

THE VALUE OF THE ONTARIO SPORT FISHERY
AN ECONOMIC ANALYSIS

By

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ABSTRACT

Over the past decade public decision makers have become increasingly concerned with the potential impacts of their decisions upon values associated with fish resources. These impacts can often involve large-scale alternation of natural habitats. Recreation is an important use of the fisheries resource. Anglers in Ontario spent more than 43 million days engaged in sport fishing expending more than 650 million dollars within the Province in 1980 (Government of Ontario, 1980). This paper deals largely with conceptual methods of measuring the economic benefits of recreational fishing. It is intended to serve several purposes: to present a review of the economic evaluations of recreational fishing and to expand certain conceptual concepts of the subject. High priority steps that should be taken to develop appropriate fishing values which can be used in policy decisions are also presented.

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INTRODUCTION

Few people in Ontario would attest that resources for outdoor recreation are insufficient or sparse. Recreational opportunities in the province are almost unmatched in abundance and quality. Economic growth and development in some areas of the province press heavily on the natural environment, but they also generate increases in population, income and leisure time, which subsequently intensify recreational demands on the same natural resource base.

The residents of Ontario have enjoyed a rapid rate of economic growth in recent decades. A characteristic of this growth has been its concentration in light industry, manufacturing and tertiary activities. These activities put heavy demands on the natural environment and involve changes of various kinds to landscape and water, not all of which can be regarded as improvements from the point of view of the recreationalists and outdoorsmen.

But, as in the rest of North America, the demand for outdoor recreation has been increasing more rapidly than for most products of our economy, as a result of the compounding of effects of increases in population, income, leisure time and mobility. The growth in recreational

demand is, of course, related to economic expansion; but these two trends are not always complementary, because industrial exploitation often destroys or reduces the aesthetic and recreational value of natural resources. As both recreational and commercial demands grow, the value of natural resources increases and decisions about how they are to be used take on greater economic importance.

Recreationalists are no longer persuaded by the argument that there are far more opportunities for outdoor pursuits than we can use in the province as a whole. The total stock of outdoor opportunities is much less relevant than their location, their accessibility and their quality. Excellent fishing in a remote and inaccessible lake does not benefit anyone. Fishermen's demand must be met, if at all, in areas accessible to them and the more accessible is the fishing, the greater its economic value.

But the areas which can serve recreationalists best tend to be those which are most in demand for other uses also.

Moreover, the pressure of recreationalists in very accessible areas tends to grow to levels which threaten to degrade, by congestion, the quality of the recreational experience.

Faced with these trends, managers of public recreational resources are finding that their traditional role of simply protecting the their jurisdiction is no

longer adequate. Decisions about the allocation of resources among competing uses, and the regulation of uses, are becoming increasingly complex and important. As situations of conflicting demands occur more frequently and severely, with every probability that competition for resources will increase indefinitely in the future, resource managers feel a growing need for reliable criteria for making decisions in the best interests of present and future generations of the inhabitants of Ontario.

Decisions about how resources are to be used are essentially economic decisions. Ideally, each parcel of land and water should be put to use, or a combination of uses, that will yield the greatest value, or benefit, to the people in whose interest the decision is made. Where the value of products and the costs of producing them are adequately reflected in market prices, the costs and benefits of alternatives can be calculated and compared, and the highest use (that which shows the greatest excess of benefits over costs or the greatest ratio) can be readily selected. Techniques for evaluating costs and benefits of industrial and agricultural uses of resources are well developed although not necessarily accepted without criticism.

In the case of outdoor recreation, however, the

benefits are usually not reflected in market prices. It is part of our tradition and heritage in North America that access to public land and water for recreational purposes is free. As a result, outdoorsmen do not register their evaluation of recreational resources in market prices and hence data for comparing the value of recreational and commercial uses of resources is inadequate.

Nevertheless, without a method for evaluating recreational benefits, rational and consistent planning of resource allocation between competing recreational and non-recreational uses is not possible. Decisions must be left to subjective judgement in many cases. In response to the growing need for reliable criteria, economists have recently directed some attention to developing indirect methods of evaluating non-priced recreational opportunities in order to restrict the range of guesswork involved in resource use planning.

This paper examines some of the recent techniques for evaluating free-access recreational resources to estimate the value of the Ontario sport fishery. The sports fishermen of Ontario fall into two general categories -residents and non-residents- and in some cases require different evaluation techniques. This study focuses primarily on the growing trends of the sport

fishery in Ontario and is also an experiment in methods for evaluating the sport fishery.

Chapter 1 presents a brief description of Ontario and its sport fishery and examines the historical and economic patterns which have influenced its growth. Chapter 2 is devoted to an evaluation of the benefits that accrue to the people of Ontario from resident and non-resident sport fishing on Ontario. The gross benefits are estimated from the spending of resident and non-resident fishermen in the province, and the net gains are calculated by subtracting the costs incurred by the people of Ontario in providing these fishermen with the goods and services they purchase. The calculation involves the difficult problem of estimating economic benefits in the absence of direct market information. Detailed information collected through questionnaires administered to the fishermen themselves, largely by the Government of Ontario, is analyzed with the purpose of establishing the monetary value of the sport fishery in Ontario.

Chapter 3 examines different methodological approaches used to estimate benefits when direct market information is not present. Such methods as the expenditure method, willingness to pay method and the travel cost method are all examined and evaluated. Chapter 4 attempts to apply these different methods to the

limited data which is available for the Ontario sport fishery and makes recommendations for future studies and the approaches which should be undertaken.

CHAPTER ONE

ONTARIO AND ITS SPORT FISHERY

The province of Ontario harbors the nations finest sport fishery. Anglers regularly travel great distances to try their skill at catching one or more of the abundant species of sport fish the province offers. The unique attraction of the fishery is its population of exceptionally large trout, bass and salmon which probably provides one of the greatest fishing challenges to even the most experienced anglers. But the variety of fish species and fishing conditions present opportunities for all forms of freshwater fish and hence the vast fishery is attractive to many kinds of fishermen, whether skilled or unskilled.

Ontario is fortunate to possess the largest number of lakes and streams in the world, compared to any other area similar in size. Ontario accommodates more than 250,000 lakes, 88,026 square kilometers of Great Lakes and an excessive number of rivers and streams. More than 140 species of fish inhabit these abundant waters in Ontario (Government of Ontario, 1984).

The history of the Ontario fishery presents a bleak chapter in the history of man's exploitation and

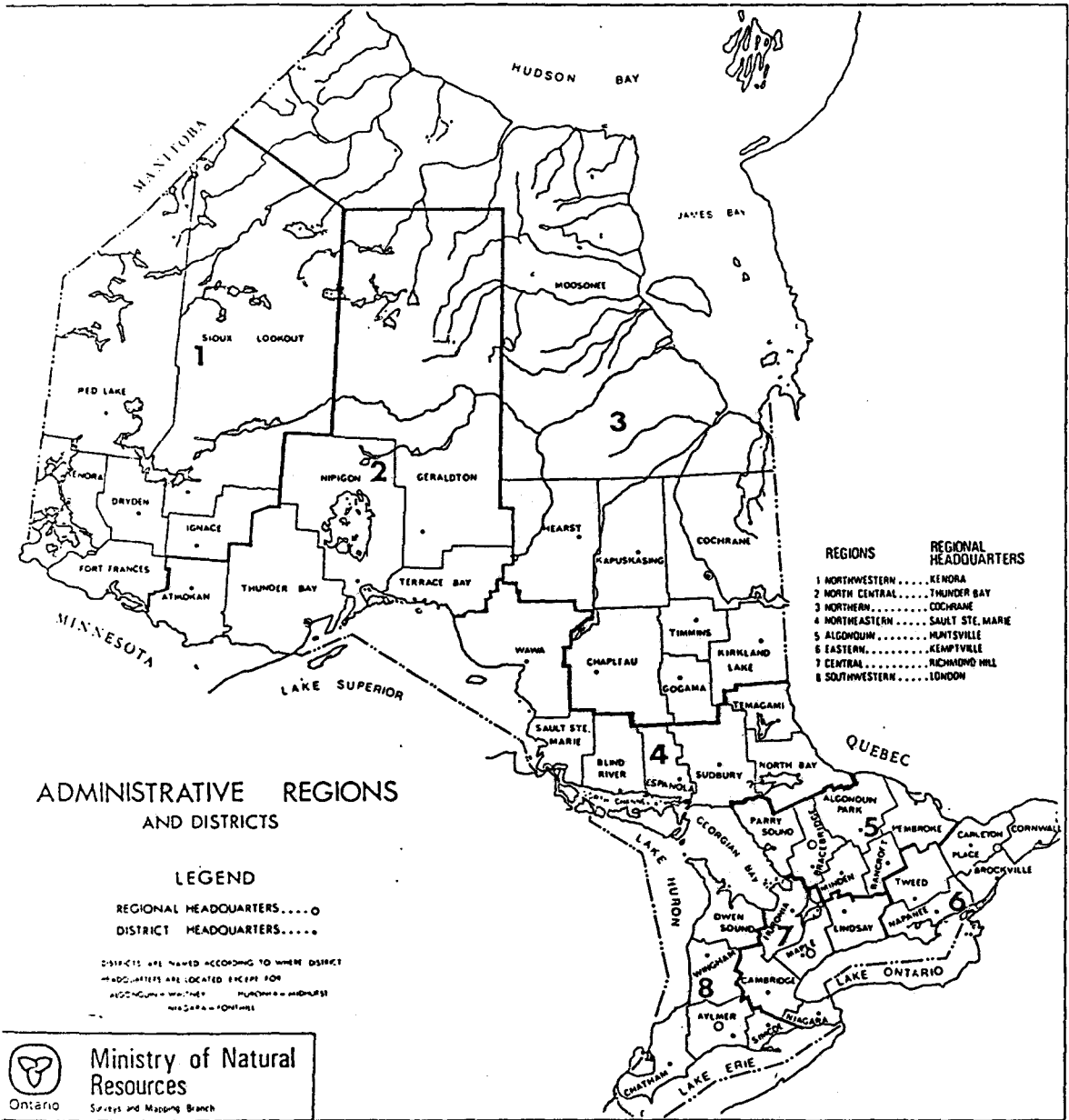
destruction of economically important natural populations and their environmental resource bases. During the last century there have been many changes in the waterways of Ontario, especially in the southern part of the province which is most abundantly populated. As the population grew in Ontario, mills and dams were built on many of the streams where fish spawned. These dams interfered with fish movement, spawning migrations, and also slowed, impounded and thus warmed the water flowing into the lakes. As population increased the disposal of domestic, agricultural and industrial wastes was thrust upon the hardy streams and lakes. The cumulative effects of these developments, added to the exploitation of the very vulnerable spawning population, resulted in the first dramatic change in the fishery. By the beginning of the 20th century, man had witnessed the complete disappearance of the Atlantic salmon from Lake Ontario (Haynes, 1983).

Processes of urbanization and industrialization resulted in large centres with enormous waste disposal problems. These surpluses of nutrients lead to excessive production of plankton and algae which used up vast amounts of oxygen. This lowered the amount of oxygen present in some sections, therefore reducing the area available to the fishes. With the combination of pollutants, toxins and oxygen depletion, not only the

fishes were affected but the organisms on which they fed were affected. This in turn limited the number of fish which the habitat produced. Due to strict municipal and industrial pollution laws and stocking programmes implemented in the early 1960's, much of the fishery has been restored. Today, large and vigorous fish populations inhabit these lakes, only to be threatened once again by the ever growing problem of acid rain. But at least for now, great interest in fishing (especially in accessible areas) has once again been generated due to large populations of sportfish available to catch (Haynes, 1983).

Fishing activity is distributed unevenly across the province. Data has been compiled separately by the Ministry of Natural Resources for eight regions of the province indicated in Figure 1. The central region, a relatively small part of the province, supports more than forty percent of the fishing (19,307,000 angler days in 1980), whereas the larger northern areas, such as the Northern region, accounts for almost an insignificant share of the total (Table 1). The high fishing density in the Central region and the other regions in Southern Ontario results, largely, from the high population density and the excellent quality of fishing in this area. Due to the high accessibility of these regions, many anglers can

Figure 1. The eight regions of Ontario set up by the Ministry of Natural Resources



easily make a number of short trips to their favorite fishing areas throughout the fishing season.

These regions are also accessible to non-resident sport fishermen from such states as Ohio and New York who can also travel to fishing areas within only a few hours. The Great Lakes are responsible for drawing a large number of fishermen to the area due to its growing population of salmon and trout.

Table 1. Distribution of fishing activity over the eight regions of Ontario, 1980 (1000's of days)

Region	Number of angler-days
Northwestern.....	2036
Northcentral.....	1360
Northern.....	1013
Northeastern.....	3618
Alogonquin.....	1961
Eastern.....	4947
Central.....	19307
Southwestern.....	7394
Not attributed to any region.....	1456
Total, entire province.....	43092

To a large extent, the differences between resident and non-resident fishermen reflect their different recreational pursuits. Most resident fishermen live in nearby communities with respect to adequate fishing areas. For those people, a trip to the nearby fishing hole is a short fishing trip for an afternoon, a day, or a weekend. It typically involves only the

enthusiastic fishermen in the family who makes many such trips. For non-residents, however, a visit to the Ontario fishery is often part of an annual vacation. It involves a major commitment in travel, and frequently participation by the whole family. Fishing activity in Ontario extends over the entire year, although weather conditions and fishing regulations constrain the heaviest fishing to the seven months from April to October. Not all species are always available, and the species sought varies over the seasons as a result of their differing spawning behavior. The shift from changing geographical pattern of fishing activity in the province.

Table 2. Relative preferences of resident and non-resident fishermen for the major species of fish in Ontario for the year 1980

Species sought	Residents	Non-residents	Total
Bass.....	15.7%	15.3%	15.5%
Trout.....	19.8	8.4	14.1
Salmon.....	2.2	---	1.1
Others.....	34.0	50.6	42.3
Any species.....	28.3	25.7	27.0
	100.0%	100.0%	100.0%

The preferences of fishermen for the enormous number of species is categorized in Table 2. Approximately one third of all fishermen pursue either trout, which is known for its exceptional size of which

has made the province famous among fishermen; or bass, which is well known for its fighting ability. Although there is little apparent difference between the preference patterns of resident and non-resident fishermen, non-resident fishermen tend to fish for a greater variety of species. Almost one third of the remaining fishermen had no special preferences among the fish species and only a small proportion of resident fishermen aimed at catching salmon, presumably attributable to the high cost and the small likelihood of attainment.

Under the existing Provincial government regulations governing sport fishing, every fisherman residing outside the province must purchase an Ontario angler's licence. Fishermen thus licensed are permitted to fish in any particular fishery free of charge as long as the fishing regulations and guidelines are pursued.

Table 3. Schedule of fees for sports fishing privileges in Ontario, 1985

Category of licence	Fee
Resident.....	-----
Non-Resident Canadian.....	\$ 6.25
Non-Resident Alien -seasonal.....	30.00
Non-Resident Alien -21 day.....	20.00
Non-Resident Alien -4 day.....	10.00

Non-residents under the age of 17 years may angle without a licence as long as they are accompanied by a

member of the family who has obtained a valid angling licence. A non-resident Canadian over the age of 17 years requires a licence, bearing an annual fee of \$6.25 (Table 3). The annual fee for foreigners is considerably higher, at \$30.00 per season. Non-residents may as an alternative may, as an alternative to an annual fee, purchase a non-resident 21 day licence at a cost of \$20.00 which may be renewed for \$10.00. Non-residents may also purchase a short term licence at a cost of \$10.00 which is valid for four consecutive days (Government of Ontario, 1984).

CHAPTER TWOTHE ONTARIO FISHING EXPERIENCE

The growth in sport fishing in Ontario cannot be determined accurately because of the lack of historical information on fishing activity. Some light is thrown on trends in fishing, however, by the studies conducted by individuals commissioned by the Ministry of Natural Resources.

There are two categories of sport fishermen attracted to Ontario - residents and non-residents. Non-residents are defined by statute as those who are not normally resident within the Province of Ontario and thus include not only foreigners but also those from other areas of Canada. As we can see in Table 4, residents easily outnumber non-resident fishermen in Ontario.

Table 4. Fishing activity in Ontario by category of fishermen, 1980

Category of fishermen	Number of anglers	Number of angler-days
Residents.....	2,168,000	36,298,000
Non-Residents.....	628,988	6,794,000
Total, all categories.	2,796,988	43,092,000

The purpose of this chapter is to estimate the value of non-resident and resident fishing activity in Ontario from the data received by the Government of

Ontario, who gathered the expenditures of these fishermen for the year of 1980. As we shall see when evaluating resident fishing, the value to the Province of resident fishing lies in the recreation enjoyment of the total community (all of the people of Ontario) in whose interests the resources are managed. The gain to the people of Ontario of non-resident fishing takes a distinctly different form: they are made better off indirectly through the spending of visiting fishermen. Most of this benefit can be expected to be manifested in higher incomes to the residents. Estimation of the value to the people of Ontario of non-resident fishing thus involves a calculation of the extent to which total income in the Province is higher with non-resident fishing than without it.

Evaluations of the true economic benefit of activities such as this are difficult and the data must be dealt with cautiously. It is sometimes assumed that the gains can be measured simply by adding up the total expenditures of those who consume the resources. This involves a fundamental misunderstanding, because such a measure would be appropriate only if it were costless to provide the goods and services which are purchased. But this is rarely the case: the price of commodities purchased must usually cover the costs of producing and

merchandizing them, as these costs are often a substantial proportion of prices paid.

A correct evaluation of the net benefits of sport fishing involves estimating not only the total expenditures associated with this activity, but also the cost incurred in providing the goods and services purchased. The total costs must then be subtracted from the gross amount of spending to yield the net benefit generated. The net gains accrue in the form of higher incomes to individuals, profits to business enterprises, and revenues to the government.

The gross amount of new income generated in Ontario by non-resident fishing is measured by the fishermen's total spending within the Province. Data relating to the expenditures of the non-resident sport fishermen in Ontario were obtained through detailed questionnaires distributed and compiled by the Government of Ontario in 1980.

A total of 628,988 non-resident anglers fished in Ontario in 1980, and altogether they fished 6,794,000 angler days (Table 5). This is a slight increase since 1970 when 605,320 non-resident anglers fished a total of 5,500,000 angler days (Cox and Straight, 1975). Non-resident fishing accounts for only a small proportion of sport fishing within the Province, but non-resident sport

fishing should not be under estimated since large expenditures are made within the Province by this category of fishermen.

Table 5. Fishing activity in the Province of Ontario for the years 1961, 1970 and 1980

Category of fishermen	Year	Number of anglers	Number of angler days	Percentage of Ontario
Resident	1961	534,800	8,490,500	12.6
	1970	1,620,400	35,131,000	21.0
	1980	2,168,700	36,298,000	32.0
Non-Resident	1970	605,320	5,500,000	
	1980	628,988	6,794,000	
Total	1970	2,225,720	40,631,000	
	1980	2,797,688	43,092,000	

An immediate problem arises in determining the degree to which the expenditures of Ontario fishermen can be attributed solely to that fishery. Some fishermen, in the absence of fishing opportunities in the Province would have fished elsewhere in Canada and incurred similar expenses. Insofar as this is so, the Ontario fishery cannot be credited with the total spending because similar amounts would have been spent in the country if this fishery did not exist. Other anglers visited the Province for other purposes as well as fishing, so that fishing opportunities were only partly responsible for generating their spending.

Of the total \$164 million generated by the fishery for non-resident fishing, the Provincial government received \$2.2 million directly from the sale of fishing privileges; the remainder representing receipts from the sale of goods and services (see Table 6).

Table 6. Value of expenditures and purchases made in Ontario by sport fishermen in 1980 solely and in part for the purpose of sport fishing (1000's of \$)

Expenditure category	Resident	Non-resident
=====		
<u>Solely for sport fishing</u>		
Rods, reels	6,518	328
Tackle, flies	2,882	218
Sounders, downriggers	1,135	45
Bait fish	8,268	4,174
Other live bait	4,892	1,902
Guide services	967	2,981
Access fee, permits	1,280	2,214
Other fishing supplies	44,120	7,009

Subtotal	70,062	18,872
<u>Partly for fishing</u>		
Lodging	35,011	40,365
Campsite fees	13,160	3,863
Food	72,427	38,896
Travel	78,133	28,219
Boat rentals	9,064	7,739
Boat maintenance	40,916	8,364
Camping gear purchase	39,199	1,594
Vehicle	63,785	86
Boat, motor or trailer	196,969	4,424

-Subtotal	615,560	145,147

TOTAL	685,622	169,019

Private sellers of food and catering services, accommodation, travel facilities and other goods and

services received more than \$162 million which can be considered to have been generated solely by the Ontario sport fishery (Government of Ontario, 1980).

The above findings indicate the gross income generated by the fishery through non-resident spending. Only part of this can be considered net gain, however, because of the costs involved in providing the goods and services purchased. This point will be expanded upon in Chapter 4.

Large numbers of Ontario residents enjoy the sport fishing opportunities provided by the Ontario sport fishery. The value of this to the residents of Ontario as a whole lies in the extent to which the participating fishermen (who are part of the total community) are made better off by this recreation. The value of sport fishing by resident fishermen is much more difficult to calculate than the benefits of non-resident fishing. This is because the benefits from non-resident activity are more directly calculable in money terms. The indirect techniques that must be adopted to evaluate the enjoyment of resident fishermen permits an assessment that can be considered correct only within a wide margin of error. Moreover, the absence of reliable information with which to measure the trends in fishing activity and their effects on the quality of the recreational experience further diminishes the precision of the estimate of the

value of the resource. This will be examined in Chapter 3, but for now, the total expenditures by the residents of Ontario for the sole purpose of sport fishing will be disclosed.

In 1961, a total of 534,800 resident anglers fished in Ontario and altogether they fished 8,490,500 angler days (see Table 5). This number represented 12.6 percent of the total Ontario population (Benson, 1961). By 1970, the number of resident anglers increased more than two-fold to 1,620,400 which accounted for 21 percent of the total Ontario population. The number of angler days also rose to 35,131,000 (Cox and Straight, 1975). Once again in 1980, the number of resident anglers increased substantially to 2,168,700 accounting for 36,298,000 angler days (Government of Ontario, 1980).

The expenditures of resident sport fishing in Ontario have increased relatively proportionate to the number of active fishermen through the past twenty years.

In 1980, a total of 685 million dollars worth of expenditures were produced by the resident sport fishermen in Ontario (Government of Ontario, 1980). The largest expenditures were made for the purchase of fishing equipment, which accounted for 44 million dollars and in part for the purchase of boats, trailers and motors which accounted for 196 million dollars (see Table 6). When

considering the expenditures of both resident and non-resident sport fishermen, the total spent within the province almost tripled, from \$315 million in 1970 to \$849 million in 1980 (Cox and Straight, 1975; Government of Ontario, 1980).

The above estimate of economic gain by non-resident fishing reflects the aggregate amount by which the incomes of the residents of Ontario collectively (including income to their government) are higher than they would be in the absence of the non-resident sport fishery in Ontario. In contrast, when dealing with the benefits of non-resident fishing, no benefits are ascribed to the expenditure of residents on goods and services purchased in pursuit of fishing. This is because the purpose should be to establish the net gain to the province as a whole: the benefit of non-resident spending on goods and services which will be examined in Chapter 4.

It is the estimated increases in the incomes that the Province would not have enjoyed if the Ontario fishery had not drawn these visitors to the Province. However, it can be reasonably assumed that the residents would spend roughly the same amount on goods and services in the Province whether they fished in Ontario or not. Their spending would no doubt be on different things and in different places, but there is no reason to believe that

the income so generated would be greater or less. But there are other implications of this activity which are not measured in the above which might nevertheless be important in a judgement of its value (Ravenscraft and Dwyer, 1978a).

In the first place, there are some costs involved which do not manifest themselves in observable economic terms. Non-resident and resident fishermen by their very presence, increase the fishing pressure and the degree of congestion on the lake. This may lower the quality of recreational fishing for fishermen in at least two ways i) by reducing the catch per rod-day if the total fishing activity presses significantly on the fish stocks and ii) by increasing physical congestion on the lake (Brown and Mathews, 1970). This will be a significant cost to the Ontario fishery since the number of non-resident and resident fishermen is greatly increasing along with the vast amount of fish caught yearly. Since 1970 when 29 million fish were caught, the number has increased five-fold to a point where 150 million fish were caught in 1980 (Cox and Straight, 1975; Government of Ontario, 1980).

Congestion may be felt not only in the process of fishing but also on campgrounds, beaches, boat facilities and highways. Any such congestion caused or increased by fishermen and which adversely affects residences, must be

regarded as a cost. So must any public spending that is incurred to accommodate the increased numbers of fishermen.

On the other hand, there may be benefits which are not included in the account of direct economic gain. The attraction of the lake for fishermen might well have the effect of enhancing real estate values on the lakeshore and nearby areas, thus increasing the wealth of resident landowners and the tax base for local governments. Residents who do not use the fishery themselves may appreciate its existence either because they value the opportunity for themselves, or their children, to enjoy it in the future, or simply because they feel that the existence of such resource improves the quality of life in the Province (Anderson, 1977). Insofar as the fishery makes people better off in these ways, it bestows benefits, although they are exceedingly difficult to quantify, are nevertheless real and must be considered.

CHAPTER THREE

METHODOLOGIES FOR EVALUATING SPORT FISHERIES

Administrators face a difficult task when trying to place a monetary value on the sport fish resource. Such estimates, however, are of use both when the economic feasibility of increasing the fish population by stocking is being considered or when the value of a fishery that could be destroyed by some unnatural event such as a dam is being compared with benefits resulting from alternative uses. While economic considerations are not only important for the preservation of sport fisheries for future generations, better knowledge about their economic value would be helpful in making decisions affecting the future of such a resource. The problems involved in estimating the value of the sport fishery are complex and are very similar to the problems encountered when estimating the demand for outdoor recreation since the benefits which accrue from such facilities are not reflected in market prices. Consequently, a brief evaluation of various procedures for measuring the value of outdoor recreation will be presented.

Perhaps the most commonly used method of inferring net value has been the gross expenditure method. The rationale for using such a method is that recreation is worth as much to the recreationist as he is willing to pay

for it. In many cases, the fishermen are simply given questionnaires which attempt to derive the respondents costs considered attributable to fishing in Ontario. This means that their costs of other fishing and other activities are to be excluded. The expenditures which the fishermen usually include are gear, travel to and from the area, travel within the area, food and accommodation, and other services specifically associated with fishing. It is important to note that these expenditures are usually prorated by the number of persons in the party or family group.

While it is true that a certain recreation such as sport fishing is valued at least as high as other things which could have been purchased with the same money, it is also true that if this recreation were abolished, most of the money might simply be directed toward other goods and services. Loss from this shift, where the recreationist would be forced to some second choice (from fishing to golfing for example) would not be total expenditures but in fact some other amount. If such a method were to be used, it would be difficult to compare recreational benefits with the benefits which might be received from alternative uses of such a natural resource (Cicchetti et. al, 1973).

Elimination of the fishery would, however, bring

about a redistribution of expenditures among countries, provinces and consumer goods making some people better off at the expense of other. Thus, surveys of fishing expenditures do identify the flow of purchases among expense categories and can be a useful aid for estimating the gross impact on each type of business activity brought about depletion or elimination of a fishery. A knowledge of sport fishing expenditures also can be useful for comparing the impact on regional incomes of competing sport and commercial fisheries which must be managed to provide an economically desirable balance of catch (Knetch and Davis, 1966).

Of all the economic measurements, the willingness to pay method was found to be regarded by practically all outdoor recreation economists as the most significant since it examines the net benefits of a natural resource.

Net benefits are an expression in dollar terms of the satisfaction received from fishing over and above the values expressed by the actual 'out-of-pocket' expenditures (Crutchfield, 1962). Since the right to recreational fishing is normally provided free or at some minimal cost, there are no markets from which to determine the values that people place on fishing over and above their costs incurred. If the government allowed provinces or individuals to own fisheries and charge profit

maximizing rents or fees for their use, then empirical evidence of the net benefits from the fisheries would be reflected by the fees people actually are willing to pay (Dwyer and Bowes, 1978).

In order to determine the net benefits of a fishery, hypothetical evaluation questions are often given to the fishermen. There are two kinds of evaluation questions which could be asked of sport fishermen to determine how much the sport is worth to them over and above their actual fishing expenditures. One could ask: "How much would you be willing to pay for the right to fish for a year?" Or one could ask: "For what minimum price would you be willing to sell your right to fish for a year?" Since in the first case the individual's answer is limited to his financial condition, whereas in the second case there is no limit to what he might honestly ask in order to be compensated for a right he formerly enjoyed, it is expected that lower average values would be obtained from the first question (Dwyer and Bowes, 1978).

The appropriate question to ask depends on the kind of recourse decision to be made. A resource agency may be considering the economic feasibility of investment in a new outdoor recreation facility. A question of the first type can be used to determine whether the potential users would be willing to pay at least as much as the

anticipated costs of the facility. This information would be very useful in judging the feasibility of the investment (McConnell and Norton, 1976).

In a second and probably more important kind of decision, the relevant question is the one about selling the right to fish. It is very common when dealing with multiple uses of land and water resources that a decision may be made which either permits the continuance of a particular fishery or brings about its termination. In many cases where there is potential loss of a sport fishery, one should determine the amount of compensation that the fishermen should receive so he will be no worse off after losing this recreational opportunity that was previously enjoyed (McConnell and Norton, 1976).

The use of concentric zones for evaluating outdoor recreation was suggested by Hotelling (1945), refined by Clawson (1959) in order to estimate the net value of recreational facilities. Only a short summary of this method will be given since it is not applicable to the Ontario fishery. This is due to the extreme size of the fishery, therefore making it impossible to determine a focal point of the greatest intensity of fishing activity in the Province. That is, many attractive fishing areas exist in the Province and the number of visitors and fees could be demanded varies greatly with every one of these

fishing facilities.

The Clawson method is able to estimate the number of visitors at each level of increased fees by the assumption that the differences in the rates of use between various distance zones is caused by differences in the money costs between zones of visiting the recreational area. This method is thus able to project attendance figures for various hypothesized entrance fees to derive a new demand curve that supposedly measures the relation between number of visits and entrance fees. The fee structure that would maximize net revenue to the owner of the area can then be readily calculated. This measure of the value or benefit of the recreational area would then provide one basis of comparison with other possible uses of the fishery and other resources of the area (McConnell, 1975).

CHAPTER FOUR

ALTERNATIVE METHODS FOR EVALUATING THE ONTARIO SPORT FISHERY

In this chapter, the scope of analysis is broadened to examine the different techniques discussed in the previous chapter in relation to the Ontario sport fishery. The expenditures of non-resident and resident fishermen were discussed in Chapter 2, therefore, the expenditure method for evaluating a sport fishery will be briefly discussed.

The value of a fishing trip can be measured by the fishermen's willingness to pay for it. In fact, there is no charge for access to the Ontario fishery, and so direct information about fishermen's evaluation of it is lacking.

It is therefore necessary to find means of establishing the value of the fishery in the absence of market data.

The value a fishermen gains from a sport fishing opportunity under free access can be regarded as the amount of compensation that he would require to leave him equally satisfied if the fishery were eliminated. Thus, if a fisherman would accept \$100 per year (but no less) in compensation for exclusion from the fishery, then this measures his evaluation of the opportunity.

In an attempt to quantify, in dollar terms, the value of the Ontario sport fishery, resident anglers could

be interviewed in order to establish the minimum annual compensation each would accept for exclusion from the fishery. There is, of course, the possibility of bias in replies. On the one hand, respondents who feared that charges would actually be levied on fishermen might deliberately understate the value of the experience to them. Others, anxious to protect the fishery, might knowingly overstate its value. Replies might also be distorted through ignorance of alternative fishing opportunities, or simply by the failure to consider carefully enough the hypothetical questions posed. Because of these problems, the interview must involve some complex cross-questioning to ensure that the replies given were rational or consistent (Bohm, 1972).

Calculation of the present value of benefits expected in the future is accomplished using the standard economic technique of discounting the expected future amounts at the appropriate rate of interest. The data required for this are the values anticipated in the future and the rates of interest (Wilman, 1980).

Expected future values of the net benefits require an estimate of future trends. In Chapter 2, it was noted that statistics on the rate of growth of sportfishing in Ontario are lacking, although fishing activity in the Province has increased at an annual rate of about 13 per

cent per year from 1970 to 1980. While this figure probably reflects fairly reliably the recent trend in sport fishing in Ontario, it would not be reasonable to expect this rate of increase to be maintained through the distant future.

Present rates of increase would soon produce such large numbers of fishermen that the quality of the fishing experience would deteriorate. A decline in the quality of fishing reduces the attractiveness of the fishery and thus high rates of increase will at some point turn fishermen away. Unlimited increase in the demand for a fishery with free entry eventually leads to an equilibrium marked by low quality (in the form of both physical crowding and low fishing success) and a number of fishermen sufficiently large to prevent the quality from improving and hence from attracting more fishermen (Ravenscraft and Dwyer, 1978b).

This inevitable tendency underlies the necessity of policies to ration -by pricing or other means- access to recreational resources as demand increases. The alternative is degradation of the recreation and the loss of the value of the recreational resource. Ontario has offered fishermen solitude, excellent fishing and a wilderness environment. Already in certain areas and at certain fishermen are conscious of crowding and with greater numbers in the future, the Province's

attractiveness will inevitably diminish. Numbers of fishermen can therefore be expected to increase, but not indefinitely at the present rate.

An increment of spending within the Province does not have an equal effect on incomes. Money received from the sale of a product, for example, is only partly distributed around the Province as income in the form of wages, profits and rents. Typically, a large share of the purchase price covers the cost of importing and transporting the products from elsewhere. However, the impact on incomes from an increment of spending extends beyond the immediate income component of sales, because the receivers of this income re-spend part of it and this new income component of sales, because the receivers of this income re-spend part of it and this new income adds to the income of others. This is the so-called 'multiplier effect' of spending on incomes: incomes received is partly re-spent to become income to others, which in turn is partly re-spent, and so on. Each successive round of re-spending is diminished by the fraction of new income and by the fraction of spending on purchases imported from outside the area (Gordon and Knetsch, 1977).

The estimate of the income generated by the fishery cannot be fully explained through the use of the

expenditure method. Such a method does not take into account the indirect incomes which are generated through income multipliers. It seems clear that the greatest benefit of the Ontario fishery to the people who live in the Province lies not so much in its contribution to direct incomes but in its generation of indirect incomes.

It has been estimated that the indirect recreational value of the fishery to residents of the Province is at least double the estimated increase in direct incomes that results from fishermen's spending (Gilbert and Winant, 1977).

The existence of any particular kind of economic activity alters the geographical and occupational pattern of employment and affects the way in which income and wealth is distributed. Sport fishing or any other activity will affect patterns of employment and the distribution of income and wealth among people and areas.

Some may gain at the expense of others and whether this is desirable or not must remain a value judgement. Non-resident fishing in Ontario probably benefits merchants, landowners and taxpayers, but makes resident fishermen and entrepreneurs at other fisheries worse off than they would be if it did not exist. Economic analysis is of no help in determining whether one pattern of income and wealth is better than another, but subjective judgement on these

matters might lead one to quantify the calculated aggregate economic benefits.

There are other important benefits and costs of the fishery to communities lying near such a facility which has not been assessed in this chapter. On the benefit side, there is, in particular, the enhancement of real estate values which results from the fishery. Insofar as the fishery increases the value of property surrounding fishing lakes, this benefits not only landowners, but also government revenues from the property tax. While the proximity of good fishing opportunities almost certainly contributes to the value of property in the area, the magnitude of this effect defies economic quantification.

In addition, fishing activity creates some real costs on residents. Large numbers of fishermen result in congestion. Residents may feel that the quality of the fishing experience itself is lowered by the presence of large numbers of non-resident fishermen and boats. Finally, even non-fishermen may experience unpleasant effects of crowding in local stores, streets, roads and highways.

While these additional effects are not quantifiable in economic terms, they may, nevertheless be important to residents and therefore they must be

considered in an assessment of the value of the fishery from their point of view. It must be recognized that estimates evaluating sport fisheries rest on meager and often imprecise data. The shortcomings of data are a pervasive problem in studies of this kind. Economic data must be estimated from small samples and numerous assumptions are required in order to permit calculations to be made. This means, inevitably, that a degree of uncertainty surrounds the precision of the estimates, and somewhat different results will be obtained if different analytical procedures are adopted. Indeed, this study was in large measure a demonstration of a set of procedures that would enable evaluations of this kind.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

The plentiful and varied natural environment in Canada offers abundant opportunities for outdoor recreation. The Ontario fishery is only a small part of this total wealth in recreational resources, but it is one of the country's most valuable sport fisheries. It has been the purpose of this study to estimate, in economic and subjective terms, the value of this fishery to the residents of Ontario.

In 1980, the Ontario sport fishery provided over 43 million angler-days to 2,796,988 fishermen from Canada and the United States. Almost one-quarter (22 per cent) of the fishermen came from outside Ontario, and this high degree of non-resident participation reflects the special attraction that the fishery holds for anglers.

Sport fishing in Ontario is increasing at an extremely rapid rate -currently at about 13 per cent per year. This suggests that the benefits derived from fishermen will grow rapidly in the future. The non-resident fishermen who visited Ontario spent a total of \$164 million and the resident angler who fished in Ontario spent a total of \$686 million in 1980. The total value of the expenditure and purchases made in Ontario by sport

fishermen exceeded 840 million dollars.

In 1980, it was estimated that 93.9 per cent of the non-resident anglers intended to fish in Ontario in the near future (Government of Ontario, 1980). Only half of these fishermen expressed a desire to return to Ontario if sport fishing was denied (See Table 7). The results for 1970 are very similar except for a slightly greater percentage of non-resident anglers expressing a desire to return to Ontario in the near future. This decrease in the numbers of non-resident anglers desiring to return to Ontario could be foreshadowing the negative effects of congestion on an individuals fishing experience.

Table 7. Numbers of fishermen who would fish in Ontario under various conditions

	Year	Yes	No
	=====		
Intend future fishing in Ontario	1970	96.9%	3.1%
	1980	93.9	6.1
Return if fishing was denied	1970	54.6%	45.4%
	1980	52.9	47.1

It is reasonable to assume that the Provincial Government's policy is, in very general terms, to maximize for the residents of Ontario the benefits to be derived from their public natural resources. In the light of this objective, the findings of this report shed light on several issues of resource management. First and most

obvious is that Ontario supports a recreational fishery of considerable value. The desirability of any projects or developments that would threaten part of or all of the fishery must be weighed against these recreational values, and any such developments can be economically justified only if they can be expected to generate net benefits in excess of the recreational benefits destroyed.

Second, the findings illustrate a general policy problem which is rapidly increasing in importance in the management of all kinds of public recreational resources; namely the threat to the quality of the recreational experience through congestion. This is a highly complex issue, involving subtle political, social and economic considerations. Yet resource managers face the facts of present trends and the problems of congestion at the most attractive public fishing sites will inevitably grow. No general policies for dealing with this problem have emerged, other than that of expanding the quantity of available recreational opportunities.

This raises the question of rationing access, in the interest of recreational quality, by modifications to the licensing system. There is no doubt that fishing pressure can be controlled at any desired level if the price of access to the site could be freely manipulated. But the rationing of access to public recreational areas,

particularly by economic methods, has never received popular support in a society that claims access to the public domain as part of its tradition and cultural heritage. However, Ontario is presently the only province in Canada which does not require its residents to obtain a fishing licence. Such a licence is being regarded as acceptable by active sport fishermen in Ontario, but only on the basis that the revenue generated by such a licence be reinvested into the natural resource. Such reinvestment would require the government to funnel money into such activities as stocking programmes, environmental protection, strict regulation and increased management of the fishing resource.

While the tradition of free access is an obstacle to the control of resident fishing pressures through pricing schemes, it does not appear to have the same importance in dealing with non-residents. In view of the economic benefits derived from the spending of non-resident fishermen in the Province, it appears that any reduction in non-resident fishing through special access charges would fail to increase the benefits to Ontario at present. However, current trends suggest that the congestion will soon become a problem, so that modifications to the licencing system, which will serve to capture the benefits of visiting fishermen through access

charges rather than indirectly through their spending, will prove advantageous.

Finally, it must be stressed that the Ontario sport fishery must be preserved since it generates large amounts of monies for those involved directly or indirectly. But the greatest benefit which is derived from the fishery is not an economic benefit but indeed an environmental benefit which serves the people of Ontario, providing them with a vital escape from the ever growing pressures of the urban way of life.

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