

ECONOMIC EVALUATION OF INLAND SPORT FISHING

ÉVALUATION ÉCONOMIQUE DE LA PÊCHE SPORTIVE  
DANS LES EAUX CONTINENTALES

by/par

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## **PREPARATION OF THIS PAPER**

The background of this paper is described in the "Foreword" of the report itself. It is being published at the request of the fifth session of the European Inland Fisheries Advisory Commission (EIFAC), Rome, 20–24 May 1968.

## **PREPARATION DE CE DOCUMENT**

L'historique de ce document est décrit dans l'«Avant-propos» du rapport. Il est publié à la demande de la cinquième session de la Commission européenne consultative pour les pêches dans les eaux intérieures (CECPI). Rome, 20–24 mai 1968.

### **Bibliographic citation and abstract**

Economic Evaluation of Inland Sport Fishing (1968) by Ingemar Norling, EIFAC tech. Pap., (7):96 p., 1968.

Part I of the present report describes the main problems, concepts, measures and methods for evaluating sport fishing. Definitions and objectives are discussed according to their importance. Very little research work in Europe has been or is being carried out on this subject. Part II is a compilation of abstracts and conclusions of relevant published and unpublished reports and articles on socio-economic aspects of sport fishing. Many of these were taken from the SFI Bulletin.

### **Référence bibliographique et résumé**

Evaluation économique de la pêche sportive dans les eaux continentales (1968) par Ingemar Norling, EIFAC tech. Pap., (7):96 p., 1968. La Section I du présent rapport décrit les principaux problèmes, les concepts, mesures et méthodes servant à l'évaluation de la pêche sportive. On en discute les définitions et les buts selon leur importance. A ce jour, la recherche en Europe dans ce domaine est négligeable. La Section II est une compilation de résumés et de conclusions de documentation publiée et en cours de publication, et de divers articles sur les aspects socio-économiques de la pêche sportive. Plusieurs de ces citations sont extraites du « SFI Bulletin ».

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## FOREWORD

FAO, in its efforts to raise the levels of nutrition and standards of living of the people under its jurisdiction, to secure improvements in the efficiency of the production of food and to better the conditions of rural populations, has long recognized that the promotion of developmental activities connected with wildlife resources, outdoor recreation and national parks should continue receiving priority. Their importance to tourism is, in fact, proving to be a promising source of exchange earnings for many developing countries.

The very recent (September 1968) UNESCO Intergovernmental Conference of Experts on the Scientific Basis for the Rational Use and Conservation of the Resources of the Biosphere also noted that wildlife may contribute to human existence as a supplementary or major form of land use. The present large and spectacular wildlife populations in some developing countries play an important rôle in attracting tourists and substantially influencing the flow of foreign currency in those countries.

The European Inland Fisheries Advisory Commission (EIFAC), whose objectives are to promote improvement in inland fisheries and to advise Member Governments and FAO on inland fishery matters, has also realized that the systematic development of wildlife, particularly sport fishing, is instrumental in promoting economic development. For some countries, good sport fishing facilities are a great attraction to foreign tourists and sport fishing is, for them, becoming an important export industry. For others, the development of sport fishing in poorly industrialized areas with attractive fishing waters is bringing about a better distribution of income within the country. The development of sport fishing within a country may also bring about net benefit to the national economy, stimulating various ancillary industries, calling greater attention of the authorities to the necessity of controlling water pollution, without mentioning the important recreational and social benefits to the participating populations.

At its very First Session (Dublin, 1960) EIFAC Member Countries, aware of the economic and social values of sport fishing, selected the subject "Appraisal of the economic and recreational values of angling and its development" as a field of wide interest and study. While the subject was discussed at the Second (Paris, 1962) and Third (Scharfling am Mondsee, 1964) Sessions and some documentation prepared - notably, a partial bibliography on the economic evaluation of sport fishing and fisheries resources (FAO Fish.Circ. (8) (Rev.1):20 p., by Wm.A. Dill, 1964) - it was not until the Fourth Session of EIFAC (Belgrade, 1966) that the economic evaluation of sport fishing was discussed seriously. At that Session, Dr. Ingemar Norling, University Reader at the Graduate School of Social Work and Public Administration, Gothenburg, Sweden, was appointed rapporteur for questions dealing with sport fisheries in both their economic and social aspects.

With the assistance of the EIFAC Secretariat, Dr. Norling undertook a world review of the literature, research and field work on the economic evaluation of sport fishing. His report, which he presented at the Fifth Session of EIFAC (Rome, 1968) received the immediate approval of the Commission which recommended that it be published in both languages of the Commission - English and French - in the EIFAC Technical Paper series and be widely diffused.

## PART I

### 1. INTRODUCTION

The terms of reference for this study were to appraise the economic and recreational values of sport fishing, with particular reference to Europe, including:

- (a) a review of the literature on the subject,
- (b) identification of the problems to be considered,
- (c) recommendations which will enable interested countries to take steps to measure:
  - (i) the relative values of sport fisheries as compared with those of commercial fisheries and other uses of water;
  - (ii) their value to the national economy.

After compiling and studying the literature on the subject of sport fishing and recreation in general, and establishing contacts with researchers<sup>1</sup> in this field in various parts of the world, it was found that very little research and systematic fact-finding has been or is being carried out in Europe. Conversely, in the United States and Canada, a substantial amount of applied research and field work has been evidenced in the last 15 years. This uneven distribution of research and data between Europe and North America was recognized by Dill (1964) when he compiled his bibliography on the economic evaluation of sport fishing and fisheries resources.

<sup>1</sup> A partial list of experts, and their address, who have greatly assisted the author by showing him publications or correspondence, is given in Appendix A.

This means that data on structure and trends in sport fishing as a part of outdoor recreation and the analysis of concepts, measures and methods are based, to a large extent, on North American literature and personal communication of the author with, notably, North American experts. This particular reference to the United States and Canada is, therefore, necessary and should not be looked upon as a serious problem. In recreational behaviour studies, different concepts, measures, methods and variables developed in other countries can be used because they belong to the behaviouristic sciences and have international application. This aspect needs to be emphasized because, in the author's experience and according to other experts involved in fishery management, people who have limited knowledge of behaviouristic sciences have a tendency to think that their country, region or local area is unique, and that concepts and methods developed elsewhere are not applicable in their case.

After compiling and studying the literature on this topic, corresponding and discussing with researchers, fishery officers, administrators, biologists and experts in tourism, it was decided to divide this report into two main parts, to be supplemented later by an updated version of Dill's bibliography.

Part I deals, in an abbreviated form, with the economic evaluation of sport fishing, the main problems, concepts, measures and methods. Part II is a compilation of excerpts, abstracts, conclusions of relevant published and unpublished reports and articles on socio-economic aspects of sport fishing and fishery resources. Many were taken from the SFI Bulletin which I thankfully acknowledge; others were selected in consultation with some of the experts listed in Appendix A. The content of Part II is subdivided as follows: socio-economic data, planning, and commercial and sport fishing. See detailed contents on page 35.

The problems and methods encountered in the economic evaluation of sport fishing are complex and no generally accepted evaluation method exists yet. It is, therefore, preferable to substantiate the first section with a wide range of examples on evaluation, planning, consumer conflicts, policy, socio-economic studies, etc., as will be done in Part II. This will be particularly useful for readers who do not have experience in behaviouristic sciences (economics, sociology, psychology, etc.) and who are eager to learn and accumulate important references on this subject.

In order to encourage European countries to evaluate their inland sport fisheries as quickly as possible, it is necessary that a flow of ideas within, but particularly between, countries start immediately. Part II should greatly assist in this regard as well as the updated bibliography which will also include, it is hoped, a list of selected and essential literature on this topic. Additional suggestions will be given at the end of Part I in order to speed up the international exchange of information, ideas and experience.

It appears from available literature, and from the author's correspondence with experts in the United States and Canada, that the main problems to be discussed here can be grouped under two headings:

- Definitions, objectives, structure and trends in sport fishing
- Concepts and methods used for evaluating sport fishing and fishery resources

Part I of this report deals with these aspects.

## 2. DEFINITIONS, OBJECTIVES, STRUCTURE AND TRENDS IN SPORT FISHING

### 2.1 Definitions and Objectives

Sport fishing is mostly seen as a kind of outdoor activity, one of several forms of the use of a natural resource, i.e. water.

In studies published in Europe and North American (U.S. 1962b, Sweden 1964) during recent years, recreation is seen as the main objective in sport fishing. Sport fishing in operational terms (equipment used, etc.) varies among countries (U.S. 1962a). One type of equipment, e.g. spear or net, is allowed in one country and forbidden in another (USFWS, 1966, Sweden 1968). This variation in regulations probably depends on differences in demand, supply, tradition and lack of empirical objectives. This lack in sport fishing reflects and creates a series of problems.

The conflicts between the different forms of use of fishing waters, e.g. commercial and sport, between forms of recreational use, e.g. fishing and boating, and between forms of recreation and commercial use, e.g. fishing and industry, cannot be solved with a view to obtaining optimum benefits in economic and social terms before correct definitions and objectives have been established.

The concept "recreation" has been of high value in the modern planning of outdoor recreational areas, particularly in North American and Sweden. It is stressing the consumer aspects, i.e. the emphasis is shifting from "fish to people" (Clawson, 1965). The consumer variables, i.e. desires, willingness to pay, age distribution and taste formation, will have a high influence on planning models for the use of water resources. However, the many problems encountered cannot be solved with only a vague concept like recreation. This point is illustrated in several examples in Part II (see 2.2, 2.5, 2.13, 2.26).

Clawson (1968; II.2.24) has made a time-process analysis of recreation (anticipation, travel to, on site, return, recollection) and has stressed that, on the whole,

this macrocircle must be considered in planning and evaluation, and that the outdoor recreation on site (the microcircle) is only a part, and sometimes a small part, of the whole package.

If it is desired to design planning models for the maximum benefit, multiple use, of water resources, these macro-micro circle aspects are very important. Much recreation can be provided if important phases like anticipation and recollection are taken into consideration. Strangely enough, we can produce much recreation by satisfying needs and learned functions such as probability of catch and/or the prospects of a good fish fight. In one planning model, the Hazzard plan (i.e. catching and releasing the fish) is successful where there is a big demand and a limited supply of fish (often trout streams near urban centres). This plan is widely used in the United States (Beall, 1964). Fishermen often throw coarse fish back into the water. These principles are similar to simulating techniques such as clay-pigeon shooting and hunting with a camera. The important thing is that levels of experienced recreation can be varied by changing conditions in the different parts of the macro-micro circles. It is also very important to discover what people can learn to like (taste formation), what they like (what produced recreation) and what they or the State are willing to pay for recreation.

From this discussion it is evident that the concept of recreational experience is very complex. It can be measured, as similar activities, in monetary terms, i.e. expenditure and willingness to pay. But these measures can only be general indicators of experienced recreation and should be complemented by more direct methods for experience measurement, e.g. modern psychophysical methods.

## 2.2 Structure and Trends in Sport Fishing

### 2.2.1 Number of sport fishermen, activity level, expenditure, etc.

Data from Canada, Sweden, the United Kingdom and the United States show that sport fishing is the largest or one of the largest active outdoor sports, representing up to 40 per cent of the total population and sometimes two-thirds of the male population in certain districts (including all levels of activity) (U.S. 1962c; USFWS, 1966; Norling, 1968; most of these reports are abstracted under II.1).

Sport fishing is more evenly distributed over age groups than most other outdoor activities (U.S. 1962b, Sweden 1964). The latest National Survey of Hunting and Fishing in the U.S.A. (USFWS, 1966) which has been extended to the 9–11 years' age group also confirms this.

The sex ratio varies between countries: the United States (USFWS, 1966) and Sweden (Norling, 1968) have a much higher fishing activity among women than Canada and the United Kingdom (II. 1.17, II. 1.2). Fishing with the family is rather common in the United States (U.S. 1962c, II.2.12) and Sweden (Norling, 1968). Fishermen's travel and tourist fishing, when measured, out of one's state in the United States (USFWS, 1966), from the United States to Canada (U.S. 1962c), from the United Kingdom to Ireland (Eire, 1966, II.3.6) and within Sweden (Norling, 1968) is indeed very large.

Fishing activities and the number of fishermen in relation to income, when studied (USFWS, 1966), gave a fairly even distribution with slightly higher activities in higher income groups. Sport fishing is, therefore, a sport for all ages and income levels (Davidson et al., 1966).



The participation in sport fishing as in hunting is higher among people living in rural areas and towns than in small and big cities (USFWS, 1966). Higher participation rate is often found in areas with good supply (USFWS, 1966, Norling, 1968).

The demand for different types of fishing varies. Fishing for trout and salmon seems especially attractive (U.S. 1962c; Norling, 1968), whereas interest in coarse fishing varies (U.S. 1962a; Norling, 1968). The interest in sea angling has been rather low in many countries but is increasing rapidly (USFWS, 1966; II.3.6).

The economic value of sport fishing has been studied thoroughly. The gross expenditure of sport fishermen in the United States (USFWS, 1966; II.1.12) and of members of sport fishing associations and clubs in Sweden (Norling, 1968) is high. In 1965, in the United States, 28 million sport fishermen spent an average of 103 dollars each, which means a total of about 3 billion dollars. Similar results are found in studies from other parts of the world (Opperman, 1965). The distribution of expenditure on different items is described under section 2.3 (gross expenditure method).

The geographical distribution of expenditure and income generated by sport fishing is uneven. Only a small part will find its way to the site of recreation (Clawson, 1965; II.2.4). Several studies of the economies of sport fishing versus commercial fishing have shown that in inland and coastal fisheries, waters close to urban centres and waters where attractive species are found, e.g. trout and salmon, higher economic and social benefits are derived from sport fishing (II.3.1; U.S. 1962c).

The mental health effects of sport fishing have not been studied specifically, however some reports indicate that sport fishing is found to have a very high therapeutic effect on mental patients (II.2.12, II.2.10).

### 2.2.2 Trends in sport fishing

Whatever measure is used, there is a strong upward trend in sport fishing activities in countries where studies have been carried out. Attendance figures and demand estimates show for the United States at least a fourfold increase in demand for sport fishing between now and the year 2,000 (USFWS, 1966). A similar general increase is estimated in Sweden for outdoor recreation (Norling, 1968).

The demand for sea angling is increasing rapidly and will probably absorb most of the new fishing pressure in many countries (USFWS, 1966). Similar tendencies are also found for coarse fishing (USFWS, 1966, II.3.6).

Some studies of potential demand for sport fishing have been made (see also 2.3, the discussion of option demand and opportunity effects in connection with direct methods). It has been found in the United States (USFWS, 1966) and Sweden (Norling, 1968) that sport fishing belongs to the highest estimates for "want to start or want to do more". In an excellent analysis of outdoor recreation data, the SFI Executive Director, Mr. R.H. Stroud, (see Appendix A, p.82) has shown that fishing and hunting, the traditional outdoor sports, constitute key values in outdoor recreation planning. They are more or less and objects of activities like boating (80 per cent of boat use is connected with fishing or hunting), and camping (86 per cent). He says, for example, "Certainly, the primary rôle of picnicking as a major recreational objective remains subject to serious doubt" (SFI, 1966; II.2.13).

Data on sport fishing trends are impressive. We can accept or doubt the figures given, and we can discuss different methods used to measure trends and the need for recreation. But if the trends in many European countries prove to be similar to those

seen in the United States and Sweden, there is a serious need for replanning the European inland fisheries. These trends would seriously affect the planning of tourist and commercial fishing in many areas and the management of the fisheries, introduction of new species, gear, regulations, etc. These problems have been seriously discussed in the Bledisloe (U.K.MAFF, 1961) and Hunter (U.K., 1965) reports (see also II.3.2 and II.2.11) and in several North American reports (e.g. II.3.1, II.3.3, II.2.12, II.2.15, II.2.23).

Several factors in the modern society of the western world contribute to a rapid growth in the demand for outdoor recreation. Some factors often mentioned are: more leisure time, unprecedented affluence, better transportation, new and better recreational equipment and supplies. To these are added an increasing population and a rapidly increasing tourist industry.

### 3. CONCEPTS AND METHODS USED FOR EVALUATING SPORT FISHING AND FISHERY RESOURCES

Recreation and sport fishing in particular have only recently been recognized as a large and important use of natural resources. This belated recognition is, nevertheless, an effect of systematic studies of the recreation area.

As can be seen in section 2.2, data on structure and trend are important. It is quite evident, however, that an economic evaluation of these data is necessary for objective decision-making.

Almost all the important studies made of structure, trend and value have been prepared during the last 15 years, as is evidenced by Dill's bibliography (1964). A large part of outdoor recreation seems to have been developed mainly as a non-market commodity and this has delayed the development of suitable evaluation methods (Crutchfield, 1965). From the latest eclectic reports that I can find, it is evident that we are just now in the midst of an important evolution in evaluation methods. No method is yet generally accepted (Bollman, 1967) and much remains to be done with important subjects such as tourism (Knetsch, 1966) and use of made lakes (Jackson, 1966, Stroud, 1966).

#### 3.1 Need for an Economic Evaluation of Sport Fishing

Natural resources, such as water, serve several purposes. Quite often, there is competition between different forms of recreation (fishing, swimming, hunting, etc.) and between recreation and commercial use of water (water disposal, hydro-power, commercial fishing, etc.).

There is no alternative for a national planning agency but economic evaluation if it wants to make objective decisions, obtain a balanced use of the resources and solve the conflicts between various groups competing for water. One of the accepted criteria is the greatest benefit to society, or the maximum net benefits from the use of social goods. Readers interested in these problems and related social evaluation are referred to articles by Crutchfield (1962, 1965), Spargo (1965), and to several other articles which can be found in the report of the Ottawa Symposium on the Economic Aspects of Sport Fishing (Canada, 1965) and Davidson et al. (1966).

#### 3.2 Can recreational behaviour like sport fishing be evaluated?

We must have a common scale for evaluation. The monetary scale is in use for evaluating other forms of water use, e.g. hydro-power, and as stated before it can be used for evaluating sport fishing.

Many arguments are raised against evaluating recreational behaviour such as sport fishing. The most common is the belief that outdoor recreational experience is outside the framework of economics, that it is an aesthetic, psychological experience uniquely personal that cannot be measured.

It is both erroneous and misleading to say that aesthetic experiences cannot be measured by economic and psychological methods. As will be seen later, market-determined and indirectly determined measures can be used with a certain level of reliability and validity. We can now, with a considerable degree of success, measure and predict the sport fisherman-consumer behaviour, e.g. attendance, demand and willingness to pay.

The measurement of psychological variables (e.g. why they are willing to pay more for this than for that) is being studied to a much smaller extent, which means also that the fundamental concept - recreation - is poorly analysed.

We know very little on the mental health - therapeutical aspect - of recreation and have only observations like that registered in ORRRC Rep.7 (U.S. 1962c, II.2.12, II.2.10) about the successful use of sport fishing at the veteran hospitals (see also 2.21).

The study of taste formation or learning process in recreation is also very meagre. We know little about why and how we become sport fishermen, and how we change our behaviour to new forms of fishing. This is a serious problem for the economist, as assumptions about stability of interest, etc., are basic for the prediction models (Bollman, 1967).

The contemporary view of these problems is that we can and have to measure sport fishing in descriptive economic terms, to get information about the amount, trends, etc. But it is also quite evident that we have to use psychological methods to measure experience variables, mental health and therapy effects, etc. Data of this type are of great importance for the social and political evaluation of recreational benefit.

The overall impression of the literature reviewed is that just now we have left the supply-orientated approach (stocking, management) and are studying in economic terms consumer behaviour or demand. We have to emphasize the consumer in recreational use of national resources, and there the economist gives way to other social scientists. This change in objectives from supply to demand studies is heavily stressed in the ORRRC Reports and the 1965 Ottawa Symposium (Canada, 1965). In these reports it is evident that the group of experts taking active interest in these studies is, by necessity, widening to include not only biologists, technician-economists, but also psychologists, educators, sociologists, etc.

The last part of the conclusion of the main address at the Ottawa Symposium given by Marion Clawson (1965) shows the importance of these trends: "The problems of fisheries people will increasingly shift from fish to people - how to educate, help, guide, and hopefully satisfy the recreationists seeking some fishing. This will inevitably impose new and different burdens upon researchers and managers alike. Whether one welcomes these imminent changes or views them with sorrow, the problems will be more easily dealt with if foreseen and met as they arise".

### 3.3 Methods for an Economic Evaluation of Sport Fisheries<sup>1</sup>

<sup>1</sup> Two sample questionnaires are given in Appendix B, p. 83.

Planning the recreational use of natural resources is more or less based on subjective estimates of demand and supply. The following evaluation methods deal mainly with users or with the demand side.

It should be stressed from the very beginning that most of the methods described are based on the theory of demand behaviour but that the term "demand" is used here, and in reports, instead of the term "use". Attendance figures are used for projections, "demand" curves, etc. These figures are measures of use where demand and supply are not separated (Stevens and Bollman, 1966).

Before we go into a description and evaluation of different methods, it should be repeated again that opinion differs among experts on the usefulness of the various methods. As was said before, no method is yet generally accepted. The description of the methods cannot be given in detail; they are summarized here to inform the reader of their existence (see also Part II).

- Gross Expenditure Method

This method usually measures the total expenditure per year on recreation or per trip. The total amount is often sub-divided into cost of travel, equipment and expenses on site. The method is widely used, and the results - total expenditure - are often impressive. The United States 1965 National Survey of Fishing and Hunting (USFWS, 1966; see questionnaire, p. 89) gave a total expenditure by sport fishermen of 3 billion dollars (average per fisherman, 103 dollars). The total amount is sub-divided into per cent as follows: auxiliary equipment, 26.9 per cent; fishing equipment, 11 per cent; bait, guides and other, 27.7 per cent; food and lodging, 15.2 per cent; transportation, 14.7 per cent; licences, 2.3 per cent; and privilege fees 2.2 per cent (II. 1.12).

As far as can be seen from recent literature, and from discussion with experts, this method has limited value (Crutchfield, 1965a). It can be used for assessing the impact of the development or loss of sport fishing activities in particular local areas (Crutchfield, 1965, a, b) such as some tourist projects. It is valuable as an indicator of money spent on different types of outdoor recreation, but it must be remembered that the values are a function of methods used and type of supply.

The method has been widely used, but the results have had very little effect on decisions of primary benefit (Crutchfield, 1965, a, b). Some of the most important restrictions should be mentioned:

(a) The method does not give a net increase in value over and above what would occur in the absence of a particular recreation opportunity or from an increase in a particular sport fishing opportunity. It is only a net benefit that can be compared consistently with net benefits from competing uses of land and water (Knetsch, 1966; Crutchfield, 1965b).

(b) The method does not reflect changes in recreational opportunity, e.g. supply, partly because the attendance expenditures do not separate demand and supply, and do not reflect the price-quantity relationship, which lie behind demand curves (Bollman, 1967).

If we use only gross expenditure data for an evaluation of primary benefit, we can come to stupid conclusions like "the further away the fish are, the harder and more expensive it is to get there, the more they are worth" (Crutchfield, 1965a).

As a conclusion, one can say that the gross expenditure method will be used less in the future because of its limited application for net benefit studies, and its reliance on operational definitions of used methods and types of supply.

Readers interested in further studies could examine relevant parts of Part II and studies by Crutchfield (1965, a, b; 1962) and by the group at the Department of Agricultural Economics, Experimental Station, University of California, Berkeley (Bollman, 1967; Stevens and Bollman, 1966).

- Market Value of the Fish Caught

The assumption behind this method is that the recreation benefit (resource value, etc.) is the same as the market value of the fish caught (Knetsch and Davis, 1966).

The basic assumption that the fish alone are the primary objective of the recreation activity or process is very misleading (Clawson, 1965).

It is argued by some that measures of market value give a minimum value to the resource. This method is seldom used independently of other methods. The recreational value is, for example, for a high quality site, many times higher than the flesh value (II. 3.1).

It has also been argued that evaluation of catch is a sound and practical method for comparing commercial and sport fishery benefits. This is, of course, not true for several reasons; one is illustrated in the basic assumption described above; another one is that some sport fish species are usually not marketed commercially (Knetsch and Davis, 1966).

For the reasons given above, the use of a multiple of this market value is not recommended, e.g. that a 1,000 dollars' commercial catch is worth 10,000 dollars in recreational use.

- Generation Cost

According to this method, the value of the recreation resource is assumed to be equal to the cost of generating it or a multiple of these costs.

This is a very odd method, of little use in economic evaluation. It has several limitations as it does not measure consumer expenditure or willingness to pay in any useful sense. It is useless to evaluate the loss of recreation opportunities or the effects of alternative projects or investments (Knetsch and Davis, 1966).

- Market Value of the Fishing Water

This type of evaluation has many forms. Charges or unit values based on net cost or supply income are multiplied by actual or expected attendance figures. This simplified method is used in evaluating recreation on the federal level in the United States (White, 1965; II.2.9). It simulates the price-quality relation of demand and supply curves in a simple manner with a basic estimate of water quality and proper unit value, e.g. technical directions are given in U.S.A. Senate Document No. 97, Supplement 1 (White, 1965), from which we can quote: "In the general absence of market prices, values for specified recreational activities may be derived or estimated on the basis of a simulated market giving weight to all pertinent considerations, including charges that recreationists should be willing to pay, and to any actual charges being paid by users for comparable opportunities at other installations or on the basis of justifiable alternative cost".

These directions are looked upon as interim. A discussion of these problems is found in II. 2.9, and in a paper by Stevens and Bollman (1966).

One form of this method is to evaluate a resource by its market value given in auction or bids in different forms. This type of pricing is more common in Europe and Canada (Spargo, 1965), and probably much more common for hunting than for fishing.

The method in all its forms is based on the economically sound principle "willingness to pay" in the choice of recreational resource and added activities.

Some more or less important objections are often mentioned, e.g. that the recreation market is commercial only to a small degree. This stands for both state- and privately owned areas. The two types of area are not always comparable, so values used from private areas are not often applicable to state areas (Knetsch and Davis, 1966).

Unit values are not sensitive enough to the important distance variable (distance between consumer and resource) and to variation in quality (Knetsch and Davis, 1966).

- Direct and Indirect Methods Based on Willingness to Pay

As was said in the case of the method dealing with the market value of the fishing water, the main objective of evaluation is to study net benefits and to measure the total willingness to pay by consumers of outdoor recreation services as though these consumers were purchasing the services in an open market.

What we try to measure as a basis for our planning decisions are the concurrent and future demands, in statistical terms, the area under the demand curve.

Two types of evaluation methods have been developed - the direct and indirect methods.

(a) Direct methods

Interviews and surveys are direct methods to test the willingness to pay for specific outdoor recreation services like sport fishing. Usually, several important background variables are studied, e.g. income, age, family structure and distribution of expenditure. As a description, we can cite Knetsch and Davis (1966): "The essence of the interview method for measuring recreation benefits is that through a properly constructed interview approach one can elicit from recreationists, information concerning the maximum price they would pay in order to avoid being deprived of the use of a particular area for whatever use they may make of it".

The problem as mentioned earlier is to develop methods with an acceptable level of reliability (is the reported price close to the true willingness-to-pay level?) and predictive validity (are the variables measured correlated with the recreational behaviour variables, choice of site, attendance frequency, etc.?).

Until recently, economists have been sceptical of the direct method (Crutchfield, 1965b) but studies, primarily by the Davis group of Resources for the Future Inc. (see Appendix A), have given many promising results, and the attitude is now positive. The Canadian Department of Fisheries (Spargo, 1965) has also made important contributions in this regard.

Detailed examples of the proper techniques can be found in Davis (1963), for example, and Knetsch and Davis (1966)<sup>1</sup>. In the latter report a very interesting comparison is made between direct and indirect measurement.

<sup>1</sup> The rapporteur has, in co-operation with the EIFAC Secretariat, started to collect examples of different kinds of useful methods aiming at the creation of an information bank of methodology.

The discussion of the usefulness of the direct methods in measuring recreation has only been going on for a few years. It is difficult and perhaps too early to summarise the discussion. Nevertheless, the most important arguments are given below. The interested reader can find more on this subject in Part II of this report and in suggested literature.

As the method is designed to measure the willingness to pay and the net benefit, it has a sound theoretical basis. Some of its limitations are:

- it is more expensive than the indirect method;
- it gives a poor separation in cases of multiple use, alternative choice, etc. (Crutchfield, 1965a);
- it understates systematically the real economic contribution of fish, wildlife, and the activities associated with it (Crutchfield, 1965a), (incidentally, this is also relevant for the indirect method) and
- it does not clearly differentiate between demand and supply when figures are used for prediction.

This so-called identification problem is relevant to all methods (Bollman, 1967).

With respect to the last problem a discussion of Knetsch and Davis (1966) should be mentioned. In their view, no method in use is able to measure option demand (demand from individuals who are not now consumers or are not now consuming as much as they anticipate consuming, and who therefore would be willing to pay to perpetuate the availability of the commodities) and the opportunity effect (derives from those unanticipated increases in demand caused by new methods or by improving the opportunities to engage in a recreational activity, and thereby acquainting consumers with new and different sets of opportunities to which they adapt through learning processes). This last process was analysed by Bollman (1967) when discussing taste formation as an implication for formal dynamic demand theory. The responses to new goods like ski-ing, spearfishing, snowmobiling, etc., are likened to the spread of an infectious disease. The epidemic model states that the growth is sigmoid rather than linear.

#### (b) Indirect methods

The indirect methods use the distance variable, e.g. travel distance or travel costs incurred by visitors coming from various distances as a proxy for a fee or price, and the frequency of visits from these visitors living in areas or zones. "Demand" functions are developed on the assumption that the travel cost variable is highly correlated with the cost attendance relation. In other words, values of travel cost are used to simulate a system of prices and attendance ("demand" functions).

The indirect methods have been widely used, partly because they are simpler and less expensive than the direct methods.

The measurement model is based on suggestions by Hotelling but it is mainly Marion Clawson who has developed the technique for the recreation area (Bollman, 1967). The work of Brown, Singh and Castle in sport fishing is often cited and recommended (Brown et al., 1964).

The interested reader is referred to Part II of this report and to articles by Spargo (1965), Crutchfield (1965b), Knetsch and Davis (1966) and Scott (1965).

The indirect method is a simplified two-factor model with several limitations because, in fact, it tries to reflect a multifactor process. It is, however, especially suitable for hunting and fishing where the demand curves generated are likely to prove more accurate than for multiple-purpose holiday activities (Crutchfield, 1965b).

Among the limitations, some of the most important should be noted:

- Distance and travel time are translated into economic terms. This involves the assumption that “all users of the resource in all areas are completely indifferent to the amount of time involved and to the pleasure of displeasure involved in travel itself” (Crutchfield, 1965b).

It is pointed out that the economic value of time varies systematically with income and type of occupation (Scott, 1965).

Crutchfield (1965b) suggests that complementary information should be provided about socio-economic characteristics of the population actually or potentially available to the site, especially income level and occupation. He also points out that if alternative use (opportunity costs of time) aspects are neglected, the results will give overstatement of elasticity of demand and understatement of the maximum net yield of the fishery.

We must also remember that little consideration is given in this model to differences in quality level (recreational outcome) and physical values of supply. The main criterion is the recreation experienced, therefore it is very important to know about user preferences for sport fishing of varying quality and availability. For an economic estimate it is thereby necessary to know the alternative costs of providing the preferred levels of service.

The problem of choice between alternative fishing sites is of importance for single owners' net benefit. If you have two sites at the same distance, of the same quality, and the interested sport fishermen are fully informed about both, then the income, attendance, etc., of each will be half of the one-site case. If there are differences between the sites, the distribution of attendance will be changed.

Clawson's model (Spargo, 1965) states that the value of a sport fishing area can be ascertained by estimating the maximum returns which would accrue to a sole owner. The fee can be determined at which the returns are maximised.

According to Spargo (1965), Clawson's method seems to be relevant where:

- (i) there are no other close alternatives;
- (ii) alternatives exist, but similar fees are charged;
- (iii) alternatives exist, but sport fishermen (such as foreign visitors) have no knowledge of them;
- (iv) the number of alternatives and their capacity is so small that the influx of sport fishermen (who used to patronise the fishing area now in private hands) has a negative influence on the “quality” of sport fishing at these alternative areas.

A complementary indirect method to Clawson's model is the Alternative Areas Method. This method has not been used much yet in evaluation of recreational benefit. The basic principle is the same as is used in primary benefit evaluation, e.g. hydro-electric power projects, an evaluation of the difference between the cost of production by



one means and the next alternative means. It is a decision-oriented method, as it satisfies the need for data on alternatives in administrators' decision process for priorities.

One of the best known studies is done by Ullman and Volk (1962). Their problem was to predict attendance and benefit at a new reservoir area. With a survey technique they studied persons attending more distant impoundments and whether they would direct their attendance to the new reservoir. Calculations of benefit were made both on travel cost and travel-time savings.

The method, of course, has limitations that are general for the indirect technique. It can be useful in area planning with several distributed recreation projects. It can, also, be useful as giving an upper limit to recreation values. The estimated value of a project cannot exceed the cost of providing these benefits elsewhere.

As a start, interested readers are referred to Spargo (1965).

#### 4. EXAMPLES OF EVALUATION OF RECREATIONAL BEHAVIOUR

The new research material which has appeared in the United States, e.g. the ORRRC studies 1958–62, has had a very significant effect in many respects. The Federal and State administrations have been re-organised, evaluations in the Congress have changed, new institutions have been formed, working instructions and definitions have been adjusted to the new facts, and the local field work has been intensified.

Some instances will be given below. Many detailed examples are given in Part II of this report. The report from the Ottawa Symposium (Canada, 1965) and various number of the SFI Bulletin<sup>1</sup> are recommended to interested readers.

<sup>1</sup> The Sport Fishing Institute, 719-13th Street, N.W., Washington DC, 20005

##### 4.1 Change in Planning Policy and Social Evaluation

Sport fishing, like other recreational activities, has been looked upon as a private activity where taste formation and activity levels were formed according to income, social habits and interest. Serious problems connected with social need, balance of resource use and demand/ supply planning were not recognised until data on structure and trends in outdoor recreation were compiled.

The impressive data published by ORRRC and other institutions have affected all levels concerned. Evaluation and policy have been changed at Congress and Departmental level. The late President Kennedy gave outdoor recreation strong support in his comments to the Congress about the budget plan in 1963 (Norling, 1968).

At the Gulf States Marine Fisheries Commission Meeting in Florida in 1962, Thomas Rice (United States), one of the leading experts in the Fish and Wildlife Service, declared that until then the fishery administration had almost solely been directed towards commercial fishing within administration, economy, laws and research. The new data from ORRRC about sport fishing has changed the picture completely and made it necessary to re-organise the whole system (II.2.23).

##### 4.2 Economic, Social and Tourist Development of Poorly Industrialised Areas with Attractive Fishing Waters

In ORRRC Report 24 on Economic Studies of Outdoor Recreation, examples are given which show that with proper planning of supply, regulations and equipment, a substantial benefit has been noted in areas with good fishing waters (II. 1.7, II. 2.22). The recreational planning of this type of area is very difficult, because both

economic and local social aspects must be considered. One often finds that in spite of a large need for income there is resistance among local groups against the economic and rational use of their water resources. Some think, for example, that the social disturbance can be larger than the economic benefit. In Part II, there is an interesting and important example of the recreational use of the Fort Apache Indian Reservation (II. 2.22).

The planning model developed produces a large amount of recreation, a good income for the tribe, work and responsibilities for the tribal members, which are in line with customs, habits and philosophy of life within the tribe.

Knowledge of planning models taking into consideration these social aspects will be necessary for the planning of recreational resources in Europe, e.g. in Lapland (Northern Scandinavia), Ireland, in several Eastern European States, and other parts of the world (Scudder, 1966). Similar consideration could, also, be used in the eventual change from commercial to sport fishing in inland and sea coastal waters.

Part II of this report and numerous references in Dill (1964) show that sport fishing is very promising for the tourist industry. The demand is increasing very rapidly (II. 3.6), a large number of persons are, or want to be, sport fishermen (U.S. 1962c) and there is a high willingness to pay for fishing opportunities. In addition, net foreign exchange earnings are substantial for countries able to satisfy eager non-national fishermen.

American data show, for instance, that 75 per cent of the United States tourists to Canada want to fish (U.S. 1962c). A large amount of tourist money is spent in connection with sport fishing in countries like Norway, Ireland (II. 3.6) and Yugoslavia (pers. comm.).

In papers dealing with sport or commercial fishing, one finds numerous descriptions of commercial fishermen who have become guides for sport fishermen, using their boats for sea angling.

As was said before, there is a serious lack of information about these structures and trends with respect to fishing tourists in Europe.

#### 4.3 Objective Balance Between Commercial and Recreational Fishing

Economic and social benefits of commercial fishing are fairly well known. In the growing competition over the fishery resources between sport and commercial fishermen, a serious conflict with all its political and emotional disturbances can be predicted. Interested countries, eager to maximise the use of their natural resources for their society, have a moral obligation therefore to evaluate, in a reliable fashion, their inland fisheries.

In some cases where objective evaluations have been performed, sport fishing often had larger national and local benefits than commercial fishing. This is the case for salmon fishing in Eastern Canada (II. 3.1), salmon and trout fishing in England and Scotland (U.K. MAFF, 1961; U.K., 1965, II. 3.2, II. 2.11), and for a large part of inland and coastal fishing in the United States (U.S. 1962o; Crutchfield, 1965a; II. 3.5, II. 2.12).

The evaluation problem is becoming more and more important as the demand for recreation increases, and the commercial inland and coastal fisheries in some parts of Europe are becoming uneconomic, or where fisheries are disappearing altogether with uncontrolled pollution.

The problems are international, as evidenced by the following quotation from Knetsch (1966): "It seems clear that if the increases in demand for outdoor recreation services apparent in the behaviour of American consumers is at all correct, and all of the evidence suggests that it is, then the public welfare is better served by shifting water and other resources from alternative uses to recreation uses. Such use is simply becoming increasingly more valuable. However, such decisions necessitate some assessment of these values."

#### 4.4 Sport Fishing and Water Pollution

The conditions of pollution are changing rapidly. All forms of water use, including sport fishing, will be affected. The problems involved are very complex. So far, few studies have been dealing with sport fishing and pollution. Two important studies are, nevertheless, reported here. One concerns the effect of sport fishing on the conditions of pollution, and the other, the reverse, the effect of pollution on sport fishing.

In a study of a 700-acre reservoir for domestic needs in Missouri (U.S.A.), it was found that a broad spectrum of intensive recreational activities did not endanger the public's health through impairment of its drinking water (Roseberry, 1964). During the period 1958–60, about 291,000 people visited the lake annually. During the summer months, about 22 per cent were sightseeing, 19 per cent picnicking, 16 per cent swimming, 14 per cent fishing, 11 per cent boating, 6 per cent camping, and 4 per cent water ski-ing (8 per cent unclassified).

In another study (Stevens, 1966) methods were developed to study the relation between angler success and sport fishery recreational values. The angler success as a unit of effort was studied with regard to three sport fisheries at Yaquina Bay in Oregon. It was found that a 10 per cent increase in salmon angling success would induce a long-run increase in angling effort of approximately 10 per cent. For bottom fish like sea perch and starry flounder, it was found that angling effort was less responsive to changes in success.

Of special interest in Stevens' treatment of data, e.g. "Demand functions and success 'elasticities' for each fishery were used to estimate the decrease in net economic value associated with a pollution-induced reduction in angling success. The methodology may also apply to evaluation of measures which would increase angling success, such as investment in hatcheries" [(II. 2.19).

#### 4.5 Sport Fishing in Man-Made Lakes

In the long-term planning of outdoor recreation, man-made lakes will play an important rôle. The ORRRC recognized this, and, after evaluation, detailed plans were developed for a high rate use and construction of man-made lakes for recreational purposes (II. 2.12). A well-planned use of man-made lakes can give a very high outcome of recreation, e.g. rod days per acre. Expenditures are high and can be an important source of income for single owners and local areas (II. 1.7).

Many reports have been published about the planning of farm ponds, small and large reservoirs. A fairly large part of the discussion is reflected in various abstracts in this report (II. 2.21).

The research in recreational management of man-made lakes is very important. The principle of multiple use has been developed and refined. Year-round fishing as an accepted rule, at least for warm-water species, is based on ecological research on the large multi-purpose reservoirs of the Tennessee Valley Authority (Stroud, 1966). To

solve the water-use conflicts in recreation, several principles of zoning have been developed in terms of area, time or some combination of these. Recreational use of reservoirs for domestic use with proper planning is not dangerous for public health (see 4.4 and Roseberry, 1964). The production of recreation, e.g. rod days per acre annually, can be very high with modern management principles and catch of 173 lb per acre and 440 fishing trips per acre are reported (Stroud, 1966).

## 5. CONCLUSIONS AND RECOMMENDATIONS

Outdoor recreation is a large and rapidly expanding field of activity, and sport fishing is one of the largest. It has a high value in terms of physical and mental health, and gains strong support in empirical planning at state level.

Expenditure in sport fishing is very great and an important source of income for the owners of the supply, from "natural" to artificial forms like farm ponds and reservoirs.

Sport fishing, as a form of use of our waters, is rapidly gaining a place among the main uses of our waters, e.g. domestic use, industrial use like waste disposal and hydro-power, commercial fishing, and other forms of recreational use such as bathing and boating. In some countries, when conditions are suitable (supply of fish, distance, etc.), sport fishing is often more important than commercial fishing (in economical and social terms) in the use of inland and coastal waters, natural and artificial. In many cases, however, sport and commercial fisheries can co-exist successfully.

One of the main purposes of EIFAC's initiative in encouraging the economic evaluation of sport fisheries is to give interested persons a wealth of information which should promote better understanding of the problems and encourage action in the right direction.

I feel that it is necessary to continue this work and therefore suggest a programme that will guarantee a flow of information to the member countries of EIFAC. The programme is divided into three parts: documentation, research, and co-ordination.

### 5.1 Documentation and Information

An Information Centre should be organised for the European area in collaboration with North American research workers, preferably within the EIFAC Secretariat, to assist member countries on various subjects such as methodology, bibliography for special projects, and to promote contacts with experts.

To ensure the good functioning of this Information Centre, it is suggested that:

- (a) a small working party should, on a continuing basis, collect data on socio-economic evaluation of fishery resources (both commercial and sport), compile literature and prepare excerpts and abstracts;
- (b) meetings and round-table discussions, including North American experts, should be organised to facilitate the exchange of information and experience between countries and experts;
- (c) an Information Magazine, similar to the Sport Fishery Institute (SFI) Bulletin (U.S.A.), or a section of such a magazine, should be devoted to the dissemination of the expanding flow of documentation on this topic;
- (d) contacts should be established with European consumer organization such as sport fishing or tourist associations, and particularly with the Confédération Internationale de la Pêche Sportive (CIPS);

- (e) a simple survey technique should be devised to collect standardised and comparative data on evaluation, use, regulations, etc., and main problems.

## 5.2 Research

Research and field work should be encouraged in general, but particularly in the field of behaviouristic sciences (economics, sociology, psychology, etc.) as this field is lagging behind in the study of recreation and sport fishing.

An interscience team composed of biologists, technicians and social scientists should be formed to pursue research and develop planning models.

## 5.3 Co-ordination

Future studies in recreational fishing in Europe should be co-ordinated with other outdoor recreation economic studies in multiple-use planning studies of commercial fisheries, studies of other use of water resources, studies in management and planning, and studies of man-made lakes.

## AVANT-PROPOS

Afin d'élever le niveau de nutrition et les conditions de vie des populations placées sous sa juridiction, d'améliorer le rendement de la production alimentaire et, en conséquence, la condition des populations rurales, la FAO, depuis longtemps déjà, a pris conscience du fait que le développement des activités découlant de la faune et de son habitat, des loisirs en plein air et des parcs nationaux doivent continuer à bénéficier d'une priorité. Leur importance pour le tourisme devient, en effet, une source très prometteuse de devises étrangères pour plusieurs pays en voie de développement.

La récente Conférence intergouvernementale d'experts sur les bases scientifiques de l'utilisation rationnelle et de la conservation des ressources de la biosphère organisée par l'UNESCO (septembre 1968) a souligné que la faune et son habitat peuvent contribuer à la subsistance humaine en tant que forme complémentaire ou principale de l'utilisation du sol.

La faune aussi importante qu'impressionnante dans certains pays en voie de développement est un attrait touristique qui influe d'une façon notable sur l'arrivée de devises étrangères dans ces pays.

La Commission européenne consultative pour les pêches dans les eaux intérieures (CECPI) dont le but est de favoriser les perfectionnements dans le domaine des pêches dans les eaux intérieures et de conseiller les Etats Membres et la FAO sur les problèmes se rattachant à ces pêches a aussi réalisé que le développement systématique de la faune, particulièrement en ce qui concerne la pêche sportive, contribue à engendrer le développement économique. Pour certains pays, des conditions favorables à la pêche sportive sont d'un grand attrait pour les touristes étrangers, et la pêche sportive est, pour ceux-là, en train de devenir une importante industrie d'exportation. Pour d'autres pays, le développement de la pêche sportive dans des zones peu industrialisées, mais possédant des eaux poissonneuses, amène une meilleure distribution des revenus à l'intérieur du pays même. Le développement de la pêche sportive à l'intérieur d'un pays peut également apporter un bénéfice net à l'économie nationale, stimulant diverses industries auxiliaires, attirant l'attention des autorités sur la nécessité de contrôler la pollution des eaux, outre les avantages récréatifs et sociaux qui en dérivent pour les populations participantes.

Dès la Première Session (Dublin, 1960), les Pays Membres de la CECPI, ayant conscience des valeurs économique et sociale de la pêche sportive, retinrent le thème "Evaluation de la pêche à la ligne au point de vue de l'économie et des loisirs et développement de ce sport" comme étant un ample champ d'intérêt et d'étude. Cependant, ce n'est qu'au cours de sa Quatrième Session (Belgrade, 1966) que l'évaluation économique de la pêche sportive fit l'objet de sérieux débats, bien qu'il en ait été discuté aux Deuxième (Paris, 1962) et Troisième (Scharfling am Mondsee, 1964) Sessions et que des documents aient alors été préparés, notamment une bibliographie partielle sur l'évaluation économique de la pêche sportive et des ressources des pêches (FAO Fish.Circ.(8) (Rev. 1): 20 p., par Wm.A. Dill, 1964) pour la Troisième Session.

Durant la Quatrième Session, le Dr. Ingemar Norling, "University Reader" à "the Graduate School of Social Work and Public Administration", Göteborg, Suède, a été nommé rapporteur des questions ayant trait à la pêche sportive aussi bien sous ses aspects économiques que sociaux.

Le Dr. Norling, en collaboration avec le Secrétariat de la CECPI, a passé en revue la documentation mondiale, la recherche et le travail sur le terrain sur l'évaluation

économique de la pêche sportive. Le rapport qu'il présenta à la Cinquième Session de la CECPI (Rome, 1968) reçut l'approbation immédiate de la Commission, qui recommanda qu'il soit publié en anglais et en français (les deux langues de la CECPI) dans la série des documents techniques, et qu'en outre, il soit largement vulgarisé.

## SECTION I

### 1. INTRODUCTION

Les objectifs de la présente étude étaient l'établissement comme suit: évaluation de l'importance de la pêche sportive sur le plan économique et récréatif, notamment en ce qui concerne l'Europe, y compris:

- (a) étude de la documentation sur ce sujet,
- (b) identification des problèmes à considérer,
- (c) recommandations permettant aux pays intéressés de prendre les décisions en vue de mesurer:
  - (i) les valeurs relatives de la pêche sportive comparées à celles de la pêche commerciale et des autres utilisations de l'eau;
  - (ii) leur valeur pour l'économie nationale.

Après rassemblement et étude de la documentation relative à la pêche sportive et aux loisirs en général, et après avoir établi des contacts avec les chercheurs<sup>1</sup> dans ce domaine dans diverses parties du monde, il s'est révélé que la recherche et l'observation systématique des faits ont été ou sont minimales en Europe. Par contre, aux Etats-Unis et au Canada, on a pu observer une importante quantité de recherche appliquée et d'études sur la terrain au cours de ces 15 dernières années. Cette répartition inégale de la recherche et du rassemblement des données entre l'Europe et l'Amérique du Nord a été reconnue par Dill (1964) quand il établit sa bibliographie sur l'évaluation économique de la pêche sportive et des ressources de la pêche.

<sup>1</sup> Une liste partielle des nom et adresse des experts qui ont apporté à l'auteur une aide importante en mettant à sa disposition publications et correspondance est fournie à l'Annexe A.

Il s'ensuit que les données sur la structure et les tendances de la pêche sportive dans le cadre des activités récréatives de plein air, ainsi que l'analyse des concepts, des mesures et des méthodes sont principalement fondées sur la documentation nord-américaine et sur les contacts personnels de l'auteur avec, notamment, les experts nord-américains. Cette référence particulière aux Etats-Unis et au Canada est donc nécessaires et ne doit pas être considérée comme un problème sérieux. Dans l'étude du comportement récréatif, divers concepts, mesures, méthodes et variables élaborés dans d'autres pays peuvent être utilisés du fait qu'ils appartiennent à la science du comportement et qu'ils ont une application internationale. Il convient de souligner cet aspect, car d'après l'expérience de l'auteur et des experts de la gestion des pêches, les personnes qui ont une connaissance limitée des sciences du comportement tendent à penser que leur pays, leur région ou leur milieu est unique, et que les concepts et les méthodes élaborées ailleurs ne peuvent s'appliquer à leur cas.

Après avoir rassemblé et étudié la documentation sur ce sujet, avoir correspondu et discuté avec des chercheurs, des officiers et des administrateurs des pêches, des biologistes et des experts des questions touristiques, il fut décidé que le présent rapport se composerait de deux sections principales qui seraient complétées par la suite à l'aide d'une version mise à jour de la bibliographie de Dill.

La Section I traite, sous forme abrégée, de l'évaluation économique de la pêche sportive, ainsi que de ses principaux problèmes, concepts, mesures et méthodes. La Section II est une compilation de citations, d'extraits, de conclusions appartenant à des rapports publiés et non publiés et à des articles sur les aspects socio-économiques de la pêche sportive et des ressources des pêches - plusieurs ont été extraits du SFI Bulletin, auquel j'exprime ici mes remerciements. D'autres ont été choisis en consultation avec



certaines des experts figurant à l'Annexe A. La Section II est subdivisée comme suit: données socio-économiques, planification et pêche commerciale et sportive (voir table des matières détaillée page 35).

Les problèmes et les méthodes rencontrés dans l'évaluation économiques de la pêche sportive sont complexes et il n'existe encore aucune méthode d'évaluation généralement acceptée. Il est donc préférable d'étayer la Section I sur une large gamme d'exemples d'évaluation, de planification, de conflits de consommateurs, de politique, d'études socio-économiques, etc., comme pour la Partie II. Cette disposition sera particulièrement utile aux lecteurs qui ne possèdent pas l'expérience des sciences du comportement (économie, sociologie, psychologie, etc.) et qui cherchent à connaître et à rassembler des références importantes sur ce sujet.

Dans le but d'encourager les pays européens à évaluer leur pêche sportive intérieure aussi rapidement que possible, il est nécessaire qu'un courant d'idées soit lancé immédiatement à l'intérieur, et surtout entre les pays. La Section II sera particulièrement utile à cette fin, ainsi que la bibliographie mise à jour, qui devrait comprendre aussi une liste des documents essentiels sélectionnés ayant trait à ce sujet. Des suggestions supplémentaires seront fournies à la fin de la Section I, afin d'accélérer l'échange international d'informations, d'idées et d'expériences.

Il apparaît, d'après la documentation existante et la correspondance de l'auteur avec les experts des Etats-Unis et du Canada, que les principaux problèmes à l'étude peuvent être étudiés sous deux rubriques:

- Définitions, structures, objectifs et tendances de la pêche sportive
- Concepts et méthodes utilisés pour l'évaluation de la pêche sportive et des ressources des pêches

La Section I du présent rapport analyse ces aspects.

## 2. DEFINITIONS, OBJECTIFS, STRUCTURES ET TENDANCES DE LA PECHE SPORTIVE

### 2.1 Définitions et objectifs

La pêche sportive est surtout considérée comme une forme d'activité de plein air, une des formes d'utilisation d'une ressource naturelle, o'est-à-dire l'eau.

Dans les études publiées en Europe et en Amérique du Nord (U.S. 1962b, Sweden 1964) au cours de ces dernières années, le principal objectif de la pêche sportive est récréatif. La pêche sportive, en termes opérationnels (équipement utilisé, etc.), varie selon les pays (U.S. 1962a). Un certain type d'équipement, par exemple le trident ou le filet, est autorisé dans un pays et interdit dans un autre (USFWS, 1966, Sweden, 1968). Ces variations de règlements dépendent probablement des différences affectant la demande, l'offre, la tradition et l'absence d'objectifs empiriques. Cette lacune relativement à la pêche sportive reflète et crée une série de problèmes.

Les conflits entre les différentes formes d'utilisation des eaux de pêche, par exemple pour le commerce et le sport, entre les formes d'utilisation récréatives, par exemple pêche et canotage, et entre les formes d'utilisation récréative et commerciale, par exemple pêche et industrie, ne peuvent être résolus en vue de l'obtention d'un maximum d'avantages économiques et sociaux avant l'établissement de définitions et d'objectifs exacts.

Le terme "récréatif" a revêtu une grande valeur dans la planification moderne des zones récréatives de plein air, notamment en Amérique du Nord et en Suède. Il souligne

les aspects de la consommation, c.à-d. que l'accent passe "du poisson aux personnes" (Clawson, 1965). Les variables du consommateur, c. à-d. les désirs, le fait d'être prêt à payer, la répartition des âges et la formation du goût, auront une grande influence sur les modèles de planification pour l'utilisation des ressources aquatiques; néanmoins, les nombreux problèmes ne peuvent être résolus à l'aide d'un vague concept tel que la récréation. Ce point est illustré par plusieurs exemples dans la Section II (voir 2.2, 2.5, 2.13, 2.26).

Clawson (1968, II.2.24) a effectué une analyse du processus temporel de l'activité récréative (attente, déplacement, sur place, retour, souvenir) et a souligné que ce macro-cercle doit être considéré dans son ensemble pour la planification et l'évaluation, et que les activités récréatives de plain air sur place (micro-cercle) ne constituent qu'une partie, souvent minime, du tout.

Si l'on désire établir des modèles de planification pour le maximum d'avantages et l'utilisation multiple des ressources aquatiques, les aspects du macro-micro cercle sont très importants. Il est possible de fournir une grande quantité d'activités récréatives si les phases importantes telles que l'attente et le souvenir sont prises en considération. Il est assez étrange de constater qu'il est possible d'assurer un divertissement de bonne qualité en satisfaisant les besoins et les fonctions acquises telles que la probabilité de prise ou la perspective d'un bon combat avec le poisson. Dans l'un des modèles de planification, le plan Hazzard (pêche et libération du poisson) est réussi quand il existe une importante demande et un nombre limité de poissons disponibles (c'est souvent le cas des rivières à truites à proximité des centres urbains). Ce plan est largement appliqué aux Etats-Unis (Beall, 1964). Les pêcheurs rejettent souvent les poissons blancs (coarse fish) à l'eau. Ces principes sont semblables aux techniques de simulation telles que le tir au pigeon d'argile ou la chasse avec un appareil photographique. L'important est que les niveaux de divertissement pratiqué puissent être variés par le changement des conditions dans les différentes parties des macro-micro cercles. Il est aussi très important de découvrir ce que les individus peuvent apprendre à aimer (formation du goût), ce qu'ils aiment (ce qui produit le divertissement) et ce qu'ils (ou l'Etat) sont prêts à dépenser dans ce but.

Cet examen montre que le concept de l'expérience du divertissement est très complexe. Il peut être mesuré, comme d'autres activités, en termes monétaires, c. à-d. la dépense et l'acceptation des frais. Mais ces éléments ne peuvent constituer qu'une indication générale de l'activité récréative pratiquée; ils devraient être complétés par des méthodes plus directes de mesure telles que les méthodes modernes psychophysiques.

## 2.2 Structures et tendances de la pêche sportive

### 2.2.1 Nombre de pêcheurs sportifs, niveau d'activité, dépenses, etc.

Les données provenant du Canada, de la Suède, du Royaume-Uni et des Etats-Unis montrent que la pêche sportive est l'un des sports de plein air les plus répandus, sinon le plus répandu, engageant jusqu'à 40 pourcent du total de la population et quelquefois deux tiers de la population masculine de certains districts (y compris tous les niveaux d'activité) (U.S. 1962c; USFWS, 1966; Norling, 1968; la plupart de ces rapports sont résumés en II.1).

La pêche sportive est répartie d'une façon plus équilibrée entre les groupes d'âge que la plupart des autres activités de plein air (U.S. 1962b, Sweden 1964). Aux

Etats-Unis la dernière Etude Nationale de la Chasse et de la Pêche (USFWS, 1966), étendue au groupe d'âge de 9 à 11 ans confirme aussi cette constatation.

Le rapport des sexes varie selon les pays: aux Etats-Unis (USFWS, 1966) et en Suède (Norling, 1968), le nombre de femmes pratiquant la pêche est plus élevé qu'au Canada et au Royaume-Uni (II.1.17, II. 1.2). La pêche familiale est assez répandue aux Etats-Unis (U.S. 1962c, II.2.12) et en Suède (Norling, 1968). Les déplacements des pêcheurs et la pêche touristique, mesurés à partir d'un état des Etats-Unis (USFWS, 1966), des Etats-Unis au Canada (U.S. 1962c), du Royaume-Uni à l'Irlande (Eire, 1966, II. 3.6) et à l'intérieur de la Suède sont très importants.

Si l'on considère la pêche et le nombre de pêcheurs par rapport au niveau des revenus (USFWS, 1966), on constate une répartition assez égale avec des activités légèrement supérieures dans les groupes jouissant de revenus plus élevés. La pêche sportive est donc un sport pratiqué par tous les âges et à tous les niveaux de revenus (Davidson et al., 1966).

La participation à la pêche sportive et à la chasse est plus élevée parmi les personnes vivant dans les zones et les agglomérations rurales que parmi celles qui vivent dans les petites et les grandes villes (USFWS, 1966). Un taux de participation plus élevé est souvent observé dans les zones riches en faune (USFWS, 1966; Norling 1968).

La demande relative aux différents types de pêche est variable. La pêche de la truite et du saumon semble spécialement attrayante (U.S. 1962c; Norling, 1968), tandis que l'intérêt manifesté pour les poissons blancs varie (U.S.1962a; Norling, 1968). L'intérêt pour la pêche à la ligne en mer, qui était assez faible dans de nombreux pays, s'accroît maintenant rapidement (USFWS, 1966; II.3.6).

La valeur économique de la pêche sportive a fait l'objet d'une étude approfondie. Les dépenses brutes des pêcheurs sportifs aux Etats-Unis (USFWS, 1966; II.1.12) et des membres des associations et des clubs de pêche sportive en Suède (Norling, 1968) sont élevées. En 1965, aux Etats-Unis, 28 millions de pêcheurs sportifs ont dépensé une moyenne de 103 dollars chacun, soit un total de près de 3 milliards de dollars. On trouve des résultats semblables dans les études effectuées dans d'autres parties du monde (Opperman, 1965). La répartition des dépenses selon les divers articles est décrite à la section 2.3 (méthode de la dépense brute).

La répartition géographique des dépenses et des recettes occasionnées par la pêche sportive est inégale. Une faible partie seulement se manifeste sur les lieux où l'activité se déroule (Clawson, 1965; II.2.4). Plusieurs études sur l'économie de la pêche sportive par rapport à la pêche commerciale ont montré que les bénéfices économiques et sociaux résultant de la pêche sportive sont plus élevés dans les pêcheries intérieures et côtières, dans les zones proches des centres urbains et celles où les espèces attirantes se trouvent, par exemple la truite et le saumon (II.3.1, U.S. 1962c).

Les effets de la pêche sportive sur la santé mentale n'ont pas été spécifiquement étudiés, mais certains rapports indiquent que la pêche sportive se révèle avoir un effet thérapeutique élevé sur les malades mentaux (II.2.12, II.2.10).

### 2.2.2 Tendances de la pêche sportive

Quelles que soient les mesures utilisées, on constate un mouvement ascendant de la pêche sportive dans les pays où les études ont été effectuées. Le nombre des participants et l'estimation de la demande jusqu'en l'an 2.000

indiquent une multiplication par quatre de la demande relative à la pêche sportive aux Etats-Unis (USFWS, 1966). Une augmentation générale semblable est prévue en Suède pour les activités récréatives de plein air (Norling, 1968).

La demande relative à la pêche à la ligne en mer s'accroît rapidement et absorbers probablement la majeure partie des nouveaux amateurs dans de nombreux pays (USFWS, 1966). Des tendances semblables se révèlent aussi pour la pêche du poisson blanc (USFWS, 1966, II.3.6).

Certaines études de la demande potentielle concernant la pêche sportive ont été faites (voir aussi 2.3, l'examen de la demande de choix "option demand" et des effets des possibilités offertes en liaison avec les méthodes directes). On a constaté aux Etats-Unis (USFWS, 1966) et en Suède (Norling, 1968) que la pêche sportive se classe parmi les estimations les plus élevées en raison du "désir de commencer ou du désir d'en faire plus". Dans une excellente analyse des données sur les loisirs en plein air, le Directeur exécutif du SFI, M. R.H. Stroud (voir l'Annexe A, p.82) a montré que la pêche et la chasse, les sports de plein air traditionnels, représentent des valeurs-clé dans la planification de la récréation de plain air. Elles sont plus ou moins l'objectif final d'activités comme le canotage (l'utilisation des bateaux est liés pour 80 pourcent à la pêche ou à la chasse) et le camping (86 pourcent). Il dit, par exemple, "Il est certain que le rôle du pique-nique en tant qu'objectif principal de récréation reste sujet à de sérieux doutes" (SFI, 1966; II.2.13).

Les données sur les tendances de la pêche sportive sont impressionnantes. Nous pouvons accepter les chiffres donnés ou en douter, et nous pouvons discuter des différentes méthodes utilisées pour mesurer les tendances et les besoins en matière de récréation. Mais si, dans de nombreux pays européens, les tendances se révèlent semblables à celles que l'on peut observer aux Etats-Unis et en Suède, il est sérieusement nécessaire de refaire la planification des pêches intérieures européennes. Ces tendances affecteraient fortement la planification de la pêche touristique et commerciale dans de nombreuses zones, ainsi que la gestion des pêches, l'introduction de nouvelles espèces, d'engins et de règlements nouveaux, etc. Ces problèmes ont été sérieusement examinés dans les rapports Bledisloe (U.K.MAFF, 1961) et Hunter (U.K., 1965) (voir aussi II.3.2 et II.2.11) et dans plusieurs rapports nord-américains (par exemple II.3.1, II.3.3, II.2.12, II.2.15, II.2.23).

Plusieurs facteurs de la société moderne occidentale contribuent à la croissance rapide de la demande de récréation de plein air. Certains facteurs sont souvent mentionnés: nombre supérieur d'heures de loisir, affluence sans précédent, meilleurs moyens de transport, équipement et fournitures nouveaux et de meilleure qualité. A tout ceci viennent s'ajouter une population croissante et une industrie touristique qui se développe rapidement.

### 3. CONCEPTS ET METHODES UTILISES POUR L'EVALUATION DE LA PECHE SPORTIVE ET DES RESSOURCES DES PECHEES

Ce n'est que récemment qu'on a reconnu que les activités récréatives, et la pêche sportive en particulier, représentaient une utilisation vaste et importante des ressources naturelles. Cette prise de conscience tardive est cependant un effet de l'étude systématique du domaine de la récréation.

Ainsi qu'on peut le voir à la section 2.2, les données sur la structure et les tendances sont importantes. Il est parfaitement évident, cependant, qu'une évaluation économique de ces données est nécessaire à une prise de décisions objective.

Presque toutes les études importantes entreprises sur la structure, les tendances et les valeurs ont été préparées au cours des 15 dernières années, comme le montre la bibliographie de Dill (1964). Une grande partie de la récréation de plein air semble s'être développée principalement comme une activité non commerciale, ce qui a retardé la mise au point de méthodes d'évaluation adéquates (Crutchfield, 1965). D'après une sélection des derniers rapports que j'ai pu rassembler, il est évident que nous nous trouvons au centre d'une importante évolution des méthodes d'évaluation. Aucune méthode n'a été jusqu'à présent généralement acceptée (Bollman, 1967) et il reste beaucoup à faire en ce qui concerne le tourisme (Knetsch, 1966) et l'utilisation des lacs de barrage (Jackson, 1966; Stroud, 1966).

### 3.1 Nécessité d'une évaluation économique de la pêche sportive

Les ressources naturelles telles que l'eau répondent à divers besoins. Il existe très souvent une concurrence entre différentes formes de récréation (pêche, natation, chasse, etc.) et entre l'utilisation de l'eau à des fins récréatives et commerciales (évacuation de l'eau, installations hydro-électriques, pêche commerciales, etc.).

Il n'existe pour les bureaux de planification nationale d'autre solution que l'évaluation économique s'ils désirent prendre des décisions objectives, obtenir une utilisation équilibrée des ressources et résoudre les conflits entre les divers groupes se disputant l'eau. L'un des critères acceptés est celui du plus grand avantage pour la société ou le bénéfice net maximum résultant de la jouissance d'un bien commun. Les lecteurs intéressés par ces problèmes et l'évaluation sociale qui leur est liée pourront consulter les articles de Crutchfield (1962, 1965), de Spargo (1965) et divers autres articles figurant dans le rapport du Symposium d'Ottawa sur les aspects économiques de la pêche sportive (Canada, 1965) et Davidson et al. (1966).

### 3.2 Peut-on évaluer une activité récréative telle que la pêche sportive?

Nous devons disposer d'une mesure commune pour cette évaluation. L'échelle monétaire est utilisée pour évaluer d'autres formes d'utilisation de l'eau, par exemple l'utilisation hydro-électrique, et, ainsi qu'il a été dit auparavant, elle peut être employée pour l'évaluation de la pêche sportive.

On oppose de nombreux arguments à l'évaluation d'activités récréatives telles que la pêche sportive. Le plus commun est l'opinion que l'expérience de la récréation de plein air se trouve hors du cadre de l'économie, qu'il s'agit d'une expérience esthétique, psychologique entièrement personnelle, qui ne peut être mesurée.

Il est à la fois erroné et fallacieux de dire que les expériences esthétiques ne peuvent être mesurées par les méthodes économiques et psychologiques. Comme on le verra plus loin, les mesures déterminées par le marché ou indirectement peuvent être utilisées avec un certain degré de précision et de validité. Nous pouvons maintenant, avec une chance considérable de succès, mesurer et prévoir le comportement du pêcheur-consommateur sportif, par exemple, présence, demande et disposition à payer.

La mesure des variables psychologiques (par exemple, pourquoi est-on disposé à payer plus pour ceci que pour cela) est étudiée avec beaucoup moins d'intensité, ce qui signifie aussi que le concept fondamental, la récréation, est médiocrement analysé.

Nos connaissances relatives à l'aspect mental - thérapeutique - des activités récréatives sont très minces, et nous ne possédons que des observations telles que celles qui figurent dans le Rap. 7 ORRRC (U.S. 1962c, II.2.12, II.2.10) au sujet de

l'utilisation fructueuse de la pêche sportive dans des hôpitaux de vétérans (voir aussi 2.21). L'étude de la formation du goût ou du processus d'acquisition dans le cadre des activités récréatives est aussi peu avancée. Nous ne savons pratiquement pas pourquoi et comment nous devenons des pêcheurs sportifs et comment nous adaptons notre comportement à de nouvelles formes de pêche. Cela pose un sérieux problème à l'économiste, du fait que les hypothèses sur la stabilité de l'intérêt, etc., sont indispensables aux modèles de prévision (Bollman, 1967).

L'optique contemporaine adoptée pour ces problèmes est que nous pouvons et nous devons mesurer la pêche sportive en termes économiques descriptifs afin d'obtenir des informations sur les montants, les tendances, etc. Mais il est aussi parfaitement évident que nous devons utiliser des méthodes psychologiques pour mesurer les variables de l'expérience, l'hygiène mentale et les effets thérapeutiques, etc. Les données de ce type ont une grande importance pour l'évaluation sociale et politique du bénéfice récréatif.

L'impression générale de la documentation étudiée est que l'usage de la méthode d'approche orientée vers l'offre (stocks, gestion) est abandonnée en faveur de l'étude en termes économiques du comportement ou de la demande du consommateur. Nous devons souligner le rôle du consommateur dans l'utilisation récréative des ressources nationales, point auquel l'économiste doit céder le pas à d'autres chercheurs sociaux. Ce changement affectant les objectifs qui passent des études d'offre aux études de demande est vivement souligné dans les Rapports ORRRC et le Symposium d'Ottawa de 1965 (Canada, 1965). D'après ces rapports, il est évident que le groupe des experts manifestant un intérêt actif pour ces études est, nécessairement, en train de s'élargir pour inclure non seulement des biologistes et des économistes-techniciens, mais aussi des psychologues, des éducateurs, des sociologues, etc.

La dernière partie de l'exposé principal prononcé au Symposium d'Ottawa par Marion Clawson (1965) montre l'importance de ces tendances: "Le problème des individus dans le cadre de la pêche se déplacera de plus en plus du poisson vers l'individu - comment éduquer, aider, guider et satisfaire au mieux l'homme disposant de loisirs et cherchant à pêcher. Ceci imposera inévitablement des charges nouvelles et différentes aux chercheurs comme aux gérants. Que l'on accueille ces changements avec plaisir ou qu'on les considère avec regret, les problèmes seront plus facilement résolus s'ils sont prévus et traités à mesure qu'ils se présentent."

### 3.3 Méthodes d'évaluation économique des pêches sportives<sup>1</sup>

<sup>1</sup> Deux échantillons de questionnaire sont fournis à l'Annexe B, p.83.

La planification de l'utilisation récréative des ressources naturelles est plus ou moins basée sur des estimations subjectives de l'offre et de la demande. Les méthodes d'évaluation suivantes traitent principalement des utilisateurs ou de la demande.

Il convient de souligner dès le début que la plupart des méthodes décrites sont fondées sur la théorie du comportement de la demande, mais que le terme "demande" est utilisé ici et dans les rapports à la place du mot "utilisation". Les chiffres de présences sont utilisés pour des projections, des courbes de demande, etc. Ces chiffres sont des mesures d'utilisation où l'offre et la demande ne sont pas séparées (Stevens et Bollman, 1966).

Avant d'entreprendre une description et une évaluation des différentes méthodes, il convient de répéter que les experts ne sont pas d'accord sur l'utilité des diverses

méthodes. Comme on l'a dit plus haut, aucune méthode n'a été jusqu' à présent généralement acceptée. La description des méthodes ne peut être faite en détail, elles ne sont résumées ici que pour faire connaître leur existence au lecteur (voir aussi Section II).

- Méthode des dépenses brutes

Cette méthode sert généralement à mesurer les dépenses totales annuelles consacrées aux activités récréatives ou à chaque déplacement. Le montant total est souvent divisé en frais de déplacement, d'équipement, et en dépenses sur place. La méthode est largement utilisée, et les résultats - la dépense totale - sont souvent impressionnants. L'Etude Nationale de la Pêche et de la Chasse aux Etats-Unis pour 1965 (USFWS, 1966; voir questionnaire) indique un chiffre total de dépenses de la part des pêcheurs sportifs de l'ordre de 3 milliards de dollars (dépense individuelle moyenne 103 dollars). Le montant total se répartit comme suit en pourcentage; équipement auxiliaire, 26,9 pourcent; équipement de pêche, 11 pourcent; appâts, guides et autres, 27,7 pourcent; nourriture et logement, 15,2 pourcent; transport, 14,7 pourcent; permis, 2,3 pourcent; droit de pêche, 2,2 pourcent (II.1.12).

Pour autant que le laissent entrevoir la documentation récente et les discussions avec les experts, cette méthode a une valeur limitée (Crutchfield, 1965a). Elle peut être utilisée pour évaluer les conséquences du développement ou de la baisse de la pêche sportive dans des zones localisées (Crutchfield, 1965,a,b) comme par exemple certains projets de tourisme. Elle est précieuse en tant que moyen d'indication des sommes dépensées pour différents types d'activités récréatives de plein air, mais il convient de se souvenir que les valeurs sont une fonction des méthodes utilisées et des types d'offre.

La méthode a été largement utilisée, mais les résultats ont eu très peu d'effet sur les décisions se rapportant aux gains primaires (Crutchfield, 1965,a,b). Il convient de mentionner certaines des restrictions les plus importantes:

(a) La méthode ne fournit pas un accroissement net de valeur au-delà de ce que l'on trouverait en l'absence d'une occasion particulière de loisir ou d'un accroissement dans une occasion particulière de pêche sportive. Ce n'est qu'un bénéfice net qui peut être comparé de façon significative avec les bénéfices nets découlant de l'utilisation concurrentielle de la terre et de l'eau (Knetsch, 1966; Crutchfield, 1965b).

(b) La méthode ne reflète pas les changements d'opportunités récréatives, par exemple l'offre, en partie parce que les dépenses de présence ne différencient pas demande et offre, et ne réfléchissent pas le rapport prix-quantité, qui se trouve derrière les courbes de demande (Bollman, 1967).

Si nous utilisons seulement les données sur les dépenses brutes pour une évaluation du bénéfice primaire, nous pouvons en arriver à des conclusions aberrantes, telles que "plus le poisson est loin, plus il est difficile et coûteux d'y arriver, plus il a de valeur" (Crutchfield, 1965a).

A titre de conclusion, on peut dire que la méthode des dépenses brutes sera moins utilisée à l'avenir en raison de son application limitée aux études de profits nets et de la part qu'elle accorde aux définitions opérationnelles des méthodes utilisées et des types d'offre.

Les lecteurs intéressés par d'autres études peuvent consulter les parties adéquates de la Section II, des études de Crutchfield, 1965,a,b; 1962) et celles du

groupe du Département de l'Economic Agricole, Station Expérimentale, Université de Californie, Berkeley (Bollman, 1967; Stevens et Bollman, 1966).

- Valeur marchande des prises de poisson

Cette méthode est fondée sur une hypothèse suivant laquelle la valeur récréative (la valeur "ressource", etc.) est identique à la valeur marchande des prises de poisson (Knetsch et Davis, 1966).

L'hypothèse fondamentale suivant laquelle seul le poisson est l'objectif principal de l'activité ou du processus récréatif est très trompeuse (Clawson, 1965).

Quelques chercheurs estiment que la mesure de la valeur marchande attribue une valeur minimum à la ressource. Cette méthode est rarement utilisée indépendamment des autres méthodes. La valeur récréative appliquée, notamment, à un site particulièrement agréable dépasse de beaucoup la valeur de la chair du poisson (II.3.1).

On a également souligné que l'évaluation des prises est une méthode judicieuse et pratique lorsque l'on compare les profits de la pêche commerciale et sportive. Cela n'est évidemment pas vrai pour différentes raisons: l'une d'elles est illustrée dans l'hypothèse décrite ci-dessus; une autre repose sur le fait que les produits de la pêche sportive ne sont généralement pas commercialisés (Knetsch et Davis, 1966).

Pour ces raisons, il n'est pas judicieux d'utiliser un multiple de la valeur marchande en établissant, par exemple, qu'une prise commerciale de 1.000 dollars représente une valeur récréative de 10.000 dollars.

- Coût de création (Generation cost)

Sur la base de cette méthode, la valeur de la ressource récréative est considérée égale au coût de génération ou à un multiple de ce coût.

C'est là une méthode très étrange, et d'une utilisation restreinte dans le domaine de l'évaluation économique. Elle est limitée notamment en ce qu'elle ne tient compte ni de la dépense du consommateur ni du fait qu'il est prêt à encourir la dépense. Il est inutile d'évaluer la perte d'occasions récréatives ou les effets de projets ou d'investissements alternatifs (Knetsch et Davis, 1966).

- Valeur marchande du terrain de pêche

Ce type d'évaluation revêt des formes variées. Les frais ou valeurs unitaires fondés sur le coût net ou les recettes réalisées sur les fournitures sont multipliés par le nombre réel ou estimé de présences. Cette méthode est utilisée pour évaluer les activités récréatives, au niveau fédéral, aux Etats-Unis (White, 1965; II.2.9). On y retrouve la relation prix-qualité des courbes de l'offre et de la demande ainsi qu'une évaluation fondamentale de la qualité de l'eau aussi bien qu'une valeur unitaire convenable. Par exemple, des indications techniques sont données dans le Document No. 97, Supplément 1 du Sénat des Etats-Unis d'Amérique (White, 1965), où nous pouvons lire "En l'absence total de prix du marché, la valeur de certaines activités récréatives peut être déduite ou estimée sur la base d'un marché fictif tenant compte de toutes les considérations opportunes, y compris les frais que les individus s'adonnant à cette activité sont disposés à encourir, ainsi que de toutes les dépenses effectivement encourues par les utilisateurs d'installations comparables ou encore sur la base de frais alternatifs dûment justifiés".



Ces directives sont considérées comme transitoires. Une discussion de ces problèmes figure au paragraphe II.2.9 et dans une communication de Stevens et Bollman (1966).

L'une des formes prises par cette méthode consiste dans l'évaluation d'une ressource sur la base de sa valeur marchande à la crie ou sur toutes sortes d'offres. Ce type d'évaluation est le plus fréquent en Europe et au Canada (Spargo, 1965) et s'applique sans doute davantage à la chasse qu'à la pêche.

Cette méthode se fonde entièrement sur le principe économiquement valable de la "volonté de payer" pour une activité récréative et pour les activités connexes.

Certaines objections sont parfois avancées, ainsi le marché récréatif ne serait commercial que dans une faible mesure. Cela est vrai tant pour les propriétés de l'Etat que de particuliers. Les deux régimes ne sont pas toujours comparables et les valeurs appliquées dans le domaine privé ne sont pas toujours utilisables dans le domaine public (Knetsch et Davis, 1966).

Les valeurs unitaires ne sont pas suffisamment sensibles par rapport aux importantes variables de distance (distance entre consommateur et ressource) et aux variations de qualité (Knetsch et Davis, 1966).

- Méthodes directes et indirectes fondées sur la volonté de payer

Ainsi qu'on l'a vu pour la méthode tenant compte de la valeur marchande des lieux de pêche, l'objectif principal de l'évaluation réside dans l'étude du profit net et dans la mesure de la volonté de payer démontrée par les consommateurs de services récréatifs en plein air, comme si ces consommateurs se procuraient les services d'un marché ouvert.

Ce que nous cherchons à mesurer pour constituer la base de nos décisions de programme ce sont les desiderata concomitants et futurs, en termes statistiques, de la superficie limitée par la courbe de demande.

Deux séries de méthodes d'évaluation ont été mises au point - les méthodes directes et indirectes.

(a) Méthodes directes

Les consultations et enquêtes sont des méthodes directes destinées à établir la volonté de payer pour obtenir des services récréatifs en plein air comme la pêche sportive. En général, différentes variables importantes sont examinées: revenus, âge, structure familiale et répartition des dépenses. Nous citerons la description de Knetsch et Davis (1966): "L'importance de la méthode de consultation pour mesurer des bénéfices récréatifs réside essentiellement dans le fait que par une conception appropriée de l'enquête il nous est possible d'obtenir des informations sur le maximum que des individus recherchant une activité récréative sont disposés à payer pour ne pas être privés de l'utilisation d'un domaine donné, quel que soit l'usage qu'ils en font".

Le problème, qui a été mentionné ci-dessus, consiste à mettre au point des méthodes suffisamment précises (le prix rapporté est-il assez proche du prix que l'on accepte effectivement de payer?) et permettant des prévisions valables (les variables mesurées présentent-elles une corrélation avec les variables du comportement récréatif, choix du site, fréquence de la présence, etc?).

Jusqu'à une date récente, les économistes ont affiché un certain scepticisme quant à la méthode directe (Crutchfield, 1965b), mais des études, effectuées notamment

par l'équipe de Davis "Resources for the Future, Inc." (Annexe A) ayant donné des résultats prometteurs, leur attitude est devenue positive. Le Département canadien des Pêcheries (Spargo, 1965) a également apporté une importante contribution à cet égard.

On trouvera notamment chez Davis (1963) et Knetsch et Davis (1966) des exemples détaillés concernant les techniques appropriées<sup>1</sup>. Le rapport de Knetsch et Davis donne une intéressante comparaison entre mesures directes et indirectes.

<sup>1</sup> Le rapporteur, en liaison avec le Secrétariat de la CECPI, a commencé à recueillir des exemples de différentes méthodes utiles en vue de la création d'une banque d'information en matière de méthodologie.

La discussion relative à l'utilité des méthodes directes pour la mesure des activités récréatives n'est ouverte que depuis quelques années. Il est difficile et peut-être prématuré de la récapituler. Toutefois, nous reproduisons ci-dessous les principaux arguments avancés. Le lecteur intéressé trouvera de plus amples détails dans la Section II du présent rapport et dans la documentation proposée.

La méthode étant destinée à mesurer la volonté de payer ainsi que le profit net, elle repose sur une base théorique saine. Elle est toutefois limitée par les éléments suivants:

- elle est plus onéreuse que la méthode indirecte;
- elle ne permet pas de distinction précise dans les cas d'usage multiple, d'alternative, etc. (Crutchfield, 1965a);
- elle sous-estime systématiquement la contribution économique effective du poisson, du gibier et les activités qui leur sont associées (Crutchfield, 1965a) (incidemment, cela s'applique aussi à la méthode indirecte); enfin,
- elle ne permet pas de distinguer clairement l'offre de la demande lorsque les chiffres sont utilisés aux fins de projection.

Ce problème, dit d'identification, concerne toutes les méthodes (Bollman, 1967).

Pour ce qui est du dernier problème signalé, il convient de mentionner une discussion conduite par Knetsch et Davis (1966). A leur avis, aucune méthode existante ne permet de mesurer la demande optionnelle (c'est-à-dire la demande d'individus qui ne sont pas actuellement consommateurs ou qui ne consomment pas présentement autant qu'ils envisagent de consommer et qui, par conséquent, accepteraient de payer pour assurer la disponibilité continue des produits) ni l'effet occasionnel (qui dérive des augmentations imprévisibles provoquées par des méthodes nouvelles ou par l'amélioration des possibilités de participation à une activité récréative, ce qui permet de faire connaître aux consommateurs des séries nouvelles et différentes de possibilités auxquelles ils pourront s'adapter à la suite d'un processus de formation). Ce dernier a été analysé par Bollman lors de sa discussion sur la formation des goûts en tant qu'élément de la théorie dynamique de la demande. Les réponses à de nouvelles opportunités comme le ski, la pêche au trident, la luge motorisée (snowmobile), etc., sont comparées à la dissémination d'une maladie contagieuse. Le modèle épidémique suggère que la croissance est de type sigmoïde plutôt que linéaire.

#### (b) Méthodes indirectes

Les méthodes indirectes utilisent la variable de distance, c'est-à-dire la distance d'un voyage, ou les frais de voyage encourus par des visiteurs ayant parcouru des distances variables et tenant lieu de prix ou de dépenses, la fréquence de ces visites de la part de voyageurs vivant dans des régions ou zones données. Des fonctions de la "demande" sont établies compte tenu de l'hypothèse suivant laquelle la variable

représentant le coût du voyage est étroitement liée au rapport de coût-fréquence. En d'autres termes, les valeurs de frais de voyage sont utilisées pour simuler un système de prix et de présence (fonctions de "demande").

Les méthodes indirectes ont été largement utilisées, notamment du fait qu'elles sont plus simples et moins onéreuses que les méthodes directes.

Le modèle de mesure se fonde sur des suggestions de Hotelling mais c'est principalement Marion Clawson qui a mis au point la technique relative à la région récréative (Bollman, 1967). Les travaux de Brown, Singh et Castle sur la pêche sportive sont fréquemment cités et recommandés (Brown et al., 1964).

La lecteur intéressé est invité à se référer à la Section II du présent rapport et aux articles de Spargo (1965), Crutchfield (1965b), Knetsch et Davis (1966) et Scott (1965).

La méthode indirects consiste en un modèle simplifié fondé sur deux facteurs et comportant de nombreuses limitations du fait qu'elle tente en réalité de refléter un processus complexe. Elle est toutefois particulièrement appropriée à la chasse et à la pêche pour lesquelles les courbes de demande sont probablement plus exactes que pour des activités récréatives complexes (Crutchfield, 1965b).

Parmi les principales limitations, il convient de noter:

- la distance et la durée du voyage traduites en termes économiques. Cela implique l'hypothèse que "tous les utilisateurs de la ressource dans toutes les régions sont indifférents au temps mis et au plaisir ou au désagrément lié au voyage lui-même" (Crutchfield, 1965b).

Il convient de noter que la valeur économique du temps varie systématiquement avec le revenu et le type d'occupation (Scott, 1965).

Crutchfield (1965b) suggère que des informations complémentaires devraient être fournies sur les caractéristiques socio-économiques de la population actuellement et potentiellement disponible pour un site donné, et notamment sur le groupe de revenu et sur les occupations. Il souligne en outre que si l'on fait abstraction des utilisations alternatives (coûts relatifs aux occasions de temps), les résultats constitueront une surestimation de l'élasticité de la demande et une sous-estimation du produit maximum net de la pêche.

Il convient également de rappeler que la place accordée dans le présent modèle aux différences de qualité (profit récréatif) et à la valeur physique de l'objet fourni est faible. Le principal critère étant celui du plaisir dérivé de l'activité il importe de connaître les préférences du consommateur en matière de qualité et de disponibilité de pêcheries sportives. Aux fins d'évaluation économique, il est par conséquent nécessaire de connaître les coûts comparés de différents niveaux de services, dans l'ordre des préférences.

Le problème du choix différents sites de pêche présente une certaine importance pour le bénéfice de chaque propriétaire de ces terrains. Si l'on dispose de deux terrains situés à la même distance, de la même qualité - les pêcheurs sportifs étant parfaitement informés de ces deux aspects - le revenu et le nombre de pêcheurs présents sera pour chacun des deux sites la moitié de ce qu'il serait pour un seul site présentant ces caractéristiques. Si l'on constate des différences entre les sites, la répartition des présences variera.

Le modèle de Clawson (Spargo, 1965) indique que la valeur d'une sone de pêche sportive peut être déterminée en évaluant le bénéfice maximum qu'un propriétaire unique pourrait en tirer. Le montant du droit peut être déterminé en fonction du revenu maximum.

D'après Spargo (1965), la méthode de Clawson serait valable dans les cas suivants:

- (i) lorsqu'aucune autre alternative n'existe;
- (ii) lorsque des alternatives existent, mais que le droit perçu est le même;
- (iii) lorsque des alternatives existent, mais que les pêcheurs sportifs étrangers (visiteurs) n'en ont pas connaissance;
- (iv) lorsque le nombre d'alternatives est si limité et leur capacité si restreinte que l'afflux de pêcheurs sportifs, qui avaient l'habitude de pêcher dans la région devenue propriété privée, influe défavorablement sur la qualité de la pêche sportive dans ces domaines alternatifs.

La Méthode des zones alternatives est complémentaire du modèle de Clawson. Il s'agit d'une méthode indirecte qui n'a pas été fréquemment utilisée pour l'évaluation des profits récréatifs. Le principe fondamental en est identique, celui qui est appliqué pour l'évaluation des bénéfices primaires (notamment pour les projets concernant l'énergie hydro-électrique), et permet d'évaluer la différence des coûts de production par deux moyens différents mais voisins. Il s'agit d'une méthode orientée vers la prise de décisions, du fait qu'elle satisfait le besoin qu'ont les administrateurs prenant une décision de disposer de données sur des alternatives possibles, compte tenu de certaines priorités.

L'une des études les mieux connues a été faite par Ullman et Volk (1962). Ils ont éprouvé certaines difficultés à prévoir le nombre d'individus présents, ainsi que le profit devant provenir d'une nouvelle zone de réservoir. Conformément à une technique d'étude, ils ont examiné le cas des individus fréquentant les terrains de pêche les plus éloignés et ont cherché à déterminer dans quels cas les individus se dirigeraient vers le nouveau réservoir. Ils ont déterminé le profit, tant sur la base des frais de voyage que de l'économie sur la durée du trajet.

Il est évident que cette méthode a ses limitations, qui sont en général valables pour toutes les méthodes indirectes. Elle présente toutefois une certaine utilité à l'occasion d'une programmation d'ensemble pour une région donnée, destinée à bénéficier de plusieurs projets récréatifs. Elle peut également permettre de déterminer la limite maximum des valeurs éeérestives. La valeur estimative d'un projet ne peut excéder le coût des mêmes avantages fournis ailleurs.

Les lecteurs intéressés pourront utilement se référer à Spargo (1965).

#### 4. EXEMPLES D'EVALUATION D'UN COMPORTEMENT RECREATIF

Les nouvelles données publiées aux Etats-Unis, notamment les études de l'ORRRC (1958-62) ont eu un effet intéressant dans de nombreux domaines. L'administration fédérale et celle des Etats ont été réorganisées, les évaluations du Congrès ont varié, de nouvelles institutions ont été créées, les instructions pratiques et les définitions ont été adaptées aux faits nouveaux et les activités sur le terrain à l'échelon local ont été intensifiées.

On trouvera ci-après un certain nombre d'exemples. D'autres exemples, plus détaillés, figurent à la Section II du présent rapport. Le rapport du Symposium d'Ottawa (Canada, 1965) ainsi que différents numéros du SFI Bulletin<sup>1</sup> sont recommandés à l'attention du lecteur intéressé.

<sup>1</sup> The Sport Fishing Institute, 719-13th Street, N.W., Washington DC, 20005

#### 4.1 Modification de la politique en matière de planning et évaluation du point de vue social

La pêche sportive, ainsi que d'autres activités récréatives, a été considérée comme une activité privée; la formation des goûts et des niveaux d'activité étant fonction des revenus, des habitudes sociales et de l'intérêt. Les problèmes importants liés aux impératifs sociaux, l'équilibre en matière d'utilisation des ressources et la planification de l'offre et de la demande n'ont pas été reconnus tant que les données relatives à la structure et aux tendances en matière d'activités de plein air n'ont pas été compilées.

Le matériel impressionnant publié par l'ORRRC et d'autres institutions a affecté tous les groupes en cause. L'évaluation et la politique ont évolué au niveau du Congrès et des Ministères. Le feu président Kennedy a vivement encouragé les activités récréatives en plein air dans ses commentaires au Congrès relatifs au Projet de Budget pour 1963 (Norling, 1968).

Lors de la réunion de la "Golf States Marine Fisheries Commission", tenue en Florida en 1962, Thomas Rice (Etats-Unis), l'un des meilleurs experts du "Fish and Wildlife Service", a déclaré que jusqu' alors l'Administration des Pêches avait été orientée presque uniquement vers la pêche commerciale dans les domaines de l'administration, de l'économie, de la législation et de la recherche. Les nouvelles données fournies par l'ORRRC sur la pêche sportive ont complètement modifié les choses et rendu indispensable la réorganisation de tout le système (II. 2.23).

#### 4.2 Développement économique, social et touristique des zones peu industrialisées disposant d'eaux piscicoles attrayantes

Dans le Rapport No. 24 de l'ORRRC sur l'étude économique des activités récréatives en plein air, on trouve des exemples dont il ressort qu'une planification convenable en matière d'offre, de règlements et de matériel, permet un profit considérable dans les régions disposant de bonnes eaux piscicoles (II. 1.7, II.2.22). La programmation des activités récréatives dans ce genre de région est difficile, du fait que les aspects économiques et sociaux doivent être pris en considération. On note fréquemment que malgré un besoin pressant de revenus, les groupements locaux opposent une certaine résistance à l'utilisation économique et rationnelle de leurs ressources aquatiques. Certains sont d'avis notamment que les désagréments sociaux dépassent le profit économique. Dans la Section II on trouvera un exemple intéressant et important concernant l'utilisation à des fins récréatives de la Réserve Indienne de Fort Apache (II.2.22).

Le modèle de programmation établi a pour effet une importante activité récréative, des recettes importantes pour la tribu, du travail et des responsabilités pour les membres de la tribu, activités conformes aux coutumes, aux habitudes et à la philosophie de vie de la tribu.

La connaissance des modèles de programmation tenant compte de ces aspects sociaux sera nécessaire pour la programmation des ressources récréatives de l'Europe, par exemple en Laponie (Scandinavie septentrionale), en Irlande, dans différents Etats d'Europe orientale et dans d'autres parties du monde (Scudder, 1966). Des

considérations similaires pourraient être appliquées à l'occasion d'un passage éventuel de la pêche commerciale à la pêche sportive dans les eaux intérieures et côtières.

La Section II du présent rapport et de nombreuses références de Dill (1964) montrent que la pêche sportive est très prometteuse dans le domaine de l'industrie touristique. La demande est en augmentation rapide (II.3.6), de nombreux individus s'adonnent à la pêche sportive ou souhaitent s'y adonner (U.S.1962c) et l'on note un désir certain de payer pour avoir l'occasion de pêcher. En outre, les rentrées nettes de devises étrangères sont importantes pour les pays susceptibles de satisfaire des pêcheurs étrangers.

Il ressort des statistiques américaines que 75 pourcent des touristes américains se rendant au Canada souhaitent pêcher (U.S. 1962o). Une somme considérable d'argent est dépensée par des touristes passionnés de pêche dans des pays comme la Norvège, l'Irlande (II. 3.6) et la Yougoslavie (comm. pers.).

Dans des communications relatives à la pêche sportive ou commerciale, on trouve de nombreuses descriptions de pêcheurs commerciaux ayant servi de guides à des pêcheurs sportifs et utilisé leurs bateaux pour la pêche à la ligne en mer.

Ainsi qu'on l'a vu précédemment, les informations manquent en Europe sur les structures et tendances relatives aux touristes intéressés à la pêche.

#### 4.3 Equilibre objectif entre la pêche commerciale et récréative

Les avantages économiques et sociaux de la pêche commerciale sont assez bien connus. La concurrence croissante pour les ressources halieutiques entre la pêche commerciale et la pêche sportive laisse prévoir un conflit sérieux, avec tous les désagréments politiques et émotionnels que cela comporte. Les pays en cause, désireux de porter au maximum l'utilisation des ressources naturelles en faveur de leur société, ont l'obligation morale d'évaluer avec précision leurs pêches intérieures. Des mesures objectives ont été effectuées dans certains cas et la pêche sportive a souvent produit des bénéfices nationaux ou locaux supérieurs à ceux de la pêche commerciale. C'est le cas pour la pêche du saumon au Canada oriental (II.3.1), la pêche de la truite et du saumon en Angleterre et en Ecosse (U.K. MAFF, 1961; U.K., 1965; II.3.2, II.2.11) et dans une large mesure pour les pêches intérieure et côtière aux Etats-Unis (U.S. 1962c; Crutchfield, 1965a; II.3.5, II.2.12).

Le problème de l'évaluation devient de plus en plus important à mesure que la demande d'activités récréatives augmente et que les pêches commerciales intérieures et côtières dans certains pays européens deviennent peu rentables, ou que ces pêcheries disparaissent entièrement du fait de la pollution croissante.

Les problèmes sont internationaux, ainsi qu'il ressort du passage suivant de Knetsch (1966): "Il semble évident que si la demande en services récréatifs de plein air qui apparaît dans le comportement des consommateurs américains est effective, et les preuves à l'appui suggèrent qu'il en est ainsi, le bien public sera mieux servi si l'on utilise l'eau non à des fins secondaires, mais en vue d'activités récréatives. Cette dernière utilisation est en train de prendre une valeur de plus en plus élevée. Toutefois, avant d'en venir à de telles décisions, il convient d'établir convenablement ces valeurs".

#### 4.4 Pêche sportive et pollution de l'eau

Les conditions de la pollution changent rapidement. Toutes les formes d'utilisation de l'eau, y compris la pêche sportive en seront affectées. Les problèmes en cause sont très complexes. Jusqu'à présent, les études consacrées à la pêche sportive

et à la pollution ont été peu nombreuses. Deux études importantes ont cependant pu être rapportées ici. L'une concerne les effets de la pêche sportive sur les conditions de pollution; l'autre, au contraire, est consacrée aux effets de la pollution sur la pêche sportive.

A l'occasion de l'examen d'un réservoir de 283 ha à usage domestique dans le Missouri (Etats-Unis), on a trouvé qu'une gamme étendue d'activités récréatives intensives n'affecte nullement la santé publique en souillant l'eau potable (Roseberry, 1964). On a noté pour la période 1958–60 une moyenne annuelle de 291.000 visiteurs. Pendant l'été, environ 22 pourcent se sont contentés d'admirer le panorama, 19 pourcent ont pris part à des pique-niques, 16 pourcent ont pratiqué la natation, 14 pourcent la pêche, 11 pourcent le canotage, 6 pourcent le camping et 4 pourcent le ski nautique (8 pourcent sans activités connues).

Dans une autre étude (Stevens, 1966), des méthodes ont été mises au point en vue d'établir la relation entre les résultats obtenus par les pêches à la ligne et la valeur récréative de la pêche sportive. Les résultats obtenus par les pêcheurs, traduits en unité d'effort, ont été examinés pour trois types de pêcheries sportives à Yaquina Bay, dans l'Oregon. On a trouvé qu'une augmentation de 10 pourcent des résultats de la pêche du saumon produirait à longue échéance une augmentation de quelque 10 pourcent de l'effort de pêche. Pour le poisson de fond comme la perche de mer et la limande étoilée, il a été noté que l'effort de pêche répond moins directement aux variations des résultats.

Le traitement des données par Stevens est particulièrement intéressant. Par exemple, des "fonctions de la demande et l'élasticité du taux de prise pour chaque pêcherie ont été utilisées en vue d'établir la baisse de valeur économique nette liée à une réduction des résultats de la pêche provoquée par la pollution. Cette méthode pourrait également s'appliquer à l'évaluation des mesures aptes à accroître les résultats de la pêche à la ligne, comme les investissements dans des aleviniers". (II.2.19)

#### 4.5 La pêche sportive dans les lacs artificiels

Dans la programmation à long terme des activités récréatives en plein air, les lacs artificiels joueront un rôle important. L'ORRRC a reconnu ce fait et, après évaluation, des plans détaillés ont été mis au point en vue d'une utilisation intensive et de la création de lacs artificiels destinés aux activités récréatives (II.2.12). L'utilisation convenablement programmée des lacs artificiels peut produire une quantité appréciable d'effets récréatifs, mesurés par exemple en termes de pêcheur-jour/ha. Les dépenses sont élevées et peuvent constituer une importante source de revenu pour les propriétaires individuels et les terrains locaux (II. 1.7).

De nombreux rapports ont été publiés sur la planification des étangs de ferme et sur les petits et grands réservoirs. L'essentiel de la discussion figure dans un certain nombre de résumés reproduits dans le présent rapport (II.2.21).

Les recherches relatives à la gestion des activités récréatives dans les lacs artificiels présentent une importance considérable. Le principe de l'usage multiple a été développé et mis au point. La pêche pendant toute l'année, conformément à une règle admise tout au moins pour les espèces des eaux chaudes, se fonde sur des recherches écologiques dans les vastes réservoirs à usage multiple de l'administration de la Tennessee Valley Authority (Stroud, 1966). Divers principes de répartition en zones ont été mis au point en vue de résoudre les conflits relatifs à l'utilisation des eaux à différentes fins récréatives; ces principes ont trait à la superficie, à l'époque ou à une combinaison de ces éléments de l'utilisation. L'utilisation à des fins récréatives des eaux

à usage domestique n'est pas dangereuse pour la santé publique si elle a fait l'objet d'une planification satisfaisante (4.4 et Roseberry, 1964). La production annuelle de loisirs, pêcheur-jour/ha, par exemple, peut être très élevée compte tenu des principes modernes de gestion et l'on rapporte des prises de 190 kg par ha et le chiffre de 1.086 parties de pêche par ha (Stroud, 1966).

## 5. CONCLUSIONS ET RECOMMANDATIONS

Les loisirs en plein air constituent une activité importante et en plein essor, et la pêche sportive est l'un de leurs principaux éléments. Elle présente une valeur élevée du point de vue de la santé physique et mentale et bénéficie d'un appui considérable dans la planification empirique au niveau étatique.

Les dépenses liées à la pêche sportive sont considérables et constituent une importante source de revenu pour les propriétaires des superficies d'eau naturelles ou artificielles, allant des étangs de forme aux réservoirs.

La pêche sportive en tant que forme d'utilisation de nos eaux gagne une place de plus en plus considérable parmi les principaux usages possibles de l'eau: usage domestique, usage industriel comme l'évacuation des eaux usées et la production d'énergie hydro-électrique, pêche commerciale et autres formes d'utilisation à des fins récréatives telles que la natation et le canotage. Dans certains pays, lorsque les conditions sont favorables (présence de poissons, distance, etc.), la pêche sportive est fréquemment plus importante que la pêche commerciale (du point de vue économique et social) dans l'utilisation des eaux intérieures et côtières, qu'elles soient naturelles ou artificielles. Dans plusieurs cas, néanmoins, les pêches sportive et commerciale peuvent coexister avec succès.

L'un des principaux objectifs de l'initiative de la CECPI, en encourageant l'évaluation économique de la pêche sportive est de fournir aux personnes intéressées une quantité suffisante d'informations aptes à promouvoir une meilleure compréhension des problèmes et à diriger l'action dans la bonne voie.

Il me semble qu'il est nécessaire de poursuivre ces travaux et de proposer un programme qui assurera la circulation des informations destinées aux pays membres. Le programme est divisé en trois parties: documentation, recherche, et coordination.

### 5.1 Documentation et information

Un Centre d'Information devrait être organisé pour la région européenne, en collaboration avec les chercheurs nord-américains, de préférence au sein du Secrétariat de la CECPI, afin d'aider les pays membres sur divers sujets, tels que la méthodologie, les bibliographies pour projets spéciaux, et d'encourager les échanges entre les experts.

Afin d'assurer le bon fonctionnement de ce Centre d'Information, il est suggéré que:

- (a) un groupe de travail devrait, d'une façon continue, rassembler des données sur l'évaluation des ressources en matière de pêches du point de vue socio-économique tant commerciale que sportive, identifier toute documentation y relative, préparer des résumés;
- (b) des réunions devraient être organisées avec l'aide des experts nord-américains pour faciliter les échanges de vue et de données expérimentales;



- (c) un Bulletin d'Information, semblable au Sport Fishing Institute (SFI) Bulletin (Etats-Unis), ou une section d'un journal similaire, devrait être réservé à la vulgarisation de la documentation au fur et à mesure de son identification;
- (d) des contacts devraient être établis avec des organisations européennes intéressées, telles que les organisations de pêche sportive ou de tourisme, et en particulier avec la Confédération Internationale de la Pêche Sportive (CIPS);
- (e) une méthode d'évaluation simplifiée devrait être définie, afin de faciliter la collection de données standard et comparatives.

## 5.2 Recherche

La recherche et les travaux sur le terrain devraient être encouragés d'une façon générale et, en particulier, dans le domaine des sciences "behavioristiques" (économique, sociologie, psychologie, etc.) où les connaissances sont moins avancées dans l'étude de la récréation et de la pêche sportive. Une équipe "multi-discipline" composée de biologistes, techniciens et sociologues devrait être organisée, afin de poursuivre les recherches et développer des modèles de planning.

## 5.3 Coordination

Les études ultérieures sur la pêche sportive en Europe devraient être coordonnées avec les autres études économiques de récréation en plein air dans le planning à usage multiple, les études de pêches commerciales, les études sur les autres usages de l'eau, les études d'aménagement et de planification et les études de lacs de barrage.

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## PART II

### Excerpts and Abstracts of Relevant Literature on Socio-economic Aspects of Sport Fishing, Planning and Methodology

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## 1. SOCIO-ECONOMIC DATA

### 1.1 Boat Fishing in Oregon (SFI bul. No. 135, February 1963)

An excellent 20-page study report describing characteristics and needs of statewide boatowners, entitled "Pleasure Boating in Oregon", is available from the State Marine Board (R.F. Rittenhouse, Director), Salem 10, Oregon. This first survey of boating activity is hailed by Governor Mark Hatfield as a guide to future action, showing the demand for more and better boating facilities and suggesting utilization of unrefunded state marine fuel taxes to defray the cost of needed launching ramps, channel dredging, and other facilities.

The report shows that over 95 per cent of all pleasure boats registered in Oregon (45,628 as of January 1962) are under 21 feet long, and that 89 per cent of all registered boats are outboard types. Among boats under 21 feet, over 92 per cent are outboards, and over 5 per cent are inboards. Among those 21 feet or longer, over 20 per cent are outboards (usually twin-motored) while nearly 71 per cent are inboards. The median horsepower is 25 among the smaller boats (principally outboards) and is 100 among the larger boats (largely inboards).

Average annual consumption of gasoline was about 125 gallons per boat under 21 feet (principally outboards) and made up about 81 per cent of total gallonage consumed by all pleasure boats. The longer boats (largely inboards) consumed nearly three times as much gasoline per boat (averaging about 346 gallons per boat and accounting for nearly 19 per cent of the total). It was interesting to note, therefore, that payments of refunds on gasoline used in pleasure boats made up about 19 per cent of total tax collections. Therefore, it seems a fair conclusion (ours) that most such tax refunds are made to owners either of inboard boats or of twin-motored outboards both of which characteristically "tank up" large gallonages at a time. It seems more than coincidental that these figures compare so closely. In Oregon, which has a 6-cent state tax, the annual net revenue due to gas taxes derived from pleasure boating is about \$300,000.

As would be expected from the foregoing, trailers are the primary means by which boats travel to available waters, with about 81 per cent of boats less than 21 feet being hauled to the launching site. Only 21 per cent of boats 21 feet or over are hauled by trailer, with the remainder moored or stored at the launching site.

Exhibiting a closely logical relationship to requirements of the predominant boat uses, the most needed types of improved boating facilities as indicated by the owners of the smaller pleasure boats are: (1) more launching ramps; (2) paved or improved launching ramps; (3) camping areas near mooring or launching sites; and (4) sanitary facilities. Owners of larger pleasure boats indicated that the most needed boating facility improvements are: (1) overnight mooring facilities; (2) more piers and docks; (3) improved law enforcement and safety regulations' enforcement; and (4) breakwaters to shelter mooring areas.

Fishing accounted for much the most important segment of time spent in use of all boats under 21 feet, with over 86 per cent engaged in fishing at least part of the time and over 47 per cent devoting over half of the boating time to fishing. Only some 14 per cent do no fishing whereas about 96 per cent do no skin diving, 85 per cent do no hunting, 55 per cent do no water skiing, and 34 per cent do no "cruising and sightseeing". The picture was somewhat different in the larger boats (constituting only 11 per cent of all registered boats, however), with "cruising and sightseeing" forging up

close behind fishing and far eclipsing other activities. Again only some 14 per cent of these engage in no fishing whatsoever, whereas all but about 18 per cent become involved in "cruising and sightseeing" at one time or another.

Fishing, moreover, is the principal use (over half of all boat-time involved) of the smaller boats, whether in rivers (46%), lakes and reservoirs (53%), or coastal waters or ocean (84%). With respect to the much smaller numbers of larger boats, fishing ranks behind cruising as the over-all principal use (over half-time), especially in river situations (10%), but forges to the forefront again on lakes and reservoirs (35%), and in coastal waters or ocean (78%). Interestingly, the data show that all of the larger boats are used to some extent for fishing in the latter situations.

Other data showed that the large majority (76%) of owners of smaller boats use their boats on fewer than 60 days annually, while the average is 45 days and the median or "typical" use is 30 days. By comparison, the large majority (83%) of owners of larger boats use their boats on fewer than 120 days annually, with an average use of 76 days and median or "typical" use of 60 days. This 2 to 1 ratio (of time afloat, also) nearly reflects the average daily gasoline consumption. The outboards burn up about 2.8 gallons of fuel per day of use; the inboards and twin-outboards burn up about 4.6 gallons of fuel per day of use.

## 1.2 British Anglers (SFI bul. No. 159, February 1965)

Research Services, Ltd. (London) predicted the outcome of Britain's recent General Election within the proverbial hair's breadth, by means of its highly refined system for polling public opinion. According to an article by Ken Sutton, in "The Fishing Tackle Dealer" (Peterborough, England) for December 1964, a national survey by the same public opinion research organisation sets the current number of anglers in Britain at 2,200,000 male adults (16 years and over). The survey was carried out for Angling Times, Ltd. (FTD Publishers) in May and June 1964, utilising 19,400 interviews in nearly 200 different population centers in Britain.

Sutton states that all are male anglers and that, if anglers under 16 were added, the total number of anglers of all ages would surely reach 2½ million. He made no direct mention of lady anglers, leaving one to conclude that there are very few English girls who fish. One knowledgeable Britisher of our acquaintance confirmed this upon our inquiry, especially for coarse fishing, although noting that the salmon record is held by a woman.

Our friend suggested that not many more than one in a thousand British women actually fish; in England, it seems fishing is very much a man's sport. Indeed, it is widely regarded as a useful means of getting away from the women on the "tight little isle", at least by the working men. This differs decidedly, of course, from custom in at least one Commonwealth nation, Canada, where 198,000 or more ladies fish. In the U.S., fishing is very popular with the fair sex, where some 4,555,000 ladies of corresponding ages indulged last year in this form of recreation (including younger girls of all ages who fish, the total probably exceeded 8,000,000).

Fishing, as elsewhere, nevertheless proved to be Britain's most popular sport. Sutton said it is "more popular than soccer, twice as popular as golf and tennis, and three times as popular as cycling." Interesting, too, is the finding that "coarse fishing" (for all fishes other than trout and salmon) is most popular among club members (one-fourth of all anglers - compared to one-twentieth in the U.S.). Only one in twenty game fishermen ever take part in the popular fishing competitions known as "match angling".



More than half of all anglers became interested in fishing through introduction to coarse fishing; 23 per cent took up sea fishing first; exposure to fly fishing first brought 10 per cent of the fishermen into the sport.

### 1.3 Industrial Forest Fishing (SFI bul. No. 138, May 1963)

A 1962 study by American Forest Products Industries, Inc. (Washington, D.C.) of recreational uses of industrial timberlands up-dated a similar survey two years earlier. It confirmed that recreational use is a very substantial by-product of well-managed industrial forest lands. A policy statement of AFPI states, in part: "Multiple use, including public recreation, is encouraged on industrial forest land consistent with the primary objectives of forest management". More than 92 per cent of industry lands are open to hunting, according to AFPI's chief forester James C. McClellan, and yield more than 150,000 big game animals annually.

Sport fishing is permitted in streams, lakes and ponds on about 97 per cent of all industrial forest lands. These facilities included 2,436 natural lakes, with 497,666 acres of water; 37,255 miles of streams; and 370 artificial lakes, with 237,034 acres of water. Also, there were 67 fish farms with 1,112 acres in farm ponds. The 46 companies with cooperative fish management programmes all required permits, but only five companies charged for fishing privileges.

### 1.4 National Outdoor Recreation Survey (SFI bul. No. 134, January 1963)

A nationwide survey of the habits and preferences of Americans engaged in outdoor recreation was conducted in 1960–61 by the U.S. Bureau of the Census. It was analyzed and reported by the Outdoor Recreation Resources Review Commission staff (special project director Abbott L. Ferris) and is now available as ORRRC Study Report 19 (\$2.00, U.S. Govt. Printing Office, Washington 25, D.C.). It contains a welter of information, based on four separate seasonal samples, each involving about 4,000 very detailed interviews.

Included are participation rates in 17 outdoor activities, preferences, expenditures and analyses of socio-economic factors involved. The data are categorized by region, age, sex, residence, education, occupation and race. Activity rates are also shown by state of health, physical impairment, and size of community. The study provides much grist for the mill of fish conservation administrators, managers and planners.

The survey determined that about 35 per cent of the U.S. population 12 years of age and over (133,000,000) fished at least once during the period June 1960 – May 1961. These 47,000,000 anglers fished an average of 11.9 days per year, with participation rates being highest in the South, and lowest in the Northeast. The estimates are comparable to those computed by the Michigan Survey Research Center which appear in ORRRC Study Report 20.

In the Census Bureau survey, fishing was found to be the preferred outdoor activity among 33 per cent of the population. It ranks second, with picnicking, to swimming in order of preferences. As a preferred activity on vacation fishing ranked third, behind sightseeing and swimming. These three activities by far exceed all others as preference for the outdoor vacation.

Fishing is preferred by males (47 per cent) over any other outdoor activity. It is highest in the 25–44 age group. Twenty per cent of those living in large urban areas expressed a preference for fishing compared to 45 per cent in rural areas. More people

in the South express a preference for fishing (44 per cent) than any other activity. In the North Central region swimming (39 per cent) is slightly preferred over fishing (36 per cent). In the West, fishing is equalled by picnicking, and surpassed in preference only by swimming. In the North-east, picnicking, driving for pleasure, and swimming exceed fishing as preferred activities. It was also reported that about 1,240,000 persons leased fishing rights during the year, over one-half of them in the South.

From the tabulated material, it was determined that about 26 per cent of all fishing activity (man-days) occurred in the spring, 47 per cent in summer, 18 per cent in the fall, and 9 per cent in winter. In the South fishing participation during the winter was 16 per cent compared to 4 per cent in the Northeast, 6 per cent in the North Central and 7 per cent in the West. There were about 3.7 million persons who fished during the December, January, February period in the North Central and Northeast regions. Undoubtedly, the great majority were ice fishermen.

Data on water-skiing indicated that anglers outnumber skiers by 6 to 1 during the summer months. During the fall months, man-days of fishing (100 million) slightly exceeded man-days of hunting (97 million). The study estimated total annual man-days of fishing equalled about 560 million, compared to 760 million man-days of swimming, 480 million man-days of picnicking, 260 million man-days of boating, 240 million man-days of hunting, and 50 million man-days of water-skiing.

One-fourth of these who prefer fishing reported they participated as freely as they would like. Forty per cent mentioned lack of time as a reason for not fishing more often; 13 per cent stated that facilities were too crowded, inadequate or distant; 12 per cent listed lack of skill and 7 per cent lack of money.

Regarding motivation, the report authors concluded (emphasis added) that the angler is inspired by "any number of incentives. He seeks food and the better the catch the more rewarding the experience. Once fishing skill is acquired, for example in casting, the exercise of the skill becomes a motive .... The fisherman may seek the peace and tranquility of the shady cove or he may join with others and find the sociability of the occasion more rewarding experience."

### 1.5 New Mexico Fishing Values (SFI bul. No. 173, April 1966)

An illuminating study report, entitled "The Economic and Social Values of Hunting and Fishing in New Mexico", has been prepared by Thomas O. Kirkpatrick (College of Business Administration, University of New Mexico, Albuquerque). In 1963, it turns out, 145,569 fishing licenses (98,445 resident and 47,124 non-resident) were sold in New Mexico. Besides license holders, there were an estimated 81,000 children under 14 years of age and not required to have a license, who also fished - an additional 55 per cent!

Almost one-third of the licensed "fishermen" were women. Compared with the average for all residents of New Mexico, anglers had higher incomes (nearly half earned more than \$7,000 per year) and were better educated (a greater percentage of high school and college graduates). License sales were predicted to increase 116 per cent by 1975, far exceeding the predicted increase in population.

About 84 per cent of all fishing was done by family groups. Wives went along on family fishing trips 70 per cent of the time, but actually fished on about one-half of these trips. Approximately 2.1 million days were spent fishing in 1963. Resident fisherman averaged 18 days out fishing that year; non-residents averaged 9 days. Half of the fishermen contacted planned on spending more time out fishing during the following

year. Ninety-five per cent of the fishing trips involved the use of automobiles. About 47 per cent of the licensees also fished outside of New Mexico.

Approximately \$31.8 million was spent for fishing. Expenditures by residents averaged \$13 per day. Non-residents spent about \$29 per day out fishing. Cost of a fishing license accounted for only 2.3 per cent of the total fishing expenditures. About \$5.5 million was spent by New Mexico fishermen fishing outside of the state. An economic survey made in 1956 revealed that daily angling expenses then averaged \$9.61. By 1963, corresponding daily expenditures had increased by \$3.81 (nearly 40 per cent).

Most fishing was done on days off rather than during vacations. Also, most fishing was carried on in areas where the fishermen lived. Participation in boating and camping increased the demand for fishing (or vice-versa). Contrary to studies which report below average rates of fishing participation by urban residents, the city of Albuquerque exhibited a higher percentage of fishermen than the state generally.

The proximity of fishing areas and facilities was believed to be responsible. Professor Kirkpatrick concluded that the most important single controllable factor affecting license sales is the existence of facilities (fishing streams, lakes, boat launching ramps, picnic tables, camping areas, toilet facilities, etc.).

Copies of this report are available from the Bureau of Business Research, The University of New Mexico, Albuquerque, at \$2.00.

#### 1.6 Outdoor Recreation Demand Factors (SFI bul. No. 130, September 1962)

In the vital job of planning sport fishery action programmes, conservation agencies must first establish existing use-patterns, and angler habits and attitudes. This is usually determined by creel censuses and mail questionnaires submitted by licensed anglers. After this information has been laboriously gathered and analysed, fishery personnel then attempt to predict future demand, primarily by projecting calculated trend lines. However, available statistics usually do not indicate possible influence of other forms of outdoor recreation on fishing activity, nor the motivating effects of more leisure time, paid vacations, and higher incomestrends of the present. Such information is vital to sound preparation for the future.

To provide some of these answers, the Outdoor Recreation Resources Review Commission sponsored a special study which was conducted by the University of Michigan Survey Research Center. The results appear in ORRRC Study Report 20 "Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults", by Eva Mueller, Gerald Gurin and Margaret Wood. It is based on 2,759 personal interviews of a representative (multi-stage area) sample of American adults (18 years or older). The report is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., price 50 cents.

The study which constituted the kernal of the basic ORRRC report, revealed that 20 per cent of all those interviewed fished "often" (5 or more times) and 18 per cent "a few times" (1 to 4 times) during the year 1959. On this basis, nearly 43 million adults wet a line during the year. Engagement in eleven outdoor activities considered by the survey ranked as follows:

| Activity                                   | <u>Per cent who engaged</u> |             |
|--|-----------------------------|-------------|
|  | Often                       | A few times |
| Auto riding for sightseeing and relaxation | 47                          | 24          |
| Picnics                                    | 31                          | 35          |
| Swimming, or going to beach                | 26                          | 19          |
| FISHING                                    | 20                          | 18          |
| Boating and canceing                       | 12                          | 16          |
| Hunting                                    | 9                           | 8           |
| Hiking                                     | 8                           | 11          |
| Camping                                    | 6                           | 9           |
| Nature or bird walks                       | 6                           | 8           |
| Horseback riding                           | 3                           | 4           |
| Skiing, other winter sports                | 2                           | 4           |

At the top are activities like pleasure driving and picnics, which take minimal preparation, skill or exertion. Most of the other activities require a good deal of skill, training, preparation, money and effort.

The report authors also ranked the activities according to “involvement” based on spontaneous mention of activities by the interviewees. Fishing and hunting were found to be the most “involving” activities and hiking, nature and bird walks, pleasure driving and picnics to be the least “involving”.

To determine potential needs for facilities, the survey attempted to define the extent to which people would like to increase the various activities in the future. In response to the query “If you could do as you please, are there any things on the list (of 11 activities) which you would like to do more often or enjoy taking up in the future?” The responses were as follows:

| Activity                    | <u>Per cent who would like to do more often or take up</u> |                             |
|-----------------------------|--|-----------------------------|
|                             | Total  | Did not do at all last year |
| FISHING                     | 21   | 8                           |
| Swimming, or going to beach | 14   | 5                           |
| Auto riding for sightseeing | 13   | 3                           |
| Camping                     | 13   | 9                           |
| Horseback riding            | 12   | 10                          |
| Boating and canceing        | 11   | 6                           |
| Hunting                     | 10   | 5                           |
| Picnics                     | 10   | 3                           |
| Skiing, other winter sports | 5  | 4                           |
| Hiking                      | 5  | 3                           |
| Nature or bird walks        | 4  | 2                           |

From these data, the authors concluded that “where the people wishing more of the activity equal or outnumber those that are presently actively engaged in it - fishing, boating, hunting, camping, horseback riding and skiing and other winter sports - are activities where a relatively large potential of interest is not being fully realised as yet. In these cases there are barriers keeping people from participating to the full extent of their desires.”

What are the barriers to participation? Lack of time (for the activity itself or for the trip necessary to reach suitable facilities) was the reason most often given, with 52 per

cent of the people mentioning it. Two other prominently mentioned factors which play a major role in holding outdoor recreational activities below the desired level are “lack of money and lack of facilities.... Since incomes are likely to rise and leisure time may also expand in the future, some increase in participation rates seems to be in prospect. It would appear that in the future, facilities will have to be increased not only in accordance with population growth and to relieve present overcrowding, but also to allow for some rise in participation rates.”

Other survey data concerning anglers and angling are included in the following table:

| Fishing participation by region, place of residence, sex and age | <u>Per cent who engaged</u> |             |
|--|-----------------------------|-------------|
|  | Often                       | A few times |
| South  | 26                          | 21          |
| North Central  | 21                          | 17          |
| West   | 18                          | 21          |
| Northeast  | 12                          | 11          |
| Cities (50,000 or more)  | 13                          | 16          |
| Suburban areas   | 19                          | 19          |
| Adjacent areas (within 50 mi.)                                   | 22                          | 16          |
| Outlying areas   | 26                          | 20          |
| Men  | 27                          | 21          |
| Women  | 14                          | 15          |
| Age group  |                             |             |
| 18-24  | 23                          | 24          |
| 25-34  | 24                          | 21          |
| 35-44  | 22                          | 22          |
| 45-54  | 22                          | 18          |
| 55-64  | 17                          | 14          |
| 65 and over  | 11                          | 9           |

From these findings, the authors deduced: “Fishing is most frequent South .... Camping, fishing and hunting - the activities that most involve ‘roughing it’ in the outdoors - seem to be more congenial to the people in outlying areas. With the increasing homogeneity of our national culture, many value and interest differences between city and country people are disappearing and decreasing differences in outdoor leisure patterns would seem to be part of this trend.... Where men and women are compared on the 11 specific activities, striking differences appear only with respect to fishing and hunting. These, particularly hunting, are the only clearly ‘masouline’ activities....” With respect to fishing, picnicking, pleasure driving and hiking, people remain fairly active until at least early middle age. Participation in swimming, boating, hunting, horseback riding and skiing seems to decline fairly regularly with age.

Sixteen per cent of the parents interviewed reported that their children fished “.... the spread of experience with outdoor recreational activities among young people will mean that interest in these activities will persist at a high level or even grow.”

The interviewers first asked the people “How do you usually spend most of your leisure time?” in order to focus on the regular day-to-day leisure patterns. Fishing was the most frequently mentioned of all active sports, and was exceeded in all leisure activity mentions only by (1) looking at TV, (2) reading, and (3) gardening or working in the yard. Fishing exceeded “visiting with friends or relatives; participating in clubs, organisations, church work; spectator sports; playing cards; and going to movies.”

Conclusion: "...swimming, hunting and especially fishing seem to be of the greatest importance and salience.... That one out of six Americans spontaneously mention fishing in the context of questions asking about activities they engage in 'quite a lot', would seem to attest to the importance of this recreational activity." It surely would.

The ORRRC report findings suggested that one appeal of outdoor recreation is the opportunity it affords for fellowship with family, relatives, friends and colleagues. "This image of outdoor recreation as an activity with a decided social appeal stands in contrast to the wilderness lover's image of outdoor recreation. For a minority of people, the appeal may lie in the possibility of getting away from people - to nature and solitude; but for the majority a major attraction of outdoor recreation seems to be the opportunity to be with people and share leisure activities with others."

Roughly three-fourths of those who took up fishing and camping as adults gave social reasons (as a family activity, primarily). Many people who started to fish in childhood and continued as adults stated that fishing meant "fun and relaxation", or that they enjoy competition and a chance to develop skills. The report poses the possibility that outdoor recreation plays a social role, partially explaining its rapid growth.

The authors mention the problem of possible changes in preferences, but make no long-run predictions. They do emphasize that leisure preferences are conditioned by locational factors-the time and distance required to reach the preferred activity location. For instance, fishing, camping, hunting and skiing were found to be more common on weekend than on vacation trips. Therefore, facilities are needed that can be reached conveniently on a 2- or 3-day weekend from the major population centers.

The report concludes with an analysis of camping, observing that proximity to water sport facilities is an important factor to consider in planning the location of additional camping areas. Three-fourths of the campers interviewed went fishing, two-thirds went swimming, more than half went boating.

#### 1.7 Reservoir Recreation Impact (SFI bul. No. 127, June 1962)

A comparative study of the economies of 17 reservoir counties and 8 non-reservoir counties in the Arkansas-White-Red River Basins has strikingly revealed the impact of large-scale recreation expenditures on relatively undeveloped areas. Prepared by Arthur L. Moore for the Outdoor Recreation Resources Review Commission (Economic Studies of Outdoor Recreation, ORRRC Report 24), the analysis revealed that in counties bordering reservoirs, per capita income increased, population losses were less, tax levies were up, and bank deposits gained impressively.

Of the seven large reservoirs involved, three were 15 years old, three 8 years old, and one was filled in 1960. From 1949 to 1959 annual per capita income in Arkansas reservoir counties increased 57 per cent compared to 23 per cent in the non-reservoir counties. Ten Oklahoma reservoir county tax collections increased 64 per cent compared to 4 per cent in two non-reservoir counties. Bank deposits were up 60 per cent in the reservoir counties in the period 1949 to 1958, compared to 40 per cent in non-reservoir counties.

Economist Moore found that investment in overnight accommodations in 14 reservoir counties rose from \$1.4 million in 1945 to \$20.8 million in 1959. Investments in lake shore homes and cabins currently average about \$3.2 million annually.

In some reservoir counties, outdoor recreation has changed almost the entire way of life. New schools and better public services have, in turn, brightened other

economic prospects. The ORRRC summary report concludes that these cases are special in that large-scale expenditures came to a comparatively depressed area in a rather short period, but that they do clearly illustrate the power of the recreation dollar.

### 1.8 Socio-economic Studies of Sport Fishing in Sweden

To date very few European studies of recreational activities such as sport fishing have been made. In Sweden, however, several studies have been carried out with regard to sport fishing and outdoor recreation in general. A summary of this data is now available in a report issued by FAO in Rome: EIFAC/OPI, February 1968, Appendix: Norling, I. Socio-Economic Studies of Sport Fishing in Sweden (13 p.).

Data is reported from studies made by members of the Swedish Anglers' Organizations (1); citizens in a mining area in Northern Sweden (2); and a state-wide study of the whole outdoor recreational area (3).

In studies 1 and partly 2 the following variables were studied: incomes; place of habitation; water-type fished and preferred; time spent on different phases in the recreational activity; equipment used and preferred; varieties of fish fished and preferred; size and type of catch; what happens to catches; expenditure; total distribution and willingness to pay for low to high quality and even "fish for fun" waters (Hazard plan type); journeys to near and distant waters; summer cottage and fishing and fishing with the family.

In the state-wide survey, for example, it was discovered that with regard to angling, 41 per cent of the population living in urban centres with more than 10,000 citizens went fishing at some time during 1963 and that 29 per cent fished six times a year or more. The activity is fairly evenly distributed throughout the different generations and fishing with the family seems quite common. Fishing is a popular and much sought-after activity.

Comparisons were made between data received from studies of sport fishing in the United States and Canada and data received from Swedish reports. These comparisons made between Swedish and North American data show that a strong similarity exists.

### 1.9 Soviet Anglers (SFI bul. No. 161, April 1965)

An article in a several months' old issue of "The American Legion Magazine" indicated that there were in excess of ten million anglers in the U.S.S.R. It also indicated that all the fishing was controlled through small collectives or fishing clubs and that all would-be anglers must be card-carrying members of the Communist Party. It would appear now that both the total number of anglers and their total identity with the Communist Party may have been somewhat exaggerated.

We have been advised by Dr. Donald E. Bevan, Associate Professor, Fisheries Research Institute, University of Washington College of Fisheries (Seattle), that "quite a number of people fish outside of the clubs or collectives and a Party membership is not required for club membership." Dr. Bevan also advises that President Kuznetzov of the Federation of Sport Fishing of the U.S.S.R. recently estimated that there were about 1½ million organized fisherman in the Soviet Union of January 1, 1964. He estimated there were six million more outside the organizations.

1.10 Sport Fishery Programmes in Canada (Fish Conservation Highlights 1960–62; Sport Fishing Institute, Washington, D.C.)

Well over half a million U.S. citizens probably look to our great northern neighbour for something special in the way of fishing experiences. It may be the chief motivation for annual excursions, or it may represent a once-in-a-lifetime expedition. Either way, Canada has a special lure matched by few other countries because it contains vast areas of virtually untrammelled "frontier" lands. For the vast majority of U.S. citizens (at least 75 per cent of them), it has been established that one of the chief motivations for visiting wilderness areas is to go fishing. According to the 1960 National Survey of Fishing and Hunting (U.S.), at least 438,000 anglers fished in Canada during 1960 in addition to fishing in the U.S. This represents a minimal figure for across-the-border angling as those U.S. citizens who do all their fishing in Canada (none at home) were excluded from the count. This compares reasonably with the statistics for sales of non-resident angling licenses in the Canadian Provinces (Table), which totalled over 593,000 in 1962.

A recent economic survey by D.A. Benson, entitled "Fishing and Hunting in Canada", 1961 (published by the Canadian Wildlife Service, Ottawa, Ontario), represents the first nationwide appraisal of the economic and social significance in Canada of these leading forms of outdoor recreation. He determined that 10.8 per cent (1,311,000) of Canadians 14 years of age or older fished (including the younger kids who fish, the total no doubt considerably exceeds 1½ million). Men anglers numbered 1,058,000 and outnumbered some 198,000 lady anglers six to one (in the U.S., less than three to one). The highest participation was found in Ontario where 37.9 per cent of all sportsmen (579,000 persons) occurred. Prairie provinces supported 20.5 per cent, Quebec 17.9 per cent, Atlantic maritimes 11.1 per cent, and British Columbia 12.6 per cent of the sportsmen.

The latter distribution of outdoorsmen (preponderantly anglers) strongly reflects the finding that freshwater sport fishermen (about 1,256,000) outnumbered their saltwater brethren (about 149,000 - of whom some 64,000 apparently fished exclusively in saltwater) by more than eight to one. To a lesser degree, it reflects the further finding that Pacific saltwater anglers (about 92,000) outnumbered Atlantic saltwater anglers (about 57,000) somewhat less than two to one. Fewer than 10,000 ladies braved the Atlantic to fish, while some 17,000 did so on the Pacific waters.

All in all, sport fishing provided some 20 million man-days (no doubt, plus several million kid-days, as well) of recreation for Canadians in 1961. Anglers travelled about 570 miles each, on the average, or a total approaching 750 million man-miles in private vehicles to enjoy their sport. More than 60 per cent of all anglers fished within 100 miles of home; more than 90 per cent did so within 300 miles.

Canadians spent \$188 million to go fishing in 1961, for an average of \$143 per fisherman. Expenditures for freshwater fishing averaged about \$138 per angler, whereas those for saltwater fishing averaged higher - apparently something over \$171 annually, possibly approaching \$214 per saltwater angler. Of the combined average expenditure per angler (\$143 annually), less than one per cent was invested in perpetuation of the resource through purchase of fishing licenses. Capital items of fishing equipment - boats, motors, trailers, fishing tackle, camping gear used primarily for fishing, etc. - accounted for 51 per cent of the expenditures. Expendable items, including accommodations where utilised, food, supplies of various nature, consumed something



under 27 per cent. Costs of operating private vehicles (averaging 7½ cents per mile), made up the 21-plus per cent remaining.

In Canada, the Federal Government maintains full responsibility for all fish in the Maritimes - Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, and the Territories (Northwest Territories, Yukon Territory). It has like responsibility for marine and anadromous species in British Columbia. It discharges this responsibility through the Department of Fisheries. By agreement with the Federal Government, however, British Columbia administers its inland sport fishery resources. Alberta, Manitoba, Ontario, Quebec, and Saskatchewan, by similar agreement with the Federal Government, administer all fishery resources within their boundaries and promulgate appropriate regulations under various Federal acts and regulations. In the National Parks, responsibility for the fish rests with the Canadian Wildlife Service of the Department of Northern Affairs and National Resources.

#### 1.11 St. Johns River Values (SFI bul. No. 141, August 1963)

According to an item in the July issue of "Florida Wildlife", the value of the St. Johns River sport fishery is substantial. A Florida game and freshwater fish commission survey team interviewed public fishing camp owners and asked how many boats had been rented during 1962. The estimated number of private boats fishing on the river during the year were added. The total was then multiplied by the average number of fishermen observed per boat.

The minimum amount it is believed that fishermen would be willing to pay if a charge were made for fishing privileges is two dollars per angler trip. Multiplying this minimum figure by the number of anglers calculated (above), gave an estimate of the recreational value of the sport fishery. The latter amounted to more than \$2.3 million for 1962 - and may represent net value - added to the economy.

This excludes all other expenses a fisherman normally incurs, such as cost of fishing tackle, bait, fuel, meals, lodging and transportation. It is estimated that each angler spends, on an average, at least ten dollars a day on such items. The value of the St. Johns River sport fishery, in terms of gross business generated, was at least \$10 million during 1962.

#### 1.12 Thirty-three Million Habitual Sportmen (SFI bul. No. 179, October 1966)

According to the just released 1965 National Survey of Fishing and Hunting (USES and W Resource Publication 27; copies at 75¢ from Superintendent of Documents, U.S. Gov. Printing Office, Washington, D.C. 20402), a mass of some 33 million habitual ("real" or "substantial") anglers and hunters - those folk 12 years or older who participated at least three times or who spent at least \$5.00 - devoted 700 million recreational days, travelled 31 billion passenger miles, and spent \$4 billion in the process of indulging their favourite outdoors pursuits during 1965. Compared to a reasonably comparable earlier survey for 1960, these data reflect a substantially increased demand for fishing in particular and its economic significance - up some 3 million sportsmen, about 55 million recreation days, and over 3 billion passenger miles (note illustration for fishing participation trend)!

Habitual anglers 12 years or older, who alone numbered some 28,348,000 last year, devoted 522,759,000 recreational days out fishing and spent \$2,925,304,000 on their preferred means of outdoor recreation. In addition, it was determined - long urged by the Sport Fishing Institute - that at least 3,241,000 youngsters of ages 9 through 11 years also fished during some portion of 28,265,000 recreational days in 1965. Although

comparable numbers of youngsters under 9 years old probably also fish, these were not surveyed.

Thus, well over 31,589,000 habitual anglers 9 years or older fished during a total of more than 550,974,000 recreational days. These statistics do not include data for incidental anglers - those fishing less frequently than some part of three days or spending less than \$5.00 during 1965 - who, it is clear, number many additional millions of people.

Freshwater areas supported 426,922,000 recreational fishing days by 23,962,000 anglers. They spent an average of \$89 per person during the year or \$4.98 per day. Saltwater supported 95,837,000 recreational fishing days by 8,305,000 anglers. They spent an average of \$96 per person in 1965 or \$8.34 per day. Freshwater fishing generated \$2,125,652,000 of gross business activity, compared with \$799,656,000 generated by saltwater fishing. The overall total of angler expenditures for necessary goods and services was very nearly three billion dollars. It was comprised of primary fishing equipment (11.0%); auxiliary equipment (26.9%); food and lodging (15.2%); transportation (14.7%); licenses and privilege fees (4.5%); and baits, guides, and other expenses (27.7%).

Among the 8,305,000 saltwater anglers, it appears that 4,486,000 fish exclusively in coastal marine waters. The remaining 3,919,000 fish extensively in inland freshwaters as well. Because of dual fishing activities by the latter there are dual expenditures for some goods and services. These are sufficiently extensive to raise the overall average annual angler expenditures to \$103.19.

Among saltwater anglers, too, there are significantly different average angler expenditures in accordance with the coastal region fished. Over half of all saltwater anglers (4,178,000) and angling (55,950,000 recreational days) occurred on the Atlantic Coast, where annual angling costs, averaging \$79.27 (about \$5.92 per angler-day), are lowest. Roughly one-fourth of all saltwater anglers (2,084,000) and angling (22,390,000 recreational days) occurred on the Gulf Coast, where annual angling costs, averaging \$84.50 (about \$7.87 per angler-day), were intermediate between East and West coasts. The nearly one-fourth of saltwater anglers (2,043,000) and one-fifth of angling (17,497,000 recreational days) remaining were found on the Pacific Coast. Angling costs there averaged \$143.11 for the year (about \$16.71 per angler-day).

This wide range in average cost of saltwater angling by region is reflective, for the most part, partly of the frequency of fishing on each coast and partly of substantially greater expenditure for auxiliary equipment, principally boats and boat motors, on the Pacific Coast. Atlantic anglers averaged 13 to 14 days, Gulf anglers averaged 10 to 11 days, and Pacific anglers 8 to 9 days out fishing throughout the year. The latter spent over four times as much per angler on boating equipment. This is undoubtedly due to the radically different fishing conditions on opposite coasts. For example, 72.5 per cent of Pacific Coast anglers fished in part in the open ocean (39.7% in bays and sounds, 22.9% in the surf, and 14.0% in tidal rivers and streams). However, only 57.5 per cent of Atlantic and Gulf anglers fished in part in the open ocean (57.6% in bays and sounds, 32.1% in the surf, and 25.1% in tidal rivers and streams).

Freshwater anglers also exhibited decided differences in their customary fishing places, for the most part at least also reflective of their availability. Man-made waters were fished in most often by 35.3 per cent of inland fishermen, some 8,461,000 in all. Less than one-third of these, 10.8 per cent of all, fished in farm and ranch small ponds (less than 10 acres), while over two-thirds, 24.5 per cent of all, fished in larger

reservoirs. This compares with 34.7 per cent or 8,313,000 anglers who fished most often in rivers and streams and 30.0 per cent or 7,188,000 anglers who fished in natural lakes and ponds.

Primarily because of various legal exclusions (too old, too young, property owners, disabled, active servicemen, aborigines, specified waters, etc.), only 59 per cent of anglers 12 years or older are licensed. These include saltwater fishermen who are now licensed in seven states. In 1960, about 61 per cent were licensed; in 1955, some 66 per cent were licensed. One among every 10 women and girls fish while one among every three men and boys fish. One among every four anglers is a woman or girl. These 28,348,000 habitual anglers 12 years old or older travelled a total of 22,111,249,000 passenger miles (9,993,683,000 car miles) in private autos, usually in groups of two or three anglers. About 97 per cent of all travel for fishing purposes was by this means.

Many anglers dragged boat trailers behind them, for they made 10,124,000 boat-launchings at places where they were required to pay launching fees (totalling \$15,563,000). These were in addition to uncounted additional millions of boat launchings made without payment of fees in public areas. Some 601,000 anglers fished in Canada (up 37% since 1960), 138,000 fished in Mexico, and 57,000 fished elsewhere, in addition to fishing in the U.S.A. The less urbanised regions of the country exhibit a significantly higher ratio of population participation in recreational fishing than do those regions that are extensively urbanised and industrialised. Consistently high ratios of anglers in the population are found in the South Region, ranging from 23 to 26 per cent in the various subgroupings involved. These ratios are equalled in the Mountain states (25%). They are exceeded only in those North Central states running from Minnesota and North Dakota south to Iowa and Kansas. The 28 per cent average of the population noted there is the highest in the U.S. The Pacific coastal states are next with 21 per cent. They are followed by 19 per cent average participation in the North Central states of the Great Lakes.

Least fishing participation is evident in the heavily urbanised and industrialised North-east region. This is especially evident in the Middle Atlantic states of New York, New Jersey and Pennsylvania where only 10 per cent of the population engage in sport fishing. A somewhat greater, if relatively low, ratio of angling participation is evident in the New England states, where 16 per cent of the population fish.

Generally speaking, urbanisation was correlated with less angling, doubtless largely a function of less availability of fishing opportunity. This is probably complicated to some extent by the competitive effects of increased availability of cultural and indoor recreation opportunities in the urban environment. In any event, fishermen made up 12.0 per cent of "big city" populations (500,000 or more), 19.1 per cent of "small city" and suburban populations (places within urbanised areas having 2,500 to 500,000 population), and 23.5 per cent of towns and rural areas (all places with fewer than 2,500 and those with 2,500 or more not within urbanised areas).

Not all anglers necessarily fished in their state of residence although the strong majority (76.5%) apparently did so. In all, some 6,674,000 anglers fished in states in addition to or other than their states of residence. About half of these purchased non-resident licenses, tags, permits or stamps to do so (3,399,717 such were sold by the 50 states in fiscal year 1965). Most of the balance of out-of-state anglers represents saltwater fishermen (2,898,000 total) who can fish unlicensed in all but the 7 coastal states that presently license various segments of marine anglers. The remaining few

hundred thousand anglers who fish unlicensed undoubtedly do so, for the most part, by virtue of privileges accorded property owners in most states.

This impressive and worthwhile study was paid for by Federal Aid funds derived from manufacturers excise taxes paid on certain principal items of fishing tackle and on sporting arms and ammunition. The report provides information needed by all conservation agencies in carrying out their restoration, management and research programmes. The International Association of Game, Fish and Conservation Commissioners requested this survey as well as the two earlier comparable surveys (1955, 1960) of sport fishermen and hunters.

#### 1.13 TVA Recreation Facilities (SFI bul. No. 185, June 1967)

The Tennessee Valley Authority now has a 20-year (1947 through 1966) cumulative record of the extent of recreation development and use of TVA lakes and lake front property. During 1966, some \$22 million were added to investments in recreation facilities and improvements at TVA lakes and lakeshores, the highest annual increase to date. The increase made a year-end cumulative total investment amounting to somewhat more than \$215 million. Estimated recreation visits to TVA lakes in 1966 totalled a record 52,067,928 (11,470,517 being to dams and steam plants) - up 2,354,167 or 5.4 per cent over 1965.

Kentucky Reservoir, with the greatest value of recreation developments (\$45,695,000), attracted the greatest number of recreation visits during 1966 (12,174,000). This largest TVA reservoir also floated the greatest number of inboard boats (721) as well as outboard-propelled and other recreation boats (11,862). It also offered over five times as many over-night rental units (5,561) as any other TVA lake and is surrounded by much the greatest number of private summer cottages (3,888). Accordingly, Kentucky Reservoir supports considerably the greatest number of man-years of employment (688.4), through operation and maintenance of recreation facilities and services, which represents many more actual people employed seasonally.

The entire 25-reservoir TVA system, of course, supports many more boats, visitor accommodations, and man-years of recreation-related employment. Overall, there are 3,382 inboard boats and 47,687 outboard and other recreation boats on all TVA waters. Collectively, these are valued at \$48,662,885, with inboard having an average value per boat amounting to some 11-fold plus that of other recreational water craft. Even so, with 5,258 boat houses, some of the latter are obviously well worth looking up when not in use, in addition to inboards. Altogether, too, 4,068 houseboats occur on TVA waters, the greatest number on any one lake (830) being found on Boone Lake, with Norris Reservoir a close runner-up (803). A total of 12,872 overnight rental units are available to transient visitors, while a closely similar number of private summer cottages (12,652) also occur at TVA waters. Recreation at TVA waters supports a total of 2,248.9 man-years of employment for operation and maintenance of facilities and services. This is equivalent to several times as many people on a seasonal employment basis.

#### 1.14 Two More ORRRC Reports (SFI bul. No. 136, March 1963)

Publication in December of two special study reports of the Outdoor Recreation Resources Review Commission brings the total released to 26, with only one left unpublished to complete this vitally significant series. Copies of the reports may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., vis:

"A Look Abroad: The Effect of Foreign Travel on Domestic Outdoor Recreation and A Brief Survey of Outdoor Recreation in Six Countries". ORRRC Study Report 18 (82 pages; price 50 cents per copy). Fishing is extremely popular in every country surveyed. Denmark's sport fishing by her nationals emphasises saltwater, while there is excellent "coarse fishing" for tourists. Fishing is virtually the national pastime in France with over 2½ million registered anglers in 1957.

In Great Britain, fishing is the most popular of the country sports "because it costs less". Many more people fish than hunt or shoot. Coastal and deep sea fishing are free to all (except for salmon and sea trout fishing in Scotland) but as a rule, freshwater fishing rights are privately owned and have to be paid for. Most coarse fishing is to let to angling clubs; trout and salmon fishermen either rent a stretch of river, join a club, stay at a hotel with its own fishing rights, or pay for the right to fish by the day, week, or month. The cost of salmon fishing is often high.

In Germany, the holder of the right to fish - whether it be the land or private owner - is responsible for fish stocking and protection. A fishing license is required. In addition, to fish in waters where rights are privately held, permission from the owner is required. Sport fishing is an ancient form of recreation in Japan, widely indulged. Fishing with well trained cormorants is still popular. Net fishing in many forms is a form of sport fishing in Japan, also.

"Projections to the Years 1976 and 2000: Economic Growth, Population, Labour Force and Leisure, and Transportation". ORRRC Study Report 23 (434 pages; price \$2.00 per copy). Contains a wealth of data and explains the basis for projecting Commission conclusions into the future.

#### 1.15 Water Values (SFI bul. No. 142, September 1963)

Water utilised for fishing and related recreational activities (camping and picnicking) in New Mexico adds \$200 to \$300 per acre-foot to the economy of that state while an acre-foot of water used by agriculture adds only \$50. The value added by industry is from \$3,000 to \$4,000 per acre-foot. These were some of the conclusions reached by Nathaniel Wollman and his Special Study Committee of geologists, biologists, engineers, agricultural economists, and economists in a sophisticated economic analysis of the benefits from different, often conflicting, uses of water which has recently been published ("The Value of Water in Alternative Uses", University of New Mexico Press, Albuquerque, price \$10).

This study was undertaken to determine the best possible uses that may be made of New Mexico's share of the San Juan River water. The water will be obtained for the Rio Grande River basin by way of the San Juan-Chama diversion that is included in development of the Upper Colorado River which Congress recently approved. Proper allocation of this new water in the semi-arid Southwest is of extreme importance to the future economic growth of the area. In this study, allocations of water for agriculture, recreation and industry were made in eight different proportions and the future values of each allocation were projected. To do this, the present values of water were determined.

Of special significance were the economic values attributed to fishing, camping and picnicking. Other important recreational uses including boating, hunting and swimming, were not covered because of the difficulty of obtaining reasonable measures of their values. It was pointed out that in spite of sharply increasing demand for fishing facilities (which will probably double in the next 20 years) the natural preserves have been shrinking. Other water uses are normally emphasised to the detriment of

recreational facilities. Prior rights have usually been exercised by agricultural and industrial users since they represent well-defined corporate or personal entities that can protect their raw materials while the recreational industry, which depletes very little water, is diffuse and disorganised. Because the recreation industry is composed of a wide variety of trades, services and government facilities, no well-defined user interest can be mobilised - except perhaps the consumer himself.

The complexity of obtaining a proper evaluation of recreational use of water is well demonstrated by the present study. Fishing, according to Wollman, "is an activity that includes but goes beyond the acquisition of fish", therefore the surface area or stream length was used as a physical measure of the recreational resource of "fishing" rather than the number of fish awaiting capture - or fish creel. The value-added per acre-foot of new water allocated for fish and wildlife was estimated from the amount of such water, the total traffic in fisherman-days and the value added that could be attributed to the average fisherman-day. To establish a base for projection, areas of known fishing waters were established, traffic surveys of fisherman-use were made and questionnaires were mailed to 3,000 licensed fishermen including resident, non-resident seasonal and non-resident five-day permit holders. These questionnaires asked for detailed information concerning expenditures made for fishing.

Wollman states that since the primary product of the recreational industry is "bliss", or at least escape, the value-added cannot be measured directly as products from farming or industry or in the catch as from commercial fishing but it may be measured indirectly from the fee paid by the consumer for a day's fishing, the fee to include food, shelter, transportation, equipment and use of water. In New Mexico, total expenditures per fisherman-day amounted to \$11.93 (resident \$9.93; non-resident season \$19.02; non-resident five-day \$31.93). The percentage breakdown of angler expenditures for fishing (exclusive of license fees) was as follows: vehicles 25.2 per cent; food 16.5 per cent; transportation 15.5 per cent; boats and motors 12.7 per cent; camping equipment 9.8 per cent; fishing tackle 7.8 per cent; lodging 6.5 per cent; special clothing 2.2 per cent; horses, etc. 1.1 per cent; fees 0.5 per cent; other 0.6 per cent; and "bribe of wife" 1.6 per cent.

By integrating fishing days per season, fishing intensity, amount of water and amount of money spent per fisherman-day (in New Mexico), the value-added per acre-foot of water is \$264, which is indeed a measurable contribution to economic welfare. And this is in addition to the beneficial restorative powers that may be obtained from some contact with nature.

While the present study applies specifically to the value for New Mexico, it may apply to other areas of the Southwest. In general, it seems true that water is becoming a more and more precious commodity and it is hoped that detailed studies of the economic values of different water uses (which are above and beyond the immeasurable but well-recognised aesthetic values) will be made in other areas.

#### 1.16 18-Million Dollar Fishery (SFI bul. No. 164, July 1965)

Gross economic value of the Oregon salmon-steelhead sport fishery was approximately \$ 18 million in 1962, say Oregon State University economists W.O. Brown, A. Singh, and E.N. Castle. The net value was estimated to be from \$ 2.5 to \$ 3.1 million.

Increased demands for utilisation of rivers and streams for hydroelectric power, irrigation, flood control, navigation, pollution disposal, and other purposes often conflict

with their use for migratory fishes. While monetary benefits may be estimated for most uses, administrators face a difficult task when trying to place a monetary value on the fishery resource. Such estimates are necessary, however, when the economic feasibility of fish protective devices are being considered, or when the value of the fishery to be affected is compared with benefits from alternative uses of the streams. While economic considerations are not the only or most important justification for preserving the fishes for future generations, knowledge of their economic value is helpful in making decisions affecting the future of the fishery resource.

The present study "An Economic Evaluation of the Oregon Salmon and Steelhead Sport Fishery" (Technical Bulletin 78, Agricultural Experiment Station, Oregon State University, Corvallis), was undertaken (1) to determine annual expenditures by salmon-steelhead anglers, and (2) to determine the "net" economic value of this fishery resource. The net economic value is the estimate of the monetary value of the resource which might exist if it were owned by a single individual and a market existed for the opportunity to fish for salmon and steelhead.

Estimated expenditures for durable items by Oregon salmon and steelhead anglers was between \$ 6.7 and \$ 12 million. The breakdown on expenditures was: tackle and gear \$1,904,800 (20.4 per cent); boat equipment \$5,493,900 (58.8 per cent); special clothing \$362,600 (3.9 per cent); camp equipment \$1,434,700 (15.3 per cent); other equipment \$150,500 (1.6 per cent); total \$9,346,500.

Current expenses, those costs associated with fishing trips made during a particular month, were estimated to range between \$7.0 and \$ 9.3 million. The breakdown on expenditures for current items was: transportation \$2,391,000 (29.3 per cent); lodging \$511,300 (6.3 per cent); charter boats and guide service \$912,600 (11.2 per cent); bait, lures, and other tackle \$796,700 (9.8 per cent); boat and motor rental \$260,200 (3.2 per cent); tackle and gear rental \$105,200 (1.3 per cent); other \$330,300 (4.0 per cent); total \$8,155,000.

The total durable expenses, plus the total current expenses, were estimated to be \$17,501,500. Using the 95 per cent confidence interval the estimated total was between \$ 14.4 and \$20.6 million. In addition, angling license fees would add approximately \$500,000 to the total figure.

As pointed out by the authors, this study was not a management study, although their estimates have relevance to management. A complete analysis of the fishery problems would include problems on biology, conservation and other implications. Obviously, economic considerations are by no means the entire story. However, they are important and those responsible for this excellent and detailed study are to be commended.

#### 1.17 1961 Fishing in Canada (SFI bul. No. 143, October 1963)

A report on an economic survey by D.A. Benson, entitled "Fishing and Hunting in Canada, 1961", published recently by the Canadian Wildlife Service, Ottawa, Ontario, gives information somewhat comparable to that developed for 1955 and for 1960 in the United States, on numbers of participants, recreation days and expenditures by participants. It is the first nationwide assessment of the economic and social significance in Canada of these leading forms of outdoor recreation.

Of Canadians 14 years of age or older, to whom the survey was limited, 10.8 per cent (1,311,000 persons) fished; 12.6 per cent fished, hunted or did both; and 6.5 per cent hunted only. Men anglers (1,058,000) outnumbered lady anglers (198,000) six to

one (in the U.S., less than three to one). The highest concentration of fishing and hunting participation was found in Ontario where 37.9 per cent of participants (579,000 persons) occurred. Prairie provinces supported 20.5 per cent, Quebec 17.9 per cent, Atlantic maritimes 11.1 per cent and British Columbia 12.6 per cent of the sportsmen.

The latter distribution of outdoorsmen, heavily weighted as it is by the preponderance of fishermen in the combined total, strongly reflects the finding that freshwater sport fishermen (about 1,256,000) outnumbered their saltwater brethren (about 149,000 - of whom some 64,000 apparently fished exclusively in saltwater) by more than eight to one. To a lesser degree, it reflects the further finding that Pacific saltwater anglers (about 92,000) outnumber Atlantic saltwater anglers (about 57,000) somewhat less than two to one. Less than 10,000 ladies braved the Atlantic to fish, while some 17,000 did so on Pacific waters.

All in all, sport fishing provided some 20 million man-days of recreation for Canadians in 1961 and hunting some 11 million more. Anglers travelled about 570 man-miles each, on the average, or a total approaching 750 million man-miles in all in private vehicles to enjoy their sport. Hunter-travel brought the total to more than one billion miles. More than 60 per cent of all sportsmen fished and hunted within 100 miles of home; more than 90 per cent did so within 300 miles.

Anglers spent \$188 million on their sport in 1961, for an average of \$143 per fisherman. Expenditures for freshwater fishing averaged about \$138 per angler, whereas those for saltwater fishing averaged higher - apparently something over \$171 annually, possibly approaching \$214 per saltwater angler. Of the combined average expenditure per angler (\$143 annually), less than one per cent was invested in perpetuation of the resource through purchase of fishing licenses (only 40 per cent of freshwater anglers were required to buy them). Capital items, i.e. fishing equipment such as boats, motors, trailers, fishing tackle, camping gear used primarily for fishing, etc., accounted for 51 per cent of the expenditures. Expendable items, including accommodations where utilized, food, supplies of various nature, consumed something under 27 per cent. Costs of operating private vehicles (averaging 7½ cents per mile), made up the 21 per cent plus remaining.

## 2. PLANNING

### 2.1 City Troutng (SFI bul. No. 164, July 1965)

Trout fishing within a half hour's drive of a big city has been extremely popular where it has been tried. In an illuminating article on urban trout angling in the April 1965 issue of "Outdoor California", fish chief Alex Calhoun pointed to Lake Murray, a 150-acre San Diego water supply reservoir, as a good example. Lake Murray formerly furnished sufficiently good bass and sunfish angling to support 7,000 angler-days of recreational fishing annually. Visitors were charged a daily fee of \$1 for patrol and sanitary services.

In 1959, trout were stocked in the lake. By 1961, attendance increased to an astonishing 50,000 angler-days in spite of a two-thirds reduction in the length of the open season. The catch jumped from 7,000 to 50,000 pounds of fish. Catches averaged nearly a pound of trout per angler-day. The entire operation was financially self-supporting, with no increase in fees, because increased attendance spread the costs over a broader base.

Factors that Calhoun said contributed to the popularity of Lake Murray included: (1) unusually successful fishing sustained by heavy stocking, (2) convenient location, (3) low fee, and (4) large trout (up to a pound) stocked. Irvine Lake in Orange Country and



Wohlford Lake in San Diego County, managed under a similar programme, are exhibiting a degree of success similar to that at Lake Murray.

Lack of funds for urban trout angling programmes has forestalled their extensive development. The pay-as-you fish approach toward financing trout angling could provide two or three million more days of trout angling in California each year near big cities, says Calhoun. The lack of certain intangible qualities commonly associated with mountain trout angling appears to be compensated to some degree by the comparatively large catches experienced in urban trout lakes.

## 2.2 Definition Needed (SFI bul. No. 187, August 1967)

An editorial in "Michigan Out-of-Doors" for July asks the highly pertinent question, what is outdoor recreation? Everyone talks about it but no one will officially say what it is. As a result, the editor keenly notes, outdoor recreation is getting all tangled up with the new Conservation, Natural Beauty, and the Great Society. Outdoor recreation must be woven through all of these, of course, but it should also have a distinct identity. The editor observes, rightly in our view, that we must have a working definition so that citizen and government can understand each other.

Few concepts have appealed to Americans as dramatically as outdoor recreation. A new Bureau of Outdoor Recreation was created - and Congress provided the Land and Water Conservation Fund Act as its major tool kit. Every state is busy planning outdoor recreation projects. These must be approved by the Bureau of Outdoor Recreation before federal funds can be made available for suitable projects. Once the plans are approved, they are not easy to change. And this poses two key questions: what do the planners consider "outdoor recreation" to be and what do they plan?

To some, the editor notes, outdoor recreation is almost anything related to outdoor pleasure. This can include baseball parks, golf courses, swimming pools, band shells and highway beautification. One state planning group was asked to build an Olympic stadium with outdoor recreation funds; other states have been asked to build floral gardens. But outdoor recreation should mean something more. President Johnson in September 1964 said: "We began a new Bureau of Outdoor Recreation so that our children will have a place to hunt and fish and glory in nature".

One thing is certain to the editor (and to us as well) - when the average outdoorsman thinks of outdoor recreation, he isn't thinking of floral gardens. Yet, with the current emphasis on landscape beautification, a big part of available state recreation funds can be siphoned into such projects. Though these things are desirable, we agree with the editorial view that they are cultural projects that can be built at man's convenience. Far more important are the natural projects for outdoor recreation - places in which the main attractions are based on natural resources, and which provide forms of recreation not available in cities.

Even if outdoor recreation should be defined to include cultural projects, priority must still be given to natural resource areas. Most of the federal money for outdoor recreation comes to the Land and Water Conservation Fund Act from taxes on motorboat fuels and admission fees to natural and semi-natural recreation areas. They do not come from outdoor band concerts or gasoline taxes used for highway construction.

In a national meeting, the MOOD editor said, a top official of the Bureau of Outdoor Recreation told a group of conservationists that "he hoped they wouldn't ask him to define outdoor recreation." Nevertheless, as the editor wisely stated, we must

have an official definition so that we can plan properly on a state level. Otherwise, we cannot assure ourselves that priority is given to natural projects for which there are no man-made substitutes - or that limited funds are not siphoned off to unrelated projects, however worthy in their own right.

### 2.3 Delaware River Recreation (SFI bul. No. 181, December 1966)

The Delaware River Basin Commission (P.O. Box 360, Trenton, New Jersey 08603) recently published a set of 10 Delaware River Recreation Maps of the non-tidal segment of the Delaware River. These are available as a packet in an attractive carrying folder, from the Commission (only) at one dollar per set. The 10 maps show state parks, forests and game land, river access and recreation areas, where to fish, swim and boat, rapids, pools and riffles, channel locations and depths, and stream-flow characteristics.

According to the DRBC executive director (James F. Wright), his Commission's purpose in preparing the recreation maps has been to make the user aware of the variety of recreational opportunities this unique river provides and to invite the user to take full advantage of all it has to offer, while remembering that the Delaware River is a public resource to be enjoyed by all. When using it, he admonishes, it should be treated with the same respect ordinarily to be given to any personal object of value, including respect for the property rights of others and an effort to help keep the river and landscape free of litter.

It seems to us that what applies to the non-tidal portion of the river should apply equally to the tidal portion, although many industries along this reach of the river seem to think otherwise. Apparently, they consider it to be their prerogative to maintain a continuing high level of pollution at the expense of abundant aquatic life and associated recreational use. To our way of thinking, this does not adequately reflect the broad public interest involved nor the high-minded objectives enunciated by the DRBC - at least as applied above Trenton.

This limited-use philosophy of local industry was clearly evident in a Water Quality Conference on the Delaware River Estuary, held in Philadelphia during late July. Four alternative objectives for water quality were discussed relative to comparative costs, reduction of waste discharges, and benefits to fish life. These boiled down, essentially, to how much dissolved oxygen would be provided for support of fish life - in comparison to the costs estimated to be involved.

Objective I would assure presence in the water of 4.5 ppm average dissolved oxygen in critical areas at estimated cost of \$490 million. Objective II would provide 4 ppm average of dissolved oxygen, alleged to give migratory Atlantic shad 95 per cent average chance of survival, at a cost of \$ 230 – \$ 320 millions. Objective III would assure 3 ppm average content of dissolved oxygen, with 85 per cent average chance of shad survival postulated, and cost \$ 130 – \$ 180 millions. Objective IV, providing average dissolved oxygen levels of 2.5 ppm, slightly better than present, would cost \$ 100 to \$ 150 million. Merely to prevent further deterioration from prevailing conditions in the estuary, Objective V would cost \$ 30 million more than present expenditures.

R.H. Stroud, of Sport Fishing Institute, commented for fishery interests on the various alternative objectives, as a member of a discussion panel at the conference. He noted, in his remarks, that costs of accomplishing pollution abatement are generally emphasized by engineers at the expense of substantial fishery values, which they ridicule. They customarily rebut the valid demand by conservationists and the general public for water pollution abatement by asking: "What do you want? Jobs or fish?"

Senator Muskie, Chairman of the Senate Water Pollution Sub-Committee, has rightly answered: "Both".

The water quality of the Delaware River Estuary directly influences the quality of man's total environment in that region. The well-being of the fish, besides providing direct recreational and economic benefits, is a good indicator of the quality of man's total ecology. Let us bear in mind, Stroud said, that it is the latter which principally governs whether Americans will have a truly Great Society. Moreover, he noted that Senator Muskie recently commented: "The preservation of America's natural beauty boils down to proper resources development and use." A reference to President Johnson's unprecedented Congressional "Message on Natural Beauty", early last year. Tragically little natural beauty may presently be found in the sewer-like environment of the Delaware estuary.

FWPCA enforcement chief Murray Stein has publicly stated his conviction that "oxygen in the water naturally belongs to the fish". It is a truism that if water is o.k. for fish, it is o.k. for most other uses as well. Thus, Stroud stated, the national mood clearly rejects the outmoded philosophy that there is an inherent right to pollute. It is no longer conscionable - or legal - to devote waterways to the principal use function of waste transport. Yet, if less than maximum technically feasible pollution abatement occurs in the Delaware River Estuary, serious deficiencies will remain in this respect. The average values of dissolved oxygen content provided by any alternative below Objective II are such that the extreme lows expected to occur in summer will prove severely limiting to fish life and associated recreation. Even with attainment of Objective I, the midsummer dissolved oxygen lows are clearly minimal in these respects. Their precise effects upon aquatic life would depend on the extent, duration and rate of on-set of these extremes.

In the session preceding the panel discussion, DECB's chief engineer, Herbert A. Howlett, had described the proposed 12,000-acre Tocks Island Reservoir. He estimated that 10,000,000 visitor-days of recreational use will occur there. Without challenging this estimate, Stroud pointed out that the 80-mile long Delaware Estuary between Trenton and Port Penn already offers over 51,000 surface acres of immense potential recreational significance. To realize it requires principally that water pollution be substantially controlled.

The estuarine area, over four times the size of planned Tocks Island Reservoir, currently supports only about two angler-days of recreational fishing per acre. On a conservative basis, given maximum pollution abatement, this potentially productive area may be eventually capable of supporting up to 100 angler-days per acre. This would be equivalent to a 50-fold increase in recreational fishing opportunity alone, after achievement of Objective I - from the presently estimated 102,000 angler-days to 5,100,000 angler-days!

Based on average daily angler expenditures of \$5.80 (as generated recently by the fairly comparable Potomac estuary), this amount of angling would stimulate gross annual expenditures for related goods and services totalling \$29,580,000. At a five per cent interest rate, a capital investment of \$571,600,000 would be necessary to provide such a yield to the economy otherwise. On the basis of net value added to the economy (at the \$2.00 per angler-day value determined for use in the cost-benefit ratio calculations of the Feather River Project of the California Water Plan), the corresponding figures are \$10,200,000 and \$204,000,000 respectively. The point, regardless of the method employed in the calculation, is that the estuarine fishery resource has a substantial "plant value" that cannot be dismissed lightly.

In the morning session prior to the panel discussion, Dr. Robert Thomann, Technical Director of the Delaware Estuary Comprehensive Study, had discussed findings of the DECS report. In the process, Stroud commented, he oversimplified the definition of an anadromous fish as one that lives in salt water and ascends for spawning to the upper freshwater reaches of a river system. Correct for American shad, which the report stresses, while overlooking the other species, the important anadromous white perch and striped bass ascend into the tidal freshwater section of the estuary to spawn. Their young use this section as nursery grounds, even as do the juveniles of American shad after descending from their upstream spawning and nursery areas. These facts focus new significance on the estuary with respect to its vital role in the ecology of fishery resources.

Moreover, Stroud pointed out, the tidal freshwater section of the estuary is also utilized as a vital nursery area by the juveniles of a number of non-anadromous species that are important both in the estuary and in the bay below. These include bluefish, weakfish, porgies, drum, croakers, spot, catfish, winter flounders, and menhaden, as well as striped bass and white perch. Thus, the pollution of the estuary also has a direct and vital effect upon the well-being and abundance of the most important fin fishes of the half million-acre Delaware Bay, which have declined substantially since the turn of the century, as well as such now rare species as sturgeon. Stroud's conclusion was that "the only conscionable course to serve the broad public interest requires the maximum pollution abatement that is technically feasible, both now and in the future."

#### 2.4 Distribution of Expenditure (Cit. from Clawson, M.: Economic Aspects of Sport Fishing in Canad.Fish.Rep. No. 4, 1965)

A few words may well be said about the recipients of the expenditures made by fishermen. Their expenses are income for someone. Who the recipients are and where they are located, depends in part upon the items of expenditure included in the study. As we have noted, most of the equipment is purchased in the home town of the recreationist. For short trips, he buys his gasoline and groceries here also. For longer trips, he must spend more money en route or at the site of his recreation. But even for the longest trips, the expenditures at or near the site may be a small part of the total. While fishermen or other recreationists from relatively distant parts do bring some additional money into the local recreation area, yet more of the business they generate is likely to be in their home towns. The makers of automobiles, cameras, film, motorboats, motors, and much other equipment owe much to the national parks and other prime vacation areas, for instance. It is this disparity between place of expenditure and place of recreation which makes it difficult for local units of government to provide recreation opportunity at a profit to themselves and their citizens. In the United States, this is part of the rationale for federal grants in aid to states and from states to cities and other units of local government; in this way the burden of supplying recreation opportunity is more widely spread, and perhaps rests more equitably on those benefiting from it.

Some of the expenditures made in a local area pay wages or profits to local people, but a large part goes to buy supplies or raw materials imported into the local area. When a fisherman buys a tank of gasoline, some part of his expenditure pays the wages of the service station attendant as well as other local costs. But much is used to import the gasoline from a more distant refinery. The same is true of other items of expenditure. On the other hand, the local recipient of these expenditures in turn buys other goods and services, some part of which is provided locally and some is imported. The relative proportions supplied locally and imported vary considerably depending in

part upon the nature of the local economy but also upon the size of the area under consideration - how big is "local"? For the typical vacation type recreation area, it seems probable that less than half of the direct expenditure by recreationists is for locally provided goods and services and that more than half is for "imported" goods; but consideration of the second, third, and possibly later rounds of expenditures generated by this initial outlay may raise the local proportion substantially.

## 2.5 Elusive Quality Factor (SFI bul. No. 181, December 1966)

A year ago, at a Montana State University Outdoor Recreation Seminar, Dr. J. Alan Wagar of the Utah Cooperative Recreation Research Unit (cosponsored by the U.S. Forest Service and the Utah State University), discussed the troublesome question of quality in outdoor recreation. As he noted, the chief difficulty is that most folk define the latter very subjectively tending, at the same time, to believe that they have revealed the fundamental truth for everyone.

In discussing the problem in terms of accommodating in necessary land management policy decisions the elusive element of quality, however subjective and indefinable it may be, he suggested that three premises underlie any effort to provide quality recreation for other people (not just ourselves), vis:

First, the sole purpose of all land management is to provide benefits for people - including keeping some whooping cranes because people like to see them (not per as because cranes have a "right to live"). This premise argues for conservation of resources simply because future generations will need them.

Second, recreation, like all other human behaviour, is motivated by needs - some being, like water, food and air, issutable physiological needs, but most if not all other needs being learned - thereby including almost anything.

Third, the quality of recreation depends on how well it satisfies the need that motivates it - an experience that thoroughly many needs being of higher quality than one that only partly satisfies a few needs. The following ten categories of needs, roughly reflective of broad human psychology, seem to Dr. Wagar to explain most outdoor recreation:

- Exercise
- Healthful environment
- Self-esteem and social prestige
- Esthetic enjoyment
- Understanding
- Freedom of choice
- Early traditions and conditions
- Self reliance
- Change and escape
- Companionship

Thus, Dr. Wagar suggests, in planning a recreation complex, a good approach would be to list the kinds of recreational opportunities that seem to be needed and then to see where you can fit them in. Too often, professional land managers tend to plan area by area instead of opportunity by opportunity. A flat spot is likely to be made into a campground when a visitor center or golf course may be the thing that's really needed. It isn't nearly so important to use a specific area for a specific purpose as it is to insure that a needed opportunity is included somewhere in the total scheme of things. Many recreation sites are still planned in a vacuum without reference to other areas.

Dr. Wagar summed up his constructive analysis by reiterating that quality is a human concept based on highly subjective criteria. It depends on the satisfaction of needs, which are mostly learned and therefore extremely varied. However, by using a few categories of needs, we can fairly well predict what people are likely to want. The important thing is not to expect everyone to want the same type of recreational opportunity. By providing a variety of opportunities, zoning, managing the areas, and interpreting the attractions, we should be able to provide benefits from recreation from now on.

Zoning can be an essential part of planning for quality in a recreation complex. Otherwise, people with different interests will spoil each other's experiences. Fishermen and water skiers illustrate the point. Sometimes they can be separated in space by giving one area to fishermen and another to water-skiers. They can also be separated in time. In some areas, water skiing is permitted only between 10.00 in the morning and 4.00 in the afternoon, giving fishermen the early morning and late afternoon when fishing is better anyhow. Zoning can also insure granny of an opportunity to see some of the world's most spectacular scenery from her automobile, without eliminating all the wild places that other people might want to see afoot.

## 2.6 Farm Ponds (SFI bul. No. 143, October 1963)

A report of the state biological survey of Kansas, by fishery biologists Claude E. Hastings and Frank B. Cross, analyses "Farm Ponds in Douglas County, Kansas" and their use in fish production (University of Kansas, Museum of Natural History, Lawrence; Miscellaneous Publication No. 29). Of 1,316 farm ponds in 1954, over 89 per cent were one-half acre in area or smaller, and less than three per cent exceeded one acre. In contrast to expressed interest in fish production in the ponds, only half had been stocked, fewer were fished often, and only three of 22 ponds sampled provided good fishing. Muddy water appeared to be the most important factor of detriment to fish production, in addition often to being too small (under one acre) and too shallow (under eight to ten feet maximum depth). Use of channel catfish coupled with supplemental feeding and fertilisation in existing small ponds would yield up to 2,000 pounds per acre.

Having particular application to southeastern states, three useful new farm pond management booklets have also appeared recently. One of these is "Management of Farm Ponds in South Carolina", by Jefferson C. Fuller, Jr., fish chief, available from the South Carolina Wildlife Resources Department, Columbia. Another is "Farm Pond Management", by Hugh M. Fields and F. Eugene Hester, and available as Extension Circular No. 435 from the North Carolina Agricultural Extension Service, North Carolina State College, Raleigh. Still a third such booklet is "The Management of Tennessee Farm Ponds", by fishery biologist Eugene S. Cobb. It gives simplified instructions concerning the construction, stocking fertilisation and harvesting of small farm fish ponds. Also includes special instructions on weed control, pond reclamation and miscellaneous problems. This revised 1963 edition is available from the Tennessee Game and Fish Commission, Cordell Hull Bldg., Nashville 3, Tenn.

2.7 Financing Marine Sport Fishery Programmes (Fish Conservation Highlights 1960–62; Sport Fishing Institute, Washington, D.C.)

It is increasingly evident that expanded saltwater sport fishery research and development programmes are needed in the coastal states. More and more people are turning to coastal marine areas to satisfy their requirements for relaxation out-of-doors. This has resulted from the rapid development of the new urban sprawl, much of it along the seacoasts, and increasing amounts of leisure time. It is well established, too, that fishing - from boats, banks, jetties, bulk-heads, piers, shores, beaches, bridges, etc. - ranks among the most popular of the principal outdoor recreation activities.

A veritable army of saltwater anglers is growing substantially year by year at a rate estimated to be four-fold that of the population. Opportunities to get to and on coastal waters to fish are fast disappearing as private development gobbles up the shoreline. At the same time, coastal marsh and estuarine habitat, vital as breeding and nursery grounds for saltwater sport fishes, is being obliterated.

The harvest of fish is increasing rapidly. The current catch of saltwater fish by sport fishermen is equivalent to nearly 28 per cent of the total harvest of food fishes by commercial fishermen. For some of the more important sport fishes, it is much higher. In 1962, for example, anglers accounted for a greater harvest of winter flounders from the bays of Long Island than the commercial fishing catch of this important fish for the same year.

The greatest benefit. The time is no longer remote when an increasing number of decisions will have to be made concerning who gets to harvest what species and how. It's a matter both of the capacity of fish stocks to replenish themselves satisfactorily and of the wisest use of the stocks for the benefit of the most people. In a beef-eating country such as ours, many species of fishes may well have their greatest value to society as objects furnishing vitally needed outdoor recreation.

A few reservations of former commercial fishes for recreational use have already been made. In California (a state having a saltwater license), the tidal-water white catfish was subject to heavy exploitation by both sport and commercial fishermen. Biological research demonstrated that the joint harvest exceeded the capacity of the catfish to replenish itself satisfactorily. This finding, together with economic evaluation as objects of recreation, resulted in the elimination of commercial harvest and reservation of the catfish fishery for sport fishing purposes, properly regulated to assure a high level of sustained yield. In Texas (another state with a saltwater license), commercial netting of redfish and seatrout in two large coastal bays was controlled in order to benefit angling. In Florida, the snook was made a "game fish"

If we are to keep pace with growing fishing pressures on coastal sport fishery resources, and assure future good fishing, the states must begin to provide more abundant fishing facilities and to maintain continuing research programmes designed to develop and evaluate beneficial fish management practices. Among the various suggestions that have been made for ways of financing state action programmes of this sort, only those that involve state-issued saltwater angling licenses thus far appear to meet the basic test for raising substantial sums of money on a continuing basis. The licensing proposals, too, are the only ones that lend themselves to protection of revenues from misguided use for non-related purposes. One state, Massachusetts, has begun to use a portion of its unrefunded marine fuel taxes for this purpose, on a small scale.

## 2.8 Financing Recreational Lands (SFI bul. No. 147, February 1964)

A detailed study of current and future land acquisition programmes for fishing and hunting needs in Massachusetts was undertaken recently, at the request of former state fish and game director Francis W. Sargent, by then wildlife manager James Shepard (now director). As a result, Shepard found that one of the biggest problems facing conservation agencies throughout the country and in Massachusetts is finding a satisfactory means of financing vital land acquisition programmes.

The fish and wildlife administrator concluded, in his report to the fish and game division's policy board, that the most practical and quickest means of financing such a programme would be through a \$1.00 increase in fishing, hunting, and trapping licenses. Shepard proposed that the additional funds become "earmarked solely for land acquisition and - used for no other purposes!" He proposed, further, that the funds so derived should be matched with equal monies from the General Fund. (Such legislation will be sought.)

The latter appears wholly justified since any lands acquired would be used extensively by the general public. According to outdoor editor Henry Moore, in his "Rod and Gun" column in the "Boston Sunday Herald" for November 12, 1963, director Sargent gave a persuasive rationale for such an approach in a talk at the annual meeting of the Garden Club Federation of Massachusetts. Sargent disclosed then that "a survey of just one of our wildlife management areas shows a 25 per cent higher usage for all types of outdoor recreation other than just hunting and fishing."

This means that hunting and fishing accounted for only about 44 per cent of total recreational activity on a managed wildlife area. It provides strong support for Shepard's contention that "the common interest in our natural resource heritage, shared by each and every citizen of the Commonwealth, demands that all contribute a fair share to their preservation and perpetuation."

## 2.9 Fishery Improvements in Multipurpose Water Developments (Cit. from White, W.M.: The Economics of Sport Fisheries Management in Canad.Fish.Rep. No. 4, 1965)

For the case of fishery improvements proposed with multipurpose water developments in the United States, benefits for some years have been reduced to monetary terms. This has proved desirable in order that the benefits from the varied and often competing purposes of water development can be integrated and a balanced plan formulated. For many years, judgment values for a fisherman-day were used that were based on total expenditures incurred by the fisherman in connection with his participation in the sport. Recently, values for fisherman-days have been derived from a cursory survey of charges assessed on private areas for the use privilege, to which informed knowledge and judgment were applied.

These so-called administrative values range from \$0.50 to \$6.00 per day and are intended to be net of all associated costs. In effect, they represent estimates of what a perfectly discerning, hypothetical private operator of a project area could not from the sale of fishing privileges. Incidentally, similar unit values have been established for hunting. The unit values have been adopted in practice by all concerned federal



agencies of the United States and they provide a useful basis for judging the merits of fishery management proposals in connection with federal water development programmes. They are used not only for comparison among alternative fishery proposals but also for comparison of fishery proposals with proposals for other types of use of the water project facilities. In addition, these standard administrative values are useful for all related economic analyses in water development programmes such as establishment of benefit-cost comparisons for justification purposes, cost allocation among purposes, and determination of cost-sharing arrangements for beneficiaries.

Of course, standardisation of fishermen-day values does not solve all economic problems of sport fishery management even as related to water resource development. The range of values permits assignment of a particular value judged to be applicable to the type and quality of fishing involved, but special problems remain which are associated with fisheries of unique character and high intangible value.

Evaluation of such costly management methods as the planting of catchable-sized fish requires consideration of the benefits and costs not only in terms of angler-days and related monetary values, but also in terms of larger social questions. We must ask if the segment of the public served by this method could be equally served in other ways at the same or lesser cost. In other words, our evaluation must be as comprehensive as possible. It is not enough merely to relate the direct costs of management to the judgment values assigned to the fishing benefits; all related costs and benefits, both intangible and tangible, monetary or not, should be considered. If acceptable fishing can be provided by planting of catchable-sized fish at locations where fishing could not otherwise be provided, such as in intermittent seasonally flowing streams near metropolitan areas, special benefits as well as lowered travel costs may accrue to the fisherman which fully justify the high management costs.

#### 2.10 Fishing Therapy (SFI bul. No. 128, July 1962)

An important aspect of therapy in the rehabilitation of mental patients at Norwich Hospital, Connecticut, is recreational fishing in a small pond on the Hospital grounds. Recently, Dr. Ronald H. Kettle, Superintendent of the Hospital, wrote to Director Lyle Thorpe, State Board of Fisheries and Game, expressing appreciation for his agency's assistance in the Fishing Project. The Board annually stocks about 600 catchable trout in the pond. Dr. Kettle stated that this form of recreational therapy is an increasingly important contribution in the improving rehabilitation of the patients. We commend Mr. Thorpe and his agency and Dr. Kettle for this fine project.

#### 2.11 General Conclusions and Recommendations of the Hunter Report (Scottish Salmon and Trout Fisheries. Dept. of Agr. and Fisheries for Scotland, August 1965, Cmnd. 2691, The Hunter Report)

343. We have set out in this report proposals which in our view will enable the Scottish salmon and trout fisheries to be used to the greatest advantage. The appointment of Area Boards, the establishment of the Scottish Anglers' Trust and the

institution of the licensing and rating schemes which will contribute to their revenues, could be achieved in a relatively short time after the necessary legislation has been passed. The new administrative system, with the protection recommended for brown trout fisheries, can be expected to bring about a marked improvement in Scottish freshwater fisheries. The changes in the system of commercial salmon fishing will necessarily take longer but we hope that the commercial and research schemes which we have recommended will be started quickly, so that the discontinuance of salmon fishing in the sea, which in our view is essential for sound fisheries management, may take place with all practicable speed.

344. We summarise below our main findings and recommendations:

#### The Fish and their Life Histories (Chapter I)

(1) The homing of salmon and sea trout is an established fact and is the key to the proper management of salmon and sea trout fisheries (paragraph 12).

#### The Need for Regulation and Management (Chapter II)

(2) There seems every likelihood that salmon and trout will in future be exposed to greater hazards in Scottish waters (paragraph 40).

(3) If Scottish salmon fisheries are to produce the maximum benefit to the country, existing methods of regulation must be replaced by a system of management under which the right numbers of fish are caught in the ways which bring the greatest advantage (paragraph 44).

(4) The system of management should be capable of dividing the run of salmon in the required proportions between the commercial catch on one hand and the angling stock and breeding escapement; of measuring the effect of changes; and of allowing the commercial fisheries to operate efficiently (paragraphs 44, 45).

(5) Commercial salmon fishing should be permitted only by methods that allow the catch and escapement to be measured accurately in the river (paragraph 46).

(6) The new general principles of management of salmon fisheries apply also to sea trout (paragraph 48).

(7) Management of brown trout fisheries can be achieved by protection and regulation, allied to research and a system of administration (paragraph 49).

#### Objectives (Chapter III)

(8) Commercial and sporting salmon fisheries should be given scope to develop, to the best extent that circumstances allow, the commercial catch being regulated to allow attractive angling (paragraph 56).

(9) Where salmon stocks can be increased by improved management, a rather greater emphasis should be placed on escapement for angling and breeding than on increasing the commercial catch (paragraph 57).

(10) Sea trout angling should be developed, but caution and flexibility are needed in the regulatory measures (paragraph 58).

(11) The objective for brown trout fisheries should be to provide ample angling available to the public at a price within the means of the ordinary angler. Although trout fishing for the market should not be an objective, there need be no bar to trout farming in specially constructed rearing stations (paragraphs 59, 61).

(12) Rainbow trout might be exploited as a sporting fish in selected waters (paragraph 62).

(13) Coarse fishing might be developed in appropriate areas (paragraph 63).

#### The Attainment of the Objectives (Chapter IV)

(14) As the full implementation of the management policy recommended requires that salmon fishing in the sea be prohibited, drift-net fishing should not be resumed, and coastal netting should be run down and eventually replaced by new methods (paragraph 66).

(15) We repeat that if inshore fishermen are found to be in need of additional support, there should be better ways of providing it than by allowing a relatively small number to engage for some of their time in salmon fishing (paragraph 70).

(16) The weekly close time is a haphazard way of regulating the escapement of salmon and sea trout, and should be replaced by direct counting of the runs of fish and by allowing the appropriate numbers to escape (paragraphs 81, 82).

(17) The commercial catch of a river should be made at a single point, preferably by a trap, or failing that, by a concentrated net fishery associated wherever possible with a counting device (paragraph 82).

(18) The change to new commercial fishing methods should be gradual and should begin with a commercial scheme and a research scheme (paragraph 87).

(19) Until experience has been gained from the commercial and research schemes, the change to single trap fishing should take place only where a substantial majority of the commercial interests concerned so desire (paragraph 90).

(20) Concentrated net fisheries should be regulated, at least initially, by some form of catch quota based on catches of previous seasons (paragraph 91).

(21) The introduction of single trap and concentrated net fisheries would be a change of method, and would not involve expropriation or wholesale change of ownership (paragraph 94).

(22) Net fishing should be licensed, with qualifying conditions related to operations during the seasons 1960 to 1964 (paragraph 95).

(23) A committee of licensed net fishermen and certain proprietors of net fishings of an existing Salmon Fishery District should prepare for publication a scheme for a single trap or concentrated net fishery for that District. After an inquiry into any objections, the Secretary of State would incorporate an approved scheme in an Order, and from that time the only legal methods of salmon fishing in the river system would be rod and line and the method stated in the Order (paragraphs 95–97).

(24) The regulations for controlling the catch of a single trap or concentrated net fishery would be stated in the Order, but the Secretary of State should have reasonable discretion to vary the total catch or the proportion of the run to be caught (paragraph 103).

(25) Area Boards should be responsible for enforcement of catch control of single trap and concentrated net fisheries (paragraph 104).

(26) If sufficient waters are open to visitors, salmon angling can make a material contribution to the Scottish economy (paragraph 105).

(27) Where the demand for salmon angling waters cannot be met by any form of voluntary arrangement, Area Boards should have power to apply for an Access Order. If certain requirements are satisfied, and after a public inquiry, the Secretary of State might by Order require that access be granted, subject to appropriate conditions (paragraphs 108–111).

(28) Fishing for brown trout without the appropriate permission should be made an offence (paragraph 114).

(29) A system of Access Orders should apply to brown trout fisheries as to salmon fisheries (paragraph 115).

(30) A co-operative of anglers called the Scottish Anglers' Trust should be established to administer and improve those angling waters which they come to control and generally to develop the sport of angling in Scotland (paragraphs 116, 117).

(31) Membership of the Scottish Anglers' Trust would be open to all, and the Trust would be concerned particularly with brown trout and sea trout angling. It would assist both visitors and local anglers (paragraphs 118, 119).

(32) Waters administered by the Scottish Anglers' Trust might include those of certain public bodies and of proprietors who are willing to admit the public provided they are relieved of the responsibility of organisation (paragraph 121).

(33) Registers of salmon, sea trout and brown trout fisheries should be compiled by Area Boards. Any brown trout fishery not registered by the owner would be registered in the name of the Scottish Anglers' Trust, who would then administer, but not own, the fishery (paragraphs 123–126).

## 2.12 Importance of Recreational Fishing in the United States (From ORRRC Study Report 7; Sport Fishing - Today and Tomorrow)

Every year, more Americans look to the out-of-doors for recreation and enjoyment. Although there is wide variation among different types of use, the rate of increase in outdoor activities has averaged about 10 per cent per year over the past 10 years (1951 to 1960). This is six times faster than the population is growing. This characteristic of our way of living has high significance to public and private agencies that are responsible for the protection of natural resources and who must, at the same time, make them available for a wide variety of public uses.

On our natural areas, such as national forests, national wildlife refuges and public lakes and reservoirs, picnickers and sightseers make up about half of the total visitors, but where fishing is afforded it leads the participant or active sports on most such areas. On the national forests, nearly 18 per cent of the visitors are fishermen, while on the national wildlife refuges, about one-third of the visitors engage in fishing. The increase in numbers of fishermen over the period 1955 to 1960 has been at the rate of 4.3 per cent per year, which is 2½ times faster than the population of the Nation is increasing. This trend is expected to continue, although the difference in rates will probably become less in the next 40 years.

For many people fishing is a highly relaxing sport. The individual angler sets his own pace, generally seeks the kind of water he enjoys, and tries to catch the varieties of fish he likes best. Fishing in all its variations is fun, and a successful catch adds to the personal satisfaction experienced by most anglers. The therapeutic value of fishing has been demonstrated many times, with some of the best examples at our veterans

hospitals where fishing is encouraged and many benefits are credited to the outdoor experience. This is especially true of hospitals treating patients with mental and nervous disorders, a condition of increasing occurrence in our present-day civilization.

The 1960 Survey of Fishing and Hunting conducted by the U.S. Bureau of the Census for the Bureau of Sport Fisheries and Wildlife accounted for 25,300,000 persons, 12 years old and older, who went fishing at least once that year. These persons collectively fished an estimated 465,700,000 days in 1960. They represent 19.3 per cent of the population in this age group. Fishing is becoming more of a family sport, with 27 per cent of the anglers women and an unknown number of children under 12 years of age. Newsweek Magazine for 12 June 1961 reports fishing as the Nation's No. 1 sport.

#### Conclusions of the Study:

By the years 1976 and 2000, our population is estimated to increase by 30 per cent and by 98 per cent, respectively, over 1960 figures. Collectively, fishermen are expected to increase by 50 per cent by 1976 and 150 per cent by the year 2000. By 2000 the number of fisherman-days will be about 3 times what it was in 1960. In round figures, current trends indicate 63 million anglers will fish 1,300,000,000 days by 2000.

Can the streams, lakes and reservoirs of the Nation provide these anglers with a satisfactory level of fishing? In most parts of the country, fishermen will find some waters open to them within an hour's drive of their homes. More and better roads and highways, improved transportation and new waters in the form of impoundments will make this physically possible.

This report shows how the increase in fishing demand can be met with only slight reductions in the average catch. This can be accomplished in three principal ways:

(1) By adding new waters. The acreage of new impoundments proposed for construction by 1976 and 2000 cannot be forecast exactly, but is estimated to be 10 million acres, which is considered adequate to supply the acres of additional fishing waters required by the year 2000. This is a doubling of impounded waters now providing fishing. There will be problems created by unequal location of waters in relation to the distribution of human population. One-half of the new waters will be required by 1976 to meet anticipated fishing pressures, the second 5 million by 2000. This acreage will include half a million new farm and ranch ponds by 1976 and an additional million by 2000. All of these new waters must provide an estimated 100 million fisherman-days by 1976 and 277 million fisherman-days annually by 2000. New waters will supply about 34 per cent of the increase in fisherman-days beyond the 1960 level and expected by the year 2000.

(2) By better management of existing waters. Improvement of existing waters can be counted upon to increase freshwater fish production by an estimated 23 per cent by 1976 and 65 per cent by the year 2000. This can be accomplished through applying presently known management techniques and by using knowledge to be gained from research in the years immediately ahead. Better management, combined with the capacity of existing water to absorb more fishing pressures, will satisfy 30 per cent of the increased recreational fishing expected by 2000. The greatest improvement will come in the warm-water fisheries and result from such things as:

- (a) Reduction in pollution load and prevention of new pollution.
- (b) Better methods of controlling aquatic weeds and undesired and competing fish species.
- (c) Improved hatchery stocks and stocking procedures.

- (d) Public acceptance of species not presently utilized.
- (e) New methods of regulating and managing reservoirs for maximum fish production.
- (f) Opening of more existing waters to public fishing and provision of more adequate access to public fishing waters.
- (g) Better information programmes to guide the fishermen.

The increase in production traceable to improved management is expected to range up to 100 per cent for warm-water impoundments, including farm and ranch ponds. The rate of increase will be substantial, but less, on cold-water habitats since many of these presently appear to be receiving the maximum usage that can be provided without losing some of their attractiveness to anglers. This is especially true of readily accessible trout streams and some trout lakes.

New opportunities are being developed for fishing in tailwaters below dams where large numbers of fishermen can be accommodated. Information from research projects just getting underway and from those planned for the future will contribute materially to the rise in management effectiveness and in benefits to the angler. Cold-water habitats now receive 25 per cent of the fishing pressure, warm-water habitats 75 per cent of the load. The latter will probably continue to gain in per cent of fishing supported.

(3) By more fishing in coastal waters. Continuing a trend first noted in 1955 and emphasized in the Bureau's 1960 Survey of Fishing and Hunting, the coastal waters will absorb an increased portion of the sport fishing effort. In 1960, this was about 17 per cent of all fishing and is expected to rise to nearly 30 per cent by 2000. More than 80 million days were spent in fishing in coastal waters in 1960, and this number is expected to double by 1976 and increase to 4½ times by 2000. Marine waters are expected to absorb 36 per cent of the increased fishing pressure above 1960 levels, anticipated for the next 40 years. Marine waters can absorb this increase provided the estuaries are not damaged or rendered unfit as spawning and nursery grounds or the migration routes of anadromous and other species blocked by man-made structures. More fishermen taking the species inhabiting coastal waters means less fish per angler in the future and catches from inshore waters may decline somewhat from the present high levels. The capacity of the open oceans to produce recreational fishing based on our present knowledge is almost boundless. Increase of fishing in the oceans depends on the availability of marinas, fishing craft, access points and money which anglers will have at their disposal.

There are problems to be overcome in both fresh and marine waters, calling on many scientific, political and social fields. Siltation and pollution must be prevented and controlled more effectively where they are presently a serious condition, as for example in our large rivers and estuaries. Present research on sport fisheries must be expanded and new projects started to provide information needed for improved management. The problem of getting more adequate funds for all sport fishery programmes will become even more pressing in the future and must be solved. Action programmes must be developed to meet these new demands which seem certain to come. The goals can be met if the public is made aware of their importance and the individual citizen can foresee benefits in terms of improved outdoor recreation.

## 2.13 Key Values in Outdoor Recreation Planning (SFI. bul. No. 178, September 1966)

The sight of large numbers of people tramping over wild landscape, probably out fishing and hunting and, in the process, doubtless also bird-watching, picnicking and sightseeing, is rather disturbing to an isolationist minority within conservation who want to know that the resources are there but do not want them disturbed. These resource isolationists also include in their number those who abhor the harvesting of nature's abundant annual surpluses of fish and game, yet who ignore or are ignorant of the harmful effects on fish and game from overcrowding, undernourishment, disease, etc.

Conservation Broader than Mere Preservation. By contrast, the majority of conservationists believe, no less strongly, that wise utilisation of renewable natural resources is the proper course for conservation. Utilization in this sense considers that controlled use of soil, water, timber, grass, fish and wildlife is beneficial in terms of fulfilling people's needs. This philosophy envisions programmes aimed at producing continuous high yields of fish, game, timber, etc., and regards resources management as a means to assure continuous supplies for continued use in the future. It therefore includes selected resource isolation when needed to assure desirable preservation of scarce, especially sensitive, or endangered resources.

This conflict between the philosophies of resources isolation and resource utilization may well be the overriding conservation issue of the sixties. However troublesome these facts may be, "conservation" means different things to different people, and irreversible changes are modifying the physical and social features of America.

Obviously, America is vastly different now than when the pilgrims first set foot on Plymouth Rock. With increasing population, it can neither be returned to wilderness nor prevented from changing further. Nevertheless, some folk, anachronisms in twentieth-century America, have apparently dedicated their energies to belligerent opposition to all change. The bulldozer, the engineer and the contractor have been identified as the Philistine; in many instances the citizenry itself is regarded as the barbarian horde.

Ill-Conceived Stress on "Simple Pleasures" Damaging. Because of this philosophical schism, concern has been voiced that the conservation movement has become divided as to objectives. Such division appears to have been the regrettable fall-out from a general lack of discrimination that has accompanied the recent "new look" emphasis in outdoor recreation. Unfortunately, the highly significant findings of the Outdoor Recreation Resources Review Commission have been badly misinterpreted, even misrepresented. As a result, much misdirected stress has been placed on the so-called "simple pleasures" of driving, walking, picnicking and sightseeing as making up the central thrust of outdoor recreation.

The creation of the U.S. Bureau of Outdoor Recreation, followed quickly by the White House Conference on Natural Beauty, seems to have confused many conservationists. This is because these events have emphasized the superficial at the expense of the fundamental aspects of conservation. The newly focused spectre of millions of picnickers, hikers, motor vehicles, posypluckers, sight-seers, etc., invading and endangering the sanctity of painfully safeguarded Natural Temples, often very sensitive to human influence, has come as a traumatic shock to the preservationists and terrorised them. This is the cause of the cleavage as to objectives that has dismayed some conservation leaders.

Until comparatively recently, conservation in America has featured a series of rather panicky movements, leap-frogging from crisis to crisis in last-ditch efforts to fence off and isolate remnants of specific scarce resources threatened with final destruction. Thus, emotionalism has provided the principal fuel for rearguard actions that have characterised much of conservation in recent decades. As a result, the erroneous notion has become firmly implanted in many minds that "preservation" - in the sense of isolation - is synonymous with "conservation". It should now become recognized that "preservation" is only part of a more nature conservation philosophy.

The distinguished former chairman of the Outdoor Recreation Resources Review Commission, Laurance Rockefeller, correctly commented, recently, that "unswerving hostility to development condemns the conservationists to a rearguard action," a defeatist course. Recognising that many more houses, bridges, highways, etc., are going to be built, Mr. Rockefeller stated that "the important question is not if, but how".

Conversely, the equally valid demand by conservationists for water pollution abatement has generally been greeted with the rebuttal: "What do you want, jobs or fish?" The correct answer, according to Maine Senator Edmund S. Muskie, was and is: "Both". This noted Chairman of the Senate Subcommittee on Air and Water Pollution has done all Americans a great service by putting the "new look" of conservation in proper context, viz: "The preservation of America's natural beauty really boils down to proper resource development and use". In these words, he has distilled the essence of the President's unprecedented congressional "Message on Natural Beauty", dated 8 February 1965.

Misrepresentation of Outdoor Recreation Data-Confusing. The main problem seems to be one of confusion resulting from misinterpretation and misrepresentation of the data and findings in several key ORRRC Study Reports. These data concern participation by Americans in various outdoor recreation activities and the high degree of interdependence among them. This has led to a seriously mistaken notion by newly attracted generalists that driving and walking for pleasure, picnicking, sightseeing, etc., have suddenly displaced fishing and hunting as the principal outdoor pursuits by Americans. Equally mistaken; they seem to believe that the naive magic of providing X-numbers of picnic tables and litter barrels, etc., will solve the myriad problems that have so long confounded resources specialists! The only trouble with this simplified approach to resource conservation is that it just doesn't do the job. It begins with erroneous assumptions based on misinterpretation of complex or questionable data, and proceeds to illogical and incorrect conclusions.

Close examination of recreation data, indeed, makes it increasingly clear that the substantial (if not principal) thrust of several "recreation activities", particularly the relatively passive picnicking, driving and walking for pleasures, are ancillary to more dominant traditional outdoor interests. If so, it would be a major blunder to deemphasize the role of fishing and hunting in outdoor recreation. On the contrary, it is necessary to reemphasize the traditional outdoor sports as constituting key values in outdoor recreation planning.

Some 68 million individual Americans of all ages and inclinations probably engaged in fishing and hunting last year, at least occasionally. Of these, about 47 millions apparently fished and hunted more or less regularly as the principal means of satisfying their outdoor recreational needs. Indeed, according to Study Report 20 of the Outdoor Recreation Resources Review Commission, about 38 per cent of American adults (18 years or older) fish regularly and 17 per cent hunt regularly as means of



relaxation. Over half of all hunters are known to fish as well as hunt. Therefore, excluding duplication, a net 46 per cent of American adults fish and/or hunt.

Swimming, unfortunately combined with “going to the beach”, is loosely (and perhaps erroneously) credited with similar popularity (45 per cent participation). It is at least possible that “going to the beach”, per se, may be as closely related to picnicking as to swimming, thereby leaving actual swimming participation very much obscured. Similarly, upon close examination, so-called “driving for pleasure” turns out actually to have been analysed in terms of the quite different concept of “automobile riding for sightseeing and relaxation”, credited with 69 per cent adult participation. Boating and canoeing was credited with participation by 28 per cent of adults, biking 19 per cent, camping 15 per cent, nature and bird walks 14 per cent.

Traditional Outdoor Sports Play Key Recreational Role. It appears that the two-thirds (66%) of American adults who were said to engage in picnics obviously do so, at least in substantial measure, as part of other recreational activities. In proper context, picnicking should probably be regarded, in large part, simply as a convenient method of eating while outdoors. Certainly, the primary role of picnicking as a major recreational objective remains subject to serious doubt.

A high degree of interdependence is apparent among various outdoor activities. Fishing and hunting, for example, are known to account for more than 80 per cent of boat use. Eighty-seven per cent of those camping indicated that fishing and hunting are their principal purposes in roughing it in sleeping bag, tent or trailer. The hiking factor in camping can be substantially accounted for by those remaining portions of fishing and hunting not done from boats. Similarly, one-third of hikers using wilderness areas indicated that their main objective was fishing; 75 per cent cited it among several goals of wilderness trips. To a highly significant extent, nature and bird walks may also prove largely incidental to these same objectives.

Quite naturally, the vast majority (90 per cent or so) of all campers found it necessary to drive cars in order to reach their campsites, unquestionably “sightseeing” en route and in vicinity and also “picnicked” in order to eat inexpensively during the trip away from home. How else could most of them have eaten after their arrival - or gotten where they were going (except for minor use of horses)? Thus, camping mostly boils down to being a convenient and inexpensive means of accommodating outdoor needs for room and board, in substantial measure for the purpose of fishing and hunting. Rather obviously, too, the majority of campsites must generally be reached by “going to the beach” - the waterside location universally recognized as the common recreational site.

Such reinterpretations are very strongly justified by other generally overlooked or ignored data to be found in the ORRRC Study Report 20. Those data, especially those measuring spontaneous mentions of leisure time activities, afford provocative insights into factors affecting outdoor recreation demand among American adults. The study team, itself, stressed the great importance and significance of these particular findings. The report authors concluded, as a result of comparisons between the two classes of data: “Among the outdoor activities, swimming, hunting and especially fishing seem to be of the greatest importance and salience”. Specifically, in the context of spontaneous mentions of “usual” leisure activities engaged in “quite a lot”, the relative frequency ratings may help to clarify the true relationships among various forms of outdoor recreation.

For example, a mere 6 per cent of American adults spontaneously included "pleasure driving" among their usual leisure activities - a far cry from the 69 per cent who indicated, under prompting, that they "drive for sightseeing and relaxation". Similarly, only 1 per cent spontaneously included "going for walks", 1 per cent "hiking", 2 per cent "camping", 3 per cent "boating and canoeing". No spontaneous mention whatsoever was made of "picnicking". Neither was there any spontaneous inclusion of "nature or bird walks" among the "usual" outdoor recreation activities. More significantly, perhaps, 10 per cent spontaneously mentioned "outdoor swimming or going to a beach" as a "usual" leisure activity. Even more dramatic was the impressive 27 per cent who spontaneously listed fishing (18%) and hunting (9%) as their "usual" leisure activities.

Fishing and Hunting are Leading Outdoor Motivations. A comparison of the 1955 and 1960 national surveys of fishing and hunting reveals that the habitual ("substantial") anglers and hunters had increased by 22.2 per cent over the five-year interval - a 4.0 per cent average annual rate of increase, well over twice the rate of additions to the population itself: Findings of a third such survey, covering 1965, will extend or modify this recent trend when available a few months hence.

As already noted, the ORRRC findings reveal that 46 per cent of the adult population actively engage in fishing and hunting. It was also found that there is a substantial backlog of unsatisfied nationwide pent-up demand for outdoor recreation. For one thing, large numbers of people who presently participate in these activities want to do so more often. For another, substantial added numbers of people who do not now participate would like to take up these activities anew. The chief deterrents appeared to be: (1) lack of time (for the activity itself or for the trip necessary to reach suitable facilities); (2) lack of available facilities (irrespective of distance); or (3) lack of money (for expensive equipment, distant travel, etc.).

Specifically, about 25 per cent of the population indicated that they would like to fish and hunt more often than they do now (15%) or take up fishing and hunting as new activities (10%). Thus, well over half the population (56%) evidently have a strong interest in recreational fishing and hunting. By comparison, unsatisfied demand represented 14 per cent for swimming and going to the beach, 13 per cent for camping, 11 per cent for boating and canoeing, 10 per cent for picnicking, 5 per cent for hiking and 4 per cent for nature and bird walks.

It is strongly indicated by these data, on a nationwide basis, that fishing and hunting are, by all odds, the most important motivations (or satisfying activities) for Americans seeking outdoor recreation. It is also clearly evident that there are vast pent-up unsatisfied demands for fishing and hunting that eclipse all other recognized forms of outdoor recreation. Coupled with increasing population, this would seem more than adequate to create a deep sense of urgency for long-range fish and wildlife planning designed to accommodate these key outdoor recreation values.

It seems rather clear, from the two national surveys of fishing and hunting thus far, that increasing urbanisation is a factor working against participation in these outdoor pursuits. For example, as the country becomes less rural, availability of readily accessible waters or of unpolluted, or of well-managed fishing waters dwindles steadily. In other words, it becomes more difficult to go fishing. Similarly, it becomes more difficult to find a place to hunt. Actually, this is a characteristic of outdoor recreation, generally. In addition, urbanisation brings an increase in the quantity and availability of indoor recreation activities or sedentary forms of entertainment. These compete strenuously with the traditionally rural kinds of outdoor recreation for use of leisure time by urbanites.

## 2.14 Liberalized Fishing – Again (SFI bul. No. 161, April 1965)

Effects of regulations governing fishing for various species of fishes, in terms of changes in the fish populations, was the subject of a panel discussion at a recent Northeast Fish and Wildlife Conference held in Harrisburg, Pennsylvania. A need for specific definitions on the exact meaning of such terms as “liberalized fishing” was stressed as well. As we see it, however, liberalized fishing is a general term that simply means the relaxation of arbitrarily restrictive fishing regulations. The latter may apply to season limits, size limits, or bag limits.

In Virginia, according to fish chief Robert W. Martin, there were “no beneficial effects from closed seasons on warmwater fish species, either harvestwise or condition of the fish populations...”. Total fishing pressure seemed to be the governing factor rather than time of harvest in determining annual catch rate. In Martin's opinion, “research to improve regulation offers the greatest potential return for the fish administrator's dollar because of the wide application of findings in this field and the low cost of implementation”.

Studies on three Michigan lakes by fishery biologist Mercer H. Patriarche, showed that closed seasons had no measurable beneficial effect on northern pike and walleye populations. Neither did their removal adversely affect the quality of summer angling for bass, bass spawning or bass harvests. Harvests were not reduced by removal of length limits. Neither did increasing bass limits from 10 to 16 inches and northern pike limits from 14 to 24 inches, result in a build-up of predatory fishes or in improved growth by associated pan fishes.

On the other hand, New York fishery biologist William Shepherd suggested that closed seasons, length limits, and bag limits may have been responsible for the restoration of the Chautauqua Lake muskellunge population. He advanced the further opinion that it was these same restrictions that have been successful in maintaining the recorded high level of harvest for this highly specialized species.

In a review of 1963 fishing regulations for all states, Sport Fishing Institute noted a marked nationwide trend toward liberalised fishing (summarized in its “Fish Conservation Highlights” 1960–1962). Thus, there is much less evidence, today, of over-regulation than existed in the unenlightened pre-World War II period of traditionally restrictive sport fishing. The northeast fishery panel concerned itself chiefly with effects of regulations upon the composition of fish populations themselves, not upon angling opportunity. The effect upon the latter has been to increase very substantially the number of angling days supportable by warmwater fish populations - and obviously without demonstrated harm to the resource!

Effects of introducing largemouth bass in northeastern waters, principally with respect to the effects upon populations of the native chain pickerel, were also discussed. In this respect, New Jersey's Bruce Pyle suggested that increased nutrients, which cause greater turbidity and fewer aquatic weeds, may favour largemouth bass in some pickerel waters where they have been introduced.

Maine fishery biologist Robert Foye argued that introductions of largemouth bass in 109 lakes (102,255 acres) that originally contained chain pickerel had rarely resulted in their decline. He said on the contrary, that “good fishing” prevails for both species in some waters. Nevertheless, he noted that any further introduction of base into additional lakes in Maine is presently considered undesirable.

## 2.15 North American Fish Policy (SFI bul. No. 156, November 1964)

The American Fisheries Society, after broad considerations, has adopted the following policy to aid in the protection, management and scientific development of the fishery resources for the greatest possible use and enjoyment by the people of this Continent (1964). The policy embraces both recreational and commercial fisheries in both fresh and marine waters, including those for mollusks, crustaceans, reptiles and marine mammals. An objective is to promote and advance the development and application of all branches of fishery science and practice, including aquatic biology, engineering, economics, fish culture, limnology, oceanography and technology.

Article I. Jurisdiction of Fisheries. Constitutional responsibility for fisheries varies among North American Nations; therefore, jurisdiction within each will have its own ruling. Specific internal problems should be under the jurisdiction of the state or province concerned; national problems or those involving joint waters should be handed by joint federal and (or) interstate or interprovincial agreement as authorized by the constitutions concerned. International problems are best solved by international joint commissions with adequate research and regulatory powers.

Article II. Administration. Administration of fisheries should be non-partisan and by individuals trained and experienced in scientific management in this field. Adequate civil service protection is essential for effective research and to permit objective recommendations and implementing management.

For maximum effectiveness the agency charged with the administration of fisheries should have full authority to establish and enforce regulations.

Because of the wide economic and social benefits from sport and commercial fisheries, costs of their development and management should not be solely the responsibility of licensed anglers and commercial fishermen. Part of the cost should be borne by general fund appropriations, taxes on industries which profit directly from fisheries, or from other sources of revenue.

Public access to sport fisheries is of paramount importance. Whether by ownership or constitutional right, such access should be preserved and expanded.

When conflicts between fisheries arise, settlement should depend upon the pertinent facts in each case. Many waters will support several types of fisheries to their mutual benefit. Where actual competition exists, the basis for proper regulations should be objective appraisal of public benefits.

Article III. Research. Progressive management requires maximum factual information obtainable through an adequate research programme.

Article IV. Fish Culture. As the oldest and one of the most important approaches to the extension and increase of fish production for food and recreation, this activity needs greater support for current efforts to modernize its practices. Important strides have been made in the study and control of hatchery diseases and in fish nutrition. Some outstanding advances have also occurred in genetical studies and in the development of improved strains of trout for stocking, but these approaches, especially research in population genetics, must be expanded to include important commercial as well as sports species. In production for stocking primary emphasis should be placed on quality rather than quantity. For recreational fishing it is recognized that fish stocked should be equal or superior to native fish in form, colour, longevity, and fighting quality.

Article V. Management. Protective and catch-restrictive regulations based upon continuous or periodic assessment of stocks and catches and predictions of recruitment, as well as fishing pressure, direct population manipulation by reduction or by stocking, habitat protection and improvement, and provision for access to fishing areas are the presently recognized tools for management of sport and commercial fisheries. Of these most important is protection of the habitat, including fish food organisms, from pollution by domestic and industrial wastes.

Regulations should be as few as possible and limited to those essential for the protection of the fisheries and for the orderly management of the fish stocks. Uniformity of regulations on contiguous waters is desirable to avoid confusion but must not be an aim in itself if there is sound reason for variation. All regulations should be clearly stated and adequately publicized. They should provide for the removal of the harvestable surplus at the most desirable size and in the best condition for sport or food.

Population manipulation by stocking or through chemical means or otherwise should be used to change levels of abundance of various sizes and species only where it can be demonstrated that improved production of desirable species will result. In either operation the possible effects upon native fauna of the area, especially upon rare or endangered species, should be considered.

Public agencies should manipulate both the habitat, the fish populations, and regulate the harvest so that natural production will maintain good sport. Providing that those who benefit pay for the cost, it is legitimate management to plant catchable fish in waters where natural reproduction is inadequate and where environmental improvement is not feasible. Private agencies should be encouraged to provide "put and take" fishing through fee fishing waters. Increasingly the goal of the sport fisherman on public waters must be recreation rather than a full creel.

Habitat improvement increases natural yields and provides more fishing places by: construction of impoundments managed for fish production, pollution control, soil conservation, barrier removal, addition of pools, shelter or fish-concentration devices, improvement of temperatures, food and spawning facilities, and the reduction of noxious vegetation. Where the need has been demonstrated, the construction and operation of fish passage or fish screening devices and water control structures will improve fishing. The ideal approach is coordinated and complete management from headwaters of the watershed to the edge of the Continental Shelf.

Perpetual access for public fishing on both inland and coastal waters, including sufficient frontage to assure full utilisation of fishery resources should be acquired and developed by the various governmental agencies. Fishing piers and artificial reefs should be constructed and bridges, jetties and other artificial or natural features should be modified as needed to increase fishing opportunities.

Article VI. Multiple Use of Waters. Fishery resources are too important to be disregarded in any water development project. Throughout much of North America the growing scarcity of water precludes any single-purpose development. Plans to use or control water for irrigation, flood control, power production, water supply, industrial cooling, conveyance of wastes, or any other public purpose should include development and maintenance of the fisheries as a co-equal objective and should be part of the project cost. Whenever an agency plans any development that will impair either the quantity or quality of water available for fish life, mitigation of fish loss should be the financial responsibility of the sponsoring agency.

In river basin development the need to maintain representative natural areas must be recognised for scientific and cultural values. Protection is also essential for key areas for fishes, such as spring sources of trout streams, marsh spawning areas for northern pike, and coastal estuaries vital to the reproduction of marine species.

All organizations concerned should cooperate in conducting research on the effects and possible improvement of waste disposal and other water uses which may impair the value of water for industry, public water supply, maintenance of aquatic life resources and recreation.

Population growth and increased demand for water for all purposes are bringing about heavy competition and conflict in its uses. Management of water areas requires adjustments and compromises in development and operation to assure maximum public benefits for fishing as well as for other types of outdoor recreation.

Increasing competition and interference among various forms of water-based recreation require zoning or regulation of hours of use so that maximum opportunity for undisturbed recreational fishing will be on an equitable basis with competing water uses such as swimming, water-skiing and speed-boating.

Article VII. Education and Publicity. Progress in management of fisheries depends upon public understanding and acceptance of current and proposed programmes. They, in turn, are geared to biological and economic bases. Factual information on fisheries must be made available to the public in clear and acceptable form. Fishery workers everywhere should use all available methods of education. The adoption of uniform common names of fishes by the Society has been an important step in this direction. Wider use of the accepted names should be urged of fishery administrators, scientists, teachers, outdoor writers and the general public.

Fishery administrators should bring this policy to the attention of their governing bodies and the public and urge its adoption in order to strengthen their programmes and to further support the Society in its efforts to protect and develop the fishery resources of the Continent.

#### 2.16 Outdoor Recreation Essays (SFI bul. No. 133, December 1962)

In an effort to define the factors which underlie and account for changes in outdoor recreation demand, the Outdoor Recreation Resources Review Commission asked a number of social scientists to express their views on probable future trends. The many variables involved render strictly statistical survey projections precarious at best, and reliable inferences drawn by specialists in cultural and social fields were needed to complement the statistical approach. The essays appear in ORRRC Study Report 22, "Trends in American Living and Outdoor Recreation" (\$1.25, U.S. Govt. Printing Office, Washington 25, D.C.).

Ethnologist Margaret Mead wrote on the history of American cultural values and predicted that in the coming space age a reassessment of man's place within the world's ecology will be required. She observed that Americans have been willing to face a problem of conservation only when it is defined as restoration or as a means of warding off disaster. To gain support for a programme of conservation, she believes that it is necessary to phrase the need in terms of an emergency which only immediate positive action can meet.

Our most immediate need is for recreation areas within and peripheral to metropolitan areas, Dr. Mead concluded. For example, "the extent to which Americans

can become boat-minded as well as car-minded and make use of water as they now make use of roads and land space is in the long run dependent on the extent to which waterways and shore-lines are included within the framework of planning for recreation space, particularly in the vicinity of metropolitan agglomerations...”.

Foremost among the developments which are profoundly affecting American life are postwar resurgent population growth and the accelerated rate of urbanization. University of Chicago sociology professor Philip M. Hauser studied these trends in relation to ORRRC survey findings and found that population growth implies a great increase in aggregate future demand for outdoor recreation facilities and services. However, he deduced that greater metropolitanization contains the possibility of greatly decreased outdoor recreation demand per capita as one manifestation of man's adjustment to the urban environment.

In his essay, Hauser cites fishing as a “perfect” example of an activity in which increased urbanization reflects lower rates of participation, ranging from 20 per cent participation of those living in cities of one million or more inhabitants to 35 per cent of rural farm persons. The population research specialist concludes that the greatest need can be met by increasing the “user-oriented” and “intermediate” types of recreation land within, or adjacent to, the urban environment itself. Urban renewal and highway construction programmes in densely populated areas provide rare opportunities to expand needed facilities. Pond and small lake construction could be provided for in these projects.

In analyzing the multitude of agencies, policies and activities in the outdoor recreation field, political scientist Morton Grodzins concludes that there is virtue in the apparent chaos. The existence of many governments operating freely in a single programme area preserves a desirable openness in the system, he states. “There is little chance in the foreseeable future of providing too much recreation land, especially since recreation, as a political issue, does not sustain widespread public attention.” Grodzins recommends a federal programme of grants to the states, increased recreational use of Forest Service and BLM lands, larger purchases of land around new Corps of Engineers and Bureau of Reclamation reservoirs, and establishment of state outdoor recreation consultant services to aid counties and cities in planning, acquisition and operation of properties.

In a final essay in ORRRC Study Report 22, University of Pennsylvania professor Herbert J. Gans argues that satisfying leisure behaviour is necessary - but not sufficient - for mental health and that it is best satisfied by providing those recreation facilities that are now in use and demand. He writes (emphasis added), “...the metropolitan areas of our country will need a much larger number of parks ... located near man-made or natural bodies of water, and they should offer nature's beauty as well as some of the conveniences usually associated with resorts... As I read the available studies of ‘open space’ use, the demand for these facilities and activities is quite small. What most people seem to want most urgently is not communion with nature, but the opportunity for individual and family activity of a not too strenuous or too primitive nature which can be conducted outdoors”.

#### 2.17 Pennsylvania Fishing and Highways (SFI bul. No. 137, April 1963)

Big Fishing Creek, Clinton County, Pennsylvania, and the adjacent Lamar Federal Hatchery are in imminent danger of complete destruction by an ill-considered routing of the proposed Keystone Shortway - unless the Pennsylvania Department of Highways quickly recognises the overriding public interest involved, and employs an

alternate route. For our part, we are hopefully optimistic that the responsible public officials and highway engineers of Pennsylvania will prove in the last analysis to be fully as enlightened and alert to the vitally important need to protect remaining precious recreational resources as did their professional counterparts in Vermont, recently.

In the latter state the administration and engineers ultimately recognized the validity and depth of public concern over the detrimental effects of a proposal for the belt line highway around Manchester to be constructed in the valley of the famed Batten Kill trout stream. They selected an alternate route lying east of the abandoned Rutland Railroad that would avoid irreparable damage to that uniquely valuable natural trout stream. Surely, when the chips are down and the final decision taken, the Pennsylvania highway folk will prove to possess no less a measure of bureaucratic statesmanship...

An alternate route for the Keystone Shortway is available outside the valley of Big Fishing Creek; it would add about \$2,000,000 to highway construction costs. This is the reason for the hesitancy over rerouting - even though, as we understand it, the U.S. Bureau of Public Roads can approve additional costs incurred by states for designing federal-aid highways (as in this case) to prevent damage to significant resources such as this. Unfortunately, compartmentalised shortsighted thinking of this very sort is widely prevalent among highway people.

For this reason, the 88th Congress of the United States will consider a bill (S. 468) introduced by Senators Lee Metcalf and Frank Moss, to amend Title 23 of the U.S. Code relating to highways in order to give needed protection to fish, wildlife and other recreation resources. They would require approval by the Secretary of the Interior of surveys, plans, specifications and estimates for projects on the federal-aid highway systems. Senator Metcalf has explained: "Of course we all want good roads. They are being built. But I am alarmed by the destruction of an irreplaceable resource, sport fishing streams, by road routing and construction."

Big Fishing Creek is one of the most productive natural trout streams in Pennsylvania and the entire Eastern U.S. as well. It is also one of the few remaining unspoiled limestone streams. As such it is both especially precious and especially sensitive to the destructive forces of construction activity. Located in the limestone-sink country, itself fed by a large underground source, there is serious danger that a single dynamite blast might cause the very water source to entirely disappear. Should this happen, 18 miles of extremely valuable and irreplaceable "blueribbon" trout fishing stream would be lost forever. Moreover, the largest federal hatchery in the East would also be destroyed with the loss of the water it must have.

An intensive biological study of Big Fishing Creek was undertaken jointly in 1962 by fishery biologists of the U.S. Bureau of Sport Fisheries and Wildlife and the Pennsylvania Fish Commission, with assistance from the fishery staff of the Pennsylvania State University, to more fully evaluate the threatened fishery resource. The study confirmed that few, if any, eastern trout streams approach Big Fishing Creek in basic productivity and naturally sustained trout yields.

It was found, for example, that optimum trout temperatures prevail the year round and that an ideal pool-riffle ratio (about 1 to 1) exists. It possesses water chemistry, cover and food producing areas of that superior and rare quality needed to maintain a large trout population of all size classes. More than 200 pounds of fish are present per acre from Tylersville to Lamar, of which over 91 pounds are trout! At the end of the 1962 fishing season there remained about 248 legal trout per surface acre of water or 1,133 legal trout per mile. These were "peaked" on top of approximately 10,000 sublegal trout



immediately available to provide replacements as the large trout are removed by fishing or natural mortality.

A census of the fishing indicated that angling use averaged about 10 anglers per day per mile of stream throughout a 140-day legal trout season over the 18 affected miles - 25,200 man-days of angling for the season. Such fishing has been shown to generate not less than \$3.00 of daily expenditures by local anglers alone. Assuming (conservatively) that most anglers originated locally, that amount of fishing activity generates local expenditures for needed goods and services amounting to not less than \$75,600 annually. A capital investment of at least \$1,890,000 would be required to yield a like return (4% interest rate). Providently, however, the creation of Big Fishing Creek resource required no such investment, being a God-given, perpetually renewable resource if properly conserved.

The Lamar National Fish Hatchery, also dependent upon the water and springs of Big Fishing Creek, represents about \$900,000 worth of construction to date. Planned additional capital expenditures of \$750,000 are in abeyance, pending the outcome of the highway controversy. This extensive facility provides an annual local payroll amounting to \$62,000 - equal to the annual yield from a capital investment, at 4 per cent interest rate, amounting to \$1,550,000 (very close to the total actual and planned capital costs of the hatchery to initiate and complete it - \$1,650,000).

The official statement presented by the U.S. Interior Department representative at last year's public hearing on the Keystone Shortway, at Lock Haven, Pennsylvania, stressed the extreme sensitivity of the area's limestone structure to explosive shock and the resultant economic loss at the hatchery from disruption of the water supply. It also emphasized the deleterious effects otherwise upon water temperatures, productivity and water volume of Big Fishing Creek waters to be expected from channelization, loss of shade and mechanical preparation of the road bed.

Altogether, then, the measurable capital loss in dollars from construction of the Keystone Shortway along Big Fishing Creek would be - conservatively - at least \$3,440,000. The trout fishery, if properly protected, was found adequate to support very substantially increased fishing (which would doubtless develop in ensuing decades). Therefore, the capital value of the fishery resource is considerably greater in fact than estimated here - unquestionably double, perhaps even triple. Thus, it would appear to be a very bad bargain, the very essence of false economy, for the people or the administration of the Commonwealth of Pennsylvania to sacrifice a capital asset probably worth some \$5,000,000 or more in order to avoid \$2,000,000 in added cost of constructing the Keystone Shortway along an alternate route outside the valley of Big Fishing Creek. This is to say nothing of the immeasurable value of increasing thousands of truly priceless recreational fishing days, rarely matchable now in the East, let alone Pennsylvania.

#### 2.18 Recreation Area Criteria (SFI bul. No. 139, June 1963)

President Kennedy's Cabinet-level Recreation Advisory Council (Interior Secretary Stewart L. Udall, Chairman) recently set criteria for and endorsed establishment of a system of National Recreation Areas. The Council's Policy Circular No. 1 defines the criteria for selecting the new areas, in turn designed to help meet mounting national needs and demands for outdoor recreation. The system will include "areas of above average natural endowments but with less significance than unique scenic and historic elements of the National Parks and National Forests". National

Recreation Areas are to include areas formerly proposed as National Seashores, Lakeshores, Riverways, Waterways and Recreation Demonstration Areas.

The primary criteria set forth by the Council for judging the merits of proposals for such areas include:

1. Spaciousness - National Recreation Areas should include not less than 20,000 acres of land and water surface, except along riverways, narrow coastal strips, or areas where population density within a 250-mile radius is in excess of 30 million people.
2. High carrying capacity - National Recreation Areas should be located and designed to serve large numbers of people, in relation to type of recreation offered.
3. Interstate use - National Recreation Areas should provide recreation opportunities significant enough to assure interstate patronage within the region of service, and should attract patronage from outside the normal service region.
4. Require Federal involvement - The scale of investment, development and operational responsibility should be sufficiently high to require either direct Federal involvement or substantial Federal participation to assure optimum public benefit.
5. Accessibility - National Recreation Areas should be located not more than 250 miles and preferably closer to the urban population centres they are designed to serve. They should be readily accessible at all times.
6. Outdoor recreation dominant - Outdoor recreation is recognized as the dominant or primary resource management purpose of National Recreation Areas. If natural resources in addition to the recreation facilities are utilized, such use should be compatible with the recreation mission, and under no conditions significantly detrimental.
7. Needs not met by other programmes - National Recreation Areas should be established only in areas where other programmes, Federal or non-Federal, will not fulfill high priority recreation needs in the foreseeable future.

2.19 Recreation Benefits from Water Pollution Control (Stevens, Joe B., Univ. of California, Berkeley, Calif., 1966. Water Resources Research. 2(2):167-82. SFA 8884)

A methodology for estimating direct recreational benefits from water pollution control was developed through a model of biological and behavioural relationships involved in sports angling. A biological production function was envisaged between inputs of angling effort and the output, or yields, of fish taken. The marginal product, angling success per unit of effort, was taken to represent the 'quality' of the recreational experience. Water pollution would cause deteriorations in dissolved oxygen, temperature, or toxicity characteristics of the water, thus shifting the production function downward and causing reductions in angling success, angling effort and recreational value of the fishery. Demand equations and 'success-effort' elasticities were estimated for three estuarial sports fisheries, and the methodology was illustrated by means of an assumed reduction in angling success. The direct recreational benefits were identified as the consumer surplus that would result from the prevention of water pollution. (Auth.)

2.20 Sport Fishing Economics (SFI bul. No. 164, July 1965)

In recognition of the growing importance in Canada of that country's rapidly expanding sport fishing, a symposium on "The Economic Aspects of Sport Fishing" was

held recently in Ottawa. The discussions pointed up the need for increased efforts to gain more fundamental knowledge about sport fishing and its impact upon the economy. The symposium was summarized in the December 1964–January 1965 issue of “Trade News” (Department of Fisheries, Ottawa).

Deputy Minister of Fisheries Dr. A.W.H. Needler opened the discussions by pointing out that fish stocks are sometimes more valuable to the community when used for sport fishing rather than for traditional commercial purposes. Dr. Marion Clawson (Resources for the Future, Inc., Washington, D.C.) predicted that a period of “mass fishing” may well be immediately ahead. Fishery management emphasis may then need to become more people-oriented. This would result in imposing new and different burdens on researchers and managers alike.

A consensus was reached that resolutions of conflicts between competing interests must consider the economic significance of sport fishing as well as that of other interests. However, there was no general agreement concerning the best method for measuring the economic value of sport fishing. Universal licensing of all sport fishermen was recognized as one possible means of establishing a sound sampling base needed for conducting studies of sport fishing economics.

Economic implications in the related field of oceanographic research are considered in National Academy of Sciences - National Research Council Publication 1228, “Economic Benefits from Oceanographic Research”. Federal support of oceanographic research has increased from \$ 24 million in 1958 to \$ 124 million in 1963. Support is expected to increase to \$ 138 million in 1965 and reach \$ 350 million by 1972.

As pointed out by Oceanography Committee Chairman Milner B. Schaefer, the potential benefits to be expected from these expenditures must be evaluated. The report compares future economic benefits that could result from oceanographic research with the cost of doing the research. It is estimated that a continuing national investment in oceanography of \$ 165 million per year will result in savings of nearly three billion dollars per year plus added production worth almost as much. Marine recreation, including sport fishing, is an important area of oceanographic research.

Reconciliation of conflicts between recreational and other uses of inshore areas is recognized as an urgent national problem. Development of such facilities as small boat harbors, breakwaters, sandy beaches and concentrations of sport fishes is also urgently needed. The demand for marine recreational facilities is so great that ways must be found to “stretch” the shoreline. Gross annual expenditure for recreational use of the sea is at least \$ 2 billion per year. It is estimated to be growing by at least 5 per cent a year.

Interestingly, the benefit/cost ratio (estimated net benefit/related research expenditures) for nearshore recreation of 8.1 greatly exceeds that for any other category. It is almost double the average for all areas of research, including weather forecasting, commercial fisheries, marine industry, shipping and sewage disposal. Not only are oceanographic research expenditures well justified, the great merit of investing in marine recreational research (in which the sport fisheries are major elements) is convincingly demonstrated.

This informative publication is available from the Printing and Publishing Office, National Academy of Sciences - National Research Council, Washington, D.C. 20418, for \$2.00 per copy.

- 2.21 Sport Fishing in Man-Made Lakes (Stroud, R.H.: American Experience in Recreational Use of Artificial Waters, pp. 189–200, in Man-Made Lakes, edited by R.H. Lowe-McConnell, Academic Press, 1966)

Stroud describes, with very impressive facts, the role of water and sport fishing as the focal point of recreation. The general extent of reservoir fishing constitutes about one-third of the surface acreage of U.S.A. inland waters, exclusive of Alaska and the Great Lakes. The warmwater species predominate (18 per cent) and the average angler's harvest from large reservoirs in 1960 was about 15.7 lb per acre in warmwater areas and 9.0 lb in coldwater reservoirs. The average sport catch per angler-day is estimated to be 1.1 lb in coldwater and 1.5 lb in warmwater reservoirs. In 1963 the large reservoirs produced about 10 fishing days per acre which is one-quarter of all angling effort on inland fresh waters.

To meet the predicted demand in 1976 (from 1960), the large reservoirs will take an 85 per cent increase in angling, 5 million new acres of impoundments will be constructed, and to maintain fishing success near the present level warmwater fish creel from reservoirs must be increased 30 per cent, which means about 21 lb per acre instead of 15.7 lb.

The role of farm ponds is rather large. In 1959, 4 per cent of all angling was performed in the 200,000 farm ponds, stocked by the U.S. Fish and Wildlife Service. The principles of fish population dynamics developed at Auburn University on warmwater species combinations have been used with success.

Small reservoirs (10–500 acres) are used to a large degree in sport fishing. Well-managed lakes, in Alabama for instance, are known to produce 100 or more man-days of angling per acre annually and annual catches of 173 lb per acre.

The Burke Lake project is interesting. A management model was developed with year-round fishing and multiple use of the resource. There were 440 fishing trips per acre of water surface, complementary activities were usual, activity with the family was high and no use friction was apparent.

Lakes like this can support several times as much fishing as do unmanaged or extensively managed natural lakes.

The large reservoirs give a similar picture to the small ones. The multiple recreational use is dominant in management just as year-round use when possible.

Stroud names three main problems associated with recreational use of man-made lakes: (1) inadequate access; (2) conflicts with other recreational groups, mainly boating activities; and (3) inadequate knowledge of reservoir ecology for an improved management (see also 2.12). Water use conflicts can be severe with a free use of the lakes. Speed-boat racing and water-skiing have, in certain areas, produced "intolerable disturbances" to many anglers.

In order to protect anglers and not penalise these new forms of use, some form of zoning can be used in terms of space (special area) or in terms of time (hours, days) or some possible combination of these. (Auth.)

2.22 The Fort Apache Indian Reservation Project (Cit. from White, W.M.: The Economics of Sport Fisheries Management in Canad.Fish.Rep. No. 4, 1965)

In conclusion, I should like to recite, as an example of the potential benefits of an economically rationalized sport fishery, the development of the Fort Apache Indian Reservation in our State of Arizona. Our Government has taken a particular interest in the economic betterment of the Indian and one of many means selected is the development of tribal recreational resources. The Division of Fishery Management Services of our Bureau is in the forefront of such activities. The 1.6-million-acre reservation in point contains about 50 per cent of Arizona's present trout stream mileage. Ten man-made impoundments were constructed to add about 935 surface acres of trout water. Thus the area can now provide a more significant portion of total fishing opportunity in this water-short State.

Permit fees charged to fishermen are designed to recover only the administrative costs of the tribal enterprise - the salaries of about ten people and certain expenses. Permit fees are set at 60 cents for the first day and 30 cents for additional consecutive days. However, the principal tribal benefits are derived from the \$4.82 average daily expenditures by fishermen on the reservation for lodging, boat rental, gasoline and other items. The latter expenditures generate a gross revenue on the reservation of over \$1 million annually. As a result of the fishery management effort this is expected to increase by 5 times and to provide direct employment for 250 tribal members by 1974. An additional \$8 is estimated to be expended on an average by each of these fishermen while off the reservation, a substantial benefit to the State of Arizona.

What are the costs? Tribal capital investments to date are about \$ 2 million of which approximately half has been for reservoir and access road construction. The balance has been expended for facilities to provide lodging, food and similar services. I assume that land costs may be considered to be negligible.

Net profits from the operation, exclusive of the costs of stocking (which has been a federal responsibility) are reported at 15 per cent per annum, computed after appropriate deductions for depreciation of facilities and repayment of capital to the tribal treasury. Each facility is planned to return its capital investment within 20 years.

Calculated another way, a new capital investment of \$ 2 million to be amortised at 6 per cent over 20 years would represent the equivalent of \$170,000 annually. If the annual stocking rate of 80,000 pounds were costed at \$1.50 per pound, or \$120,000 and administrative costs of \$44,000 were added, total annual costs would be \$334,000. Trout fishing benefits would be calculated at a minimum of \$2 per fisherman-day using the present schedule of administrative values. This would place 1964 fishing benefits at \$584,000 which, compared to annual costs of \$334,000, would indicate a benefit-cost ratio of 1.75, a highly favourable comparison. Other secondary and intangible values accrue to the tribal members which are not measured in this comparison. They have better fishing, better roads, better services and higher individual incomes than they would otherwise have.

Whether or not the tribal council has examined exhaustively the alternative possibilities for investment, I cannot say. But it is obvious, I believe, that they have not only selected an economic use for their funds but they have selected an enterprise well adapted to the historic affinity of their people for the out-of-doors. It provides wholesome employment for their people while exploiting a renewable resource of their lands.

We conclude that the methodology of applying economic analysis to sport fishery management is in its infancy. There will be many pitfalls during the period when specific techniques are being developed and tested. Until methodology is perfected, the results would provide a frail single reed for the planner. However, the necessity for rigorous justification of management measures seems to make it imperative that we develop these techniques as a support, though not as a sole criterion, for management decisions. As in any other phase of human activity, there will never be a complete substitute for good judgment which weighs the best economic, social and other factors that are available as a basis for decisions.

### 2.23 The Little Giant Again (SFI bul. No. 140, July 1963)

In an address last March in Florida before the Gulf States Marine Fisheries Commission, Thomas D. Rice, Special Assistant to the Commissioner, U.S. Fish and Wildlife Service, commented on the state of the commercial fishing industry and on some of its problems. He then went on to "talk turkey", as it were, to the Commission members with respect to the growing marine giant - sport fishing. On this he commented as follows:-

"And now I should like to dwell for a few minutes on some matters that have bothered me somewhat over the past several years. I have been impressed with the fact that something is missing in our concern with fishery development of the Interior, the Coastal State Agencies and the Interstate Marine Fishery Commissions as between the Commercial and Recreational Fisheries.

"The lack of balance is reflected in great and reasonable concern with commercial fishery statistics and little or none with sport fish catches. It is reflected in the agendas of such meetings as this, where the vastly important shrimp resource is king and the vastly important sport fish resource is all but ignored. It is reflected in great and good research efforts for a few of the major commercial fishes and little or no effort for the major game fishes.

"What has brought this imbalance most sharply to my attention are the statistics of growth in numbers of salt water anglers and in the quantities and poundage of their catches all around the coasts. Most of this growth is recent and rapid. It has been reported in publications of the Outdoor Recreation Resources Review Commission and the Fish and Wildlife Service, but it hasn't quite gotten through to us all that we're riding a wave of the future. We had better take account of it. We had better follow what's happening. We had better try to see clearly how we can take advantage of it to keep all our fisheries strong and growing in the face of threats from pollution, river and shore and marsh development and destruction.

"The Fish and Wildlife Service and the Interstate Commissions are the custodians of valuable and imperiled resources of all Americans. What can we all do together to achieve the most productive, best balanced effort on behalf of these resources?

"Have you as state organisations exhausted all possibilities to increase your income through sale of marine sport fishing licenses? To your credit, you have done better on the Gulf Coast than other areas have, but more might be accomplished.

"Have you been able to devote as much time to your regulation of salt water sport fishery catches as to the regulation of freshwater fish catches? Do we have a balance between sport fishery regulations and commercial regulations? Have we worked together to get the facts necessary for the making of good rules for fishing?

"Have we worked as hard or as soon as we should have on the many proposals to dredge channels through fish spawning grounds and oyster beds and to change bayou outlets? We realise now that we began to study the Mississippi Gulf outlet problem almost too late.

"Have we worked well enough together on the complicated studies of water quality which will tell us whether the pesticides sprayed on the land will decimate our young fishes and our shellfish in estuarine areas?

"There is need for comprehensive planning to meet these problems whether they arise from domestic or international sources or whether we are interested in sport fish, commercial fish or any other inhabitants of our coastal waters. A body such as this, representing federal, state, industry and recreational interests, can, and I am sure will, provide a valuable and continuing service in this respect."

2.24 The Whole Outdoor Recreation Experience (Cit. from Clawson, M.: Economic Aspects of Sport Fishing in Canad.Fish.Rep. No. 4, 1965)

In my approach to outdoor recreation, I regard as basic the concept of the whole recreation experience. Almost every outdoor recreation experience includes five rather well-defined phases:

1. Anticipation or planning. This takes place primarily before the family leaves home. It decides then such questions as where to go, when, what equipment to take and to buy, how much money to spend, how long to stay, and the like. As nearly as I can estimate for the United States, more than half of all expenditures for outdoor recreation take place during this phase. Heavy equipment such as autos, boats, motors, camping gear, and the like is mostly bought here. Some people plan their outdoor recreation carefully, on the basis of the best information available; others are haphazard, hasty or careless. If public agencies want to help people plan their outdoor recreation activities better, to increase their later satisfactions and to reduce their disappointments, I think this is the best stage to do so. Almost no public efforts are directed now to helping recreationists at this stage.
2. Travel to the site. Most outdoor recreation requires travel from home to the recreation site. Often, more time and money are spent in this travel phase than are later spent on the site. We lack adequate information but there is reason to believe that for many people this phase is not particularly enjoyable - may even have a negative value. I think it possible that the enjoyability of this phase might be increased considerably.
3. On site. This is the phase we most often think of, or talk about, when outdoor recreation is mentioned. Many different activities may take place, with different members of the family often doing different things. This is the phase which often gives point and direction to the whole experience, and it is the one by which we often describe the whole. But we should not fall into the error of regarding it as the totality.
4. Travel back. The recreationist family obviously must return home; but its route often need not be the same. We suspect that its attitude is significantly different from the outgoing trip. It may well be that the family responds to different considerations on the two trips.
5. Recollection. After the family returns home, it recalls its recreation experience. I have hasarded the judgement that more than half of the total satisfactions of the entire experience arise here. Stories are told to friends and neighbors, work associates and

others; stories often reinforced with slides or artifacts of some kind. The recollection may differ considerably from the activity. Bigger fishes are caught or get away in the living room or office than on the lake or stream. Experiences unpleasant at the time such as drowning rain, may provide wonderful conversation fodder. The recollection experience gradually leads to planning the next experience and so the cycle begins again.

We must treat the whole experience as a package deal. Each part is essential to the whole. All the costs of the package must be balanced against all the satisfactions. The annoyance at a dirty restroom on route may offset the pleasure of a new museum in the park, for some people. In research, in economic analysis, in education of recreationists, in tourist promotion and in park or fisheries administration we must constantly be aware of the whole experience. In my judgment, many park or recreation resource administrators have been excessively preoccupied with the on-site phase of the whole experience. They could properly retort that this was their only responsibility, that they were not permitted or required to work off the site of their prime responsibility. But I think we must look at their role in a new light.

#### 2.25 Trout Angling Effects (SFI bul. No. 133, December 1962)

The effects of angling regulations on wild brook trout were studied during six continuous years at Lawrence Creek, Wisconsin, and are reported by fishery biologists Robert L. Hunt, Oscar M. Brynildson and James T. McFadden in Technical Bulletin Number 26 (Wisconsin Conservation Department, Madison 1). Lawrence Creek contains a dense population of wild brook trout and has a reputation for "good trout fishing".

According to the report, three sets of regulations were evaluated: A 6-inch minimum size limit and bag limit of 10 (1955 season), no size limit and no bag limit (1956–57 season) and a 9-inch minimum size limit and bag limit of 5 (1958–60 seasons). The first two sets of regulations were much alike in their effect upon harvests. Few anglers were able to catch 10 or more wild brook trouts and few brook trouts less than 6 inches were kept, even when legal. Consequently, 1955, 1956 and 1957 harvests were largely unaffected by the presence or absence of regulations as liberal as a 6-inch limit and bag of 10.

When the minimum size limit was raised to 9 inches during the 1958–60 seasons, the catch was dramatically reduced, angling success indices declined, and fishing pressure declined. Simultaneously, the growth of trout declined and instances of higher-than-normal summer and winter mortality due to natural causes reduced the possibility of stockpiling enough two-year-old brook trout to provide a yield (in terms of both number and pounds) comparable to one which includes a significant percentage of one-year-old brook trout as well.

In Lawrence Creek enough yearling brook trout usually survived the fishing season to provide adequate reproduction regardless of the angling regulations. This was true even though it was found that the catches of brook trout in 1956 and 1957 represented 59 per cent and 65 per cent of the respective pre-season populations. Two-year-old brook trout seemed especially vulnerable to angling.

It was concluded that regulation of the harvest of wild brook trout from Wisconsin streams is both biologically sound and necessary to insure perpetuation of this fishery wherever sufficient angling activity exists. Minimum size limits were found to provide a more dependable method of controlling the harvest than bag limit restrictions.

Harvests made under a 9-inch limit showed much reduced rates of exploitation at all levels of fishing intensity and trout population density encountered. A minimum size



limit adapted to the growth characteristics of the brook trout populations being managed would ameliorate angling mortality over a wide range of trout density and angling pressure.

## 2.26 What Is Recreation? (SFI bul. No. 175, June 1966)

A provocative paper presented in Raleigh, North Carolina, at the Annual Southeastern Park and Recreation Training Institute last February (by Hugh A. Johnson, leader of research in the economics of outdoor recreation with the USDA Economic Research Service), raised some very basic questions about "Research Needs in Outdoor Recreation". His first expressed need concerned the very nature of outdoor recreation itself. He noted that recreation is not the outdoors, but our reaction to the outdoors.

Recreation was stated to be something a person does because he likes doing it and not because of some reward he might receive. Johnson urged that we dig deeper, arguing that, "We need to get into the root-concepts expressed in words like ethics, polity, philosophy, morals and mores, to use a few. We need answers to the basic question, 'What's this all about?'".

Discussing "demand" for recreation opportunities, Johnson stated that our first great need is to "reexamine the reasons why we have parks and playgrounds and recreation administrators. Why are we concerned about preserving forests and waters and fish and wildlife? Why are we trying to provide recreation opportunities for the massing millions concentrating in our cities? "

The demand for recreation opportunities in the out-of-doors has increased faster and further than the supplier's ability to provide the needed facilities and services. This insufficient supply is said to be attributable to six situations:

1. Inability to accurately identify recreation needs.
2. Inability to forecast recreation trends.
3. Inability to secure adequate financing - public and private.
4. Lack of knowledge of the significance of recreation.
5. Inability to articulate the need for recreation.
6. Lack of administrative, policy making, managerial and leadership competencies in recreation.

This temporary shortage of outdoor recreation facilities does not necessarily mean, said Johnson, that we should plan to devote more money for more large parks and forests and recreation areas. On the contrary, he suggested, research reflection may argue that such investments in extensive public holdings will not provide the greatest good for the greatest number of people at the lowest alternative cost.

One problem that Johnson stressed is to measure the "real" demand as contrasted to the expressed demand! Evidence seems to be mounting that recreationists must be studied as "complex, often irrational, changeable, different, interesting individuals". Johnson also emphasized that overall estimates of recreation demand must be carefully analyzed for their true meaning. We need, he said, to develop better methods to determine how recreation users measure quality, how they adapt their recreation demands to the available resources, the conflicts in recreation uses, the economics of choice and many other aspects not usually brought out in user surveys or in enterprise analyses.

2.27 Year-Round Troutng (SFI bul. No. 161, April 1965)

West Virginia has made a major change in its trout fishing regulations. Following the 1965 opening on 24 April, trout fishing will continue thereafter on a year-round basis. It is planned to secure comparative information on changes that may result in fishing effort, return to the creel of planted trout and any decrease or increase in truck following.

The only reason that troutng has been closed during the first four months of each year heretofore was to permit stocking of 50 per cent of the hatchery-reared trout stocks. The remaining 50 per cent are stocked in weekly allotments after opening day. The former pre-season stocking can also be divided into weekly plants from the time weather permits.

The State believes that its new policy of year-round trout fishing will offer these advantages:

1. Makes use of at least two extra months of prime trout water - often the best stream conditions of the year.
2. Gets away from opening day crowds that hinder fishing and detract from sport.
3. Will allow a fuller use of hatcheries by providing more poundage of fish produced per unit space.
4. Should draw more tourist trout anglers to the State for early spring fishing.
5. Will allow a more reasonable use of facilities such as camping areas. Opening day crowds have exceeded what it is possible to provide in facilities in many areas.
6. Will help to alleviate health problems associated with the overcrowding of areas.
7. Will provide better fishing and more opportunities to West Virginia anglers.
8. Should decrease total fishing pressure on native trout waters since most of this effort is associated with opening of the season.

2.28 Sport Fishing - Today and Tomorrow (Recommendations) (From ORRRC Study Report 7)

The following items are regarded as the most significant needs of the recreational fisheries of the United States:

- (1) The sport fisheries should receive wider recognition as a resource of national significance. This is particularly true when applied to the oceans, Great Lakes, waters on areas administered or developed with Federal funds and fisheries of interstate waters. This can be accomplished by furthering cooperation between Federal and State conservation agencies and by providing the public with more adequate information on fishery resources. The nationwide increase in vacation travel and the pleasure of fishing new waters have awakened a new and widespread public interest, which can best be met by expanded cooperative programmes. No one agency can do the job unaided.
- (2) Provision of recreational fishing should be recognized as one phase of water-resources management, where all compatible uses are encouraged and developed. On some areas, such as national wildlife, refuges, military areas, national parks and

watersupply reservoirs, there may be uses of higher significance than fishing; but fishing should be permitted and encouraged wherever it does not seriously interfere with essential uses. In several western States, sport fishing is still not recognised under State laws as a beneficial use of water. This situation can and should be corrected under public demand.

(3) There are three main problem areas in sport fishery management that must be given attention if the requirements of fishermen are to be met in 1976 and 2000:

- (a) Greater provision for public access to all types of water, whether publicly or privately owned. This also involves parking facilities, boat ramps, sanitary facilities, even shelters and trails for public use. The States are aware of this need and with increased Federal assistance can go far toward meeting public-access requirements which are expected to expand from 2 to 4 times by 2000.
- (b) Correction and prevention of damaging pollution and siltation in all waters, especially the larger rivers and estuaries. We are still losing inland water areas to pollution as fast as, or faster, than they are being improved. Siltation is a serious problem near urban developments and where outmoded agricultural practices are still prevalent. The estuaries are the spawning and nursery waters for many marine fisheries and must receive greater protection from pollution than at present, if they are to serve the needs of the Nation in the future.
- (c) Improved financing. Financing of sport fishery programmes is generally inadequate at both State and Federal levels. Fisherman use is increasing faster than license revenues and much faster than Government appropriations for management of resources. The costs of salaries, equipment and construction items, meanwhile, have risen sharply. At the State level, the situation calls for increases in license revenues, including a marine sport fishing license and possible supplemental sources for new funds. For the needed Federal programmes, the money can come only through increased appropriations supplemented by reasonable user fees where appropriate. The improvement of existing fish habitats through available management techniques is entirely feasible, but will take money and personnel not presently employed.

(4) The need for more facts to guide the management of fishery resources is imperative. The most vital points on which knowledge is needed are as follows: (a) management of impounded waters, particularly the large reservoirs, (b) new and precise techniques for the control of fish species and fish habitats, to increase the production of desirable species; (c) more effective protective facilities for anadromous species, both upstream and downstream migrants; (d) better understanding of the effects of new pollutants, commercial poisons, detergents and radioactivity on aquatic life; and (e) knowledge of marine sport fisheries. Although significant progress in fishery research has been made by the States under the Dingell-Johnson programme over the past 10 years and by the U.S. Fish and Wildlife Service since its reorganization in 1956, much needs to be done.

(5) Some areas of responsibility for sport fishing are not clear, especially in the marine waters. No single pattern of authority is followed and in 7 of the 23 coastal States, no State agency has primary responsibility in this field. Only a few coastal States

have well-developed marine sport fishery programmes. The resource is of such vast local and national importance that this situation cannot continue to be overlooked. In some inland waters - on some military lands, certain national parks areas and unallotted public domain - management responsibilities have not been defined. These situations are of importance in a particular State and generally require legal examination and court ruling to set forth the lines of jurisdiction.

(6) Strong efforts must be taken to preserve and protect natural shorelines of large rivers, lakes, the ocean beaches, and the estuaries from physical damage and destruction. Dredging, filling, channeling and drainage are destroying irreplaceable wetland habitats, including spawning and nursery areas, along our coasts. Every possible measure must be taken to save these irreplaceable resources for the future.

(7) Waters affording fishing opportunities near large centers of population are one of the most critical needs of the fishing public. Legislation, both State and Federal, concerning purchase or preservation of lands within the areas of "urban sprawl" should include specific provisions for development of feasible impoundments for sport fishing and other recreational purposes. At every legislative opportunity for public works, such as youth corps, public land development and acquisition or land conservation measures, specific provisions for development of new waters near centers of population should be included as a benefit for present and future generations.

### 3. COMMERCIAL AND SPORT FISHING

#### 3.1 Atlantic Salmon (SFI bul. No. 186, July 1967)

The 1966-67 winter issue of "The Atlantic Salmon Journal" (Fredericton, N.B., Canada), contains reports from the Annual Conference of the Atlantic Salmon Association, last February in Montreal, plus other pertinent information. For example, data given for the Canadian catches of Atlantic salmon indicate that a total of 860,725 fish were taken in 1966. Of this total, some 366,699 were adult salmon and 494,026 were grilse. Angling accounted for 122,640 fish (34,614 adults and 88,026 grilse), while commercial fishermen harvested an estimated 738,085 fish (332,085 adults and 406,000 grilse - all from Newfoundland waters).

During the conference, the famed Miramichi River was acclaimed as "the world's greatest (Atlantic) salmon producing river". A record 73,574 salmon were caught there by all means in 1966, attesting to its great significance to the world, not only to Canada.

It was brought out that salmon angling currently generates gross expenditures of some \$8,000,000 annually in Canada's Eastern Provinces and Quebec at current levels of catch. It was noted in this connection that angling catches of salmon could easily be increased by more than 60 per cent "if they were available". (Presumably, they could become available if the current high level of commercial fishing take were sufficiently restricted - perhaps on the order of one-half.)

Commercial nets in 1966 brought less than one-third the revenue to these provinces (\$2,500,000) from the exploitation of more than 5½ times as many fish. Thus, the value of salmon caught by angling averages about \$65 per fish, compared to a value of only \$3 per fish exploited commercially.

On this basis, it would be sound economics to restrict commercial fishing harvests to the point where the angling catch could be increased from 123,000 to the Association-suggested goal of 200,000 fish. We might assume that anglers' catches would average 20 per cent of available fish. On this basis - suggested by us rather than

by the Association - some 385,000 fish would need to be reserved from current commercial harvests (a reduction by 52 per cent) to make possible an increased angler catch of 77,000 fish.

Applying value figures given by the Association, these additional fish caught by anglers would be worth over \$5,000,000 in revenues to Canada. The 385,000 fish, necessarily reserved from the commercial catch to make such an increase in the angling catch possible, would otherwise be worth only \$1,155,000 to the Canadian economy. Thus, the economy of the Eastern Provinces and Quebec would benefit very handsomely from such an approach.

As T.B. Fraser, Manager of the Atlantic Salmon Association, put it with respect to the relative dollar values of salmon caught by angling vs. netting: "These figures need to be studied by some governments who still labour under the delusion that the commercial fishery for salmon is still the big revenue producer".

3.2 Commercial Fishing (Salmon and Freshwater Fisheries, Report of Committee on, London, May 1961, Reprinted 1964, Cmnd. 1350, The Bledisloe Report)

51. Before we went into the question of the control of commercial methods we considered whether we ought to recommend that all commercial fishing for salmon, trout, coarse fish and eels should be abolished and the entire stocks of these fish made available for exploitation by anglers for sport. There is no doubt that interest in angling has vastly increased of recent years and that the increase is continuing; anglers contribute greatly to the tourist industry and to the fishing tackle trade; some pay rates on sporting property to the local authorities in whose areas their waters lie and most contribute substantially to the funds of river boards through license duties. On the other hand, commercial fishing in England and Wales employs comparatively few people (2,000 as against some 560,000 salmon and trout anglers in 1958) and none of them is employed in the business all the time for there is a close season of at least five months; most of the fishing is done in public waters and there is, therefore, no contribution to local rates; and the amount of license duty paid by netmen is in only a few areas a noticeable contribution to the income of the river board. Nevertheless, salmon and sea trout are extremely valuable food fishes and though unfortunately we can hardly hope that they will ever be abundant enough to be an important item in the diet of the people of this country, they will always be much sought after. Economically they make a small but worthwhile contribution to our natural wealth. To many inshore fishing communities salmon or sea trout fishing is an essential part of their livelihood, for without it their income from other kinds of fishing, shellfish, sprats, pilchards or white fish, would not be sufficient to maintain them and their families and they would be lost to the fishing industry entirely. Finally, we are by no means satisfied that the amount of fish caught commercially in England and Wales is greater than the stocks can stand. The figures in Appendix 3, moreover, suggest that the reduction or cessation of netting does not always result in strikingly better angling and we think that to abolish commercial fishing altogether would result in a substantial loss of good food without a countervailing advantage to the angler. We therefore recommend that commercial fishing should continue, although the methods now employed may well be susceptible of development and improvement.

52. Having reached this conclusion we have naturally given a good deal of attention to the control of commercial fishing to see whether we could devise methods which would safeguard the stock of fish and be fair to the angling interest but at the same time

not hamper unnecessarily a lawful and desirable business. It is also important that control measures should be easy to operate and enforce.

53. A description of the commercial methods of fishing for salmon and trout which are now in use is given in Appendix 4. In the present Act the use of these methods of fishing is closely regulated by statute, not only as to times and places when they may be used, but also as to their actual method of operation. Thus nets must be of a certain minimum mesh (which can be varied by byelaw); two nets must not be used within one hundred yards of each other, nor across more than three-quarters of the width of the river; fixed engines were "frozen" as to number and situation by the decisions of the Special Commissioners of 1865, and even if by a change of the course of a river they have become useless they cannot be replaced.

### 3.3 Commercial Fishing Confab (SFI bul. No. 164, July 1965)

Commercial fisheries of both the United States and Canada are lagging behind those of other nations. Reasons for this lag and measures for improving the U.S. competitive position in world fisheries were discussed during the "North American Fisheries Conference" at the Annual Meeting of the commercial fishing industry held recently in Washington, D.C.

Dr. Wilbert M. Chapman, Van Camp Foundation (San Diego, California), cited a mate of state regulations as contributing to the poor position of the North American nations in world fisheries. He stated that efficiency has been legislated out of the fisheries to protect the less efficient fishermen from the normal effects of competition.

Conflicts between sport and commercial fisheries were recognised as valid where there are limited quantities of particular stocks of fish. In such cases, Chapman stated, priorities must be established through research and that "the recreation use should have the priority" (emphasis added).

Establishment of overall quotas to be taken from the stocks each year was recommended by Chapman as a means of maintaining adequate spawning stocks. These quotas, he argued, should include a reasonable individual bag limit for sportmen with the food fishery permitted to take the remainder. (In a number of instances, it must be recognized, especially with respect to inshore stocks, there will not be any remainder for the commercial fishing industry to share.)

### 3.4 Fisheries Vs. Shell Dredging (SFI bul. No. 184, May 1967)

Estuaries are among our most vital natural resources, being the situations where much of our coastal marine life originates. Nationwide, about 65 per cent of all our commercial fish and shellfish, and most marine sport fish species, inhabit estuaries during all or part of their life cycles. In Texas, the 333,000-acre Galveston Trinity East Bay estuarine complex has been reported to be the spawning and nursery grounds for 80 per cent of the total fisheries products taken from the Gulf of Mexico along the entire Texas coast. It is known, for example, that each acre of marine grass flats in the bays of Texas produces an annual crop of at least 20 redfish and at least 40 sea trouts.

The loss of Texas of the biological productivity of the Galveston estuary complex, from whatever cause, would be disastrous. Approximately 750,000 Texans currently engage in recreational fishing throughout Texas coastal waters. In the process, they catch (and presumably eat) about 40,000,000 pounds of speckled trout, redfish, flounder, drum and shrimp annually. This fishing provides about 8,000,000 days annually of preferred outdoor recreation - an activity officially recognised to contribute importantly

to the general public health. The 80 per cent of the fishing attributable to the biological productivity of the Galveston estuary complex amounts to 6,400,000 angler-days and 32,000,000 pounds of sport-caught fish.

Based on federally assigned dollar values for "net economic benefits" attributable to each recreational fishing day, the type of sport fishing involved there (at \$3.00 per angler-day) generates "net economic benefits" to Texas amounting to some \$19,200,000 annually. Added to the annual landed value (\$25,622,000) of the commercial fishery products (116,000,000 pounds of finfish and shellfish) similarly depended upon this area, the total annual value derived from utilisation of the biological products that are directly dependent on this critical bay-estuary complex is about \$44,822,000. This is a perpetual annual yield at present levels of resource husbandry, representing a capital value (4 per cent interest rate) for the biological productivity involved considerably exceeding one billion dollars (1,120,550,000)!

The U.S. Bureau of Commercial Fisheries indicates that present commercial fishery harvests there could be increased immediately and sustained, with added fishing effort, by about 50 per cent. This means, in turn, that the annual value of presently available commercial production could be readily increased by about \$12,811,000. This would raise the value of annually available commercial fishery products to the total of \$38,433,000. (This does not take into account any potential increases that might be obtained by intensive scientific management of shellfish resources).

The Bureau's estimate of presently available unharvested surplus, if valid, should apply across the board of biological productivity. If so, it is reasonable to assume that 50 per cent more sport fish could also be taken on a sustained basis, with increased effort, thus raising the latter to about 48,000,000 pounds.

The average catch of coastal saltwater fishes by Texas anglers is about 5 pounds per angler-day. This is several times the average daily catch that freshwater fishermen, including Texans, have gradually found acceptable. It, therefore, seems reasonable to expect that the increasing saltwater anglers, including Texans, will eventually find comparable levels of daily catches reasonably acceptable.

Assuming future average catch per angler-day in coastal salt waters of 2 pounds (would exceed current average daily freshwater catch rate), together with increased total harvest, at least three times as many angling days can easily be accommodated. Thus, the sport fishery resources that are dependent on the Galveston Trinity East Bay estuary could support a minimum of 24,000,000 angler-days. (This does not take into account any potential increase that might eventually be obtained through intensive scientific management of the resource.) The future "net economic benefits" (at \$3.00 per angler-day) that are reasonably realizable from the Bay estuarine dependent sport fishery, then, would be approximately \$72,000,000 annually.

Therefore, the anticipated total future annual value (conservative) that is reasonably derivable from various utilizations of the biological products, dependent in some critical way upon this important Bay estuarine complex, would amount to an estimated \$110,433,000. The equivalent capital value (4 per cent interest rate) would be approximately \$2,760,825,000. That value could be expected to increase substantially over the remainder of the century in direct proportion to the application of intensive scientific management to both the sport and commercial fisheries resources base.

The major factors affecting the biological productivity of the Bay estuary are essentially three-fold: (1) shelldredging for production of aggregate and of calcium; (2)

pollution, both municipal and industrial, including siltation from dredging; and (3) dredge-and-fill operations for real estate development. The loss or degradation of such an important estuary from whatever cause, be it pollution or dredging for shell or dredging and filling for real estate development, can be very damaging to the economy and to fishery resource-dependent recreation. Losses due to pollution are subject, with cleanup, to eventual rehabilitation. However, losses due to dredging activities tend to be substantially permanent. All three factors apply in varying degree in this case, but current urgency surrounds the shell dredging problem.

By October 1963, three and a half years ago, the remaining supply of "exposed oyster beds" (no more than two feet of overburden) in the Galveston Trinity East Bay estuarine complex was about 120,000,000 cubic yards of recoverable shell. At that time, remaining exposed oyster beds were calculated to constitute a seven-year supply for industrial use as aggregate in road construction and/or chemical extraction of calcium. By late March 1967, it had presumably been reduced to one-half of that estimated quantity, with commensurate reduction in capital value (at an average \$2.00 a yard at dockside) - to some \$120,000,000, or about \$34,000,000 annually over the ensuing 3½ years. This is considerably less than the "net economic benefit" from utilization of the fishery resource that is dependent on this area.

After 3½ more years of exploitation, when the shell becomes exhausted in the fall of 1970, its industrial value will have fallen to zero. As an associated consequence, the biological productivity would be damaged, as well, and the recreational and commercial fisheries would decline accordingly. On the other hand, if the shell deposits should be left intact, the fisheries would be able to continue, undiminished, to serve many millions of Texans indefinitely into the distant future. Fully dredged out, only relatively small numbers of Texans can be served for less than the span of a single current generation.

It would appear to be the height of folly for the State of Texas to permit the loss of another acre of exposed oyster shell to such purpose in the Galveston Trinity East Bay estuarine complex. It would be particularly wasteful and tragic in view of the known availability of huge limestone deposits, at relatively short-haul distance inland, as an alternative source of the raw materials needed for industrial aggregate and calcium. It is recognized that this new source would be somewhat more costly than the shell deposits, due to increased transportation and processing expense associated with its substitute exploitation. Eventually, of course, it will necessarily be substituted on a permanent basis as the shell resource becomes exhausted.

It turns out, on examination, that the cost differential for crushed limestone delivered at dockside in Galveston, as an alternative to shell, is about 58 cents per ton. Since a yard of shell weighs slightly more than a ton, the added cost of furnishing the substitute limestone for the remaining 120,000,000 cubic yards of shell (somewhat less than 130,000,000 tons) as the raw material for its various industrial uses would be about \$75,400,000.

The capital value of presently harvested biological products (at current levels of partial utilization), dependent for their existence in some way on the Bay estuary's biological productivity, is about 15 times as much as the cost differential incurred by use of the alternative source of materials. On the basis of reasonably anticipated future use (conservative since it ignores further increases due to intensive scientific management of those resources, likely to occur in the future), the perpetually renewable biological resource would be worth well over 36 times the differential in cost due to use of the alternative source of limestone aggregate and calcium: Expressed another way, a



decline in the biological productivity of this vital Bay estuary amounting to considerably less than 5 per cent would result in a loss in overall capital value of the dependent fishery resources by an amount that would exceed the capital value of the current remaining supply of exposed oyster shell (used for the customary industrial purposes).

Although it can be shown that estuarine-dependent fishery resources have high values in comparison with other estuarine-related values, although an acre of estuary can be demonstrated to be worth considerably more when properly managed for its optimum sustained biological productivity than when exploited for other uses, the real issue is not a matter of comparative economics. In the final analysis, the overriding issue comes down to an increasingly urgent fundamental moral question. That question is, whether permanently destructive exploitation of irreplaceable estuarine areas for the generations of short-term private financial gains will be permitted - or whether these biologically critical brackish water areas will be so managed as to assure optimum sustained yields of useful aquatic life for the generation of continuing multiple public benefits for many centuries to come. The latter course preserves for future decision a maximum array of desirable options; the former course permanently narrows the range of future choice by irreversibly foreclosing upon important options now.

### 3.5 Fish Harvest (SFI bul. No. 138, May 1963)

According to statistics revealed by the U.S. Fish and Wildlife Service, the U.S. commercial fish (food fish and industrial fish combined) and shellfish catch for 1962 amounted to 5.2 billion pounds. This near-record catch had the record value of \$ 385 million at dockside. As we understand it, the ultimate retail value of the edible fishery products served on the table approximates 3.3 times as much as their wholesale value. Industrial fish, mostly menhaden, made up over 51 per cent of the total catch. Other fishes and shellfishes not utilised to any appreciable extent by anglers made up well over 10 per cent.

Something under 39 per cent of the commercial catch - about two billion pounds, or less - represent species of fish in which sport fishermen have a strong community of interest with commercial fishermen. The mutuality of interest is of course much greater for some species than for others but angling interest in most of them is expanding at a very rapid rate.

For example, the Special Study Report of the Outdoor Recreation Resources Review Commission (ORRRC Study Report 7) on "Sport Fishing Today and Tomorrow" estimated that the 1960 angling catch of saltwater sport fish came to about 565 million pounds: This estimate - equivalent to nearly 30 per cent of the corresponding commercial catch - was derived by multiplying the average catch per man-day of angling (as estimated from a review of a number of scientifically conducted angler-catch studies) by the number of man-days of angling devoted to saltwater sport fishing (as established by the U.S. Bureau of the Census study). To catch these fish, some 6.3 million anglers spent about \$ 626 million - representing an ultimate retail value amounting to about \$1.10 per pound of sport-caught fish!

### 3.6 Studies of Irish Angling and Commercial Fisheries

A series of studies has been prepared during the past few years by the Department of Agriculture and Fisheries and the Tourist Board in Ireland (personal communication).

One study "Analysis of Returns Received from Fisherman engaged in Commercial Fishing for Salmon and Sea Trout (1966)" (mimeo 1968) gives detailed

information, for example, of the number of fishermen employed (4,365), total quantity of salmon captured (2,326,000 lb) and sea trout (86,000 lb); (total value about £700,000); nets and boats used, average time devoted to this type of fishing each season (mean approx. 20 weeks per engine and 36 hours per week) and average net income per man per week fishing (mean approx. £4.6 with a deviation from £2.14.0d for snap nets to £6.3.6d for bag nets).

Another study "Analysis for Returns of Expenditure Incurred by persons licensed to fish for Salmon and Trout by means of Rod and Line" (mimeo 1967) outlines, for example, the following figures for 1966: Number of licenses issued (12,052) estimated total expenditure £490,146, estimated total expenditure on hotels and travelling (£223,356) and estimated total value of catch by rod and line of £118,873.

A third study "Return of Angling Visitors from outside the State 1957–1966" (mimeo 1967) records an impressive upward trend, for example, of the number of visitors from 11,900 in 1957/58 to 106,700 in 1966/67 and a change during the same years in the total visitors' expenditure from £285,500 to £3,757,000. These figures include game fishing (59%), coarse fishing (23%) and sea fishing (18%). The increase in expenditure during these 10 years is approximately ten-fold for game fishing and twenty-fold for coarse and sea fishing.

APPENDIX A

ANNEXE A

A Partial List of Experts in the Economic Evaluation of Sport  
Fishing and their Address

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APPENDIX B

ANNEXE B

SAMPLE QUESTIONNAIRES FOR SPORT FISHING SURVEYS

MODELES DE QUESTIONNAIRES PERMETTANT D'INVENTORIER LA PECHE  
SPORTIVE

CONTENTS

1. Case study of the Southern Appalachian Trout Fishery
2. National Survey of Fishing and Hunting - Fishing Questionnaire

Budget Bureau No. \_\_\_\_\_

Expires \_\_\_\_\_

MEASURING THE CONTRIBUTION OF VARIOUS QUALITATIVE FACTORS  
TO THE RECREATIONAL VALUE OF TROUT FISHING RESOURCES -  
A CASE STUDY OF THE SOUTHERN APPALACHIAN TROUT FISHERY

Stream: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Interviewer \_\_\_\_\_  
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

Date: \_\_\_\_\_  
(10-12)

Time: \_\_\_\_\_  
(13-14)

Data obtained in this survey will be kept anonymous. (We are not going to ask your name or license number.) The data will be used only for statistical purposes in combination with data from other respondents.

(ALL QUESTIONS APPLY TO THE FISHERMAN BEING INTERVIEWED.)

We are attempting to obtain information relative to what people look for when selecting trout streams, and how much time and money they spend on a trout fishing trip.

1. What attracted you to this particular stream in preference to others? \_\_\_\_\_  
(15-16)

1. Accessibility.

1. Easiest to reach
2. Closest to home
3. Easy to fish (Open bankside trails, etc.)

4. Peripheral environment

1. Scenic
2. Remote
3. Uncrowded

2. Probability of desirable catch

1. High numbers
2. Good or acceptable size
3. Preferred species
4. Native trout
5. Stocked trout

5. Special regulations

1. Flies only
2. Artificial lures only
3. Can use bait

3. Stream conformation

1. Fast water, falls and pools, deep, wide, etc.
- 2.

6. Other

1. The only fishable water within reach in available time
2. Reoutation
3. Curicsity. (wanted a chang
4. Came with others
- 5.

2. What kind of bait are you using now? \_\_\_\_\_  
(17)

1. Natural bait

3. Artificial lures (except flies)

2. Artificial bait (cheese etc.)

4. Flies

3. We are interested in how much time you plan to spend away from home on this fishing trip:

a. When did you leave home? Date \_\_\_\_\_ Time \_\_\_\_\_  
(18-20) (21-22)

b. When will you return home? Date \_\_\_\_\_ Time \_\_\_\_\_  
(23-25) (26-27)

c. What will be your total travel time on this trip, not including walking (both ways)?  
\_\_\_\_\_ Hours  
(28-29)

d. How much time did you spend: (1) walking from your car (or other transportation) to the place where you began fishing?, (2) walking from the place where you will stop fishing back to your car? \_\_\_\_\_ Minutes  
(total) (30-32)

e. How much time will you spend fishing on this trip? \_\_\_\_\_ Hour  
(33-35)

f. How much time will you spend fishing on this stream today (if different from above) \_\_\_\_\_ hours  
(36-37)

4. a. What is the total number of days you expect to go fishing this year in Tennessee? \_\_\_\_\_  
(38-39)

b. How many of those days will be for trout fishing? \_\_\_\_\_  
(40-41)

5. How many trout have you caught so far today on this stream? \_\_\_\_\_ How  
many have you kept? \_\_\_\_\_ In how many hours? \_\_\_\_\_ What is  
(42-43) (44-45) (46-47)  
the length of the largest? \_\_\_\_\_ (inches)  
(48-49)

6. Would you estimate the total replacement cost of your fishing equipment that you expect to use today? \_\_\_\_\_ (Include rod and reel, waders, lures, bait and other tackle)  
(50-52)

7. Other than your fishing equipment and bait, how much will it cost you out of your pocket for this trip?

a. Transportation (to and from) \_\_\_\_\_ miles or \$ \_\_\_\_\_  
(53-56) (57-59)

b. Food and beverage other than from home \$ \_\_\_\_\_  
(60-62)

c. Lodging \$ \_\_\_\_\_  
(63-65)

d. Others \$ \_\_\_\_\_  
(66-67)

e. What percent of these costs do you attribute to the following purposes:

|                  | % Attributable to: |    |    |    |      |
|------------------|--------------------|----|----|----|------|
|                  | 1                  | 2  | 3  | 4  |      |
| Fishing          | 100                | 75 | 50 | 25 | (68) |
| Other Recreation | 100                | 75 | 50 | 25 | (69) |
| Business         | 100                | 75 | 50 | 25 | (70) |
| Other            | 100                | 75 | 50 | 25 | (71) |

(CHECK A TOTAL OF 100%)

8. What town is your present home post office in? \_\_\_\_\_ state? \_\_\_\_\_  
(72-74) (75-76)

9. Which category on this list describes your present occupation? \_\_\_\_\_ (circle)  
(77)

- |                                    |               |
|------------------------------------|---------------|
| 1. any paid occupation             | 4. Housewife  |
| 2. student: High school            | 5. Retired    |
| 3. student: College,<br>University | 6. Unemployed |

(IF R IS NOT IN GROUP 1, END THE INTERVIEW HERE)

10. Will you tell me (or circle the number) which of these categories is closest to your average hourly net wage rate for this month (before taxes)? If you have more than one occupation, please answer for the lowest paying one. (Show R card) \_\_\_\_\_  
(78-79)

|     | <u>Hourly</u> |      | <u>Hourly</u> |
|-----|---------------|------|---------------|
| (1) | \$1.00        | (6)  | \$6.00        |
| (2) | 2.00          | (7)  | 7.00          |
| (3) | 3.00          | (8)  | 8.00          |
| (4) | 4.00          | (9)  | 10.00         |
| (5) | 5.00          | (10) | 12.00         |

NOTICE- All information which would permit identifications of the individual will be held in strict confidence, will be used only by persons engaged in and for the purposes of the survey, and will not be disclosed or released to others for any purposes.

|                               |                 |  |        |                           |  |       |                              |  |
|-------------------------------|-----------------|--|--------|---------------------------|--|-------|------------------------------|--|
| FORM FH-1<br>(12-10-65)       |                 | U.S. DEPARTMENT OF COMMERCE<br>BUREAU OF THE CENSUS<br>ACTING AS COLLECTING AGENT FOR U.S.<br>DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE<br>SERVICE<br><br><b>NATIONAL SURVEY OF FISHING AND HUNTING<br/>FISHING QUESTIONNAIRE</b> |        |                           | a. Control number                          |       | b. Line number               |  |
|                               |                 | c. Age   | d. Sex | e. Classification<br>code | f. Education<br>Grade   Completed<br>Y   N |       | g. Family income<br>code     |  |
| h. Enumerator's name and code |                 | 1. State in which this<br>unit located   |        | 1. INTERVIEW<br>TIME      | Began                                      | Ended | Total minutes                |  |
| <b>RECORD OF<br/>CALLS</b>    | k. Date of call | l. Time of call  |        | m. Noninterview reason    |  |       | n. Date and time to callback |  |
|                               | 1.              |  |        |                           |  |       |                              |  |
|                               | 2.              |  |        |                           |  |       |                              |  |
|                               | 3.              |  |        |                           |  |       |                              |  |
|                               | 4.              |  |        |                           |  |       |                              |  |

**Section 1 - GENERAL**

|   |  |      |   |  |       |      |  |   |   |
|---|--|------|---|--|-------|------|--|---|---|
| 1 | During 1965, did you fish in fresh water, salt water, or both? (Card 3)<br>l)<br>1 <input type="checkbox"/> Fresh water only<br>2 <input type="checkbox"/> Salt water only<br>3 <input type="checkbox"/> Both  | 3    | (If "Salt water" or "Both" in Item 1)<br>A. During 1965, was any of your salt water fishing..<br>(1) surf fishing? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(2) in bays and sounds? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(3) in rivers and streams in tidal waters? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(4) in the ocean beyond the surf,<br>including pier fishing? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No                 |  |       |      |  |   |   |
| 2 | (If "Fresh water only" or "Both" in Item 1)<br>A. In 1965, did you do any fresh water fishing in<br>(1) man-made lakes and reservoirs of<br>10 acres or more? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(2) man-made ponds and reservoirs of<br>less than 10 acres? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(3) natural lakes and ponds? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(4) Rivers and streams? 1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No<br>(If "Yes" checked more than once in 2A) | 4    | A. Did you do any fishing outside the United States in 1965?<br>1 <input type="checkbox"/> Yes (Ask 4B and 4C)<br>2 <input type="checkbox"/> No (Skip to 5)<br><br>B. Where<br><br>C. Was it mostly fresh or<br>salt water fishing?<br><table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">Fresh</td> <td style="text-align: center;">Salt</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> </table> |  | Fresh | Salt |  | 1 | 2 |
|   | Fresh  | Salt |   |  |       |      |  |   |   |
|   | 1  | 2    |   |  |       |      |  |   |   |



|   |   |   |
|---|---|---|
| B. In which of these did you do MOST of your fresh water fishing?<br>(Check one):     | 1   | 2 |
|   | 1   | 2 |
|   | 1   | 2 |
| (1) Man-made lakes and reservoirs of<br>10 acres or more 1 <input type="checkbox"/>   | 5 During 1965, did you fish outside your home State?                              |   |
| (2) Man-made ponds and reservoirs of<br>less than 10 acres 2 <input type="checkbox"/> | 1 <input type="checkbox"/> Yes                      2 <input type="checkbox"/> No |   |
| (3) Natural lakes and ponds 3 <input type="checkbox"/>                                |   |   |
| (4) Rivers and streams 4 <input type="checkbox"/>                                     |   |   |

**Section II - PLACES FISHED AT DISTANCES OF 50 MILES OR MORE FROM HOME**

|   |  |                               |                    |
|---|--|-------------------------------|--------------------|
| 6   | A. Please tell me the names of the places in the United States where you fished in 1965 that involved traveling 50 miles or more each way. |                               |                    |
|   | B. (For each place named) In 1965, how many times did you go to ... and fish?  |                               |                    |
|   | A. Name of place   |                               | B. Number of trips |
|   | State  | County, area, or nearest town |                    |
|   |  |                               |                    |
|   |  |                               |                    |
|   |  |                               |                    |
|   |  |                               |                    |
| If no trips of 50 miles or more, write "None" under name of place and proceed to Section III, Page 5.<br><br>List each place in a separate column on pages 3 and 4 and ask items 7-25 for each place. Start with the place visited most often and list other places in order of number of visits. |  |                               |                    |

|   |   |                              |  |                                  |                                  |                                  |
|---|---|------------------------------|--|----------------------------------|----------------------------------|----------------------------------|
| For places visited at distances of 50 miles or more (list each place in a separate column in descending order of number of trips) |   |                              |  | 1                                | 2                                | 3                                |
| 7   | Transcribe the information from 6A. List only places visited at distances of 50 miles or more on this page. |                              |  |                                  |                                  |                                  |
|   | A. Name of place  |                              |  |                                  |                                  |                                  |
|   | State   | County, area or nearest town |  |                                  |                                  |                                  |
| B. Number of trips  |   |                              |  |                                  |                                  |                                  |
| 8   | Now taking all of your trips to ... together, on how many different days did you go fishing at ... in 1965? |                              |  |                                  |                                  |                                  |
| 9   | When you went to ... in 1965, was most of your fishing fresh water or salt water?                           |                              |  | 1 <input type="checkbox"/> F. W. | 1 <input type="checkbox"/> F. W. | 1 <input type="checkbox"/> F. W. |
|   |   |                              |  | 2 <input type="checkbox"/> S. W. | 2 <input type="checkbox"/> S. W. | 2 <input type="checkbox"/> S. W. |
| 10  | Now we're interested in the cost of the trips for yourself, whether you paid or someone else did.           |                              |  |                                  |                                  |                                  |

|  |  |   |            |    |   |    |    |   |    |    |   |
|--|--|---|------------|----|---|----|----|---|----|----|---|
|  | On a typical or average trip, how much was spent for the privilege of fishing on private property FOR YOURSELF?  |   | \$         | :  | : | \$ | :  | : | \$ | :  | : |
| 11   | On an average trip, how much for live bait and other natural bait?   |   | \$         | :  | : | \$ | :  | : | \$ | :  | : |
| 12   | How much for boat rentals FOR YOURSELF on an average trip?   |   | \$         | :  | : | \$ | :  | : | \$ | :  | : |
| 13   | How much for rental of other equipment FOR YOURSELF?   |   | \$         | :  | : | \$ | :  | : | \$ | :  | : |
| 14   | On an average trip to ... how much for guide fees FOR YOURSELF for fishing?  |   | \$         | :  | : | \$ | :  | : | \$ | :  | : |
|  | (Note: Fishermen may secure a package or charter deal which may include bait, guide fees, equipment rental, and even meals and refreshments. If such a deal is indicated ask Item 15.) |   |            |    |   |    |    |   |    |    |   |
| 15   | On an average trip to ... In 1965, how much for package or charter fees?   |   | \$         | :  | : | \$ | :  | : | \$ | :  | : |
| 16   | How many of the trips to ... were taken chiefly for the purpose of fishing?<br>(If NONE, go back to Item 8 for the next place; if one or more proceed to Item 17.)                     |   |            |    |   |    |    |   |    |    |   |
| 17   | How many of the times you went to ... chiefly for fishing did you go by..  |   |            |    |   |    |    |   |    |    |   |
|  | A. automobile?   |   |            |    |   |    |    |   |    |    |   |
|  | B. other means? (Specify) _____  |   |            |    |   |    |    |   |    |    |   |
|  | (If 1 or more for "Automobile," ask Items 18 and 19; if no trips by automobile, skip to 20.)   |   |            |    |   |    |    |   |    |    |   |
| FOR TRIPS BY<br>AUTOMOBILE<br>(Entry in 17A) | 18   | On the (entry in 17 A) trips to ... by automobile, how many times did you go..  | OFFICE USE |    |   |    |    |   |    |    |   |
|  |  | A. alone?   | (+ 1)      |    |   |    |    |   |    |    |   |
|  |  | B. with one other fishermen?  | (+ 2)      |    |   |    |    |   |    |    |   |
|  |  | C. with two other fishermen?  | (+ 3)      |    |   |    |    |   |    |    |   |
|  |  | D. with three other fishermen?  | (+ 4)      |    |   |    |    |   |    |    |   |
|  |  | E. with four other fishermen?   | (+ 5)      |    |   |    |    |   |    |    |   |
|  | F. with five or more fishermen?  | (+ 6)   |            |    |   |    |    |   |    |    |   |
|  | 19   | For the average automobile trip to ..., what was the total round trip mileage, including any additional milsage in connection with fishing? |            |    |   |    |    |   |    |    |   |
| NOT BY<br>AUTOMOBILE<br>(Entry in 17B)       | 20   | On an average trip by ... how much was spent for transportation FOR YOURSELF In connection with fishing including the round trip to ...?    |            | \$ | : | :  | \$ | : | :  | \$ | : |
|  | 21   | How many miles did you travel in connection with fishing?   |            |    |   |    |    |   |    |    |   |
|  | 22   | A. On an average trip to ... how much was spent for meals at eating places FOR YOURSELF?  |            | \$ | : | :  | \$ | : | :  | \$ | : |
|  |  | B. How many meals at eating places on an average trip?  |            |    |   |    |    |   |    |    |   |
|  | 23   | How much for various types of refreshments purchased on this trip such as snacks, coffee, soft drinks, candy, and the like?                 |            | \$ | : | :  | \$ | : | :  | \$ | : |
|  | 24   | How much FOR YOURSELF on lodging?   |            | \$ | : | :  | \$ | : | :  | \$ | : |
|  | 25   | Was there any other expense for fishing on this trip such as gasoline for a boat, or ice?<br>(Specify) _____                                |            | \$ | : | :  | \$ | : | :  | \$ | : |

| For places visited at distances of 50 miles or more (list each place in a separate column in descending order of number of trips |   | 4  | 5  | 6  |
|--|---|--|--|--|
| 7  | Transcribe the information from 6A. List only places visited at distances of 50 miles or more on this page.   |  |  |  |
|  | A. Name of place  |  |  |  |
|  | State   |  |  |  |
|  | County, area or nearest town  |  |  |  |
|  | B. Number of trips  |  |  |  |
| 8  | Now taking all of your trips to ... together, on how many different days did you go fishing at ... in 1965?   |  |  |  |
| 9  | When you went to ... in 1965, was most of your fishing fresh water or salt water?   | 1 <input type="checkbox"/> F. W.<br>1 <input type="checkbox"/> F. W. | 1 <input type="checkbox"/> F. W.<br>1 <input type="checkbox"/> F. W. | 1 <input type="checkbox"/> F. W.<br>1 <input type="checkbox"/> F. W. |
| 10   | Now we're interested in the cost of the trips for yourself, whether you paid or someone else did. On a typical or average trip, how much was spent for the privilege of fishing on private property FOR YOURSELF? | \$ : :<br>:  | \$ : :<br>:  | \$ : :<br>:  |
| 11   | On an average trip, how much for live bait and other natural bait?  | \$ : :<br>:  | \$ : :<br>:  | \$ : :<br>:  |
| 12   | How much for boat rentals FOR YOURSELF on an average trip?  | \$ : :<br>:  | \$ : :<br>:  | \$ : :<br>:  |
| 13   | How much for rental of other equipment FOR YOURSELF?  | \$ : :<br>:  | \$ : :<br>:  | \$ : :<br>:  |
| 14   | On an average trip to ... how much for guide fees FOR YOURSELF for fishing?   | \$ : :<br>:  | \$ : :<br>:  | \$ : :<br>:  |
|  | (Note: Fishermen may secure a package or charter deal which may include bait, guide fees, equipment rental, and even meals and refreshments. If such a deal is indicated ask Item 15.)                            |  |  |  |
| 15   | On an average trip to ... In 1965, how much for package or charter fees?  | \$ : :<br>:  | \$ : :<br>:  | \$ : :<br>:  |
| 16   | How many of the trips to ... were taken chiefly for the purpose of fishing?<br>(If NONE, go back to Item 8 for the next place; if one or more proceed to Item 17.)  |  |  |  |
| 17   | How many of the times you went to ... chiefly for fishing did you go by..   |  |  |  |
|  | A. automobile?  |  |  |  |
|  | B. other means? (Specify) _____   |  |  |  |
|  | (If 1 or more for "Automobile," ask Items 18 and 19; if no trips by automobile, skip to 20.)  |  |  |  |
| FOR TRIPS BY<br>AUTOMOBILE<br>(Entry in 17A)   | 18 On the (entry in 17 A) trips to ... by automobile, how many times did you go..   | OFFICE USE   |  |  |
|  | A. alone?   | (+ 1)  |  |  |
|  | B. with one other fishermen?  | (+ 2)  |  |  |
|  | C. with two other fishermen?  | (+ 3)  |  |  |

|  |  |       |    |             |            |
|--|--|-------|----|-------------|------------|
| NOT BY<br>AUTOMOBILE<br>(Entry in 17B)   | D. with three other fishermen?   | (+ 4) |    |             |            |
|  | E. with four other fishermen?  | (+ 5) |    |             |            |
|  | F. with five or more fishermen?  | (+ 6) |    |             |            |
|  | 19 For the average automobile trip to ..., what was the total round trip mileage, including any additional mileage in connection with fishing?   |       |    |             |            |
|  | 20 On an average trip by ... how much was spent for transportation FOR YOURSELF In connection with fishing including the round trip to ...?  |       | \$ | :           | \$         |
| 21 How many miles did you travel in connection with fishing?   |  |       |    |             |            |
| 22 A. On an average trip to ... how much was spent for meals at eating places FOR YOURSELF?                                    |  | \$    | :  | \$          | :          |
| B. How many meals at eating places on an average trip?   |  |       |    |             |            |
| 23 How much for various types of refreshments purchased on this trip such as snacks, coffee, soft drinks, candy, and the like? |  | \$    | :  | \$          | :          |
| 24 How much FOR YOURSELF on lodging?   |  | \$    | :  | \$          | :          |
| 25 Was there any other expense for fishing on this trip such as gasoline for a boat, or ice?<br>(Specify) _____                |  | \$    | :  | \$          | :          |
| <b>Section III - PLACES FISHED AT DISTANCES OF LESS THAN 50 MILES FROM HOME</b>  |  |       |    |             |            |
| 26   | Now about places within the United States that were less than 50 miles away from home and at which you fished. Please tell me how many times you went fresh water (salt water) fishing more than 50 miles away. (Use calendar, Card IX)              |       |    | Fresh water | Salt water |
| 27   | In total, on how many different days did you do fresh water (salt water) fishing in such places?   |       |    |             |            |
|  | Now we are interested in the cost of a typical or average fresh water (salt water) fishing trip for yourself whether you paid for it or someone else did.  |       |    |             |            |
| 28   | How much was spent for the privilege of fishing on private property FOR YOURSELF on an average trip to a place LESS THAN 50 MILES away?  |       | \$ | :           | \$         |
| 29   | How much for live bait and other natural bait?   |       | \$ | :           | \$         |
| 30   | How much for boat rentals FOR YOURSELF on a typical or average trip?   |       | \$ | :           | \$         |
| 31   | How much for rental of other equipment FOR YOURSELF?   |       | \$ | :           | \$         |
| 32   | On an average trip to go fresh water (salt water) fishing LESS THAN 50 MILES away, how much for guide fees FOR YOURSELF?   |       | \$ | :           | \$         |
|  | (Note: In some instances, particularly for salt water fishing, the fishermen may secure a package or charter deal which will include bait, guide fees, equipment rental, and even meals and refreshments. If such a deal is indicated, ask Item 33.) |       |    |             |            |
| 33   | How much for package or charter fees FOR YOURSELF?   |       | \$ | :           | \$         |
| 34   | How many of the trips were taken chiefly for the purpose of fishing?   |       |    |             |            |

|  |   |   |            |   |
|--|---|---|------------|---|
|  |   | (If "None," omit 35-44; if 1 or more, proceed to Item 35.)  |            |   |
| 35   | How many of the (entry in 34) times you went chiefly for fishing did you go by..  |   |            |   |
|  | A. automobile?  |   |            |   |
|  | B. other means? (Specify)   |   |            |   |
|  |   | (If 1 or more for automobile, ask 36 and 37; if "None" for automobile ask 38 and 39.)   |            |   |
| FOR TRIPS BY<br>AUTOMOBILE<br>(Entry in 35A) | 36  | On the (entry in 35A) trips by automobile, how many times did you go..  | OFFICE USE |   |
|  |   | A. alone?   | (+ 1)      |   |
|  |   | B. with one other fishermen?  | (+ 2)      |   |
|  |   | C. with two other fishermen?  | (+ 3)      |   |
|  |   | D. with three other fishermen?  | (+ 4)      |   |
|  |   | E. with four other fishermen?   | (+ 5)      |   |
|  |   | F. with five or more fishermen?   | (+ 6)      |   |
|  | 37  | For a typical or average automobile trip taken chiefly for fishing, what was the total round trip mileage, including any additional mileage in connection with fishing?     |            |   |
| NOT BY<br>AUTOMOBILE<br>(Entry in 35B)       | 38  | On an average trip by ..., how much was spent FOR YOURSELF for all transportation costs in connection with fishing, including the round trip to the place where you fished? | \$         | : |
|  | 39  | On an average trip, how many miles did you travel in connection with fishing?   |            |   |
| 40   | (If more than one trip taken chiefly for fishing) How many of these ... (fresh water, salt water) trips were to a place..         |   |            |   |
|  | A. 5 miles away or less?  |   |            |   |
|  | B. 6-24 miles away?   |   |            |   |
|  | C. 25-49 miles away?  |   |            |   |
| 41   | A. On an average trip chiefly for fishing, how much was spent for meals of eating places FOR YOURSELF?                            |   | \$         | : |
|  | B. How many meals on an average trip?   |   |            |   |
| 42   | How much for various types of refreshments purchased on an average trip such as snacks, coffee, soft drinks, candy, and the like? |   | \$         | : |
| 43   | How much FOR YOURSELF for lodging?  |   | \$         | : |
| 44   | On the average trip was there any other expense for fishing, such as gasoline for a boat, or ice? (Specify)                       |   | \$         | : |

**Section IV - FISHING EQUIPMENT**

Now I'd like to talk about equipment used for fishing.

45 A. Please look at this list of fishing equipment (Card II) and tell me which of the items you bought in 1965.

(Ask for items bought in 1965 and fill appropriate columns below)

- B. How much did it (they) cost?
- C. Is it used chiefly for fresh water or salt water fishing?
- D. (Ask only for rods and reels) How many ...s did you buy?

IF NONE PURCHASED, ENTER "NONE" BELOW AND PROCEED TO 46

| A. Item | (If bought in 1965) |       |                                   |                    | D. How many? |
|---------|---------------------|-------|-----------------------------------|--------------------|--------------|
|         | B. Cost             |       | C. Used chiefly for- (check one); |                    |              |
|         | Dollars             | Cents | Fresh water fishing               | Salt water fishing |              |
|         |                     |       | 1                                 | 2                  |              |
|         |                     |       | 1                                 | 2                  |              |
|         |                     |       | 1                                 | 2                  |              |
|         |                     |       | 1                                 | 2                  |              |
|         |                     |       | 1                                 | 2                  |              |

**Section V - EQUIPMENT WHICH MAY BE USED FOR BOTH HUNTING AND FISHING**

Filled On Other Questionnaire

Now I have a list of supplies and equipment which may be used for both hunting and fishing.

46 A. Please tell me which items (Card III) you bought in 1965 that were used chiefly for hunting or fishing?

(Ask for items bought in 1965 and fill appropriate columns below)

- B. How much did it (they) cost?
- C. Is it used chiefly for fresh or salt water fishing, or for waterfowl, small game, or big game hunting?

IF NONE PURCHASED, ENTER "NONE" BELOW AND PROCEED TO 47

| A. Item | (If bought in 1965) |       |                                     |      |         |      |      |
|---------|---------------------|-------|-------------------------------------|------|---------|------|------|
|         | B. Cost             |       | C. Used chiefly for .. (Check one): |      |         |      |      |
|         | Dollars             | Cents | Fishing                             |      | Hunting |      |      |
|         |                     |       | F.W.                                | S.W. | W.F.    | S.G. | B.G. |
|         |                     |       | 1                                   | 2    | 3       | 4    | 5    |
|         |                     |       | 1                                   | 2    | 3       | 4    | 5    |
|         |                     |       | 1                                   | 2    | 3       | 4    | 5    |
|         |                     |       | 1                                   | 2    | 3       | 4    | 5    |

**Section VI - GENERAL PURPOSE EQUIPMENT**

Filled On Other Questionnaire

47 A. Next, I have a list of general purpose items. Please tell me which of these (Card IV) you bought in 1965 and use primarily for hunting or fishing.

(Ask for items bought in 1965 and fill appropriate columns below)

- B. How much did it (they) cost?  
 C. Is it used chiefly for fresh or salt water fishing or for waterfowl, small game, or big game hunting?  
 IF NONE PURCHASED, ENTER "NONE" BELOW AND PROCEED TO 48

| A. Item | (If bought in 1965) |       |                        |      |         |      |      |
|---------|---------------------|-------|------------------------|------|---------|------|------|
|         | B. Cost             |       | C. Used chiefly for .. |      |         |      |      |
|         |                     |       | (Check one):           |      |         |      |      |
|         | Dollars             | Cents | Fishing                |      | Hunting |      |      |
|         |                     |       | F.W.                   | S.W. | W.F.    | S.G. | B.G. |
|         |                     |       | 1                      | 2    | 3       | 4    | 5    |
|         |                     |       | 1                      | 2    | 3       | 4    | 5    |
|         |                     |       | 1                      | 2    | 3       | 4    | 5    |
|         |                     |       | 1                      | 2    | 3       | 4    | 5    |

Filled On other Questionnaire

**Section VII - SPECIAL HUNTING AND FISHING EXPENDITURES**

48 How much did you spend for the items on this card (Card V) in 1965 primarily because you hunt or fish?

Enter amount only in "Amount spent" column for first two items. Enter amount under categories for last two items (See instructions)

IF NONE PURCHASED, ENTER "NONE" BELOW AND PROCEED TO 49

| Items                               | Amount spent |       | Fishing |      | Hunting |      |      |
|-------------------------------------|--------------|-------|---------|------|---------|------|------|
|                                     | Dollars      | Cents | F.W.    | S.W. | W.F.    | S.G. | B.G. |
| (a) Magazines                       |              |       |         |      |         |      |      |
| (b) General Club Dues               |              |       |         |      |         |      |      |
| (c) Special Club Dues               |              |       | 1       | 2    | 3       | 4    | 5    |
| (d) Annual Leave and Privilege Fees |              |       | 1       | 2    | 3       | 4    | 5    |

**Section VIII - HUNTING AND FISHING LICENSES HELD**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| 49   | A. Did you buy any license(s) in 1965 to hunt or fish OUTSIDE your Home state?<br>1 <input type="checkbox"/> Yes (Ask B-E)      2 <input type="checkbox"/> No (Skip to 50)       | License obtained in 1965   |  |  |  |
|  |  | 1  | 2  | 3  | 4  |
|  | B. What State(s)?  |  |  |  |  |
|  | C. What kind of license? (Use booklet. List each license in a separate column.)  |  |  |  |  |
|  | D. How much did it cost?   | \$    :  | \$    :  | \$    :  | \$    :  |
| E. What kind of fishing (hunting was in chiefly used for?) | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. |  |
| 50   | A. Did you buy a resident license in 1965 to fish or hunt?<br>1 <input type="checkbox"/> Yes (Ask B-E)      2 <input type="checkbox"/> No (Skip to 51)                           |  |  |  |  |
|  | B. What State?   |  |  |  |  |
|  | C. What kind of license? (Use Booklet. List each license in a separate column.)  |  |  |  |  |
|  | D. How much did it cost?   | \$    :  | \$    :  | \$    :  | \$    :  |
|  | E. What kind of fishing (hunting) was it chiefly used for?   | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. | 1 <input type="checkbox"/> F. W.<br>2 <input type="checkbox"/> S. W.<br>3 <input type="checkbox"/> W. F.<br>4 <input type="checkbox"/> W. F.<br>5 <input type="checkbox"/> W. F. |
| 51   | Did you have a duck stamp in 1965?<br>1 <input type="checkbox"/> Yes      2 <input type="checkbox"/> No  |  |  |  |  |
| 52   | The Federal Government, some States, countries, and cities charge special fees or require special licenses for hunting or fishing on certain lands or waters.                    |  |  |  |  |
|  | A. Did you pay any such fees in 1965?<br>1 <input type="checkbox"/> Yes (Ask B-C)      2 <input type="checkbox"/> No (Skip to 53)  |  |  |  |  |
|  | B. How much did it cost during 1965?   | \$    :  | \$    :  | \$    :  | \$    :  |
|  | C. What kind of fishing (hunting) did you chiefly do there?  | 1 <input type="checkbox"/> F. W.   | 1 <input type="checkbox"/> F. W.   | 1 <input type="checkbox"/> F. W.   | 1 <input type="checkbox"/> F. W.   |

FILL FOR 1965 LICENSES





**Section X - HUNTING INFORMATION**

57 (Ask if no FH-2 assigned) Did you do any hunting during 1965?

1  Yes (Fill FH-2)  No (End questions)

**Complete Interview time on the first page**

Notes

*If person did salt water fishing (an entry of "salt water only" or "both" in item 1 of this schedule) remember to prepare on FH-5 at the end of the interview.*

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- EIFAC/T6** Water quality criteria for European freshwater fish. Report on water temperature and inland fisheries based mainly on Slavonic literature (1968).  
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- EIFAC/T7** Economic evaluation of inland sport fishing, by Ingemar Norling (Rome, 1968).  
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