

**PART IV:**  
**PRESENT**  
**FISHERY**  
**VALUES**

# CHAPTER 11

## Introduction

Since one of the aims of the Okanagan Basin Study was to develop plans for the water and water oriented resources of the Basin for the beneficial use of man (i.e. basin residents), and since sport fisheries are one of those resources, it was considered an essential part of the fisheries study to determine the value of the fishery to the Okanagan Basin. It was also deemed worthwhile to gain a general understanding of the resident and non-resident Okanagan Basin angler. Not only do these data provide a method for evaluating the economic worth (tangible and intangible) of the resource, but they also are one of the essential bases for evaluation and projection of the fishery resource in future planning.

By understanding the present fishery resource base, the use made of it by the public, the sociological structure of the users and the economic base for the resource (Parts II, III and IV), it is possible to plan, project and evaluate plans for the future (Part V).

Okanagan residents are becoming increasingly aware of the economic and environmental benefits associated with sport fisheries in their valley, of the attraction of these fisheries to tourists, of their importance as a recreational pursuit for residents and as indicators of the environmental health of the Basin. This section discusses economic and recreational values associated with salmonid sport fishes, as well as other sport fish species; mountain whitefish and bass, which are sought by resident and non-resident fishermen.

The value of water for many uses licenced by the Province, could be adequately expressed in market prices, notably in the case of industrial, municipal and agricultural water demands. In fact, these uses are not priced according to market criteria in British Columbia because of existing institutional arrangements which allow only a nominal licence fee to be charged (see Technical Supplement VII). In the case of sport fishing recreation however, the benefits cannot readily be reflected in market prices. Sport fishing opportunities are traditionally provided free of charge, and apart from a nominal fee for a fishing licence, fishermen are not presently required to express the value they place on their sport at market prices. Thus, no data were available to compare the values of recreational and commercial uses of water. In view of the increasing importance of sport fishing to Okanagan residents, there is a need to understand the value and demand for this recreation, so rational decisions on allocating water resources between recreational and non-recreational uses are possible.

Only user values associated with the sport fishing experience itself are considered herein. It therefore underestimates the total value placed on sport

fishery resources in the Okanagan to the extent residents value watching the fish spawn in tributaries to Okanagan Lake or in Okanagan River. As the sport fishery in the Okanagan in general does not appear threatened by irreversible destruction, option values do not apply.

The major source of information was a questionnaire survey of a random sample of fishermen, a creel census of resident and non-resident anglers, and an aerial census to estimate the total population of sport fishermen in the Basin. All three studies were closely integrated from their inception.

# CHAPTER 12

## Methods

Basic data used were obtained from three surveys:

- 1) a socio-economic survey of a sample of valley fisherman,
- 2) a creel census to obtain biological information relating to catch, and
- 3) an aerial census to estimate the total population of anglers in the Okanagan.

As this chapter is mainly concerned with the first survey, this section describes the methods employed in the socio-economic survey in some detail.

A questionnaire survey was devised as the basic tool for soliciting opinions and preferences of Valley fishermen toward their recreational experiences. Because of the complex problem of determining values associated with fishing, the direct interview survey was chosen rather than an indirect mailed questionnaire. This approach is more expensive and time consuming, but reduces bias and provides for a more comprehensive understanding of individual preferences and attitudes towards sport fishery opportunities and management. A preliminary draft questionnaire was pre-tested in late June on a sample of fishermen in the main valley and headwater lakes, and a number of revisions were made. Following further revisions resulting from the initiation of the main sampling program in early July, a final version was established (Appendix T).

With the exception of the section on economic evaluation, the design of the questions is fairly simple. The first part seeks data on frequency and location of fishing effort and travel costs of both resident and non-resident fishermen. The second section determines fishermen's preferences and opinions for type of fishing experience (main valley or headwater lakes), species of fish sought, and the overall quality of launching and fishing facilities in the valley. Following a section to obtain basic socio-economic data, there are three questions designed to determine the value of a day's fishing over and above economic expenditures required to get on site.

At the beginning of the socio-economic survey there was no reliable estimate of the total population of resident and non-resident anglers, and thus no real guidelines for employing statistical sampling procedures. Intuition suggested that the population should be stratified between headwater lake anglers and anglers fishing in the main valley lakes. During July and early August, a random sample of fishermen were approached in both location types. In mid-August, preliminary results from aerial census of valley fishermen began to indicate patterns of fishing activity and a first estimate of the spatial and temporal distribution of total angling effort in both the main valley and headwater

lakes. Using these data, sampling techniques were adjusted to conform with the observed distribution of anglers. A total of 206 interviews were conducted by the end of September, and as the survey program was quickly running into decreasing returns, it was terminated on October 1, 1971.

A number of biases can be identified in this survey. Despite sampling adjustment, the survey tended to over-sample headwater anglers relative to main valley lake anglers, to the extent that headwater anglers harbor significantly different preferences and values toward their sport than the main valley counterparts. This bias will affect the general results of this survey. However, much of the analysis of results distinguishes between these two types of angler experience and this approach will help to illustrate the degree of bias.

Interviewing was conducted only during the summer months, so neither fall nor spring anglers nor ice-fishermen were included in the survey. Although these categories represent a small percentage of total fishing effort (less than 10%) they include different types of fishing experience, including spawning mountain whitefish (November), trophy rainbow trout fishing in the main valley lakes (March), ice-fishing, and tributary stream fishing. While these omissions reduce the comprehensiveness of the report, the survey was aimed at obtaining data to evaluate water management alternatives rather than to specifically manage the fishery itself, so that these deficiencies are not considered highly significant.

Many non-residents come to the Okanagan during the summer months for general recreational purposes, and sport fishing is often not a primary motivation. The survey thus tended to contact a relatively larger number of such tourists than would have been the case if the survey had been extended to include the spring and fall fishing season. This bias could result in an underestimation of the value of the Okanagan fishery to non-residents, a factor that will be discussed later.

Finally, there is a source of bias common to all such questionnaire surveys relating to the likelihood of contacting satisfied, ardent fishermen who fish frequently rather than anglers who fish only occasionally or who are dissatisfied. The former category will be more frequently contacted because they are more often available. Consequently, data such as median number of angler-days and possibly the values placed on fishing experience may tend to be over-estimated.

Despite this array of biases, it is believed that the general sample of 206 anglers was selected at random and with some exceptions mentioned above, this group does represent a broad range of opinion and values associated with fishing in the Okanagan.

A creel census survey was undertaken on the main valley and headwater lakes over the period June 1971 to May 1972 inclusive. The reader is referred to Part III for details of this work. These data were analyzed and compared with similar data obtained in the socio-economic survey to illustrate the degree of bias mentioned in the previous section. The creel census also obtained information on the length of time spent fishing, which was necessary to estimate the total population of anglers from the aerial survey.



Marked seasonal differences were noted in the distribution of boat-angler effort in the Okanagan (Figure 13.1), although the seasonal patterns appear to be similar for both main and headwater lakes. Little fishing is observed until late May, when the ice disappears from the headwater lakes. There is a surge of fishing effort on both the main valley and headwater lakes in June and July, and this is basically maintained in August until fishing activity generally drops off in September. As mentioned earlier, there is a small but important shore fishery on the main valley lakes in November, as both kokanee and mountain whitefish migrate towards the lake shore and tributaries to spawn.

According to pooled results from the socio-economic survey and the creel census, approximately two-thirds (106,844), of the angling days were experienced by residents, and one-third (53,342) by non-resident tourists. There was a seasonal variation in these proportions with resident angler-days far outnumbering tourists in June and throughout the fall, while tourists almost matched resident participation during July and August (Table 13.2).

TABLE 13.2

SEASONAL PROPORTION OF RESIDENT AND NON-RESIDENT FISHING EFFORT IN THE OKANAGAN VALLEY IN 1971

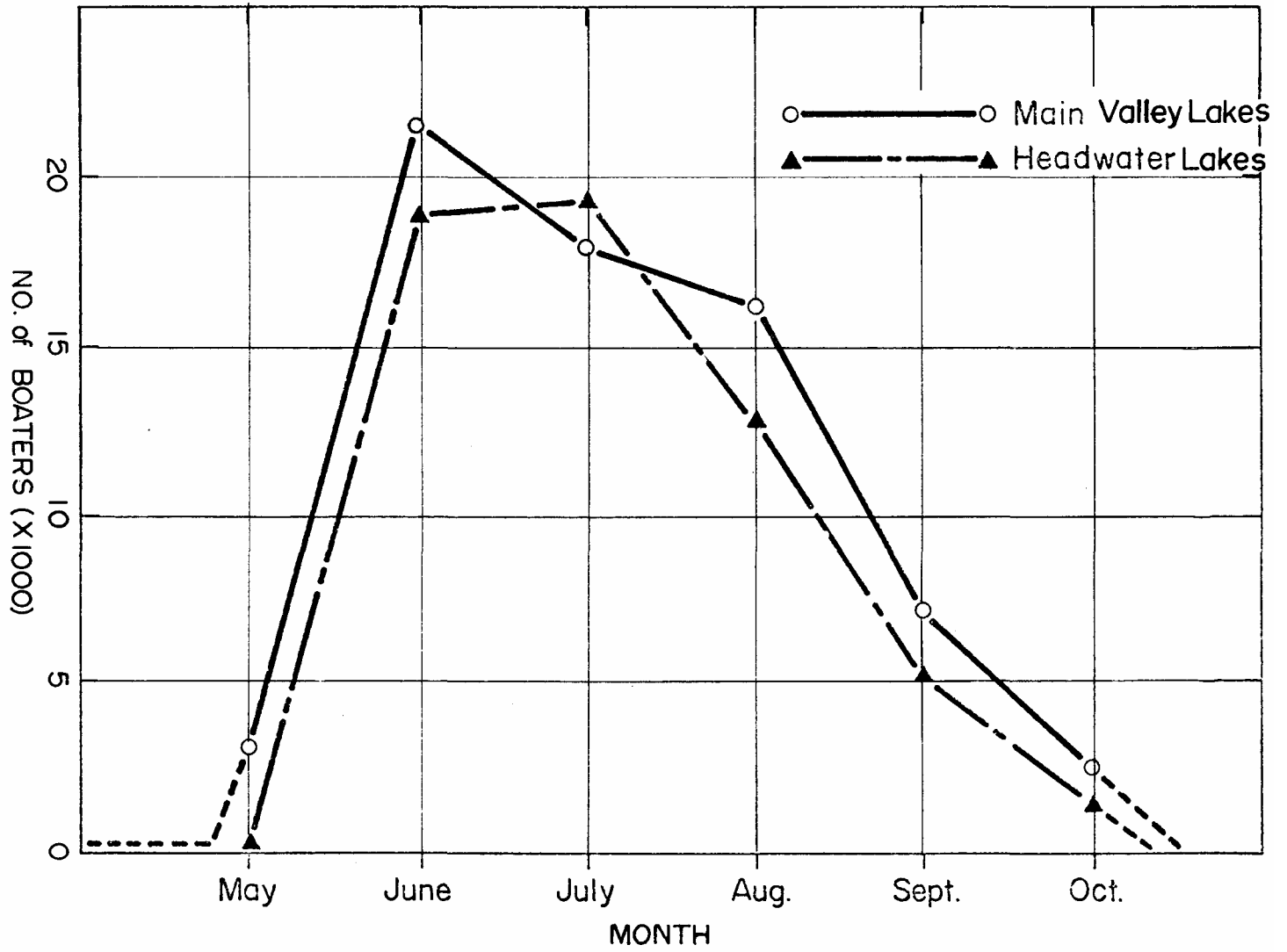
Month	Resident	Non Resident	Total Number Interviewed
June	76.4	23.6	224
July	62.3	37.7	454
August	50.5	49.5	321
September	69.0	31.0	232
October	84.4	15.6	90
November	98.4	1.6	122
MEAN	66.8	33.2	

13.2 BACKGROUND OF FISHERMEN

Almost half (49%) of the resident fishermen interviewed in the creel census lived in the Central Okanagan region, followed by 28% from the South-Central Okanagan, 14% from the North Okanagan and 9% from the Oliver-Osoyoos area (Table 13.3). This breakdown is approximately representative of the total population distribution for the valley, although the North Okanagan appears to be slightly under-represented and the Penticton area over-represented.

Non-residents from the Lower Mainland were the largest single category of tourists fishing in the Okanagan in 1971 (Table 13.4). The results of both the socio-economic survey and creel census are shown in this table and demonstrate the homogeneity of these two surveys in this regard.





SEASONAL PATTERNS OF BOAT ANGLING EFFORT IN  
THE OKANAGAN

Figure 13.1

TABLE 13.3  
RESIDENCE OF VALLEY FISHERMEN IN THE OKANAGAN  
IN 1971

LOCATION OF RESIDENCE	PERCENT OF RESIDENT ANGLERS SAMPLED FROM EACH REGION	PERCENT OF TOTAL POPULATION IN EACH REGION
North Okanagan	14.1	27.1
Central Okanagan	48.7	41.1
South-Central Okanagan	28.4	23.3
Oliver-Osoyoos	8.8	8.5

TABLE 13.4  
LOCATION OF NON-RESIDENT ANGLERS FISHING IN THE  
OKANAGAN BASIN, JUNE 1971 - MAY 1972

ORIGIN	SOCIO-ECONOMIC SURVEY	CREEL CENSUS
Lower Mainland	35.7	42.1 %
Rest of B.C.	18.8	15.7
Alberta	16.5	19.9
Saskatchewan-Manitoba	4.6	2.6
Rest of Canada	1.0	2.6
Western U.S.	22.5	16.6
Rest of U.S.	0.9	0.5

In both the socio-economic survey and the creel census, residents and nonresidents were asked how often they fished in the Okanagan. The results for resident anglers from both surveys are shown in Table 13.5, again to compare the socio-economic survey with the larger creel census. The median number of angler days for residents is estimated at 16 days per year from the creel census and 21 days per year from the socio-economic survey. Using a median value of 16 angler-days per resident fisherman (as this figures appears to be more representative of the general population of resident anglers), an estimated 6,680 resident anglers fished in the Okanagan in 1971.

Table 13.5 indicates that relatively more anglers fishing 20 days or less were contacted in the creel census than in the socio-economic survey, while the reverse is true for anglers fishing more than 30 days per year. This provides a clear indication that the socio-economic survey tended to interview fishermen with higher than average participation in the sport. Almost all (90%) resident fishing activity involved one-day trips, the median length of trip being 1.1 days.

TABLE 13.5  
FREQUENCY OF RESIDENT PARTICIPATION IN FISHING  
IN THE OKANAGAN BASIN IN 1971

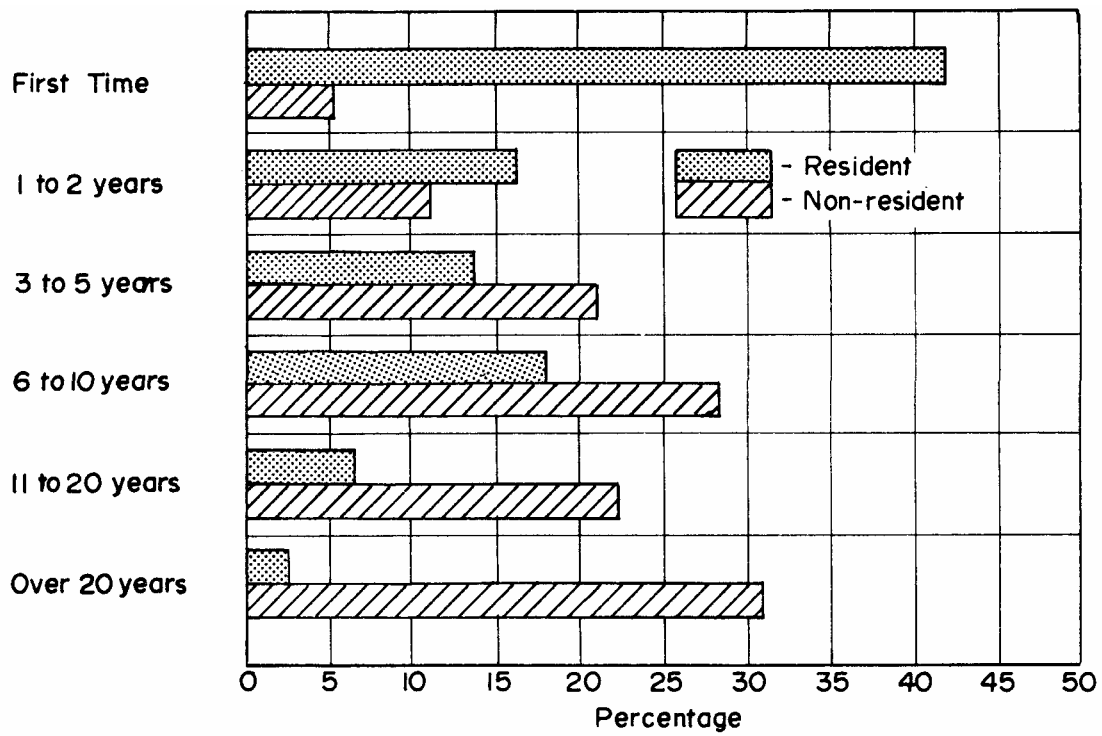
Angling Days per Year	Socio-Economic Sample (Percent)	Creel Census Sample (Percent)
1 - 5	10	9
6 - 10	16	25
10 - 15	8	14
15 - 20	10	17
21 - 30	15	16
31 - 60	30	12
61 - 100	9	5
Over 100	2	2

Just under one-third (31.7%) of the non-resident anglers indicated that fishing was the major reason for coming to the Okanagan. Many tourists enjoy fishing as part of a package of recreational experiences available in the Okanagan. This variety of recreational opportunities was frequently quoted by non-resident fishermen as the major attraction of the Okanagan as it allowed them to "escape" for a day or two, while other members of their party enjoyed other types of outdoor recreation such as swimming, sunbathing, or hiking.

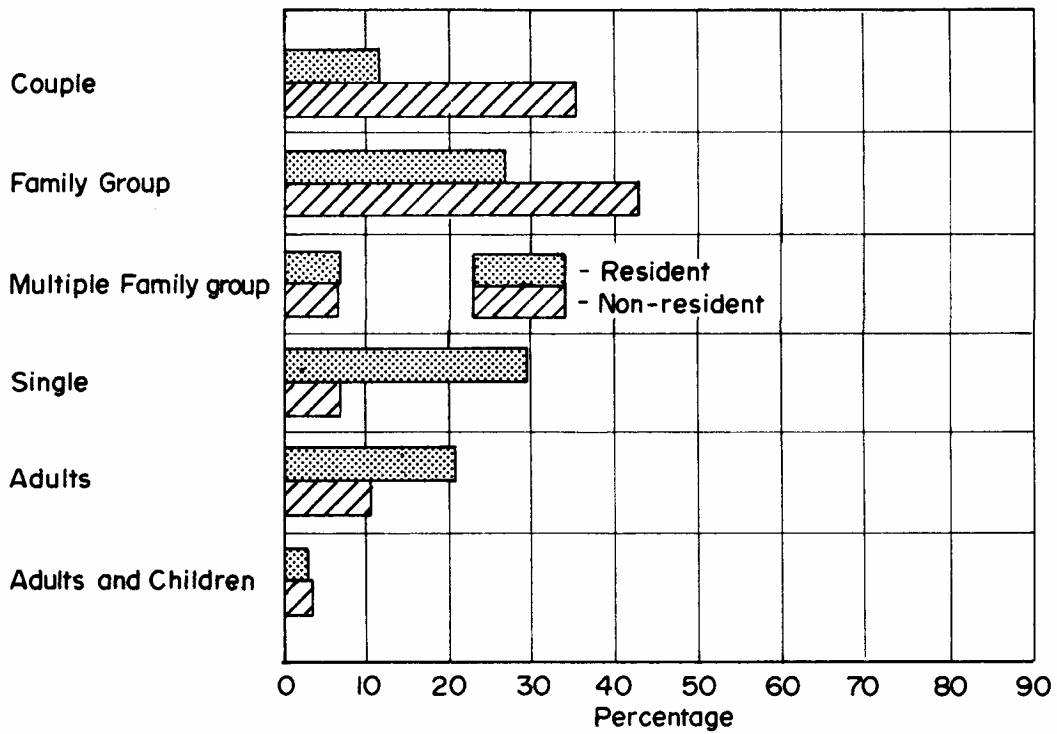
Resident fishermen tend to have considerably longer fishing experience in Okanagan lakes than their non-resident counterparts (Figure 13.2). The median length of experience in the Okanagan is about 1.3 years for tourists compared to over 8 years for residents. Over 40% of tourist fishermen interviewed were fishing for the first time in the Okanagan in 1971, while only 7.3% of residents belonged to this category. At the other end of the scale, almost one-third (30.3%) of resident anglers had been fishing for over 20 years, compared to only 2% of non-residents. These statistics for residents may be biased upwards, as there appears to be a relationship between length of experience and frequency of participation. The large proportion of first-time tourist anglers appears to indicate that non-resident demand is increasing at present.

### 13.3 SOCIO-ECONOMIC CHARACTERISTICS OF FISHERMEN

Fishing in the Okanagan tends to be a shared experience. This is particularly true for non-residents, only 5% of whom fished alone (Figure 13.3). Indeed, 76% of non-resident respondents fished as family groups with children (43%) or as married couples (33%). Over half of the non-resident groups contained females who were angling. In contrast, almost one-third (31%) of resident anglers fished alone (almost all of them males) and an additional 22% fished as



LENGTH OF FISHING EXPERIENCE OF RESIDENTS AND NON-RESIDENTS IN THE OKANAGAN BASIN. Figure 13.2



TYPES OF GROUP FISHING IN THE OKANAGAN BASIN LAKES. Figure 13.3

groups of friends, In fact, only about 33% of residents fished in family groups. However, both resident and non-residents commented that social interaction was one of the major advantages of fishing as a prized recreational experience.

The age distribution of resident vs. non-resident anglers is compared in Table 13.6. Non-resident anglers tend to be younger than residents. Almost two-thirds of non-resident anglers are younger than 40, while only half the resident anglers are in this category. In contrast, 20% of residents are aged over 50, compared with under 7% of tourists. A notable feature of Okanagan Basin sport fishing is the number of retired or semi-retired resident males and couples who actively participate in the sport.

TABLE 13.6  
AGE DISTRIBUTION OF RESIDENT AND NON-RESIDENT ANGLERS IN THE OKANAGAN BASIN IN 1971

AGE GROUP	RESIDENT (percent)	NON-RESIDENT (percent)
Under 20	7.7	4.0
20-29	17.3	26.7
30-39	25.0	32.6
40-49	13.5	19.8
50-59	16.3	9.9
Over 60	20.1	6.9

While there appears to be no general statistical correlation between age and participation, there is a strong tendency for the older resident anglers to fish for over 50 days a year.

Almost 40% of resident anglers were classified as wage earners (laborers, tradesmen), compared to under 13% of non-residents (Table 13.7). In contrast a large proportion (40.7%) of tourists were classified as professionals.

TABLE 13.7  
OCCUPATIONS OF RESIDENT AND NON-RESIDENT OKANAGAN BASIN FISHERMEN IN 1971

OCCUPATION	RESIDENT (percent)	NON-RESIDENT (percent)
Wage earners	38.1	12.6
Agriculture	3.9	0
Salaried - Professional	26.9	40.7
Technical	5.3	5.0
Student	10.5	6.1
Retired	20.3	13.1
Housewife	6.7	10.8

Fishermen not presently in the labor force (retired, students, housewives), represented over one-third of resident participation, probably because they have available leisure time during the weekdays when much of the interviewing was conducted. It is interesting to note that few farmers were interviewed.

Table 13.8 presents a comparison of household incomes of resident and nonresident anglers with a sample of general Okanagan residents. Again, there appears to be a significant difference in distribution of incomes between the two groups, with the middle and upper income classes being better represented among non-residents than residents. Over 60% of tourist anglers have annual household incomes exceeding \$10,000, compared to 34% of resident anglers. This differential is probably due to the large number of tourist anglers whose visits to the Okanagan are not primarily motivated by fishing and who have sufficient incomes to take family holidays in the region. The median income of resident anglers is approximately \$7,250, which is somewhat lower than the median income of all British Columbian fishermen estimated at approximately \$8,000 in 1969-70. (Pearse Bowden, Economic Consultants Limited, 1971). The median income of valley fishermen is somewhat higher than the median valley household income. There is a slight tendency towards greater angler participation with higher incomes, but this relationship is masked by the relatively large number of low income retired residents who fish frequently.

TABLE 13.8  
HOUSEHOLD INCOME DISTRIBUTION OF RESIDENT AND  
NON-RESIDENT ANGLERS IN 1971

HOUSEHOLD INCOME	Okanagan Residents* (Percent)	Resident Anglers (Percent)	Non Resident Anglers (Percent)
Under \$3,000	18.8	12.1	2.8
\$3,000 - \$4,999	20.6	12.1	23.3
\$5,000 - \$6,999	23.0	23.3	8.5
\$7,000 - \$9,999	19.1	18.7	24.5
\$10,000 - \$14,999	11.3	20.8	30.2
Over \$15,000	7.2	13.0	30.2

\* Data obtained from Resident Survey which contacted 384 households at random during the fall of 1971.

Table 13.9 compares the educational attainment of both resident and non-resident anglers with a general sample of Okanagan residents. It clearly shows that relatively more non-resident anglers have completed more years of schooling, particularly university education, than their resident counterparts. There does not appear to be any significant difference between the education of the general sample of Okanagan residents and the sample of resident anglers. Nor is there any significant relationship between the amount of angler participation and education levels for either resident or non-resident fishermen.

In summary, non-resident anglers tended to fish more in family groups, were younger, better educated and had higher household incomes than resident anglers. It appears that the amount of fishing is not related to age or education, but may be positively related to household income. There is an apparently increasing participation by non-residents in fishing in the Okanagan, particularly by tourists who come to the valley seeking a variety of recreational experiences.

TABLE 13.9  
EDUCATION OF RESIDENT AND NON-RESIDENT  
ANGLERS IN THE OKANAGAN, 1971

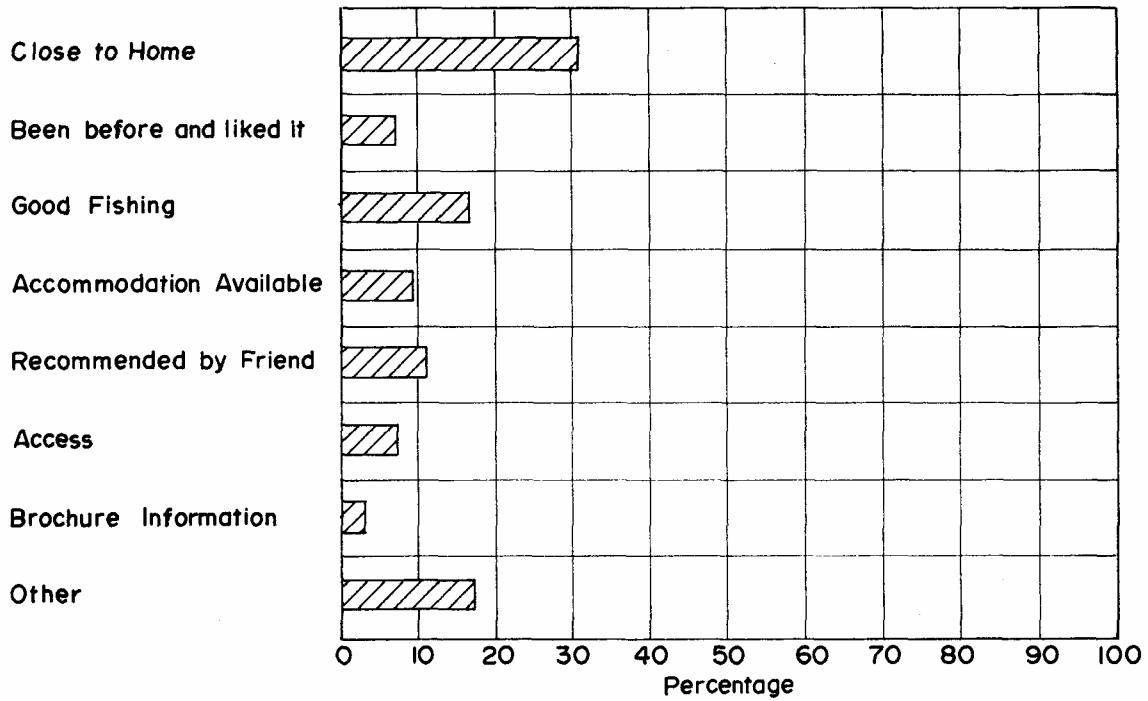
EDUCATION*	Okanagan Residents* (Percent)	Resident Anglers (Percent)	Non-Resident Anglers (Percent)
Grades 1 - 8	16.4	20.6	10.5
Grades 9 - 12	61.6	57.8	45.7
Some University or Graduate	11.0	15.7	31.9
Technical Training	11.0	5.9	1.9

\* Resident Survey Data - op. cit (Table 5.8)

#### 13.4 BEHAVIOUR AND PREFERENCES

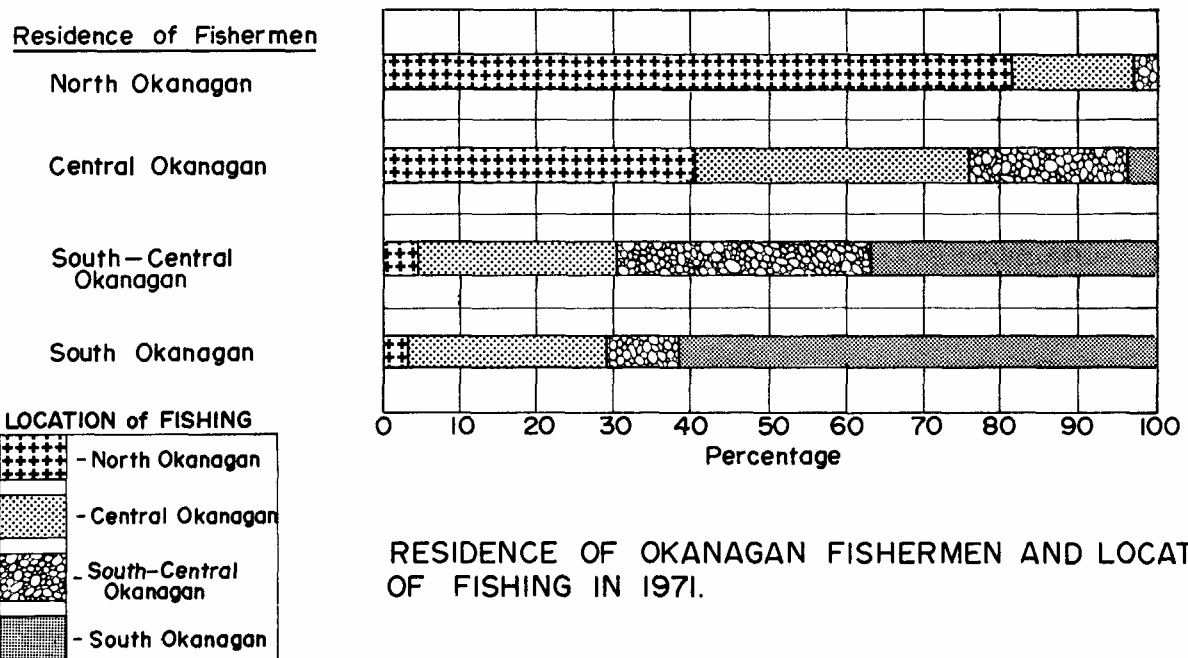
Effective management of the sport fishing resources in the Okanagan should be responsive to the needs and desires of the participating fishermen. This section discusses resident and non-resident attitudes and preferences for fishery management in the valley and where possible, compares these attitudes with anglers' actual behaviour. This comparison is required since respondent's statements and attitudes as discerned in questionnaire surveys frequently do not match their observed behaviour. The section begins by discussion preferences for location and type of fishing experience in the Okanagan and backs this up with an analysis of observed behaviour including travel time and energy expended to reach fishing sites.

Resident anglers were asked why they fished at particular locations in the valley, and the results are shown in Figure 13.4. Over 30% mentioned proximity to place of residence and a further 16% stated that the high quality of fishing were the principal reasons. No other reason was prominent as indicated by the relatively high proportion of responses in the 'other' category which included such comments as moorage facilities, aesthetics and "a good place to stop for lunch". It is perhaps worth noting that though few resident anglers placed high priority on fishing success per se, most expressed dissatisfaction if they failed to catch at least one fish every 2-3 outings.



FACTORS TAKEN INTO CONSIDERATION BY RESIDENT ANGLERS WHEN CHOOSING A FISHING LOCATION IN THE OKANAGAN BASIN.

Figure 13.4



RESIDENCE OF OKANAGAN FISHERMEN AND LOCATION OF FISHING IN 1971.

RESIDENCE OF OKANAGAN FISHERMAN AND LOCATION OF FISHING IN 1971.

Figure 13.5



The importance of proximity of fishing to residence is borne out by behavioral patterns (Table 13.10). Apart from the 34% of the general sample who camped at their fishing location, a further 33% spent less than 30 minutes to reach their site. Only 13% of the general sample spent more than an hour travelling to their fishing location. Travel time varies between headwater and main valley lake angling. Over 75% of resident respondents fishing the main valley lakes were on site within 30 minutes of leaving their homes, compared with 7.5% of headwater anglers. Apparently the headwater anglers are willing to trade off time and energy for the perceived higher quality of fishing opportunities in the upper lakes.

TABLE 13.10  
TIME REQUIRED TO REACH FISHING SITE OF INTERVIEWED  
RESIDENT OKANAGAN BASIN ANGLERS IN 1971

TIME	GENERAL SAMPLE (Percent)	MAIN LAKES ANGLERS (Percent)	HEADWATER LAKE ANGLERS (Percent)
Stayed Overnight	34.3	18.1	44.8
Less than 15 Minutes	23.2	61.1	1.5
15 - 30 Minutes	10.1	15.2	6.0
31 - 60 Minutes	18.8	4.2	27.6
1 - 2 Hours	9.7	0	14.9
Over 2 Hours	3.8	1.3	5.3

The importance of proximity of angling to residence of resident Okanagan anglers is illustrated in Figure 13.5. Over 80% of North Okanagan resident anglers fished in the lakes of the northern Okanagan, and about 60% of Penticton area and Oliver-Osoyoos area anglers fished in their respective regions. Only anglers resident in the central portion of the Okanagan region were found more frequently in the northern Okanagan region (58%) than in their home regions (52%).

Many resident anglers appreciated the ready availability of good or acceptable angling and expressed a strong desire to see it maintained or enhanced.

An overwhelming majority (80%) of all anglers questioned stated that they preferred catching rainbow trout to kokanee or other sport fish. As rainbow trout represent almost all of the available catch in the headwater lakes, this attitude parallels headwater angler behaviour. However, almost half (48%) of main valley lake anglers stated a preference for rainbow trout, even though kokanee constituted 80% by weight and 94% by number of all fish caught in these lakes. Apparently many main lake anglers are content to catch their secondary preference at a good success rate in lieu of available stocks of rainbow trout. A number of headwater anglers stated that they would fish more frequently in the main lakes if the rainbow trout fishery were improved. Main reasons cited for anglers' preference for rainbow trout included its fighting ability and suitable sport for fly fishing, while many of those preferring kokanee did so because of its flavor.

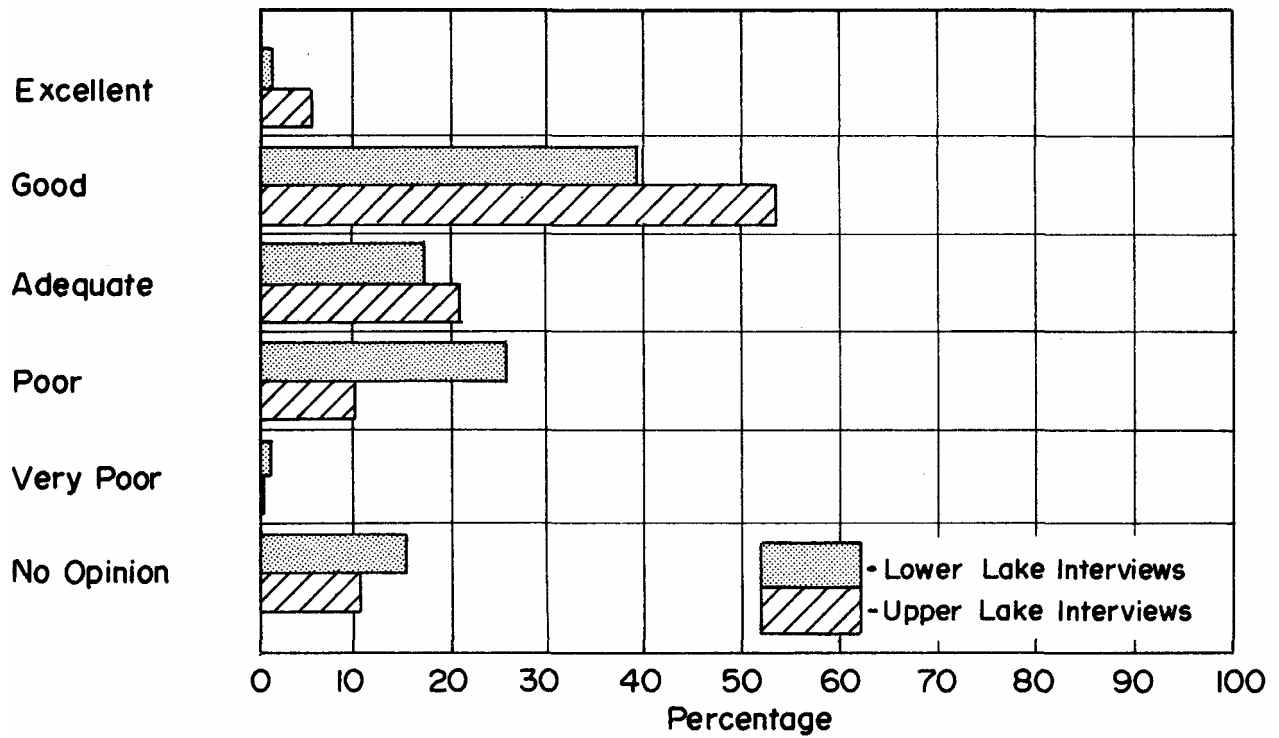
Anglers were asked if they were generally satisfied with the range of fishing experiences offered in the Okanagan, and 60% stated that they were satisfied while 28% indicated that they were not. The remainder did not offer an opinion.

Residents were asked to state their preferred angling experience and to indicate, if appropriate, what types of fishing they would like to see more of in the Okanagan. The results are shown in Table 13.11, and indicate that over one-third (36%) of anglers had no particular preferences and the majority of the remainder preferred some type of headwater angling experience. A significant minority (23%) desired more stream fishing in the valley. These results are compared with the responses from the sample of anglers who initially indicated that they were generally unsatisfied with fishing opportunities (Table 13.11) The reason for their dissatisfaction appears to be mainly due to the absence of stream fishing (52%) and shortage of lakes where only fly-fishing is permitted. It should be emphasized that in absolute terms, few anglers appeared to be particularly concerned about the lack of stream fishing, realizing that the Okanagan was not a particularly suitable location for this activity. However, many were aware of the use of tributaries for irrigation water storages and diversions and some mentioned that efforts should be made to manage one or two tributaries for stream fishing, rather than for the single purpose of water supply. It is interesting to note that only a very small minority of anglers, including main valley lake anglers, mentioned a particular preference for main lake fishing.

TABLE 13.11  
STATED PREFERENCES FOR FISHING OF  
OKANAGAN BASIN ANGLERS

TYPE OF FISHING	GENERAL SAMPLE	"UNSATISFIED" SAMPLE
No particular preference	36.4 %	- %
Headwater fishing:	35.0	48.2
General	(20.4)	(22.2)
Fly fishing	(10.7)	(20.4)
Lakes with no motor boats	( 3.9)	( 3.6)
Stream fishing	22.8	51.8
Main lake fishing	5.3	1.8

The Okanagan sport fisherman is offered a range of facilities, some public such as boat ramps and boat docks, and some private such as boat rentals and equipment. Figure 13.6 indicates that the majority of anglers were satisfied with the existing range of service with 70% considering them either good (50%) or adequate (20%). There was a tendency for main valley lake anglers to be relatively less satisfied with the facilities offered than were the headwater anglers. Most of



ANGLER EVALUATION OF QUALITY OF FACILITIES IN THE OKANAGAN BASIN.

Figure 13.6

this dissatisfaction was levelled at poor or inadequate public boat launching facilities around Okanagan and Osoyoos Lakes. There are only two public boat ramps at Osoyoos Lake and two in the immediate vicinity of Kelowna, where a large number of residents and tourists fish throughout the fishing season. The major criticism of headwater fishing facilities was centered on sub-standard boat rentals offered at some private fishing camps.

### 13.5 ECONOMIC EVALUATION OF SPORT FISHING

As mentioned earlier (Section 13.1) one of the problems associated with evaluating water requirements for sport fishing is that recreational fishing is not sold or marketed and anglers are presently not asked to pay to fish. This does not mean that fishing is valueless, for in all likelihood fishermen would pay if required. Under the current policy of zero pricing, it is necessary to devise indirect methods for calculating the total value of recreational fishing to the Okanagan Valley.

This section briefly describes the methods used to place values on sport fishing and then calculates the total value accruing to the Okanagan using the described techniques. As the viewpoint of economic analysis is related to the Okanagan Basin, the methods used in this evaluation process differ between resident and non-resident fishermen as is discussed below.

#### 13.5.1 Non-Resident Fishing Values

The value of non-resident fishing activity in the Okanagan is related to direct expenditures incurred by these fishermen while in the Okanagan. The basic intention in this approach is to determine how much money would not have been spent by non-resident anglers in the Okanagan in the absence of sport fishing opportunities. If fishing in the basin is the primary motivation for a nonresident to travel to the valley, then the total expenditures while in the Okanagan are accounted as gross economic benefits associated with the sport fishery. If fishing is not stated as a primary motivation, then any specific expenditures incurred by the non-resident while fishing (equipment, travel, accommodation) are accounted as gross economic benefits. Revenue from the sale of fishing licences is not included, as this money accrues to the Provincial Government rather than to the Okanagan itself.

To obtain an appropriate estimate of the net economic value of non-resident fishing in the Okanagan, the total costs to the valley residents for providing goods and services for non-resident anglers should be subtracted from the gross expenditures. Estimates of net income accruing the Okanagan from tourist expenditures in retail and accommodation facilities have been made during the Basin Study and are used in this report. These figures probably underestimate the net economic gain of non-resident angler expenditures, since non-resident fishermen represent less than 2% of total holiday summer visitors to the Valley (Total number

of holiday visitors was estimated at 485,400, while the number of non-resident anglers was estimated at 7,620), and many of the retail and accommodation facilities required to serve tourist anglers would be provided even in their absence.

The above mentioned net gain contributes to the Okanagan economy and this should be accounted for under the economic growth objective, one of the multiple objectives associated with the Okanagan Basin Study. However, these net economic benefits may not represent the total value of fishing to non-resident anglers. The degree to which a visitor's aesthetic satisfaction exceeds the real costs associated with his fishing experience is part of the concept of consumer surplus and should be accounted under the social well-being objective. Some attempt was made to measure such values in surrogate dollar terms by asking non-resident anglers how much they considered a day's fishing was worth over and above their daily expenditures.

### 13.5.2 Resident Fishing Values

Resident participation in sport fishing contributes to both the economic and social well-being goals of the Okanagan Study. The economic values include expenditures on equipment, moorage and rentals. As fishing is a unique recreational experience, it appears feasible that in the absence of fishing opportunities in the Okanagan, some residents would spend a portion of their recreational funds in adjacent regions such as Kamloops or the Kootenays to continue their fishing enjoyment. Net income accruing from this assigned portion of resident expenditures is used as a measure of economic value.

The costs of managing the Okanagan sport fishery must be subtracted from this net income from resident angler expenditures to obtain a net economic benefit to resident fishing. The justification for accounting all management costs to resident fishing is based on the grounds that the fishery would be managed for residents anyway, even in the absence of non-resident anglers.

Resident anglers experience aesthetic benefits which accrue to the well-being goal. An attempt was made to quantify these values in surrogate dollar terms by determining the amount of compensation a resident angler would require to leave him equally satisfied if the fishery were eliminated. Unfortunately, this approach is open to significant upward bias, and so an alternative question asking the resident to estimate the worth of a day's fishing was used instead. Through testing, it was determined that respondents could provide answers more easily by comparing their satisfaction of a days' fishing with other recreational experiences for which they are required to pay, such as skiing, golf, skating, etc. Such comparisons may also have resulted in biases, and thus results should be considered with care.

13.5.3 Non-Resident Angler Expenditures

Table 13.12 shows the average expenditures of non-resident anglers in 1971, both those primarily motivated for fishing in the valley and those to whom fishing was a part of a package of recreational experiences. The expenditure per angler-day of \$24.00 by primary motivated tourist-anglers compares favorably with the figures obtained by Pearse Bowden, Economic Consultants Limited (1971). Based on the average angler day figures, total gross expenditures by the entire non-resident angler population in 1971 amounted to \$500,380, an average of \$65.67 per angler. The breakdown of these expenditures is estimated from partial returns from the questionnaire survey and from data obtained from Pearse Bowden Economic Consultants Limited (1971). Slightly more than half the total revenues were obtained from food and accommodation expenditures, about 25% from travel expenses and the rest from equipment expenditures, boat rentals, etc.

TABLE 13.12  
NON RESIDENT ANGLER EXPENDITURES  
IN THE OKANAGAN IN 1971

	Total Expenses	Food and Lodging	Equipment	Rentals	Total
<u>Primary-Motivated Anglers</u>					
Total Expenditures	\$ 90,170	\$191,770	\$ 30,480	\$ 50,800	\$ 363,220
Expenditures per Angler	35.50	75.50	12.00	20.00	143.00
Expenditures per Angler Day					24.00
<u>Other Anglers</u>					
Total Expenditures	\$ 38,100	\$ 60,900	\$ 12,700	\$ 25,400	\$ 137,160
Expenditures per Angler	7.50	12.00	2.50	5.00	27.00
Expenditures per Angler Day					5.50
TOTAL EXPENDITURES	\$128,370	\$252,730	\$ 43,180	\$ 76,200	\$ 500,380

The proportion of net income accruing to Okanagan residents from these total expenditures can be estimated from income coefficients obtained in the economic growth study. These coefficients take into account both direct and indirect (multiplier impact) effects upon the total Okanagan economy. Table 13.13 indicates that the net economic value of non-resident sport fishing in 1971 was \$261,100, representing an average of \$34.26 for each non-resident angler. About 60% of these net benefits accrued from food and accommodation revenues, where there is a significant multiplier effect within the Okanagan Valley.

TABLE 13.13  
NET BENEFITS FROM NON-RESIDENT ANGLER  
SPENDING IN 1971

Type of Expenditure	Income Coefficient	Total Gross Expenditures	Total Net <sup>a</sup> Benefits
Food and accommodation	0.59	\$ 252,730	\$ 149,100
Travel expenses <sup>b</sup>	0.31	128,270	39,800
Retail costs	0.31	43,180	13,400
Boat rentals, etc.	0.77	76,200	58,800
<b>TOTAL net benefits</b>			<b>\$ 261,100</b>
<b>Net benefits per angler</b>			<b>\$ 34.26</b>

<sup>a</sup> These benefits are based on the assumption that over the total angling season, 40% of non-resident anglers come to the Okanagan for the primary purpose of fishing.

<sup>b</sup> These expenses are included in the retail sales sector and thus may lead to an overestimate of total income. However, other retail sales such as fresh fruit from roadside stands is not included in the retail sector, which probably will compensate for this factor.

#### 13.5.4 Resident Angler Expenditures

Estimates of total annual expenditures by resident anglers were obtained from two questions:

1) travel costs per trip and

2) expenditures on equipment, boats, moorage costs, etc. Median travel and rental costs per resident angler in 1971 were estimated at \$32.00, (\$12.00 rentals and \$20.00 travel) while the median value of total additional expenditures on equipment, etc. was estimated at \$140.00 for a total of \$172.00 per angler. Thus, during the 1971 season, resident fishermen spent approximately \$1,149,000 on goods and services associated with sport fishing in the Okanagan.

Actual net income accruing to the Okanagan from resident anglers' expenditures is difficult to assess as it is not known how much would be spent outside the Basin in the absence of a fishery in the region. Some indication of this amount can be obtained from an analysis of fishing behaviour of the sample of residents contacted. Approximately 50% stated that they fished outside the Okanagan at least once a year, and it is therefore assumed that they would be willing to spend their present amounts outside the Basin in the absence of an Okanagan sport fishery. Therefore, the net income received from resident angler expenditures was reduced by 50% to provide an estimate of the assigned net income derived from resident anglers. Table 13.14 shows that resident anglers contributed a total estimated net income of \$199,100 to the Okanagan economy in

1971, representing \$29.80 per resident angler. As anticipated, most of this expenditure was associated with equipment and boat purchases. It should also be noted that there appeared to be a positive relationship between resident expenditures and household income; i.e. the wealthy angler tended to spend more money than the poorer angler, thus compounding the associated tendency for wealthy anglers to fish more frequently than their less wealthy counterparts .

TABLE 13.14  
NET BENEFITS FROM RESIDENT ANGLER  
SPENDING IN 1971

Type of Expenditure	Income Coefficient	Total Gross Expenditures	Total Income	Total Net Income (50% of Total Income)
Retail Expenditures	0.31	\$ 920,300	\$ 285,300	\$ 142,600
Travel Expenses	0.31	137,900	42,700	21,400
Boat Rentals	0.77	91,100	70,100	35,100
Total Net Benefits		\$1,149,000	\$ 398,100	\$ 199,100

#### 13.5.5 Costs of Managing the Okanagan Fishery

The costs of managing the Okanagan sport fishery should be weighed against the net income benefits accruing from resident angler expenditures to obtain a true measure of the net economic benefit. These annual costs, estimated by the B.C. Fish and Wildlife Branch, are about \$90,000.

Under the assumption that the costs of managing the Okanagan sport fishery would be the same in the absence of non-resident anglers, part of these costs should be subtracted from the assigned net income derived from resident anglers' expenditures. This fraction should represent the value added to the Okanagan economy resulting from the expenditures of wages of Fish and Wildlife Branch personnel associated with sport fishery management. In addition to income created from purchases of equipment and vehicles should also be accounted as a net cost. The costs of operating and maintaining the Fish Hatchery at Trout Creek are not included in this total however, as this hatchery serves other regions in British Columbia and it is assumed that it would continue to operate in the absence of an Okanagan sport fishery.

Total net costs of managing the sport fishery from the viewpoint of the Okanagan are estimated at \$14,350. This total comprises \$8,995 resulting from income expenditures and \$5,355 generated from purchases of vehicles, equipment and fish habitat improvement costs. Thus, the net economic benefits to the Okanagan as a result of resident angler participation are estimated at \$199,100 minus \$14,350, or \$184,750.



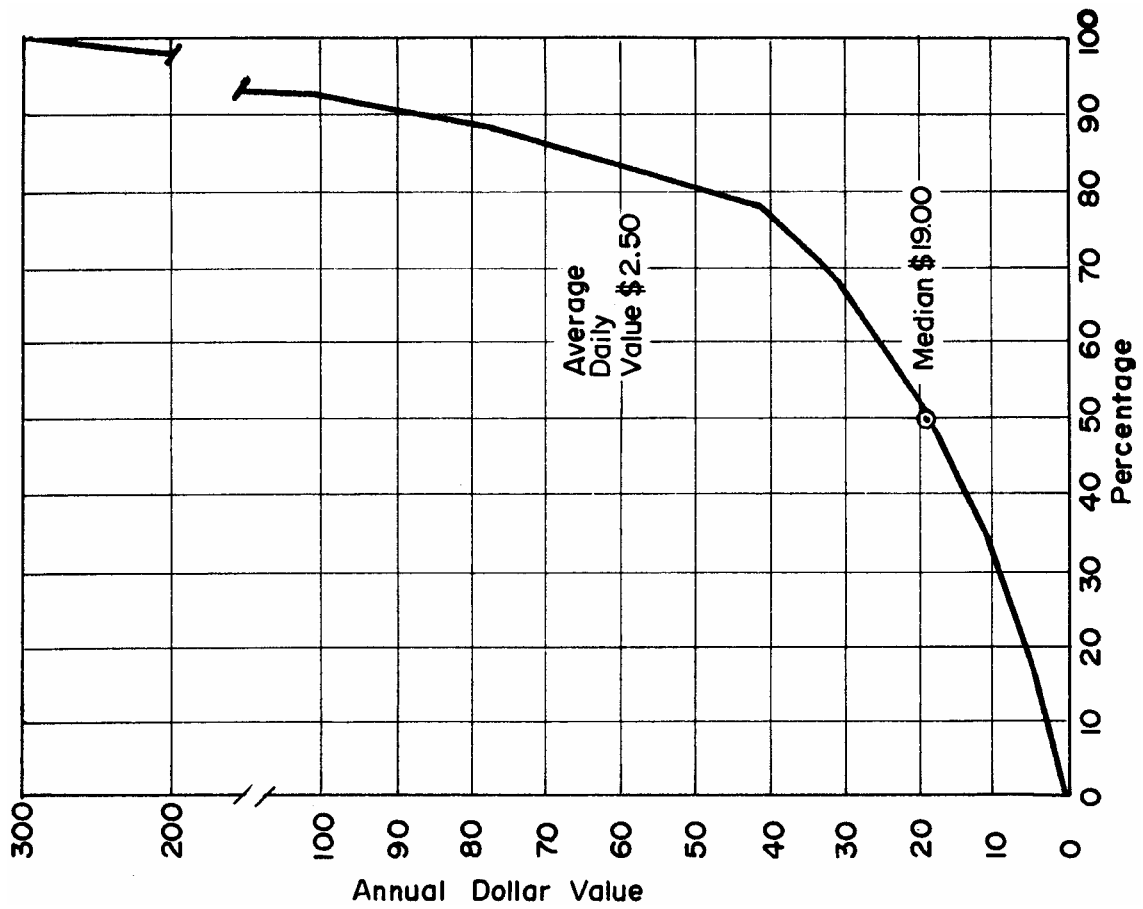
In summary, sport fishermen spent a total of \$1,649,380 in the Okanagan during the 1971 fishing season. Resident anglers spent an estimated \$1,149,000: an average of \$172.00 per angler and \$10.75 per angler-day. Non-resident anglers spent an estimated \$500,380: an average of \$65.57 per angler and \$9.38 per angler-day. Tourist fishermen, for whom fishing was the primary reason for coming to the Okanagan, spent an average of \$24.00 per angler-day.

The net economic benefit to the Okanagan resulting from angler expenditures totalled \$445,850 in 1971. About 60% of this net benefit (\$261,100) is ascribed to non-resident angler expenditures and the remainder (\$184,750) to resident angler spending.

#### 13.5.6 Non-Economic Values

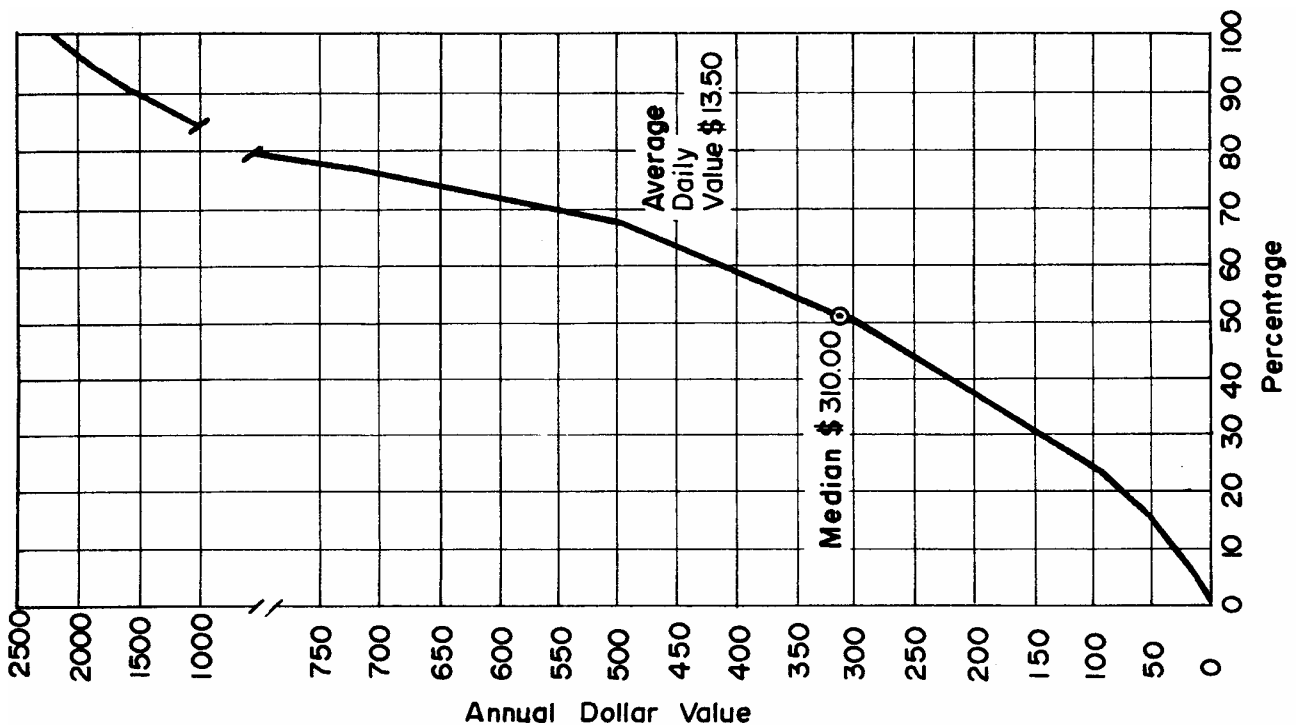
Under a zero-pricing policy, the net economic benefits derived from expenditures of resident and non-resident fishermen cannot necessarily be equated with the total value of their sport. In the absence of any market-price data, both resident and non-resident anglers were asked how much a day's fishing was worth over and above their estimated expenditures. The results of this question are shown in Figures 13.7 and 13.8, which indicate the percentage of resident and non-resident anglers who stated various levels of aesthetic value integrated over the fishing season. The median value for resident fishermen is \$310 per season or \$13.50 per angler-day, while the median value for non-resident anglers is \$19.00 or \$2.50 per angler-day. The large difference between the two values appears to be due to the fact that non-residents were more immediately aware of the daily expenditures involved in fishing, whereas the bulk of resident expenditures involved large single payments for equipment and moorage fees, daily costs usually being under \$5.00.

Applying median values to the total number of resident and non-resident angler-days provides an estimate of the total social value of sport fishing in the Okanagan. For resident anglers this value amounts to approximately \$1,830,000 and for non-resident anglers to \$58,000 to produce a total of \$1,888,000 for the 1971 fishing season. This figure represents the additional value anglers place on their recreational experiences in the Okanagan over and above their direct expenditures. As no actual money is involved, these values should be accounted under the environmental quality objective as a surrogate for recreational aesthetic values and should be separated from the expenditure dollars mentioned in the previous section, as these accrue to the economic growth goal.



NON-RESIDENT FISHERMEN, ANNUAL AESTHETIC VALUES ASSOCIATED WITH ANGLING IN THE OKANAGAN BASIN.

Figure 13.8



RESIDENT FISHERMEN, ANNUAL AESTHETIC VALUES ASSOCIATED WITH ANGLING IN THE OKANAGAN BASIN

Figure 13.7