establish the value of recreation by enquiring of recreationists either the most they would be prepared to pay for access to the recreation rather than be excluded[3] or the minimum amount which would be accepted as compensation for being excluded from the recreation.[4] In either case the essence of this technique is that recreationists are simply asked to declare the values which they attach to the sport fishery.

The practical difficulty with direct techniques in evaluation lies in obtaining rational and consistent expressions of value from fishermen or other recreationists by asking them hypothetical questions. This is particularly true in light of the emotionalism toward the values and importance of recreational resources among many recreationists.

Indirect Techniques

An alternative approach to establishing the value of recreation is to employ "indirect" techniques which attempt to impute what recreationists would be willing to pay on the basis of their observed behavior, particularly the costs they incur in travel to a recreation site. Many variations of this basic technique have been developed and tested on specific sites.[5] This approach basically involves stratifying the visitors to any particular recreation site on the basis of the distance travelled and travel costs. The rate of participation at the site can then be related to the level of travel costs. The willingness of persons living in any particular travel zone to pay and their rates of participation for given levels of fees can then be predictied by referring to the participation rate from other zones where travel costs are higher.

The practical difficulties with this approach lie in the large amounts of detailed data which must be collected, and the many restrictive assumptions which are necessary in order for the methods employed to produce valid and meaningful results.

Despite some of the problems involved in their application, it is probably fair to say that the approaches to

the estimation of the value of recreational resources which have been developed yield estimates which are already as reliable as those frequently used in evaluating other resource uses and projects. While the economic techniques involved would naturally benefit from further testing and refinement, support for this kind of work is not likely to be of interest to today's fishery managers. The important question for these people is more likely to be how they can make use of what has been learned to date in discharging their management responsibilities.

From the point of view of precision and exactness separate studies could be made of the values involved in each major fishery program, or in each area where there is a conflict between fisheries and other resource uses. An approach of this nature would certainly be of great benefit to the ranks of unemployed economists, but too cumbersome, slow and costly for most of the routine problems in fishery management. Empirical studies have an important role to play in special programs where there is adequate lead time and decisions can be formulated over monthes or even years. In such cases the obvious approach is to obtain the services of social scientists, formulate a theoretically sound approach to the necessary evaluation problem and proceed with empirical work. If developed carefully the results should play an important role in guiding the decision at hand and will no doubt be valuable when similar management decisions arise.

But for those problems which require the evaluation of sport fishery resources, but do not allow the luxury of empirical study, an alternative approach is necessary. There are several possible means of assigning a value to sport fishing resources under these circumstances. One, employed frequently in the United States, has been to assume the arbitrary schedule of values to be used for different types of recreation activity.[6] This approach can be considered a start in the right direction, insofar as it recognized that the value of recreation is quantifiable. There is lettle reason to believe, however, that the values assigned in this arbitrary fashion adequately reflect the real value of sport fishing opportunities. In particular they are felt to understate the value of the more highly prized fishery resources[7] and also may fail to make sufficient allowance for quality differences between recreation activities.[8]

A somewhat similar approach, but one which is likely to reflect the value of sport fishery resources more realistically, is to base an estimate of the value of a particular fishery on results obtained in empirical studies or actual recreation

markets in comparable fisheries elsewhere. This approach too has many drawbacks, the most serious of which is the difficulty of locating evaluation studies which deal with fisheries similar in quality, location and so forth, to the particular one under study. It may also be difficult to obtain empirical estimates which are on the appropriate basis for any given problem. Sufficient empirical studies have been done to date, however, that , with some judicious selection, it should be possible to obtain a reasonable reflection of the values of a given sport fishery on fairly short notice.

Being able to estimate the value of a day of fishing within reasonable limits is not the end of the evaluation problem. For many sites we still do not have even the rudimentary data concerning the amount of fishing which they presently support, their potential, or the rate at which use may be expected to grow in the future. Nor do we know what changes may be expected in the relative value of fishing opportunities. This information is essential for adequate evaluation. Few decisions are based on one year of use or values as they accrue today; most fishery management problems have long term consequences which require the best possible estimates of underlying trends which affect the use and value of sport fish resources. These are the areas in which the most perplexing problems in evaluation are encountered, and they are also the areas where much could be learned from the collection and analysis of routine data on a consistent basis through time - data relating simply to the number of days of fishing activity supported by particular fisheries. Even these figures are generally not available in Canada, with the exception of a few areas and some specialized fisheries. It is in the development of standardized data and time series of this nature that a good deal of valuable work remains to be done just to put basic information about sport fishery resources on the same level as data relating to the consumption of other goods and services.

Finally, it must be recognized that even with accurate information on the values of a day of fishing at a particular site and its present and potential use, the resulting estimates may not adequately reflect the full value of the fishery resource, for evaluations of this nature focus directly on the use of recreation resources. As such they ignore other values which do not depent on direct use - the vicarious satisfaction which some people derive from the knowledge that fish and wildlife populations are maintained, and the premium or option that some might be willing to pay to preserve the opportunity for use in the future. These values will be important in particular cases where the existence of a species or the continuation of a

unique natural system are threatened, and in such cases they deserve special cognizance.[9] But ofr most problems in fishery management, where the goal is to make relatively small adjustments in the total population of any species, and the satisfaction of fisherman and other recreationists is the basic objective, the benefits generated by direct use of the resource are the relevant and adequate measure of value.

COMMON PITFALLS IN EVALUATION

Economic analysis can be a very useful and powerful tool when properly applied to problems dealing with the efficient allocation of resources. But, to ensure that society does in fact get the maximum net benefit from the use of resources it is essential that analysis should be comprehensive, objective, and on the same basis for all uses. This unfortunately has seldom been the case in resource development decisions where the rationale, if there is any, often is illogical and confused. Economists are encouraging recreation managers to undertake rigorous and theoretically sound evaluations of the resources they manage. There is merit in this, but only if the results can be used in an analytical framework in which other resource uses are evaluated on the same rigorous basis. Toward this end there is an urgent need to develop a framework through which conflicting demands on a single resource base can be resolved. Until such a framework can be evolved and gains acceptance operationally, fishery managers are well advised to cast a critical eye on any economic analysis put forth by those whose interests would displace sports fisheries.

Some common "mistakes" in evaluation which have apeculiar habit of recurrin, ralate to estimating the value of flood protection, the valuation of commercial fisheries, weighing the values of mineral and forest exploitation, and estimating values of electric power.

The Value of Flood Protection

Constructing storage reservoirs to reduce downstream flood risks has been a common practice in many parts of North America. Such storage may also be utilized in the firm production of electrical energy which enhances its value. But when a "system" of storage reservoirs is being considered for any given drainage the way which the system benefits are analysed and attributed to individual projects can be manipulated so as to seriously distort the analysis of each individual project.

Consider three storage reservoirs costing $30 million each for a total system cost of $90 million and providing flood protection with a value of $160 million. Regarded as a complete system construction of the reservoirs appears to be warranted, with the overall ratio of benefits to costs being roughly 1.8:1. But it is also well known that the addition of storage capacity to any given river system is generally attended by diminishing returns.[10] This closer scrutiny could well reveal that construction of the first reservoir might genreate $90 million in benefits and the second $60 million, both projects being justified. But the third reservoir, with incremental benefits of only $10 million against cost of $30 million can hardly be deemed feasible.

Too often we are presented with entire systems as complete packages. An incremental analysis would seem like simple old fashioned horse sense, but these have been conspicuously absent in major river basin planning in many areas. Regardless of how vigorously sport fishery values are calculated, upholding the public interest requires that both sides be honest in their evaluations. The exercise of economics otherwise becomes a farce.

Commercial Fishery Evaluations

Fishery managers often exercise joint dominion over both commercial and sport fisheries. Deciding on the allocation of available fish stocks between the competing uses is a problem which frequently arises. While it may be necessary to go to great lengths to place a value on fish allocated to sports fishermen, placing a value on the commercial use of fish should be a straightforward matter as the end product is a marketed commodity. Frequently, however, the value which is purported to

represent the net worth of commercially used fish stocks is not the value net of all costs, but hte gross value of the fish after they have been processed, placed in cans, and delivered to the distributor's warehouse. While some convoluted justifications for this approach are sometimes given (and sometimes not given) the thrust of these arguments is that fish are extremely obliging and somehow render themselves caught, processed and canned all at no cost to society. When this kind of reasoning is applied to an industry which has few equals in terms of inefficient exploitation of natural resources it must be viewed as absurd in the extreme. Yet this basis for evaluating commercial fisheries has been used in the past and continues to be used at present; equally adroitly by private industry and government departments. One can hardly blame the sport fishery manager for feeling both frustrated and foolish in putting forward a rigorous evaluation of the net worth of sport fishing for comparison with the gross value of commercial fishing. Once again if the sport fishery manager is to embrace a rigorous economic evaluation of his "product" he had better be sure that his "opponents" do likewise.

Mineral and Forest Exploitation

In many parts of Canada the mining and forest industries enyoy unquestioned acceptance as the basic force in the economy and creators of all prosperity. To oppose these industries in the belief that the damages inflicted on particular sport (or commercial) fisheries might be greater than the benefits from logging or mining is frequently classed as heresy. But a closer look is warranted. What we should really be concerned with in analysing situations where these resources uses conflict with fisheries are the net returns from logging or mining, not the gross values. Unfortunately, people have become accustomed to thinking in terms of the gross values generated by extractive industries of this nature and are not receptive to arguments that the net values may be mere fractions of the gross value. Indeed in the case of the mining industry there is reason to question the very existence of net benefits when the full range of concessions and public expenditures are taken into account.

Analysis based on the gross rather than the net value of forestry and mining activities tends to be the rule rather than the exception. To ensure "objective" and "fair" treatment of all resource uses fisheries managers must guard against this type of deliberate overstatement. They may find economic analysis to be a surprisingly useful and potent tool if they begin to apply it rigorously in this fashion.

The Value of Electric Power

Fisheries managers have probably lost more sleep over the problem of hydro-electric power projects and their impact on fish resources than over any other single issue in recent decades. The steady march of dams and reservoirs across the land would seem to indicate that the value of electricity has consistently exceeded the value of fisheries and other recreation losses. But this is a rather generous assumption. It implies that not only have fishery and recreation resources been given adequate consideration in past planning, but also that the value of electric power has been rigorously appraised. Unfortunately much planning of this nature and many major decisions have gone unquestioned in the past.

This is unfortunate because recent application of rigorous economic analysis to proposed hydro-electric projects tends to support the hypothesis that the benefits from these projects have been seriously overstated in the past. In placing a value on electricity produced by hydro plants, it can only be worth, as an upper limit, as much as it costs to obtain it from an alternative source. And when the real cost of producing electricity from alternate sources has actually been falling through time the future value of electricity produced by hydro plants will also fall, and at the same rate.[11] Trends of this nature have been largely overlooked in past analysis, however, and due to the very complex nature of integrated power systems such oversight has generally gone unnoticed.

The recent analysis concerning applications to build hydro-electric plants in the Hell's Canyon reach of the Snake River in Idaho is perhaps one of the most interesting because it was demonstrated that at what may be the "...best remaining hydro-electric site in the coterminous United States", the value of the electricity which would be displaced. Despite the Applicants' protests that if this analysis were accepted the Federal Power Commission would "...struggle in vain to find another project to license.", the analysis was accepted and a license was <u>not</u> issued[13].

This one example, perhaps better than any other, illustrates how powerful a tool economic analysis can be in resource allocation decisions. It is interesting to speculate on how many hours of sleep fishery managers may have gained had analysis of this nature and degree of rigor been undertaken in the past.

There are many pitfalls to be avoided in the application of economic analysis to the problems faced by sport fishery managers. The problems, however, lie as much in the acceptance of faulty economic analysis by others as in the preparation of valid estimates of the value of sport fishery resources. There is much to be gained by employing economic analysis, and by ensuring that it is applied rigorously at all times.

Footnotes

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CHAPTER 11
TOWARDS THE IMPROVEMENT OF SPORT FISHERY EVALUATIONS: CONCLUSIONS AND RECOMMENDATIONS

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Abstract. The gradual shift in approach to sport fishery evaluation in the past decade in Canada has had some important implications for the collection and dissemination of information, the role of evaluations in planning and decision-making, and the priorities allocated to different kinds of research. This chapter reviews the conclusions and recommendations of the Workshop in these matters.

With respect to data collection, analysis, and dissemination, it seems that the provinces are looking to the federal government for advice and technical assistance as to the kinds of data to be collected, the methodologies that might be used, and ways in which standardization might be accomplished. The federal government might play a useful role in stimulating and co-ordinating efforts in this connection.

There is considerable variation in the approaches taken to evaluation of different parts of Canada. While a few agencies use relatively sophisticated methods, most tend to rely on simple techniques, some of which have little grounding in economic logic. There is much confusion as to the meaning of "economic values" and as to whether these differ from "social values". Several suggestions were offered for overcoming deficiencies in evaluations notably by increasing the exposure of fishery managers to the social sciences and by employing social scientists in fishery management agencies.

Two areas of research were identified as being of critical importance. Firstly, the development of tools for economic analysis of sport fisheries, and secondly, the identification of motivations and behavioral patterns relating to sport fishing.

The chapter concludes with a number of recommendations which emerged from the discussions at the Workshop, relating particularly to the role that the Recreational Fisheries Secretariat Branch might play in the collection and dissemination of data, and improvement of evaluation techniques.

Sommaire. L'évolution graduelle de la façon d'aborder l'évaluation de la pêche sportive qui s'est produite au Canada au cours de la dernière décennie s'est particulièrement fait sentir dans les domaines de la cueillette et la diffusion de l'information, du rôle de l'évaluation dans la planification et la prise de décision et de l'importance accordée aux différentes sortes de recherche. Ce chapitre passe en revue les conclusions et les recommandations du colloque dans ces domaines.

En ce qui concerne la cueillette, l'analyse et la dissémination des données, il semble que les provinces attendent du gouvernement fédéral des conseils et de l'aide technique quant aux sortes de données à recueillir, à la méthode qu'on pourrait employer et aux moyens d'arriver à une normalisation. Le gouvernement fédéral pourrait jouer un rôle utile en stimulant et coordonnant les efforts dans ce domaine.

Il existe des variations considérables entre les façons d'aborder l'évaluation adoptées dans différentes parties du Canada. Tandis que quelques organismes utilisent des méthodes relativement perfectionnées, la plupart ont tendance à se servir des techniques simples, dont certaines assez peu conformes à la logique économique. Il y a beaucoup de confusion quant à la signification de l'expression "valeurs économiques" et beaucoup se demandent si ces valeurs diffèrent des "valuers sociales". On a proposé plusieurs façons de supprimer les lacunes de l'évaluation, ainsi, on pourrait perfectionner les connaissances des gestionnaires de la pêche dans les sciences sociales et employer des sociologues dans les organismes de gestion de la pêche.

On a trouvé deux zones de recherche qui étaient d'importance critique. D'abord, la mise au point d'outils pour l'analyse économique de la pêche sportive et, deuxièmement, l'étude des motivations et des modes de comportement qui se rattachent à la pêche sportive.

Le chapitre conclut avec un certain nombre de recommandations qui ont résulté des discussions du colloque, recommandations se rattachant particulièrement au rôle que le secrétariat de la pêche sportive pourrait jouer dans la cueillette et la distribution des données ainsi que dans l'amélioration des techniques d'évaluation.

There has been a gradual shift in the approach to sport fishery evaluation in Canada in the past decade, from the use of methodologies which tended to ascribe infinite values to sport fisheries to those which attempt as assessment of demands. The pace of the shift, as well as its extent, has varied from one part of the country to another: some provinces have adopted fairly sophisticated methodologies while others have concentrated upon relatively simple ones. In all cases, however, changes of approach have had some important implications for the collection of data, the role of evaluations in planning and decision-making, and the priorities allocated to different kinds of research.

Collection and Dissemination of Information

Improvement of the sophistication of evaluation of sport fisheries requires expansion of data collection and dissemination programs. A review of present programs suggest that although there has been increased effort in this regard in many parts of Canada in the past few years, the data now collected are inadequate for the policy decisions that are facing fishery managers in different parts of the country. Although a few sport fishery management agencies gatehr information on a systematic basis, most of theim collect it only sporadically, or on and 'ad hoc' basis such as when a crisis occurs. While some agencies collect data on a wide variety of matters concerning sport fishing, most agencies concentrate on numbers of participants and numbers of fish caught. Apart from a few studies undertaken in British Columbua,[1] Alberta,[2] Ontario,[3] New Brunswick[4] and Newfoundland,[5] there has been little attempt to examine factors which condition the demand for sport fishing. A consequence is that judgements as to what the public wants with respect to sport fishing rest largely upon the views of fishery managers rather than on empirical investigation.

The discussions at this Workshop clearly revealed that fishery agencies in various parts of Canada are anxious to improve the evaluation of sport fisheries, and are looking for guidance as to how to improve their data collection and dissemination programs. They are seeking advice on four matters in particular:

(i) what types of data are required for what kinds of management decisions;

(ii) what kinds of information might be most usefully gathered by the provinces themselves and what kinds by the federal authority;

(iii) what kind of mechanisms might be used for disseminating the information that is gathered;

(iv) how might data collection methods be standardized to ensure comparability as well as to improve accuracy?

Some suggestions as to kinds of data required for different types of decisions were offered in papers presented by Pearse[6] and by Sewell[7] at the First Sport Fisheries Statistics and Valuation Workshop. This is a matter that needs to be explored in greater depth, with reference to specific problems in various provinces.

While there has been discussion of the roles that various levels of administration might play in data collection and dissemination, no specific agreements have yet been reached. It was evident in the discussions at this Second Workshop, however, that the provinces are looking to the federal government for stimulus and guidance, and possibly co-ordination in the establishment and development of data collection and dissemination programs.

The Role of Evaluations

Although there seems to be broad agreement among sport fishery managers that evaluations need to be undertaken, there remains disagreement as to what they should cover and at what stage in the planning or policy-making process they should be undertaken. Those with a background in the natural sciences tend to take a "supply-oriented" approach to evaluation. The first step in the evaluation, they suggest, should be an assessment of the resource itself, aiming to determine the biological carrying capacity of particular lakes or streams, where fishing can be undertaken. Others, with a greater exposure to the social sciences take a different view. They point out that information on supply has little meaning unless it is known whether there is a demand for the goods or services which a fishery resource would make available. The implication is, therefore, that demand studies should be undertaken as the initial phase in planning or

evaluations relating to sport fisheries. Specifically, the preferences of sports fishermen for this type of activity over other uses of leisure time need to be identified, and the values which they derive from different types of fishing opportunity need to be determined.

The discussions also revealed that there is confusion as to the meaning of "economic and social values". Some fishery managers regard these as being quite separate and even opposing values. Economic values, they suggest, cover only those aspects to which a dollar value can conveniently be attached. Thus expenditures on getting to a fishing ground are taken to be a minimal expression of the values derived on the importance of the fishery. There are, it is claimed, other more important or "higher" values which cannot be satisfactorily expressed in monetary terms, such as the potential contribution to the improvement of human health or the maintenance of the complex web of nature. As a consequence sport fishery managers tend to separate economic and social values and to give heavier weight to the latter.

The economist, however, emphasized that economic and social values are really not separate. Conceptually all values derived from the enjoyment of a sport fishery opportunity are economic values. Theoretically it should be possible to determine the value of such satisfactions as "the opportunity to get away from it all", the opportunity to be in the outdoors", or "the contribution of this generation to the enjoyment of future generations" in dollar terms if only an attempt were made to determine what it would cost to obtain those same opportunities by some other means.

The general result of these uncertainties has been for evaluations to be either avoided or based on invalid methodologies. What might be done to overcome this deficiency?

(i) Encourage sport fishery managers to improve their understanding of the principles of economics, either by taking courses in the subject or by working with those who have had training in it.

(ii) Encourage sport fishery agencies to hire social scientists.

(iii) Develop a handbook which sets out clearly the conceptual basis for evaluations and which provides illustrations of how to apply evaluation techniques. Such a handbook should also state what is incorrect or invalid as well as what is correct. The Recreational Fisheries Branch of the Department of the Environment might well undertake the sponsorship of the preparation of such a Handbook.

Research Priorities

It is always tempting in any study of an unsolved problem to conclude that "more research is required", since no-one will disagree that it would be useful to know more than we know now. The important thing, however, is to specify what society needs to know more about and what priorities should be assigned to particular kinds of research.

In the field of sport fishery evaluation two broad areas of research seem to be particularly ungently required:

(i) development of tools for economic analysis of sport fisheries, particularly those which can take into account latent demand and option demands.

(ii) determination of motivations, perceptions and attitudes relating to recreational activities.

Tools of Economic Analysis

As the Chapter by Bowden in this volume points out, the adoption of economic principles in evaluations of sport fisheries makes it possible to make objective comparisons between this resource use and competing alternative uses. Methods based on such principles are now available. They need refining, however, to enable account to be taken of such dimensions as "latent

demand" and "option demand". Some useful research has been undertaken in both connections by Krutilla, Cicchetti, Stankey, and others,[8] but it needs to be applied and refined through specific application to sport fisheries.[9]

Perceptions, Attitudes, Motivations and Values

One of the major gaps in present understanding relating to the demand for sport fishing is knowledge as to what it is that sports fishermen seek in this activity, and what satisfactions they derive from particular kinds of fishing experience. Studies undertaken by Hendee and others with respect to other kinds of recreationists -- such as campers, hikers, and hunters -- reveal that different individuals have different perceptions of particular recreation opportunities, that they have widely differing motivations for participation, and that the values they seek differ considerably too.[10] As noted earlier, many of the evaluation methodologies presently in use fail to take such considerations into account. A consequence may be that the values attributed to a given fishing opportunity are more of a reflection of the planner's or the fishery manager's perceptions than of those of the fisherman himself. Research on forest managers has indicated that such attribution may result in the wrong kinds of opportunities being provided,[11] or highly prized opportunities being destroyed. The same could be true of sport fishing.

There has been little research on the psychological dimensions of outdoor recreation in general, and sports fishing in particular. It is an area of study, however, that should be accorded high priority. Studies are needed in connection with the development of theory and tools of measurement, empirical investigations of perceptions, attitudes, motivations and values of sport fishermen are also required.

These two broad areas of research meet the criterion of "social relevance" that is being used increasingly by government agencies. Beyond that these studies should provide insights into other aspects of sports fishery management, such as the need for administrative reform or the need for new types of regulation, like user fees.

Conclusions

The 1972 Sports Fisheries Evaluation Workshop provided an important opportunity to assess the state of the art in such evaluation and to determine what kinds of action ought to be taken to improve them. In particular it furnished an opportunity to offer some guidance as to the role that the federal government might play in this regard. Three broad recommendations appeared to emerge from the discussions:

(i) that the Recreational Fisheries Branch begin work immediately on the development of a national data gathering and dissemination system and make specific proposals to the provinces in early 1973.
This effort might be assisted by the establishment of a small Task Force drawn from the various regions of Canada, together with members of the Branch.

(ii) that the Branch continue to encourage the development of improved methods of evaluation through the sponsorship of workshops and research.
Workshops should be held more frequently than at 2-year intervals and might consist of a few small regional meetings followed by a large meeting.
Specific encouragement is required for research in this area as there is no agency which currently provides the necessary support.
Particularly emphasis needs to be placed on the development of means of identifying preferences and of predicting behavioral responses to sports fishery management.

(iii) that the Branch continue and expand its role as an information exchange, soliciting reports and information from the provinces, agencies in the United States and various international agencies, such as EIFAC and disseminating these materials to participating agencies.

The 1972 Workshop clearly showed that progess has been made in sports fishery evaluation in Canada since the Workshop in 1970. It also indicated, however, that substantive action is

required at the federal level in the connections noted above if that progress is to be sustained.

FOOTNOTES

1. See, for example, Sewell, W.R.D. and Rostron, J., Recreational Fishing Evaluation, Queen's Printer Ottawa, 1970; Sinclair, William F., The British Columbian Fishermen, Fisheries Service, Department of the Environment, Vancouver, B.C., July 1972; and Pearse, P.H., and Laub, M., The Values of the Kootenay Lake Sport Fishery: An Economic Analysis, B.C. Fish and Wildlife Branch, Victoria, B.C. 1969.

2. The province of Alberta has recently completed an economic study of recreational hunting and fishing. A report entitled Alberta's Hunting and Fishing Resources: an Economic Evaluation is to be published shortly.

3. Two socio-economic surveys have been undertaken recently in Ontario by the Sports Fishery Branch, focussing on participation in sport fishing, the origins of anglers, and the economic impact of non-resident anglers.

4. Studies of preferences and reactions of sport fishermen in New Brunswick to controlled public fishing waters were undertaken recently, and a report is now being prepared.

5. An economic study of fish and wildlife was undertaken in Newfoundland in 1970. The results are to be published shortly.

6. Pearse, Peter H., Sport Fishery Management in Canada: Emerging Problems and Data Requirements, Paper presented at the First Sport Fishery Statistics and Valuation Workshop, Ottawa, 15 October, 1970.

7. Sewell, W.R. Derrick, Forecasting the Demands for Recreational Fishing in Canada: Problems, Methods, and Data Requirements, Paper presented at the First Sports Fisheries Statistics and Valuation Workshop, Ottawa, 15 October, 1970.

8. See, for example, Krutilla, J.V., and Cicchetti, C.J., Evaluating Benefits of Environmental Resources, With Special Application to the Hell's Canyon, National Resources Journal, Vol. 12 No.1, January, 1972, pp. 1-29; Cicchetti, C.J. et al, The Demand and Supply of Outdoor Recreation, Bureau of Economic Research, Rutgers - The State University, New Brunswick, N.J. 1969, and Stankey, G.H., The Perception of Wilderness Recreation Carrying Capacity: a Geographic Study in Natural Resources Management, Unpublished Ph.D

Dissertation, Department of Geography, Michingan State University, 1971.

9. The Pacific Regional Office of the Fisheries Service, Department of the Environment is undertaking a pilot study of the strength of sport fishermens' preferences for this activity.

10. See, for example, Hendee, J.C., Catton Jr., W.R., Wilderness Users, What do they think? American Forests, Vol. 74, No. 9, 1968, pp. 28-31; 60-61. Catton, Jr., W.R., Motivations of Wilderness Users, Pulp and Paper Magazine of Canada, 1969, pp. 121-126; Hendee, J.C., Rural-urban Differences Reflected in Outdoor Recreation Participation, Journal of Leisure Research, Vol. 1. No. 4, 1969, pp. 333-341; Hendee, J.C., and Potter, D.R., Human Behavior and Wildlife Management: Needed Research. Paper presented to 36th. North American Wildlife and Natural Resources Conference, Portland, Oregon, March 10, 1971; and Clark, N., et al, Values, Behavior, and Conflict in Modern Camping Culture, Journal of Leisure Research, Vol. 3 No. 3, 1971, pp. 143-159.

11. Hendee, J.C., Foresters' Perception of Wilderness User Attitudes and Preferences, Journal of Forestry, Col. 68, No. 12, 1970, pp. 759-762.

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APPENDIX

SURVEY OF OWNERSHIP AND UTILIZATION OF INLAND FISHERIES IN VARIOUS EUROPEAN CONTRIES AND CANADA

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Abstract. The European Inland Fisheries Advisory Commission (EIFAC) has encouraged a survey of ownership and utilization of inland fisheries in sixteen European countries and Canada. Its purposes were to determine the nature of ownership of fishing rights, the means used for administering such rights, the use of taxes for regulating fisheries, and fishing methods employed for various species. Particular attention was paid to the management of tidal fisheries and data was also gathered on the basis of entitlements to fishing rights in offshore waters.

This appendix presents a brief summary of the data gathered in the survey.

Sommaire. La Commission européenne consultative pour les pêches dans les eaux intérieures a appuyé une étude sur la propriété et l'utilisation des pêcheries continentales dans seize pays d'Europe et le Canada. Ses buts étaient de déterminer la nature de la propriété des droits de pêche, les moyens utilisés pour administrer ces droits, l'utilisation faite des taxes pour diriger la pêche, et les méthodes de pêches employées pour les différentes espèces. On a apporté une attention particulière à la gestion des pêches en eaux à marée et on a aussi recueilli des données sur les fondements de l'attribution des droits de pêche dans les eaux côtières.

Cette annexe présente un bref résumé des données recueillies lors de l'enquête.

Taking note of the continuing interest of the European Inland Fisheries Advisory Committee (EIFAC) in the subject, the Government Commission on Inland Fisheries in Ireland which was appointed in 1970 has recently sought information of a background character from a survey; in preparation for EIFAC, of ownership and utilization of inland fisheries in 16 European countries and Canada. The prime purpose of the survey were to determine the nature of ownership of fishing rights, the means for administering such rights, the use of taxes for regulating fisheries, and fishing methods employed for various species. Particular attention was paid to the management of tidal fisheries, and data was also gathered on the basis of entitlements to fishing rights in offshore waters.

The information presented in this report summarizes data gathered from the 16 countries as based on the various questions posed to fisheries agencies in the countries noted.

1. How are fishing rights in freshwater rivers and lakes disposed as to ownership:
   (a) are they vested in the state, province or other local authority?

   (b) Can they be owned by private persons?

Belgium: Fishing rights belong to the owner of the riparian land, perhaps the State, a community or an individual.

Canada: Fishing rights are vested in the federal government in the Yukon, Northwest Territories and in National Parks. Similarly, ownership within provinces is vested in each province. Private ownership exists in Quebec and New Brunswick.

Denmark: Fishing rights in freshwater rivers and lakes may both be vested in the State and municipal authority and be owned by private persons. State or municipal ownership applies mainly to lakes. Private ownership applies both to lakes and rivers.

England and Wales: In non-tidal waters the general presumption is that they are privately owned.

Finland: The fishing rights as a rule belong to the owner of the water area. The proprietary unit is the water area of the village, the joint owners are the farmers of the village, each according to his assessment unit of land. Thus, in spite of the joint ownership, the water area and the fishing rights belong to private persons, the farmers.

France: In genral fishing rights are privately owned. The State owns fishing rights in navigable waters, canals and certain lakes and waters where it has riparian ownership. Associations can also own fishing rights.

Hungary: According to the Hungarian Civil Code, the owner of all fishes living in natural waters is the State. No "res nullius" is known. The licences with the right of fishing acquires the ownership with the fact of catching.

The Statutory Rule on Fisheries declares that fishing rights in all waters - with the exception of fish farms and rice-fields of the agricultural co-operatives - belong to the State.

Iceland: Fishing rights are mostly owned by private persons.

Ireland: Rights of fishing in fresh waters are in general owned by private persons but some are held by state departments not as a matter of ownership policy but for reasons appertaining to the primary functions of those departments.

Netherlands: Fishing rights can be owned by state, province, local authorities and can also be privately owned. "Private" includes persons, foundations, churches, etc. As a rule, ownership of the water and the fishing rights are not separated. Such a separation is against the Fisheries law. However, there are cases where ownership of water and of fishing rights are separated. These historical seignorial rights go back to the days before 1848. They may be owned by the government, public authorities as well as by private persons.

Norway: In Norway, fishing rights in freshwater rivers and lakes usually belong to the owner of the riparian land. In some big lakes only the shallower parts belong to the riparian owners, the rest (the deeper parts) to the state.

Poland: At present, fishing rights are vested in the State on state waters; on closed waters e.g. artificial ponds, which belong to the owner of the riparian land, small lakes without inlet or outlet, and encircled by one owner's land, can be owned by private persons. It is derived from Fishery Act 1932.

Scotland: They are generally privately owned either by private individuals or corporate bodies but some salmon fishieres belong to the Crown.

Spain: All inland waters are public property and can be fished by anyone, but the best fishing sections of the best salmon rivers have been taken over by the State. There are no privately controlled waters in Spain.

Sweden: Fishing rights in freshwater rivers and lakes are mainly owned by private persons but the rights can be leased.

West Germany: Fishing rights on rivers and lakes can be owned either by the State (Federal Republic of Germany), the states (e.g. Slesvig-Holstein, Lower Saxony, and others), the counties, the municipalities (towns, etc), or also persons (natural and legal persons). This situation is to be understood on the basis of the historical development, which differed considerably both regionally and locally. In more recent fishery laws, fishery economic points of view were considered on a larger scale. The basis of some of the fishery laws of the states is the "Preussische Fischereigesetz" (Prussian Fishery Law) of 11/5/1916 (e.g. in Slesvig-Holstein). After the Second World War, and especially by

the dissolution of the Prussian State, only the responsabilities have changed.

Yugoslavia: All Yugoslav waters (rivers, lakes, closed waters - various channels, accumulation, etc.) are socially-owned and with regards to fishery they may be managed by local authorities (communal assemblies), sport-fishing organizations and work organizations.

a. Generally the management is transferred to sport-fishing organizations, except in case of some big rivers such as the Save and Danube, a part of the Morava, the Drava, the Drina and the Bojana and lakes and accumulations managed by fisheries-commercial organizations, but they are used by sport fishermen as well on the basis of an annual compensation payment. The fisheries institutes manage the spawning places (they are short courses of some rivers, especially adapted for spawning and salmonide culture or some artificial lakes round bigger rivers for ciprimide culture.) At some of these places sport fishing is permitted subject to special compensation payment (daily licence, etc.).

b. Private persons neither own nor manage rivers and lakes, or other waters in Yugoslavia.

2. If private ownership of exclusive fishing rights exists, does this ownership derive from
   (a) the constitution of the state;
   (b) statute law, charter or decree;
   (c) common law, custom or long-standing occupancy;
   (d) ownership of riparian land;
   (e) any other root of ownership or title?

Belgium: Ownership of riparian land.

Canada: As far as can be ascertained, the outright private ownership of fishing rights in New Brunswick, for instance, stems from land grants made by the then-province (s) or by the Crown, Imperial Parliament, etc., prior to Confederation. There does not appear to be any constitutional barrier to creation of private ownership by either the federal or provincial governments on lands within their respective jurisdictions. This applies onty to non-tidal waters.

Instances of small lakes and ponds which are whooly contained in privately owned land are found in a number of provinces. A few are owned by private fishing clubs, some are operated commercially as "put-and-take"

fisheries for anglers paying various forms of fees, while others produce for commercial fish markets.

Denmark: In a few cases fishing rights may derive from statute law (b) and from common law (c) but private ownership of exclusive fishing rights mainly and in principle derives from ownership of riparian land (d). This principle is stated in the Freshwater Fisheries Act of 1965. Under certain circumstances, however, e.g. when lots have been parcelled out from larger estates, fishing rights may not follow the lot but still belong to the estate (e). In the latter case the riparian owners are entitled to claim their fishing rights commuted, of they constitute the majority of the landowners and represent at least half of the total length of the banks of the water in question. The owners in question submit the claim for commutation to a water court which settles all questions concerning the commutation, including the amount of compensation. Fishing rights which derive from law or which are entirely or partially vested in the State cannot be commuted.

England and Wales: Private ownership of fishing rights generally derives from ownership of riparian land.

Finland: The private ownership of water area and fishing rights derives from the ancient Scandinavian legislation (joint ownership according to the assessment units of land). The fisheries legislation, as also the water legislation, have accepted and followed this traditional or historical maxim.

The ownership of the above said unit, or village water area, derives from riparian land ownership of the village. Every farm in the village has its share in the joint ownership, adjacent to the water or not.

In the big lakes (diam. over 8 km) as also in the coastal waters against the open sea, the riparian rights of the village reach 500 m out from 2 m depth.

France: Fishing rights derive from ownership of riparian land.

Hungary: With the exception of fish farms and rice fields of the agricultural co-operatives, there are no private fisheries in Hungary.

Iceland: Private ownership derives from the ownership of riparian land.

Ireland: Private ownership derives variously from (a) (b) and (d).

Netherlands: Private ownership is primarily derived from ownership of the water apart from historical rights. Fishing rights of polder waters and rivers are often derived from ownership of riparian land.

Norway: Fishing rights usually belong to the owner of the riparian land.

Poland: Ownership of riparian land but only in the case of land-locked waters without an inlet or outlet.

Scotland: They were originally part of the private estate of the Sovereign who from time to time made grants of salmon fishing rights to his subjects; other fresh water fisheries are pertinent of the land in Scotland.

Spain: There is no private ownership in Spain.

Sweden: The ownership of fishing rights derives from riparian ownership.

West Germany: (a) The constitution (the basic law of the Federal Republic of Germany) maintains the principle of ownership (Article 14 of the basic law). Expropriations can only be made in the interest of the common good by law by which also compensation is settled. In this way the existence of private fishing laws is also based upon constitution. (b) The right to fish, and the content of the Fishery Law is principally laid down in the fishery laws of the states. With regard to inland fishery there exists no rivalry with the competency of state legislation. The Fishery Law derives from the principle that the owner of a water is entitled to the right to fish. (c) Independent (private) fishing rights originate from usage from time immemorial, or they were granted by the Sovereign as the predecessor in right of the present state. (d) Concerning small water-ways (water-ways of the 2nd and 3rd order according to the law relating to waters) the riparian owns the fishing right, so that with regard to small waters the fishing right is extensively divided, and, therefore, these waters are mostly not very well managed. However, there exists the possibility that several owners of fishing rights can form collective fishery districts and economic co-

operatives. (e) Often an independent (private) fishing right is combined with the ownership of a piece of land. The respective owner of this fishing right, e.g. independent of the property, can sell this fishing right to the owner of the water.

Yugoslavia: There is no private ownership of fishing rights in Yugoslavia.

3. If ownership of fishing rights ordinarily derives from riparian ownership, can rights be legally severed from ownership of riparian land?

Belgium: Fishing rights belong to the owner of the riparian land but the owner of the fishing right can give up his fishing right.

Canada: Rights can be severed from ownership of riparian land.

Denmark: In principle, fishing rights cannot be separated from riparian land. Only in cases when fishing rights remain in or come into the possession of the State can they be separated from riparian land.

England and Wales: Rights can be severed from ownership of riparian land.

Finland: If the joint owners so desire, joint ownership may be split and each farm given its separate share located and mapped.
It is also possible to sever a water area (for instance a rapid or waterfall) as a separate "water farm" from ownership of village land.

France: Not possible under present legislation.

Iceland: Fishing rights can not legally be separated from ownership of riparian land.

Ireland: Yes. In Ireland private or exclusive rights of fishery are extensively held and are customarily known as rights of several fishery.

Netherland: Fishing rights cannot be severed legally from riparian ownership. Ownership of the water including fishing rights however may be separated from riparian ownership. This is not possible as a rule in polders because the owners of riparian land are obliged to clean

the polder ditches and canals in order to ensure an unrestricted flow of water.

In ditches which separate properties the borderline runs through the middle of the ditches. However, both owners are allowed to fish the ditch over its full width with professional fishing gear.

Norway: Ownership cannot be legally severed from ownership of riparian land. In former days this was possible.

Poland: Riparian ownership was abolished by an Act of 1932.

Scotland: Salmon fishing rights do not derive from riparian ownership.

Sweden: Fishing rights cannot be severed from ownership of riparian land.

West Germany: Only in the case of small water-ways (water-ways of the 2nd and 3rd order in the sense of the law relating to waters) is the riparian the owner of the fishing right. A separation of fishing right from ownership is not possible.

The fishing rights of the owners of lakes are within the framework of the laws of ownership. The limits of the right to fish do not change by a flooding of the bank. For the owner of fishing rights near a river, or for the person who exercises the fishing right, there exists the right of the "Fischnacheile" (i.e. fishing may be carried out in the part of overflowing water which covers the land).

4. Can exclusive fishing rights be owned collectively and if so, under what circumstances?

Belgium: Fishing rights belong to the owner of the riparian land: This can be the State, a community or an individdual.

Canada: There are partnerships, company, club, and other forms of collective ownership of riparian waters in New Brunswick and Quebec.

Denmark: The Freshwater Fisheries Act allows riparian owners to join in a kind of co-operative the rules of which (a bye-law) must be approved by the Minister of Fisheries. Co-operatives and bye-laws may be established either on the request of one or more of the riparian owners or if the Minister of Fisheries so decides.

England and Wales: Fishing rights may be owned collectively either by way of lease or purchase.

Finland: The proprietary unit is the water area of the village, the joint owners are the farmers of the village, each according to his assessment unit of land. Thus, every farm in the village has its share in the joint ownership, adjacent to the water or not.

France: Ordinarily there is not collective ownership of fishing rights, but the rights of riparian owners can be granted to recognised angling and fish culture association.

Hungary: Fishing rights are managed by co-operative organizations, angling associations and Scientific Fishery Institutions.

Iceland: Collective ownership of fishery rights can occur as when two farmers own land on each side of a river. In practice they own the fish in the river together. Nevertheless each one should stay on his side of the river when fishing, except when landing the fish.

Ireland: There are no legal obstacles to the acquisition by collective groups of exclusive fishing rights.

Netherland: If the water is owned collectively too.

Norway: Exclusive fishing rights may be owned collectively where there are many owners of the riparian land. Fishing associations may own river stretches.

Poland: Exclusive fishing right cannot be owned but commercial fisheries can be leased collectively from the state by fishing co-operatives.

Scotland: Fishing rights may be sold or leased to groups.

Sweden: Fishing rights can be owned collectively where the rights belong to a village land owned in common and where the fishing rights have not been divided according to the assessment unit of land.

West Germany: During the last decades the tendency has developed for several private fishing rights in one water to be utilized collectively. They are united into adequate economic units (fishery districts or fishery economic co-operatives), with each member having a claim on the profit of the unit.

Yugoslavia: If the water management is carried by commercial fisheries organizations or cooperative organizations, their members practise collective fishing.

5. What arrangements exist for joint management utilization of fisheries in freshwater which are collectively owned, or to which no exclusive title is claimed, e.g. by means of contract within a co-operative organization?

Belgium: No arrangements exist for joint management.

Canada: Management of freshwater fisheries, per se, is the sole responsibility of the federal and the various provincial governments involved according to ownership and/or administrative agreement in the waters in question. Where private collective ownership exists, other aspects of management operate within the framework of prevailing property use purposes and laws.

Denmark: The main purpose of a bye-law is to ensure that the water body is managed in a uniform and rational way in order to secure the highest yield and preserve the most suitable biological balance. Provisions related to the fishery management are laid down in the bye-law, for instance concerning the obligation to manage the water body according to management plans worked out on the basis of biological surveys. Provisions also relate to gear, methods, close seasons and minimum sizes which may be specific for the water in question. Provisions relating to conservation of fish may restrict but never extend the provisions laid down in the Freshwater Fisheries Act.

The bye-law often also contains provisions concerning the distribution of profits between the members of the co-operative. The co-operative may manage the water body either collectively, i.e. put out the fishery to lease on contract, either commercial and recreative fishery separately or jointly, or the members of the co-operative may fish for themselves under the provisions of the bye-law. Apart from rod and line, the amount of gear (fykes, nets, hooks, etc.) per member is often restricted.

England and Wales: There are no fishing rights to which title does not exist. The collectively operated fisheries are those leased to angling clubs or syndicates.

Finland: According to the Fisheries Act (503/51), the management of water areas (fisheries) under joint ownership has to be organized by the meeting of owners which shall accept the rules and elect the executive committee and chairman for enforcing the rules. The meeting also defines the extent of fishing right for different shares. The owners also are responsible for conservation of the area.

There are now (1972) more than three thousand such joint ownership units which have organized their activity, of which 2535 also are members of the Finnish Fisheries Association.

France: The rights of riparian owners can be granted to recognised angling and fish culture associations.

Hungary: The state owns all fishing rights. Fisheries are managed by co-operative organizations, angling associations and scientific fishery institutions.

Iceland: Several farmers may own land adjacent to a river. Each one owns the fishing rights on his stretch of river. By law the farmers have to get together and form a riparian owner association. Based on the previous fishing record, available spawning grounds and nursery areas, each farmer gets assigned a certain percentage of any profit that will be made, when the river has been leased. The river is leased on a yearly basis to the highest bidder whether it be an individual or an angling club. This also holds true for lakes.

Ireland: There are no arrangements for joint management.

Netherlands: There are no special rules for such a joint management. Advice can be obtained from government agencies free of charge.

Norway: Riparian owners, e.g. fishing associations, may co-operate in hiring out their fishing or selling fishing licences.

Poland: Fishing rights can be held collectively by fishing co-operatives or angling associations.

Scotland: There are no fishing rights to which title does not exist but fisheries may be leased to groups.

Spain: In waters which are public property, anyone is free to fish, provided he has a general licence.

Sweden: There is no special arrangement for joint management of waters but the rights may be leased. To make the utilization of collectively owned fisheries more effective, a special organization can be establisned. If fishing licences are sold to the public by this organization, 80% of the costs for the establishment (mostly clearing up of fishing rights) will be paid by the State.

West Germany: The regulations for common utilization of fishing rights differ within the various states. Fishery economic co-operatives may either utilize the fishing rights, or lease them or by issuing permits for fishing or licences allow them to be utilized. Legal persons, with the exception of fishery guilds, may utilize their fishing rights only by lease or by issuing permits.

Yugoslavia: There are no special arrangements for joint management of waters. Usually the fisheries - commercial organizations (fish farms and co-operatives), manage such waters and take care of their improvement. They develop adequate plans and programmes which are carried out within their possibilities.

6. If fishing rights are vested in the state in whole or in part, how is utilization provided for, i.e. by licences, lettings or other concessions? Is preferential treatment given to angling associations, amenity development associations, co-operatives, etc? Do state concessions of fishing rights impose management obligations on the users? Do they in effect delegate management functions entirely to the concessionaires?

Belgium: The owner of the fishing right (which can be the State) can fish himself, give up his fishing right, or lease it to one or several persons - in order to fish in these waters it is necessary to have the permission of the proprietor and moreover to buy a state fishing licence.

Canada: By various forms of licence requirements for the most part, as well as by leasing in certain Quebec and New Brunswick waters. There is no preferential treatment where leasing results from public auction. Provision of satisfactory warden protection is a condition of leasing in New Brunswick. Except for isolated instances involving research, management responsibilities are not delegated. All anglers, irrespective of waters, are subject to conservation laws.

Denmark: Utilization of fishing rights vested in the State may be provided for in different ways and there are no general rules of procedure. Generally state-owned water bodies are administered by the local state forest districts which themselves decide upon the way of managing the water in question. Frequently, however, the commercial fishery is put out to lease on contract under which there is an obligation for the leaseholder to follow certain principles of management that are laid down. The leaseholder pays an annual base rent on top of which there is generally a percentage duty according to gross income from catch.

Besides commercial fisheries management, recreative fishing may be allowed either on the basis of sale of local permits or annual rents. Recreative fishing may also be performed by the public from hired boats specially supplied with fishing permits in the water in question. Riparian owners in state vested lakes are sometimes also permitted to fish with rod and line from the shore or from private, but registered boats. Anglers are only permitted to fish with angling gear, not with commercial gear. Angling permits may be sold either by the leaseholder or by the administrative body. In some cases angling rights are restricted to the members of an angling association.

A state fishery concession normally imposes special management obligations on the users, mostly according to a management plan based on a biological survey. The observance of the plan is controlled by the fishery authorities. The plans aim at developing a commercially and recreationally valuable fishery, creating the best conditions for the marketable and game fishes, controlling the noxious fishes and liberating fry, most often elvers.

In most cases management functions are delegated entirely to the leaseholder, but in a few cases the administrative body itself manages the fishery by employed staff.

England and Wales: There are no fishing rights vested in the state.

Finland: During the 16th century fishing rights for salmon and whitefish were claimed to belong to the Crown (IUS REGALE). Now the Fisheries Administration leases out salmon fishing in some rivers as well as several off

shore salmon fyke net sites (favouring local professional fishermen).

The State is the sole owner or a share holder of water areas exceeding 560,000 hectares. These areas are administered by the National Board of Forestry. In licencing and leasing out fishing rights, according to the Statute (322/53), the Forestry Administration has to give preferential treatment to the local inhabitants, especially to those who don't have any fishing rights of their own. This especially concerns so-called recreation fishing as also household use fishing. Licences may be given e.g. for one year, the leases are made for 5 - 25 years. When leasing out the authorities may -- and usually do -- impose management and conservation obligations on the lessee according to the plan amended by the Forestry Administration.

In these state owned areas there also are 58 sport fishing areas where licence fees usually are: 1-2 days 5 (or 10 mk), the first week 9 mk and the next weeks 4 mk each.

France: The management and general administration of fishing are always the responsibility of the State. The State yields its fishing rights in tidal waters to the merchant navy. In state owned inland waters the state issues licences but if the state has leased the waters, the lessees may issue licences.

Hungary: The State practices its rights through certain organs enumerated in the Statute: specifically, (1) through State enterprises and scientific fishery institutions directly, (2) through lettings to agricultural co-operatives and fisheries co-operatives, (3) through lettings to the Hungarian National Angling Association.

Iceland: The State owns the interior of Iceland. As a result it owns several inland lakes. Some lakes in the mountainous interior are open to the public but they do not support any fish. Traditionally, however, the fishing rights in most of these lakes belong to the farmers in the adjacent county that keep their sheep there during the summer. They have formed an association which tries to improve fishing in the lakes and sells fishing licences to the public. The State owns many farms in Iceland but any profit from fishing rights goes to the occupant of the farm (some provisions are made that this be used to maintain the place). Thus the State

does not derive any direct income from its fishing rights. Furthermore, no one can fish anywhere in Iceland without a licence from the appropriate riparian owner or owners. The rivers in the mountainous interior are mostly glacial and do not support any amount of fish. If they did, the same laws would apply as for the lakes.

Ireland: Lettings of fishing rights vested in the State are made for varying periods by means of competitive tenders, special consideration being accorded to tenders submitted by angling associations, etc.. Any management obligations on users considered necessary are provided for in the terms of the lease governing each letting.

Netherlands: Fishing rights are conveyed by licence or hire and when let the tenant (private person, club or associations etc.) is responsible for correct management.

Total fishing rights permit the tenant to fish by all legal methods. Fishing rights can also be split up and let separately: the right to fish for eel (and usually also tench) to professional fishermen and the right to fish for other species ("scaled" fish) to sport fishermen. This type of letting is encouraged by the Government, especially in state-owned waters according to the general policy of priority for sport fishing.

Norway: State fishing rights may be leased to fishing associations, or the State may sell fishing licences. Fishing associations are then usually obliged to cultivate their concessions according to plans from state fishery biologists.

Poland: Commercial fishing rights are utilized by state fish farms, or are leased by the State to co-operatives and to the Polish Angling Association. These bodies are responsible for legal aspects of the commercial fishing involved. Sport fishing rights utilized by physical persons are licenced: licences are open to the members of Polish Angling Association, paid differently according to the intended fishing: trout, inshore, off-shore, winter-jigging, spinning, etc. Fishing rights on small rivers, streams, lakes, or waters close to big towns, are preferably leased to the Polish Angling Association. The State imposes management obligations on the users; these are included in any contract of lease. However, some management measures can be applied only with special permission of state administration e.g. changing of water courses, or of water level,

electric fishing, and few others where locally appropriate.

Scotland: Crown fisheries are let to private individuals or corporate bodies. There is no licencing system for any kind of fishing either for sport or commercial purposes, in the inland waters of Scotland.

Spain: On the limited sections of river that are "cotos-controlled" by the State, only a restricted number of people are allowed to fish at one time, and the number of fish each may catch is also restricted. The issue of the required permits is decided by lottery and is thus quite impartial.

The percentage of permits issued is somewhat as follows: (1) tourists 15% (lottery held by Minister of Tourism), (2) riparian fishermen 10%, (3) collaboradores about 10%, and (4) general lottery about 65%.

The cost of a permit varies according to the lottery from which it is drawn. Permits drawn from the General Lottery are more expensive than those drawn from the other three. A person who is eligible for a permit from lotteries (1) (2) and (3) can also apply for a permit from lottery (4) if he fails to obtain one from his own lottery.

A riparian fisherman is one who lives on or near a stretch of river controlled under the cotos system. As noted above, 10% of permits are allocated to riparian fishermen, who may also apply for permits from the General Lottery.

Collaboradores is a term referring to fishermen's societies. If a fishermen's society is sufficiently big, if it is approved by the Fishery Board, and if it contributes to the upkeep of a cotos-regulated fishery preserve, then its members are eligible for the approximate 10% of permits specially reserved for collaboradores, as mentioned above.

Some fishery preserves are totally controlled by particular fishermen's societies, subject to inspection by the State. On these preserves, the proportions of permits issued are: collaboradores 50%; riparian fishermen 20%; General Lottery 20%; tourists 10%.

Sweden: In the lakes of Vanern, Vattern, Hjalmaren and Storsjon, there are waters with public right of fishing

with unfixed gear and no special licences are required. Parts of the privately owned fishing waters in these lakes are also open for fishing by the public with special fishing gear. Waters in the north of Sweden above the border of cultivation are reserved for the Laplanders. Apart from waters so reserved, there are in the north considerable areas in part of which fishing rights derived from riparian ownership are held by private persons in fresh waters, rivers and lakes; while further large areas are held by the State Forestry Body and are freely available for fishing under permit.

West Germany: According to the fishing laws of the states, fishing rights should in general be utilized by long-term lease. Such contracts can be concluded either with individual fishermen, fishery co-operatives, or associations of sport fishermen. Individual fishermen or fishery co-operatives are allowed to issue permits only (in leases), e.g. to sport fishermen, if that is not explicitly excluded.

The states usually transfer the fishing right completely without reserving individual rights for themselves.

On the North East Canal, the administration of the federal water-ways issues permits for fishing to professional and sport fishermen. The authority for issuing licences to sport fishermen has been generally transferred to the "Landesverband der Sport-fischer" (regional association of sport fishermen).

Yugoslavia: Each socialist republic passes its own laws on fresh water fisheries by which fishing rights are governed according to specific conditions in the republic. In all the republics the sport fishermen are members of sport fishing organizations with rights in the area which their sport organizations covers. The commercial organization issues licences to sport fishermen. There are no special limitations.

Every Yugoslav citizen, who need not be a sport fisherman, can obtain a daily licence by paying a fee that covers not only fishing in waters outside the sport fishing organization or the commercial organization area, but also in waters of other socialist republics of Yugoslavia. The licence fee ranges from 5 to 50 new dinars depending on fish resources and organization managing the waters. This right is available to all tourists - both domestic and foreign. There are no special concessions.

7. What provision exists under statute law or by custom concerning public rights of access to State-owned fisheries or to fisheries in which the public are deemed to be entitled to free fishing?

Belgium: There are no provisions concerning public rights of access.

Canada: It is not certain whether the concept of "state-owned fisheries" and "fisheries in which the public are deemed to be entitled to free fishing" can be equated. The only fishery capable of being "state-owned" so far as Canada is concerned is that which exists in non-tidal waters as an incident of ownership of the sub-soil, with the basis of public access in such waters varying widely among the ten provincial and the federal jurisdictions involved in keeping with many factors, e.g. fisheries abundance, value, demand for and management requirements of some species, precedent, decisions made respecting fisheries ownership, etc. Even when the sub-soil in tidal waters is owned by the state (province), a right of fishing exists for the public at large, subject only to federal regulation as to management and use; i.e., in the latter case the right to fish is severed from ownership of the soil.

Denmark: There are no water bodies in Denmark where the public has free access to the fishery. Anyone who wants to fish will have to buy or hire the fishing rights from the owner in question. He may do this on daily, weekly, monthly or annual basis. Or he may join an angling association which hires fishing rights for its members. There is no general fishing licence in Denmark, either with respect to commercial or recreative fishery.

England and Wales: There are generally no State-owned fisheries, but there are some stretches of freshwater over which the presumed owners, whether riparian proprietors of land or others, do not exercise their rights to the exclusion of the public, and so a state of "de facto" free fishing, prevails.

Finland: There are fishing rights which are not connected with ownership: citizens (including all Scandinavian citizens) may fish in the coastal off shore area outside of the village boundary for household and recreational purposes (Fisheries Act 2). Inhabitants of a commune by a big lake may angle and do other hook fishing outside of the village boundary, with the communes bordering lakes together to resolve if other fishing methods may

be allowed or not. (F. Act, 3). Inhabitants of the commune may angle without a licence and with only minor restrictions. In the outer archipelago and in the area facing open sea, this includes net fishing for Clupea harengus var. membras, Clupea sprattus and Coregonus albula. (F. Act, 4). Inhabitants of villages can with a moderate payment obtain a licence for household and recreation fishing. (F. Act, 65).

Angling inside the boundaries of one's own commune is free of charge. To be allowed to use his other fishing rights -- owned, paid or general -- anglers over 16 years of age have to pay 5 mk yearly as the fisheries conservancy fee. This payment is collected and used by the State.

Hungary: The legally entitled persons have the right of access to the fishing grounds. It may happen, that in certain circumstances a special road is granted for them, but according to our statutes fishing cannot be hindered in any way, and on the banks a free path is to be left by any owner.

Iceland: People are not entitled to free sports-fishing except in the sea. Salmon fishing, however, is forbidden in the sea.

Ireland: There is in general no provision in statute in this connection. Access to fisheries in which the public are deemed to be entitled to free fishing is often available by public right of way to the fishery: where no such right of way exists, access depends on consent of the riparian owner, which as a rule is readily given with or without conditions.

Netherlands: Sportfishing with an "ordinary rod" can be carried out without consent of the holder of the fishing rights, provided that one is permitted to enter the riparian land. Owners often issue permits for the right to enter their property.

Norway: The salmon and inland fishing laws declare that the public are entitled to fish in waters owned by the State or local communities.

Poland: Provided a valid licence is held, sport fishing can be performed on any state water except on waters distinctly marked as closed spawning areas, rearing ponds etc.

Scotland: There is no public right of fishery in freshwater in Scotland with the exception of the right to fish for brown trout in all navigable and tidal waters.

Spain: No owner of land on the bank of a river can prevent anyone from fishing from that land.

Sweden: There is a legal right to pass over private land.

West Germany: In some inland waters, free fishing is allowed to all riparians. For example, in the State of Bremen, each citizen of this state has the right to angle freely in the River Weser. Similar arrangements apply to the State of Hamburg.

Yugoslavia: The public has the right of access to all fishing grounds, but is warned on notice-boards that fishing is permitted only with an adequate fishing licence.

8. What is the legal status of fishing rights in tidal waters: is there any recognised machinery for the acquisition of exclusive rights (whether by individuals or by approved organizations) as against the general public? If so are there recognised limits within which such acquisition can take place.

Belgium: There are no tidal waters in Belgium which can be fished. The only tidal waters are those of the lower Scheldt, which are badly polluted and can no longer be fished.

Canada: The right to fish in tidal waters is a public right, subject only to regulation by the federal government. No exclusive right can be acquired as against the general public, though some sorts of fishing: e.g., weir fishing, salmon traps, involve the use of gear affixed to the soil. A licence to so fish connotes no grant of the soil or of a fishery but simply a licence to fish for the current year, subject to regulation, with the type of gear and at the place specified in the licence. In Quebec where title to certain tidal areas vests in the Province, it can grant the request to fish with stationary appliances but exercise of this right cannot interfere with the right of the public to fish under present regulations for other types of fishery.

Denmark: There are no general fishery provisions for tidal waters. Fisheries in Denmark are under the Freshwater Fisheries Act from 1965 and the Sea Fisheries Act from the same year.

England and Wales: The general rule in tidal waters is that the right to fish is public. There are some private fisheries in tidal waters, originating from grants made by the Crown before 1189. The law always presumes that a public right exists unless and until a claimant can prove otherwise.

Finland: There are no tidal waters which can be fished.

France: In tidal waters, the exclusive fishing rights belong to the merchant navy.

Iceland: Salmon fishing in the sea and tidal waters is forbidden except in cases where this fishing in the past has affected the real estate value of the farm. There are only 4-5 such cases. Trout can be fished in tidal waters with gill-nets which are not fit to catch salmon. This fishing, however, can not take place within 1000 m of the mouth of a river that is less than 25^3/sec. and not within 2000 m of the mouth of larger rivers.

Ireland: In tidal waters, the presumption as to entitlement to fish is in favour of the public. Nevertheless, although, prima facie, the public is entitled to fish in the sea and the estuarine waters, yet certain rights to fish in particular waters, to the exclusion of the public, have been established. These rights have originated in various ways and constitute what is commonly known as an exclusive or several fishery. Arising from legal actions determined in the courts within the past forty years, certain fisheries in tidal waters which were formerly preserved as exclusive or several fisheries are now deemed to be public fisheries. For the proper regulation of fishing in such waters by the public, the State has, under statute, declared such waters to be "special tidal waters" and further, under statute, a system of control has been established as part of which licences to fish are issued on payment of licence duties fixed with references to those particular waters.

Netherlands: With regard to the tidal waters regulations do not differ from those relating to inland waters. In the estuaries, sport fishing can be carried out with two ordinary rods without consent of the holder of the fishing rights.

Norway: In the sea the owner of the riparian land has exclusive rights to fish for salmon, sea trout and sea char with bagnets, stake nets, anglenets and "flake"

seines, and to use seines nearer river mouths than 250 meters. These rights do not extend to more than 1/4 of the width of the fjord.

Poland: The Baltic does not have tides. Marine waters are open to sport fishing provided a valid licence is held.

Scotland: The private ownership of salmon and sea trout fisheries in Scotland extends not only to all rivers, and lakes but also to the sea within 3 miles of the shore.

Sweden: In the sea as a general rule, the waters within 300 m from land are privately owned but on the west coast and most of the east coast there are public rights of fishing in privately owned waters. A licence is required for fixed nets.

West Germany: In German coastal waters in general, fishing is free to every German. Foreigners can only fish in these waters if they purchase a fishing licence for foreigners. Exclusive fishing rights in coastal waters can only be obtained with regard to banks of mussel culture. These rights are granted by the State through official channels.

9. If co-operative fisheries are carried on in tidal waters, please describe the system as regards (a) the right to fish to the exclusion of the general public and (b) the regulation of catch either in total or as among members of the co-operative.

Belgium: No tidal waters that can be fished.

Canada: There are no such arrangements and assuredly no one can acquire an exclusive right in tidal waters as against the public at large.

Denmark: No general fishery provisions for tidal waters.

England and Wales: In tidal waters there are no co-operative concerns which are entitled to fish to the exclusion of the general public.

Finland: No tidal waters which can be fished.

France: There are no fishery co-operatives in tidal waters.

Iceland: Not applicable.

Ireland: No provisions made.

Netherlands: Not applicable.

Norway: In the sea, the owner of the riparian land has exclusive rights to fish for salmon, sea trout, and sea char.

Poland: Not applicable.

Scotland: Private ownership of salmon and sea trout fisheries in Scotland extends to the sea within 3 miles of the shore.

Sweden: Not applicable.

West Germany: Co-operative fisheries are rare in coastal regions. Where such a co-operative fishery exists, e.g. on the River Eidor, fishing is not carried out by the co-operatives, but stretches may be leased.

10. Is the use of commercial methods of fishing subject to regulation by reference to (or in any other way subservient to) the interests of upper water proprietors e.g. by imposition of extended close seasons, weekly close periods for fishing or, in the case of weirs, the maintenance of an unused gap or fishing eye?

Belgium: There are no special regulations.

Canada: The extent of management of Atlantic salmon runs, for instance, depends on the circumstance relating to the river in question. In addition to long-established seasonal closures in commercial tidal fisheries, there can also be special closures for special requirements, e.g. fish for hatchery purposes, to enable normal spawning under adverse water conditions, upstream angling, etc.

Denmark: It is illegal to place fixed gear, fykes, nets or the like further out in streams than midstream. If such gear is used from both banks, either opposite to each other or with a distance of less than 35m, a gap between the gear of at least one-third of the width of the river must be left open. The Minister of Fisheries may however dispense from these provisions when special conditions prevail.

In case of weirs, eel traps, etc., - depending on their age - special provisions exist with regard to the

maintenance of fishing eyes and closed periods of fishery in the traps. For all kinds of traps, however, the trap must be kept open and no fishing take place between sunrise and sunset. In case of salmon and trout traps and similar traps for the catch of ascending fish no fishing must take place between sunset Friday night and sunrise Monday morning.

All weirs and other obstacles in rivers shall be furnished with elver pass at the cost of the owner. The pass must be in function from April 15th to September 30th. Special provisions exist as regards the establishment of fish passes, depending on the age and use of the weir in question. No fishing must take place within a distance of 50m above and below a fish pass.

In the sea any fishery is prohibited in a zone of 300m to each side of river mouths wider than 2m. A free access to this zone is secured by the establishment of closed zone 200m wide and 100m long in a straight direction from the river mouth. With respect to river mouths less than 2m wide, similar prohibition zones exist from 2 months before the close season for salmon and trout until the end of the close season. Similar prohibition zones may also be established in lakes around the inlet of rivers.

England and Wales: Fisheries in inland waters are under statutory control and restrictions on the exercise of fishing rights e.g. by the prohibition of certain methods of fishing the regulation of other methods, the specification of close times during which fishing is prohibited, are imposed, some by Act of Parliament and some by bye-laws made by river boards. In many tidal waters, the public right of fishing for salmon and sea trout by means of a net, is restricted by the power of river boards to limit the number of licences that may be issued for this form of fishing.

Finland: The Water Act (264/61) includes several protective clauses relating to closure, pollution and alterations of watercourses. In any river 1/3 of the width shall be free for passing fish, etc., (12). In this "fish passage" no stationary gears are allowed (excl. hooks). (F. Act, 10). The Fisheries Act also includes regulations concerning close seasons, close areas, allowed gears, restrictions, etc., as to give definite outlines for the management. But the main responsibility of conservation remains on the occupant of fishing

rights. (F. Act, 53). Fisheries authorities control the activities.

France: There are regulations governing type and size of engine, times for fishing, as well as weekly close times.

Hungary: The methods of fishing are controlled and the number of licences may be limited, this being done in accordance with a general conservation plan.

Iceland: The middle portion of a river must be clear of obstructions such as gill-nets. This area shall equal 1/3 of the width of the river. Salmon and sea trout fishing with nets is not allowed from Friday night till Tuesday morning. The only nets allowed are gill-nets with bag on one end. Special permission from the Ministry of Agriculture is needed for the use of dragnets e.g. for brood stock. Netting of salmon is at the present time confined to a few of the largest rivers in Iceland. All the smaller rivers are exclusively for angling. About 50% of the salmon caught, are caught by rod.

Ireland: All those who fish by commercial methods (i.e. nets or weirs) are obliged to observe a weekly close time, usually of 48 hours duration from 6 a.m. Saturday to 6 a.m. Sunday. During this time all commercial methods of fishing must be removed or taken up so as to allow a free escapement of fish to the upper waters where apart from being open to fishing by rod and line they may be regarded as making safe passage towards the spawning grounds. In weir fishing a free gap must be kept open at all times measuring not less than one-tenth the width of the stream where the weir is built. The annual close season laid down for fishing by commercial methods are more restricted (a minimum of 168 days of the year) than those for fishing by rod and line (the minimum 92 days close period). There are a number of other restrictive provisions in regard to net fishing such as the prohibition of all net fishing in fresh water, declaring of certain prohibited areas such as a half mile limit around the mouth of any river, and certain restrictions on the operation designed to prevent the use of nets so as to block off the entire run of fish up river. In addition to such statutory restrictions there are certain local bye-law provisions laying down sanctuary areas in places where the use of nets would lead to taking unduly heavy toll of stocks of fish.

Netherlands: There are no regulations protecting the interests of upstream proprietors. All weirs have fish passes (modern control works have fish lifts). In rivers, fishing is not permitted (1) within a distance of 75 metres upstream of a weir, (2) in a fish pass, (3) within a radius of 25 metres of the upstream opening of a fish pass. These rules do not apply when a weir is non-operative.

Norway: Commercial fishing is regulated in many ways. Closed season from Sept. 1 till April 30th or more in many rivers. Weekly closed periods 3 - 5 days. In weirs, a gap of at least 1/4 of the deepest part of the rivers must be open. New weirs are not allowed.

Poland: The use of commercial methods of fishing is subject to regulations derived from the Fishery Act, which include regulations regarding the legal size of fish by species, prohibitions regarding the use of explosives and poisons, closed spawning seasons, local closed periods, and so on.

Scotland: Fishing is not permitted during the weekly close time (from 12 noon on Saturday to 6 a.m. on Monday) or during the annual close time which must always cover a period of 168 consecutive days.

Spain: No reply given.

Sweden: To allow a free escapement of fish to upper waters, a free gap must be kept open at all times with not less than one sixth the width of the deepest part of the stream. The fishing is regulated concerning seasons and fishing gears by local bye-laws.

West Germany: Regarding flowing waters with a stock of salmonide, fishing is not allowed within an eight weeks period during spawning time in winter. Concerning waters containing fish which spawn during spring, a closed season during this period is fixed. In this case only fishing with non-mobile gear and angles is allowed.

The function of fish ladders is nowadays considered problematic. Rising of eel into the upper layers of the waters is indispensible. Fish ladders are rare in North Germany. Fishing is prohibited, above and below fish ladders, either during the whole of the year or during certain times. The respective regulations are laid down in the Fishery Law.

Yugoslavia: Only in the Republic of Slovenia is the fishing time limited. A sport fisherman is allowed to go fishing only twice a month and to fish only a certain quantity of fish - specially of salmonides - during each trip. There are no time limitations in other republics. In all waters fishing is prohibited during spawning and up to a fixed size for each species of high-quality fish.

11. Apart from conventional conservancy provisions as envisaged in Question 10, to what extent is there provision for exercising quantitative control of fishing by commercial methods?

Belgium: No quantitative control.

Canada: In the face of mounting demands and an endangered habitat, various moves have, for instance, been considered and taken to reduce the commercial catch of Atlantic salmon.

Denmark: There are no provisions for exercising quantitative control of fishery by commercial methods. But on demand all fishermen and other owners of fishing rights (and fishmongers) are obliged to give information on their fishery and their trade.

England and Wales: No quantitative control.

Finland: There is no need for exercising quantitative control of fishing by commercial methods exceeding those discussed under Question 10. The commercial fishing mainly occurs in the coastal and off shore waters which are not too heavily burdened.

France: No quantitative control.

Hungary: There is apparently no quantitative control in the case of commercial fishing. Anglers however are limited to specified daily and annual catches. In addition anglers may not sell their catch.

Iceland: Salmon fishing is only allowed three months each year during the period from the 20th of May until 20th September. The closure mentioned in paragraph 10 can be extended 24 hours if need be.

Ireland: There are some provisions for limiting the number of licences that may be issued for use of nets in certain fisheries. Provision exists whereby quantitative control can be exercised in regard to catches of salmon whether

indirectly by control over numbers of salmon nets used at sea or directly by control of landings of salmon caught at sea. Otherwise there are no provisions for quantitative control of fishing.

Netherlands: No quantitative controls.

Norway: No quantitative controls.

Poland: Quantitative control of commercial fishing is exercised by Fishery Guards. A type of social control is exercised by sport fishermen; some are Honorary Guards. However, since waters are leased on long terms, fishermen themselves are interested in proper kinds and intensity of fishing.

Scotland: No quantitative controls.

Sweden: No quantitative controls.

West Germany: There are no regulations in the Fishery Law on quantitative control. As to associations of sport fishermen, regulations are often laid down on a private basis.

Yugoslavia: No quantitative controls in commercial fisheries.

12. Are there any provisions for levying tax on the use of fisheries which can be made to serve as a means of control?

Belgium: None

Canada: Various forms of licence fees can be imposed as a means of control. Excess fishing capacity in the British Columbia Pacific salmon fisheries is being reduced through limitations on entry as well as through sharply increasing licence fees on vessels (plus ineligibility for vessels subsidies, etc.).

Denmark: None

England and Wales: Not answered.

Finland: None

France: None

Hungary: Not answered.

Iceland: None

Ireland: See replies to Question 11 and 14.

Netherlands: None

Norway: None

Poland: No taxes on leased fisheries.

Scotland: Not answered.

Sweden: None

West Germany: Fishing rights in inland waters are only granted against payment of taxes. This is also a means of control. There are no provisions made in this respect in the "tax law".

Yugoslavia: Each socialist republic has its own regulations governing fresh water fishing and determined clauses according to which fishing, improvement, control, etc. are carried out.

13. Please describe the methods of fishing employed in coastal and sea fisheries for salmon and trout, indicating any which are usually or exclusively operated under proprietary right.

Belgium: No tidal waters which can be fished.

Canada: There are no proprietory rights in tidal waters. Atlantic salmon are taken in coastal waters principally by trap nets, gill nets and drift nets, plus incidental catch in non-salmon gear. There is, however, a hereditary aspect to salmon trap-net licences, which is currently under review.

Denmark: The following are used in coastal and sea fisheries for salmon and trout: pound nets; fyke nets; set nets; drift nets; and hooks (drift lines). Pound nets and fyke nets are operated under a kind of proprietary right as the fisherman at the end of each fishing season must apply to the fishery control officer for the use of pound net and fyke net positions which he is going to use during the next season. The fishery control officers are responsible for the distribution of these places among the fishermen. Special provisions exist with respect to the proper buoying of the nets, and for the distance between the gear. Drift nets and drift lines are mainly operated from larger fishing vessels in high seas fishery, especially in the Baltic.

England and Wales: Commercial salmon netting takes place in estuaries and on the coast. Proprietary rights generally do not exist in tidal waters.

Finland: Fyke nets, drift nets and drift lines (usually outside of proprietary waters), trolling and sport angling (usually in proprietary areas).

France: Not answered, since coastal and sea fishing are under the jurisdiction of the General Secretariat of the Mercantile Marine, Paris. There is no public fishing as such.

Iceland: Salmon fishing is not allowed in the sea except in very special cases. Some 4 farms conduct a sea fishery for salmon using a form of gill-net with a bag on one end, and bag-nets which need special permission. Trout fishing with gill-nets is common. Both these are operated exclusively under proprietary rights. Anybody can, however, set trout-nets beyond 60 fathoms from shoreline but it is not common.

Ireland: The following methods of fishing for salmon and trout are employed in coastal and sea fisheries; (a) Drift nets of lengths regulated by bye-law - up to 1,500 yards long - the fish being caught by meshing. The nets are fished from boats ranging in type from oared yawls, or trondheim, to powered boats up to 50 feet in length. (b) Draft nets. These are usually hauled or drafted on to a convenient landing or hauling ground, the net being shot or paid out so that with the help of the tide it may encircle a catch of fish which are then hauled in. An oared boat is usually employed in paying out the net. (c) Fixed engines such as bag nets or stake nets. These are usually operated on the principle of having a leader running out from the shore to the fixed net where the fish enter by a valve into one or more chambers from which there is no escape and are then fished out when the tide permits.

With a few exceptions only nets in the final category (i.e. fixed nets) are operated under proprietary right. Many of these nets have fallen into disuse and legislation does not permit the authorization of any new fixed engines or a changing of site for operation of those for which statutory certificates have already been issued.

Netherlands: Salmon is completely, and trout almost, extinct as a result of pollution. No fishing for these species is carried out anymore.

Norway: In coastal fisheries under proprietary rights there are stationary traps, bagnets, "flake-seines", anglenets, stake-nets. Owners of proprietary rights can also use common seines within 250 m of river mouths. Where there are no proprietary rights, gillnets, rod fishing, trolling, longlines are used. However longlines are not allowed for catching salmonids inside the 12 mile fishing border, and driftnets (for salmon) are forbidden inside the base lines.

Poland: Salmon and trout fishing in coastal and sea waters is performed by co-operatives of commercial fishermen, and by private licenced marine fishermen. There is no sport fishing for salmon.

Scotland: All commercial salmon and trout fishing is carried on under proprietary right. The proprietor may fish by any legal means and outside estuary limits may use fixed engines.

Sweden: Salmon and sea trout are fished for in coastal and sea fisheries by gill nets, long line, stake nets and pound nets. Stake nets and pound nets (i.e. fixed nets) are operated under proprietary right in the Baltic and a licence is required for fixed nets in waters for public fishing.

West Germany: In the salmon and sea trout fishery of the Baltic, longlines (driftlines) and driftnets are used. In coastal waters, gillnets are employed in fishing for sea trout (salmon is not found in these waters). Outside coastal waters, sea trout are practically only fished in rivers during their spawning migration.

14. Are commercial methods of fishing subject to (a) State licencing control (b) a fishery rate or other levy imposed to meet conservancy expenses?

Belgium: Commercial fishing is no longer carried on in Belgium.

Canada: (a) All commercial fishing for Atlantic salmon, for example, takes place in tidal waters and is subject to federal licencing. (b) No.

Denmark: (a) Commercial fishing is not subject to State licencing. (b) Recently a fishery rate on salmon caught in the sea and landed in Denmark has been introduced. The rate is imposed to meet the costs of a smolt liberation program. No other fisheries in Denmark are subject to such rates.

England and Wales: (a) A licence must be obtained from the appropriate River Authority. (b) No information given.

Finland: (a) No. (b) No.

France: (a) Yes. (b) No.

Hungary: (a) Everybody has to pay a moderate stamp-duty for his licence. (b) To secure the financial basis of conservancy and development a "Fishery Development Fund" was created. The incomes of this fund are from the lettings of natural waters by entitled organs and from a moderate fishery-development contribution paid by anglers.

Iceland: Gill-netting in rivers is rare. Where it is still practiced it is only allowed where it has traditionally been done. The number of nets is fixed and game wardens know their locations and enforce regulations concerning them strictly. These fishermen must pay 2% of their net income to a Salmon Conservancy Fund and have to declare their catch for taxation as well as to the conservation agency.

Ireland: All commercial methods of fishing are required by law to be operated under licence, at rates of duty fixed by statute. The licences are issued by the District Board of Fishery Conservators. All fishery properties which have been valued for rating purposes are rateable to the District Board of Fishery Conservators, who are empowered to strike a rate annually of such an amount levied on the total valuations as will, with the estimated amount of other income, be sufficient to meet expenses for the fishery year in question. Both the licencing and the rating provisions apply equally to rod fishing for salmon and to commercial fisheries. A further levy for conservancy purposes is collected by the State on all exports of salmon, collection being made on exportation as a matter of administrative convenience. The present rates of levy are 10/12p. per lb. on exports up to 31st May each year and 5/12p. per lb. for the remainder of the year.

Netherlands: For commercial fishing gear, a so called "large" fishing licence is required, the cost of which is £31, of which £20 goes to the Government and £11 to the Organization for Improvement of Inland Fisheries.

Norway: (a) There is no State licencing system. (b) Everybody who fishes for salmon, sea trout, sea char or inland fish whether with commercial gear or sport fishing has to pay an annual fee of 10,- Norw. kroner. A special tax of 2% of the value is levied on all salmon and sea trout landed inside the fishing border (the 12 mile border). 25 kroner per 100 kilo is taken as an export duty on all salmon and sea trout exported. The income from these sources is used to meet conservancy expenses.

Poland: There is a conservancy fund which derives revenue from users of the fishery: commercial fishing pays some small percentage of the value of fish sold; sport fishermen contribute through a percentage of the licence fee.

Scotland: (a) There is no licencing system for any kind of fishing, sport or commercial, in the Inland waters of Scotland. (b) In Scotland, district boards are financed by an assessment which they are permitted to levy on the salmon fishery proprietors in their districts.

Spain: The total number of licences that may be issued is limited.

Sweden: (a) No. (b) No.

West Germany: The state controls the fishery methods only in so far as regulations of mesh-size, minimum sizes, etc. are contained in the national laws and international contracts. Free fishing may be prohibited locally in order to protect mussel culture.

Yugoslavia: Commercial methods of fishing: (a) are not subject to State licence, (b) for the purpose of improvement of fresh-water management (stocking, etc.) and for providing necessary funds for water protection, the organizations managing the waters (with the agreement of local authorities) prescribe adequate amounts which are paid to the sport fishing organizations (if the sport organizations are in charge of water management) or are paid to the commercial organizations in case they manage the waters.

15. To what extent does the regulation of angling in tidal waters follow the pattern described for fresh water?

Belgium: No tidal waters which can be fished.

Canada: It has been policy to impose the minimum of restrictions and regulations on ocean angling commensurate with conservation and development requirements. This explanation, however, has to be related to the needs and characteristics of specific fisheries. For example, conservation regulations relating to valuable anadromous species such as Pacific salmon in British Columbia follow a common pattern in both tidal and non-tidal waters. By contrast, there is no ocean angling for Atlantic salmon and thus there are no regulations pertaining to same.

Denmark: Angling in Danish territorial waters is free to all Scandinavian citizens, whereas other aliens must obtain special permission (which however is not payed for) through the local fishery control station. There are no special provisions relating to the fishery in tidal waters.

England and Wales: In tidal waters the general rule is that the right to fish is public.

Finland: Regulations are mostly the same for the angling in coastal waters as in fresh waters, except the close season in rivers (from Sept. 15 to Nov. 30th).

France: Not answered.

Iceland: Angling in the sea is only restricted within 60 fathoms of the shoreline. Beyond that anybody can fish with a pole. Regulations concerning fishing within 60 fathoms of shoreline are subject to same regulations as freshwater fishing, as much as possible.

Ireland: Angling in tidal waters is subject to regulations on the same basis, as to close seasons etc., as the freshwater.

Netherlands: There are closed seasons for fish and minimum net sizes in fresh waters but none in tidal waters. There are minimum fish sizes in both fresh and ocean waters. For freshwater angling, a f3 contribution for the improvement of inland fisheries enables persons 15 years of age and over to use one ordinary rod. A "small" f.9.75 fishing licence enables use of one special rod or

two ordinary rods, as covering the contribution for the improvement of inland fisheries. For fishing with professional gear a "large" fishing licence: (As noted in reply to Question 14). For professional fishing in tidal waters a licence of f2,= is required, but no licence is required for sport fishing.

Norway: Angling in the sea is free. The closed season in the sea is from the 5th of August to the 30th of April; in freshwater, where there are salmon, from the 1st of September to the 30th of April; and in freshwater where there are sea trout or sea char, but no salmon from the 15th of September to the 30th of April.

Scotland: All salmon and sea trout fisheries along the coast are privately owned.

Spain: Not answered.

Sweden: In tidal waters the general rule is that the right to fish is public.

West Germany: In tidal waters angling is not limited, but a licence has to be purchased. Anglers have only to observe the regulations relative to protection.

16. Please describe any system prevailing of entitlement to fishing rights in offshore waters related to ownership of the seabed or otherwise.

Belgium: No tidal waters which can be fished.

Canada: There are oyster leases in shoreline waters, but no exclusive fishing rights exist in offshore waters, nor does any lease imply ownership of the seabed. It is a right to grow and harvest oysters in a particular area.

Denmark: The commercial fishery within the limits of the Danish fishing zone is restricted to Danish citizens. The Danish fishery limit is 12 naut. miles along the coasts of the North Sea, the Skagerrak and Kattegat, and 3 naut. miles along the remaining coasts.

England and Wales: In general, all sea fishing is public but in some tidal waters there are private fisheries but these have originated from grants made by the crown before 1189.

Finland: In big lakes, and in the coastal waters against the open sea, the riparian rights of the village reach 500 m out from 2 m depth.

France: Coastal and sea fishing are under the jurisdiction of the General Secretariat of the Mercantile Marine.

Iceland: Reference should be made to the replies to questions Nos. 8 and 13. In summary, the fishing rights in Iceland follow the adjacent land in any purchase, and the two can under no circumstances be separated. These fishing rights are, however leased on a yearly basis to angling clubs that henceforth can forbid even the riparian owners to fish in the river except when provisions are made.

On the whole angling is getting more common, and netting for salmon is decreasing, since the farmers now realize that more financial gain can be obtained by leasing the river to anglers. The number of poles on a river is strictly controlled and the appropriate number estimated by the Institute of Freshwater Fisheries.

Ireland: See reply to question No. 8.

Netherlands: In offshore waters, there are international regulations according to the North-Atlantic-Fishery-Treaty (1959); within 3 miles no fishing is allowed by foreign fishing vessels. International agreements, however, may form exceptions to this general rule.

Norway: There is no ownership of fishing rights in offshore waters.

Poland: All coastal waters belong to the State.

Scotland: All salmon and sea trout fisheries in Scotland are the subject of proprietorship, and extend into the sea for a distance of 3 miles.

Spain: Not answered.

Sweden: In the sea as a general rule the waters within 300 m from land are privately owned but on the west coast and most of the east coast they are public rights of fishing in privately owned waters.

West Germany: In offshore waters no fishing rights exist; only the international agreements have to be observed.

17. Please describe any system practised in your country as regards ownership, reservation of rights or utilization of fisheries which does not come within any of the foregoing suggested classifications.

Denmark: According to an Act of June 23, 1956, all private fishing rights on territorial waters were commuted. The rights mainly applied to fishery for eels with pound and fyke nets. At the commutation the owners got compensation, and if they managed the fishery themselves, they got a right to continue the fishery for life. In case the fishing right at the time of commutation was rented to a fisherman, he could rent the fishery from the State for life. When a leaseholder does not want to continue the lease, the right is rented out by the Ministry of Fisheries for a period of 20 years from the date of commutation.