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Most people think of outdoor recreation as related to public welfare, health, both physical and mental, and general education. Although there is general reluctance to place a dollar value on outdoor recreation, no one has ever doubted that it has value.

The participation in outdoor recreation has been increasing rapidly for many years. With the prospect of very substantial increases in total population, per capita leisure time, income, and travel etc., a concomitant growth in the demand for outdoor water-oriented recreation is expected. On the other hand, increasing demands for the use of rivers and streams among nonrecreational alternative uses causes concern about realistic and efficient use of these resources. Procedures have been developed for estimating the monetary benefits resulting from most of the water uses such as hydro-electric power, irrigation, navigation and flood control, soil conservation, and municipal and industrial water needs. However,

the benefits from recreation (by itself or as an aspect of a multi-purpose use) are not easy to measure. Methods employed to measure recreational benefits have ranged from attempts to use economic theory and logic to pure "judgement" evaluations.

In this study an attempt was made to estimate the economic importance of the recreation provided by the salmon-steelhead sport fishery resource in Oregon. To achieve this purpose, estimates have been made of 1) annual expenditures by salmon-steelhead sport anglers; 2) the "net" economic value of this resource; and 3) some basic relationships of fishermen's demand for salmon-steelhead fishing. Expenditure data were obtained each month by a mailed questionaire. Over 5, 700 questionaires were mailed and approximately 4, 400 were returned. Additional information regarding anglers' attitudes and fishing patterns was obtained from 305 personal interviews. Net economic value of the salmon-steelhead sport fishery was estimated by simulating a market pricing mechanism.

It was estimated that during 1962 salmon-steelhead anglers spent over $9 million for durable fishing equipment and over $8 million on "current" expense items associated with salmon-steelhead fishing trips. Counting expenditures for angling licenses connected with salmon-steelhead, the annual gross economic value of the sport fishery was estimated to be in the neighborhood of $18 million, plus or minus $3 million.

Net economic value (which could be obtained if a market existed for the opportunity of fishing for salmon-steelhead) was estimated to be in the range of $2.4 to $3.0 million per year, as of 1962. This value was estimated by three different econometric models producing quite comparable results. A further analysis with one of the models indicated that the salmon-steelhead sport fishery should become increasingly valuable with increasing population and higher family incomes. A 40 percent increase in net economic value to $4 million annually within ten years is possible if income and population trends of the past 15 years continue.

AN ECONOMIC EVALUATION OF THE SALMON-STEELHEAD SPORT FISHERY IN OREGON

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CHAPTER I

INTRODUCTION

Statement of the Problem

For years the subject of outdoor public recreation has been under discussion and the general belief that recreation values are intangible has tended to detract from interest in the field. This has kept the development of economic theory of outdoor recreation behind the times and need.

The participation in outdoor recreation has been increasing rapidly for many years. For the period since world war II, the yearly rate of increase has averaged around 10 percent for many types of outdoor recreation activities (14, p. 1). The major factors considered to be responsible for this steady and relatively rapid rise in the use of recreation facilities have been: 1) increasing total population; 2) increasing per capita real incomes; 3) increasing per capita leisure; 4) increasing per capita travel; 5) a revision of our attitudes towards recreation; and 6) increasing knowledge of the recreation facilities.

Population of the United States has doubled between 1860 and 1890, doubled again between 1890 and 1930 and increased half again by 1960 (58, p. 301). This upward spiraling is expected to continue and the population of the United States is projected to be over 225 million by 1975 and around 350 million by 2000. A close look at the growth curves of population and national park visits reveals that the national park visitation since 1945 has been increasing even faster than the "exploding population". This relationship is expected to continue with the national park visits growth curve becoming comparatively steeper (63, p. 7).

Average productivity per man-hour in the United States (measured in constant 1950 dollars) was about 41 cents in 1860, 76 cents in 1900, 93 cents in 1920, 1.32 dollars in 1940 and 2.42 dollars in 1960. This increase reflected rising per capita real incomes. Per capita real incomes are projected to be about $3000 by 1975 compared to $2000 in 1959. With higher income many families find it both possible and desirable to increase their propensity to spend (both time and money) for recreation purposes (58, p. 301).

Increasing leisure as a result of the dropping average workweek hours appears to be contributing towards greater demands for outdoor recreation. The average workweek in the United States dropped from 69.8 hours in 1850 to 60.2 hours in 1900, 49.7 hours in 1920, 43.3 hours in 1940 and 39.7 hours in 1960 (58, p. 299). A study

made under the aegis of the Senate Select Committee on National Water Resources projects the leisure hours per week to rise to nearly 78 hours in 1975 and 85 hours in 2000. This compares to nearly 72 hours in 1959 (63, p. 7). This suggests that the increasing leisure is likely to result in increasing participation in the outdoor recreation activities. This conclusion is subject to challenge. One may argue if there is really any genuine leisure[1] insofar as our "non-working" hours are crowded with the thousand-and-one necessary details of modern life. To some ways of thinking an average American has so little time to call his own and one often hears him say, "I don't have time".

Leisure has also been explained in the context of economic growth, productivity and propensity to work and play. The leisure time is positively correlated both with the economic growth and productivity, but it has negative correlation with the propensity to work. In other words the societies with higher economic growth and productivity levels would tend to have greater leisure and consequently greater demands for outdoor recreation. A detailed and critical analysis on leisure time is presented by Wilenskey (66, p. 32-56)

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[1] Leisure is the time one has free from his income earning responsibilities and from personal family housekeeping activities such as eating, sleeping, keeping house, personal grooming, shopping and similar activities that are necessary for day to day existence (58 p. 299). Leisure is by choice not by need.

and Donald (26, p. 355-360).

The revolution in communication and transport facilities have made it possible to reach distant recreation sites in much shorter time. "Wonders of nature" that once seemed far away are just around the corner. In 1945 an average American traveled a total of 1500 miles compared to 3500 miles in 1959. It is estimated that the per capita annual total miles traveled would reach 4750 miles in 1975 and nearly 5000 in 2000 (63, p. 7).

Although Americans still adhere to a work ethic, the work is partially being considered as a means of attaining enjoyment of leisure. The outdoor recreation experience is attaining the place of "an economic good"[1] from the traditional meaning of "natures' free gift". This change in attitudes is of particular interest to economists, because the recreation experience as a human behavior (although not explicitly market oriented) depicts a reasonable degree of rationality in relating means and ends. That is, there is involved some sort of economizing and choice process.

The aforesaid suggests that the participation in outdoor water-oriented recreation is expected to continue at a phenomenal rate.

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[1]Some people have thought that recreation is a factor of production or something which stimulates the factor of production, but it seems that recreation has more explanatory meaning when considered as a consumption good.

ORRRC[1] reports that the demand for fishing opportunities (the second most favored outdoor water sport) is expected to increase over the coming years - 50 percent by 1976 and 150 percent by 2000 (42, p. 71). At the same time increasing demands for the utilization of rivers and streams for hydro-electric power, irrigation, flood control, industrial use, navigation, and waste disposal sometimes present severe problems to fishing activity (specially to the anadromous fish habitation) in these rivers and streams.

It is quite evident that the competition for land and water among the major uses begs a vital question - what price tag does society place on each of the water uses?[2] Answers to this question would permit economic comparisons and establishment of priorities for the various water uses. Procedures have been developed for estimating the monetary benefits resulting from most of the water uses mentioned above. However, the benefits from recreation (by itself or as an aspect of a multipurpose program) are not easy to measure. Besides the complications of measurement one encounters many arguments against placing specific monetary values on outdoor recreation.

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[1] ORRRC as an abbreviation of Outdoor Recreation Resources Review Commission will be used in the following pages where ever needed.

[2] Although land and water resources are fixed in the physical sense it is recognized, however, that their usefulness can be increased through capital investment and better management.

Prewitt concludes that recreational values cannot be measured in dollar terms other than on some arbitrary or judgment value basis (49, p. 30). In 1960 California Public Outdoor Recreation Plan Committee stated (11, p. 200):

> The benefits of recreation are exceedingly hard to calculate. Many persons feel that recreation is a basic necessity of life, and that the promotion of recreation is a promotion of the general welfare specified in the Constitution of the United States, and is part and parcel of the right to "the pursuit of happiness". Its primary benefits are intangible, and do not lend themselves to measurement. The betterment of tenor of mind and body, the increased knowledge and awareness through intimate contact with nature, the enhancement of the appreciation of beauty (or of our own historic past), the quickening of spirit - few of these can be reckoned in any part by any yardstick yet devised... The economic benefits expressed in dollars and cents are by most experts considered to be secondary to these paramount but impalpable ones.

Nevertheless, there are a few like Professor Hotelling and Clawson who have pioneered in conceptualizing the problem and have come up with a practical method of measuring the net benefits of outdoor recreation.[1]

Quite logically, if recreation is to be considered in the same manner as other alternative uses of land and water resources, then a value needs to be placed on the amount of recreation provided. The type of outdoor recreation analysedin this thesis is the recreation provided by the Oregon sport fishery resource during the calendar

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[1] Their contribution is discussed in detail in chapter 2.

year of 1962, to the salmon-steelhead anglers who fished within Oregon boundaries including coast. An attempt was made to measure the economic value of the salmon-steelhead sport fishery, in terms of gross and net benefits.

It needs to be pointed out that salmon-steelhead angling is part of the total or general angling activity and attention is focused on salmon-steelhead angling only (with a few references to general angling). Further, the salmon-steelhead fishery resource in Oregon is open (under prescribed regulations) to 1) sport fishermen for recreation and 2) commercial fishermen for livelihood. Again this analysis is limited to the salmon-steelhead sport fishing. In the following section of this chapter the distinction between sport and commercial fishing is outlined.

Commercial Versus Sport Fishery

There is considerable investment by the Oregon commercial fishery operated through private interests. The commercial fishery can be defined as the fishing activity where the species of fish are caught, processed, and sold commercially. In this case, economic evaluation is conceptually straightforward and should be possible to estimate empirically. Important considerations in such an economic evaluation of fishery resources have been pointed out by Crutchfield. He shows that for evaluation of the commercial fishery a full measure

of potential economic yield requires realistic estimates of the lowest costs possible for harvesting the commercial catch. That is, an effective evaluation of the commercial catch should assume that the most efficient of known techniques be employed in harvesting the fish. It is necessary to compute costs in this way due to the nature of a common property resource. Quoting from Crutchfield (20, p. 146-147):

> As long as the fishery is open to all comers, no net yield--gross value over total production costs (including a reasonable return for capital invested) can be developed. This yield which would constitute the net contribution of the resources itself would ordinarily accrue as rent to the owner of the resource, as in the case of farm land, forests and mines. Even if he chooses to use it himself, full costs must include the amount which he could have earned by leasing the property. Since no one fisherman has a property right in the resource, no one can be made to pay a 'rent' to fish. The rent simply looks like excess profits and it attracts new gear and men until costs are again equal to receipts.

He further points out that a computation of costs under such an inefficient system would not be satisfactory or comparable since net yield from power, irrigation, and other competing water uses is calculated on the assumption of sensible management to maximize income from a valuable property right. For valid comparisons, net yield from a fishery should also be estimated on the assumption of sensible management to maximize income from the fishery resource. The minimum cost of taking the sustained physical commercial catch can be estimated fairly accurately. Subtracting this estimated minimum

cost from the value of average annual landings should provide a good estimate of the annual net value of the commercial fishery.

There are various ways the sport fishery could be defined, depending upon the objectives. The most obvious definition is - a set of resources which provide recreation opportunities to fishermen who engage in this activity by choice and not by need. The above definition does not lend practical approach to the problem of measurement of the recreation benefits. From the practical point of view, the sport fishery can be defined as a set of resources managed by a monopolist (in this case a public agency) who seeks to maximize the net benefits from selling the "fishing" as its product. For the purposes of this analysis we will use the latter definition. For the sport fishery, the end "product" is fishing rather than fish. Therefore, it does not make sense to try to estimate the value of the sport fishery by multiplying the number of fish caught by sportsmen times the commercial value of such fish.

Direct estimation of the value of the sports fishery is very difficult because the product is rarely marketed commercially in the United States. According to Crutchfield an incomplete gross value measure can be provided by surveys of angler expenditures if they are properly defined and measured. Where people choose freely to spend money on fishing it can be inferred that they value it at least as highly as other things that could be bought with the same money.

This figure is incomplete, however. It may not include the full cost of local, state, or federal services which contribute to sport fishing. More important is the omission of a full charge for the right to fish--the rent of the fishery resource. Surveys of angler expenditures usually include only the costs of obtaining fishing equipment and of getting to the fishing area. If fish were so abundant that anyone could fish without restriction, the usual angler expenditures would be sufficient. However, if the catch of the more desirable game fish must be rationed, the "price" of fishing is below the equilibrium level where supply and demand are equated (21, p. 335-346).

Crutchfield has rightly emphasized that it is the value of fishing rights that is crucial for the valuation of the sport fishery. This concept is consistent with his method for valuating the commercial fishery. The main difficulty is not that the value of sport fishing rights are intangible but that the law and tradition make sport fishing available on a basis that does not provide the full measure of the willingness to give up other things of value in order to fish. Therefore, it is necessary to simulate the results of a market pricing mechanism which is not operative because it is inconsistent with a tradition of complete equality of access to outdoor recreational resources. Herbert Hoover, the past president of the United States and an ardent fisherman expresses "equality" in the following way (31, p. 243-245):

> Fishing is a discipline in the equality of man, for all men are equal before fish. . . Fishing is a chance to wash our souls with pure air, with rush of the brook or with the shimmer of the sun on the blue water. It brings meekness and inspiration from the scenery of nature, charity towards tackle makers, patience towards fish and mockery of profits and ego.

This suggests that the aesthetic values and beliefs though invariably unmeasureable should clearly be identified and taken as given in the economic analysis.

Objectives of this Study

The broad objective of this study was to develop information on the economic importance of the s-s[1] (salmon-steelhead) sport fishery in Oregon. The achievement of the above objective would provide information 1) to assign gross and net benefit figures on s-s sport fishery, 2) to compare the relative position and place of s-s fishing as a recreation with that of other uses of the same resource; 3) to measure the effect of varying additional fees for s-s angling on the benefits to the resource; 4) to construct an econometric model which would help in predicting future needs; 5) to aid decision making towards management, propagation, and conservation policies of the resource; 6) to initiate further research in this area.

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[1] s-s as an abbreviation of salmon-steelhead will be used in the following pages. Salmon-steelhead includes primarily chinook salmon (Oncorhynchus tshawytscha), silver salmon (Oncorhynchus kisutch, and steelhead trout (Salmo gairdneri).

Hypothesis

1) Income, fishing success, distance traveled to fishing spot, and cost of fishing have significant effect on s-s fishing days taken.

2) The Clawson model suited for park demand can also be applied towards determining fishing demand.

3) "Other" fishing is a close substitute for s-s fishing; and the anglers living at farther distance from the s-s fishing spot do progressively less s-s fishing.

Limitations

The estimates in this study are based upon conditions which existed during the 1962 calendar year and do not pertain to returns which might be obtained under modified fishing regulations.

Since each recreation facility has its own peculiar characteristics concerning physical appeal and services available, the application of the econometric models (estimated through this study) should be made with caution. However, the same technique can be used in estimating the parameters of similar models.

Although the estimates of this study have relevance to management problems, the study should not be viewed as a management study.

Finally, it needs to be mentioned that the results from this study

stand chances of improvement with further insight into the subject.

CHAPTER II

METHODOLOGY

In this chapter a brief review is made of the methods which have been employed in evaluating the recreation benefits. The last part of the chapter presents the methods which were used in this study.

Historically the expenditures method has achieved wide popularity but the most promising methods which have been employed to evaluate recreation benefits appear to have descended from an ingenious suggestion by Professor Hotelling. His suggestion is contained in his letter (32, p. 8-9) to the director of the National Park Service, which reads as follows:

> Let concentric zones be defined around each park so that the cost of travel to the park from all points in one of these zones is approximately constant. The persons entering the park in a year, or a suitably chosen sample of them, are to be listed according to the zone from which they come. The fact that they come means that the service of the park is at least worth the cost, and this cost can probably be estimated with fair accuracy. If we assume that the benefits are the same no matter what the distance, we have, for those living near the park, a consumers' surplus consisting of the differences in transportation costs. The comparison of the cost of coming from a zone with the number of people who do come from it, together with a count of the population of the zone, enables us to plot one point for each zone on a demand curve for the service of the park. By a judicious process of fitting it should be possible to get a good enough approximation to this demand curve to provide, through integration, a measure of the consumers' surplus resulting from the availability of the park. It is this consumers surplus (calculated by the above process with deduction for the cost of operating the park) which measures the benefits to

> the public in the particular year. This, of course, might be capitalized to give a capital value for the park, or the annual measure of benefit might be compared directly with the estimated annual benefits on the hypothesis that the park area was used for some alternate purpose.
>
> The problem of relations between different parks can be treated along the same lines, though in a slightly more complicated manner, provided people entering the park will be asked which other national parks they have visited that year. In place of a demand curve, we have as a result of such an inquiry, a set of demand functions. The consumer surplus still has a defining meaning, as I have shown in various published articles, and may be used to evaluate the benefits from the park system.
>
> This approach through travel costs is one of several possible modes of attack on this problem. There are also others, which should be examined, though I think the method outlined above looks the most promising.

Surprisingly enough the above letter appears in the same report (commonly referred as "Prewitt Report" based on the most formal study of the subject to date) which essentially concludes that the recreational values can't be measured (49, p. 30)[1]. It seems that the above conclusion would have been more appropriate if stated as that the recreational values should not be measured rather than can't be measured. At least this would keep the "positive" approach (evident in Hotelling's letter) separate from the "normative" approach. Nevertheless, Professor Hotelling's ideas have stimulated interest

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[1]It may be pointed out that Clawson took exactly the same position in his book Uncle Sam's Acres in 1951 (16) which was published two years after the Prewitt Report.

and initiated more research in this subject. In the next few pages the various methods are critically examined.

Expenditures Method

This method attempts to measure the recreation value under two assumptions: 1) to the recreationist, recreation is worth at least as much as he is willing to pay for it; 2) amount spent for recreation is determined by free choice over other alternatives to spend or save the same sum of money. In many cases the second assumption is a reality.

These recreation expenditures, if they are properly defined, can be estimated by surveys. Estimates of such expenditures have been made in many instances;[1] and have been used in some way relating to the value of the recreation facility itself. State Tourist and Highway Departments often use this method to measure expenditures by tourists. In 1955 the California State Department of Fish and Game used this method to establish "economic values of striped bass, salmon, and steelhead sport fishing in California". The mean expenditure per angler day was $9.18 for striped bass fishermen,

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[1] Almost every group interested in tourist and recreation industry has estimates of average per day expenditures of tourists and recreationists. National Recreation Association (39) maintains partial listing of such estimates.

$16.09 for salmon fishermen, and $18.11 for steelhead fishermen (46, p. 13). Again in 1960 the department employed this method in the "economic evaluation of California's sport fishery". This showed a mean value of $14.27 per resident angler day for fresh water anglers, not including the amortized cost of durable equipment used in sport angling (37, p. 203). On occasion the Corps of Engineers and the Bureau of Reclamation have used the total expenditures as a measure of benefits (35, p. 57).

In 1952 the application of this method was made by Ballaine and Fiekowsky to determine the "economic values of anadromous fishes in Oregon rivers". They estimated $87.77 as an average expenditure per s-s angler per year. The total expenditures by s-s anglers were estimated to range between approximately 7 and 9 million dollars in Oregon during 1951 (2, p. 27). These figures were based on the respondents who constituted less than one-half percent of all the Oregon s-s license holders in 1951. The principal weaknesses of the study are: 1) The relative variability of the s-s expenditures due to the month of fishing and the type of angling license was not taken into account by the simple random sample. 2) The recollections in June, 1952 of the angler expenditures incurred during 1951 were subject to a considerable memory bias and error. 3) The s-s angler as a respondent was asked to report the amount of expenses which accounted for his share of using the family owned equipment (if owned

and used by family) and other current expenditures for s-s angling. Obviously this presents a complicated problem to the respondent. Furthermore, if two or more respondents (for example husband, wife and children) happen to come from the same family the problem of allocation of the family expenses for s-s angling among each respondent becomes even more difficult. Information based on this kind of survey could easily lead to unreliable results. 4) The transportation expenses were obtained by multiplying total miles with 10¢ (as cost of gas, oil and depreciation etc. per mile). The cost of 10¢ per mile seems unreasonably high.

Coming back to the assumptions and justification underlying this method, it has been argued that individuals or groups making such expenditures must have received value corresponding to the expenditures, or they would not have made them. As Crutchfield has suggested, it is true that where people choose freely to spend money on the recreation activity we can legitimately infer that they value it at least as highly as the other things that could have been purchased with the same amount (20, p. 148). But the nature of these expenditures suggests that if the sport fishery were lost, those expenditures would simply be directed toward other goods and services. Loss from this shift, where the sport fishermen would be forced to some second choice, would not be such expenditures but the net value which the expenditures method fails to measure. Therefore, the

expenditures made for the recreation facility both by the recreationists and the maintaining (of the recreation facility) agencies do not provide the value (net) comparable with other use values of the same resource. However, the expenditures estimated under a standard expenditures method would be useful in comparing the relative merits of different single-purpose recreation projects. Nevertheless, the net value of the recreation facility can be imputed from such expenditures. This is shown in some of the methods discussed later.

Gross National Product (GNP) Method

GNP is a commonly accepted measure of economic activity. In this method the GNP concept is applied to measure the recreation value in two alternative approaches.

1) This approach attempts to measure the contribution of recreation towards GNP assuming recreation as a factor of production or something which stimulates production. This suggestion is propounded by Ripley of the California Department of Fish and Game (35, p. 59). He contends that:

> A significant proportion of our high national product is due to the additional productivity gained by individuals through recreation that they would not have gained otherwise... The value of a day spent in recreation can then be assumed to be, on the average, as equal to GNP divided by the total population multiplied by the number of days in the year.

Assuming the United States GNP of 600 billion dollars and 180 million population at the end of 1963, according to this approach, the recreation value of a day spent in recreation would be approximately $9.13 (600 billion divided by the product of 180 million and 365). The total number of recreation days during the year multiplied by $9.13 would provide what he calls "intrinsic value" of recreation to the society. As he points out this method does not provide the net value which can be compared with other alternative uses of the same resource. However, the relative contribution of different recreation activities (providing varying number of recreation days) towards GNP can be compared approximately.

This approach is subject to criticism from at least two angles. First, the treatment of recreation as a factor of production fails to quantify what is intended to measure. Recreation when considered as a consumers' good (even though it may incidentally increase productivity) extends logical interpretation and evaluation. Second, the equal treatment of work and recreation confuses the economic distinction between factor of production and consumption good. He contends that leisure (for recreation) is an essential to production as working time. For that reason, consumption of food by man in

order to remain alive and capable of work[1] is also essential. Should we then call food articles as factors of production? If not, the recreation may more readily be considered a consumers' good.

2) The second alternative use of the GNP concept has been made under the approach named "standard method" which attempts to measure the direct contribution of the recreation industry to GNP. This includes the incomes accruing to the owners of recreation facilities and income component of the expenditures for goods and services contributing to the recreation industry (35, p. 60). This approach differs from the method used for the benefit measurement (gross revenue minus all associated costs) of river basin projects because it will retain those parts of the associated costs which make for the income to factors of production located in the area benefiting directly or indirectly from recreation. However, if each use of a resource were measured according to the National Product Method, there would be some degree of comparability among the alternative uses. Wollman attempted to establish the relative "value of water in alternative uses"[2] with a common device the value-added by the

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[1]It is recognized that the quality of human nutrition could affect the productivity but this does not convert the consumption goods into factors of production.

[2]With special application to water use in the San Juan and Rio Grande Basins of New Mexico.

particular industry or plant. He estimated value-added per acre-foot, measured as the sum of "primary value-added" (the amount by which the market value of the output of the firm or industry exceeded the value of the goods and services that were obtained during the process from other firms or industries) plus "value-added by purchases" (the second round of value-added resulting from purchases within the state by the businesses themselves), for Rio Grande Basin, as under:[1]

Agriculture	$ 44 to 51
Recreation	212 to 307
Industry	3,040 to 3,989

From the above figures, it is evident that the industry yielded the highest value-added per acre-foot of water (67, p. XVIII). To attain the highest contribution of Rio Grande Basin to the National Product, an optimum allocation among the various water uses (if industry could not absorb the whole supply of water) would be desirable.

Value-added estimates definitely provide the volume of business within a particular area, i. e. they would localize the impact of the gross expenditures by the recreationists. In other words, the value-added estimates are analogous to the income generated in a given

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[2]These figures are based on two rounds of value added (primary plus secondary value-added).

area because of the presence of the recreation facility. This obviously is not the net value of the recreation facility.

Cost Method

Under this method the benefits are computed from the cost figures of the recreation facility. The National Park Service has used this method with the contention (59, p. 1-4):

> The Service holds that, provided a proposed reservoir would not destroy more important conservational and recreational values, expected benefits resulting from (1) the construction of a reservoir and (2) from full development of the needed recreational facilities would be greater than specific costs of developing, operating, and maintaining these facilities. A reasonable estimate of the benefits arising from the reservoir itself may be normally considered as an amount equal to the specific costs of developing, operating, and maintaining the recommended facilities... It is recognized that a reservoir must be constructed to make possible public use of the proposed recreational facilities and that certain recreational benefits are created by the mere construction of a reservoir... It needs to be emphasized that the process in which we are engaged is primarily one of determining recreational benefits which may be used as basis for making allocation of costs.

The National Park Service has used costs, from 1950 to 1957, as a basis for determining benefits which are twice as large as the estimated costs. The Service considers primary benefits equal to costs and secondary benefits equal to primary benefits which automatically makes the total benefits twice the amount of cost.

The use of costs as a basis for estimating benefits involves a mere value judgement based on circular reasoning. The assumed

constant relationship of one to one or two to one between benefits and costs does not provide answers toward comparing the economic feasibility of the recreation projects or some other uses of the same resource.

In 1957 the National Park Service began using the "market value method" to measure recreation benefits (35, p. 66). The market value for a unit of recreation (e.g., a fishing day or a park visit) was determined from the 1951 price schedules of private recreation facilities. The price so determined was adjusted for the changes in the consumer price index and for the costs associated with the use of privately owned recreation equipment.

It can be argued that there is really a true market value for the recreation provided by park visit or sport fishing. Let us assume for a moment that the handful of private commercial recreation facilities do reflect a market value. This one market value becomes invalid when almost all of the public as well as private recreation facilities possess discriminating physical features.

The net value of recreation can be estimated if "market cost" could be defined along with the "market value". Since both of these indicies (market value and market cost) do not prevail in the true market sense; this method falls short of application toward the measurement of recreation benefits.

The Trice-Wood Measurement of Recreation Benefits

An interesting and important application of Professor Hotelling's concentric travel cost zones was made and presented by Trice and Wood (55, p. 201-207). They used data obtained from visitors to three similar areas in the Sierras. The data contained information regarding (1) number of persons in each recreational party; (2) the city or county of origin of each party; (3) the number of days spent by each party in the area of recreation; (4) the number of days the party spent on its entire recreation trip. By using these four items of information from each recreational party, there was computed an average cost of travel per visitor day. Travel costs were estimated to be 6.5 cents per mile; however, other rates were also used for the sake of comparison.

Analysis of the data was made to obtain the cost of a recreational-value per visitor day for the 90th percentile level and for the median level. The median level was then subtracted from the 90th percentile level to obtain what Trice and Wood called "free value received," and which, supposedly, approximated a consumer surplus value.

Professor Hines has suggested that the Trice-Wood analysis requires the additional and unrealistic assumption that individual preference scales are identical (29, p. 365-367). Such assumption does seem necessary if 90 percent of the visitors living nearest to

the recreational area are to receive a "consumer's surplus" or "free value received" equal to the travel cost of the 90th percentile minus the median travel cost.

Lessinger also questions whether it is generally true that those who are "able to enjoy the parks without incurring the full travel expense of the most distant travelers" obtain a consumer's surplus (36, p. 369-370). According to Lessinger, "This assumption implies that the only significant difference between those far and those close to a park is the distance to the park." Lessinger points out that there is actually more difference between those far and those near to a park than mere distance. Those living close to a regional recreational area may often be relatively isolated from central metropitan areas whereas most of those who live far from a regional recreation area tend to be those living in metropolitan areas. Lessinger states that, "Those who have purchased closeness to regional parks at the cost of urban accessibility would not be willing to pay additional amounts equal to the travel costs of the high cost users."

It would therefore seem that there are two important limitations to the Trice-Wood analysis. The first and most crucial relates to the "travel cost per visitor day--number of visitor days" relationship. If this relationship were a good approximation to the actual price-quantity relationship or demand for visitor days, then the Trice-Wood procedure would merit greater confidence. A second

and related limitation concerns the logic of subtracting the median level of travel cost per visitor day from the 90th percentile level. Why should the 90th percentile be selected as the "bulk-line" market value rather than some other percentile, such as 80th or 60th?

Despite the aforementioned limitations to the Trice-Wood analysis, it has apparently been a useful procedure and has been applied to other problems. More importantly perhaps, the pioneering efforts of Trice and Wood have stimulated interest in improving quantitative analysis in an important but neglected field of research.

The Clawson Method of Measuring the Demand for Outdoor Recreation

This method for measuring the demand for and value of outdoor recreation (which is related to the approach suggested by Hotelling) has resulted from the imaginative and extensive research of Marion Clawson. In his research, Clawson first computed what he called an approximation to the demand curve for the recreation experience as a whole. This demand schedule or curve was measured by plotting the estimated costs per visit as a function of the number of visits per 100,000 population in a given distance range. He assumed that the visit to the recreational site was the main purpose of the trip and, therefore, had to bear all costs of the trip, allocating to other activities on the trip only those costs additional

to the main trip.

Clawson states that the correspondence between cost per visit and number of visits per 100,000 base population may include some variables, such as the cost of distance in time, and to this extent may not represent a pure demand curve showing the net relation between price and volume. However, disregarding this possible complication, he assumes that the experience of users from one location zone provides a measure of what people in other location zones would do if costs in money terms were the same (14, p. 9-36).

Clawson is able to estimate the number of visitors at each level of increased fees by his 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 park. He is thus able to project attendance figures for various hypothesized entrance fees for a given park 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 readily be computed. This measure of the value or benefit of the recreational area would then provide one basis of comparison with other possible uses of the water and other resources of the area.

Clawson's procedure is simple and direct and has greatly influenced research in resource economics. For example, Milstein

uses Clawson's approach to estimate the effect of increasing fees on attendance figures for a lake (38, p. 17-31). Lerner estimated the economic value of Nacimiento Reservoir using the Clawson's technique (35, p. 80). Ullman using Clawson's idea has attempted to predict reservoir attendance and benefits (56, p. 473-484).

Nevertheless, certain limitations of Clawson's approach should be noted if further advances in methodology are to be made. Perhaps the most crucial limitation is connected with Clawson's method of estimating the demand for the total recreational experience. It would seem that there is much more than the monetary cost of the visit involved in determining the number of visits per 100,000 population of various distance zones. One would expect the effect of distance to act as a demand "shifter". The cost of the trip in time would be one effect that could shift the demand curve to the right or to the left, depending upon whether the visitor regards the travel time as pleasant or onerous. However, in addition to the complication of travel time, distance can be expected to shift the demand curve to the left for another reason. The greater the distance a zone is from a particular recreational site, the greater are the number and appeal of available substitutes for that particular site because other sites become relatively cheaper in time and money. Certainly if a prospective visitor lives one thousand miles from Yosemite, the visitor very likely has many alternatives to Yosemite,

especially insofar as time and costs of travel are concerned. Hence, it would seem desirable to take account of distance explicitly, rather than indirectly, if more accurate projections are sought.

Knetsch makes the interesting and significant observation that, while the Clawson relationship between money costs and number of visits is distorted because of the effect of the time constraint, the Clawson demand curve should be consistently biased to the left of the true demand curve (34, p. 1-19). That is, the Clawson demand curve is an underestimate of the actual demand for the given resources. (The assumption is, of course, that the greater the travel time required, the fewer will be the visits even if money costs were to remain the same). It should also be noted that alternative recreation sites could be relatively more attractive for the more distant zones even if time and money costs for the particular site were the same as a closer zone.

Knetsch suggests that other demographic factors, such as age and income, should be helpful in improving demand projections for outdoor recreation. If certain age or income groups average higher attendance at certain kinds of recreational areas, then explicit inclusion of such variables in demand estimates would allow changes of these factors in the general population to be incorporated into demand projections.

Other economists have also questioned the interpretation of Clawson's use of travel costs for isolating a demand function.

Castle has suggested that expenditures such as travel costs could be classified as transfer costs (13). Transfer costs would be defined as those costs that must be borne either by the buyer or the seller when goods are exchanged but which are not normally included in the price. Under most situations they are borne by the buyer; otherwise they would be included in the price. Examples of transfer costs would be transportation to or from a market or the installation cost of a piece of equipment if such costs are not included in the price.

Castle has suggested that a more sophisticated analysis of these transfer costs might be fruitful. For example, variables permitting substitution effects to be taken into account might be needed. Castle also pointed out that another possibility is to view the user of the recreational facility as being both the "supplying" as well as the "demanding" unit. In such a case transfer costs might be viewed as rising as additional users make use of the facility. At the point where marginal transfer cost equals the marginal utility of the recreational experience, an equilibrium is reached. For such an approach to be used, a simultaneous-equation model would need to be estimated. Variables such as leisure time, alternative recreational possibilities, and income would need to be entered in the appropriate equations.

Despite the aforementioned limitations of Clawson's method for estimating demand, it has been an important methodological innovation

for research in recreational resource evaluation. Clawson's work has also greatly stimulated further efforts to quantify the demand for and value of outdoor recreation.

Methods Used in This Study

In general, almost all of the methods and studies discussed in the preceding part of this chapter have proved helpful in becoming acquainted with the subject.

The expenditures method was employed in this study to estimate the total expenditures by s-s anglers in Oregon during the calendar year of 1962. This figure was needed to determine the amount of income generated by the s-s sport fishery in Oregon. To obtain this estimate the amount should be deducted from what had to be spent by the suppliers of the recreation services for s-s equipment from outside the State.

Clawson's approach was employed to determine the net value of the Oregon sport fishery. Multivariate and multiequation models were used to determine the simultaneous solution of the parameters. To estimate these parameters two-stage least squares technique was used.[1] Besides this a simple multivariate single equation model was also tried.

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[1] The reason for using this technique is explained in the later chapter containing the net value of the sport fishery.

CHAPTER III

SAMPLING PROCEDURE

Sample Size and the Design of Mail Questionaire

The work on the sampling procedure was started in July, 1961 after a comprehensive review was made of the sampling methods employed in similar studies. A preliminary step before selecting the sample was to decide on the following points:

First, the approximate number of questionaires (sample size) to be mailed during the year was set at 6000. This was based upon the cost per respondent, adequacy of the sample size and an estimated 50 percent response. Later on, because of the higher response (experienced in pretesting and during the first few months of actual response) than the expected 50 percent, the total number of questionaires to be actually mailed during the year was reduced slightly to 5,751. The sample size of 5,751 is approximately 2.60 percent of the total Oregon s-s angling licenses sold during 1962, and 4.26 percent of the total estimated 1962 Oregon s-s angler-families.

Second, it was decided that although the questionaires would be mailed to the individual anglers who happened to be selected, the angler expenditures would be obtained for the whole family (angler-family) rather than for the individual angler. This means that for

the purpose of locating the respondent the individual angler was considered as a sampling unit, but for the economic analysis the angler-family was used as a sampling unit. The per angler-family was preferred because many angler expenditures are made by the family as a unit rather than by each family member separately. It would often be complicated, if not impossible, to try to have the respondent partition his own particular share of the expenditures from those of the family as a whole.

Third, in general, since the anglers do not keep records of their expenditures incurred for angling, possibilities of error from memory bias exist. This is mostly true for the expenses of smaller amounts, for example for bait, lures, food, and rentals, etc.; although many anglers can easily recollect, at some later date, their expenses of larger amounts, for example, for boats, trailers, and such other durable angling equipment. So it was decided to mail the questionaires to the respondents during the first week of each month of the calendar year 1962 and ask for their current expenditures during the preceding month and durable expenditures for the preceding 12

months only.[1] This means that the respondent who received the questionaire during the first week of June, 1962 would report his current expenses made for the fishing trips taken in May, 1962 and the durable expenditures incurred between June, 1961 and May, 1962. This is one of several ways of obtaining information on the angling expenditures. Another way would be to ask the respondent angler-family to report the cost or value of all their present durable equipment purchased over the years along with the current expenses made for the preceding month or year. Ballaine and Fiekowsky (2, p. 19-28) asked the respondent anglers to report their estimated current expenditures for the whole year along with the estimated value of s-s fishing equipment owned by them at that time. Pelgen (46, p. 17) used a similar approach. One disadvantage of the method used by Ballaine and Pelgen would be the greater error introduced because of faulty recall over the comparatively longer period. Another serious problem associated with Pelgen's method would be the necessity to determine the amount of depreciation involved in

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[1]The distinction between fixed and variable costs was specified as precisely as possible. Durable expenditures were defined to include the expenditures made for tackle, boating equipment, special clothing, and camping equipment. Current expenses, on the other hand, were the costs associated with fishing trips which include the expenditures made for transportation or mileage on the private car, lodging, food, charter boats, guide service, bait and lures, and rental of boat, motors, tackle, or gear.

order to get the cost of the durable equipment on an annual basis.

The approach of asking the angling expenditures, used in this study, was preferred over the other approaches because of its comparative advantage in avoiding the depreciation problem and possibly reducing the memory bias. However, one consequence of asking for durable equipment costs for the preceding 12 months only is that it would lead to a high variance of the estimate simply because people tend to be uneven in the way they purchase durable fishing equipment from year to year. For example, one angler-family may list a durable expenditure running into hundreds or thousands of dollars whereas another family may have just as much or more durable equipment but may have purchased none of this equipment during the preceding 12 months (from the time they received the questionaire) and would, therefore, enter zero as their durable expenditures.

Fourth, the fact that the angling equipment may be used for purposes other than s-s angling, presents the problem of cost allocation. For example, suppose a boat is used for a total of 100 hours during the year. Of this 100 hours, 50 hours may be used for all angling of which 25 hours for s-s angling and the remaining 50 hours for boating and water skiing, etc. To obtain the share of durable expenditures for s-s angling, the respondent angler-family was asked to allocate the costs between all fishing, s-s fishing, and nonfishing purposes.

It is the points outlined above along with many other minor details which determined the design of the s-s expenditures questionaire and the introductory letters (Appendix 1). The questionaire contains information regarding expenditures data as well as the number of angler-family members, general angling licenses both dailies and nondailies, s-s angling licenses, license fees paid, family income, fishing days and trips taken, and the number of various varieties of fish caught.

Composition and Selection of the Mail Sample

Population

Before going into the composition and selection of the sample the population needs to be defined. The population may be divided into primary and secondary populations. The primary population consists of all the individuals over 14 years of age who held any type[1] of 1962 Oregon angling licenses during the calendar year of

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[1]There are at least eight different types of 1962 Oregon angling licenses such as resident combination, resident angler, juvenile (14-17 years inclusive), nonresident angler, vacation angler, special (pioneer, veteran and old age) combination, special angler, and daily angler.

1962.[1] The secondary population is composed of all the 1962 Oregon s-s angling license holders[2] who obtained s-s angling licenses at the same time they purchased their regular angling licenses or at some different time in 1962. This means that the secondary population is contained within the primary population with one exception that the persons under 14 years of age with s-s angling license are not part of the primary population. The secondary population does not include those individuals who might have fished for salmon and/or steelhead illegally (that is without a s-s angling license) and also those under 14 years of age who unknowingly[3] did not obtain the s-s angling license. This discrepancy, due to illegal s-s fishing (if there was any) in the total secondary population did not affect the results of this study because s-s fishing days, trips, and expenditures

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[1]Oregon 1962 angling licenses purchased in December, 1961 were counted as January, 1962 sale.

[2]Individuals under 14 years of age are not required to buy general angling license to fish although they have to obtain the s-s angling license (which is free to them) in order to fish for salmon and/or steelhead.

[3]Synopsis of Oregon angling regulations 1962 mentions that "juveniles under 14 years may obtain free a s-s punch card from any license agent" (41, p. 3). The word "may" might lead some individuals to the conclusion that obtaining a s-s punch card for persons under 14 years of age is optional, although each licensed angler or juvenile must have in his possession a Oregon s-s punch card to fish for salmon and/or steelhead in any open waters of the State; (s-s punch card means the same thing as s-s angling license).

were reported for the family as a whole even though some of the family members may have been illegal fishermen. It also did not effect the estimation of the total Oregon s-s angler-families (to be used in the process of blowing up the sample estimates to total figures) because the percentage change in the denominator due to illegal s-s fishermen was proportionately reflected in the numerator.[1]

Sample Composition

The composition of the sample involved three considerations:

1) The allocation of the sample among the anglers with and without s-s angling licenses was primarily based upon the data requirements in the econometric model to be developed in this study. It was decided that approximately two-thirds of the sample should be drawn from those anglers (including the anglers under 14 years of age) who obtained their s-s angling licenses at the same time they purchased their general angling licenses. The remaining one-third of the sample was drawn from the anglers who did not buy their s-s angling licenses at the same time they purchased their general angling licenses; of course, some of these anglers do pick up the s-s angling licenses at some later date. If they picked up the s-s

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[1] The total 1962 Oregon s-s angler-families were estimated by dividing the product of number of sample s-s angler-families and total 1962 Oregon s-s angling licenses issued, by the number of sample s-s angling licenses.

angling license before they received the questionaire[1] they were categorized under anglers with s-s angler licenses. This means that the portion of the sample allocated to non s-s anglers would be decreased by the number of the non s-s anglers who become s-s anglers by picking up the s-s angler licenses at some later date. A crude estimate of this number[2] was determined and taken into account in the allocation of the sample among anglers with and without s-s angling licenses.

2) The second consideration was to determine a basis for the distribution of the sample among the daily-vacation and annual anglers. Provision was needed for drawing sufficient daily and vacation anglers in the sample, as some difficulty has been experienced in earlier studies in drawing enough of these anglers (12). The daily

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[1]The sample was both selected and mailed monthwise. The sample selection and mailing is explained later in this chapter.

[2]A crude estimate can be made of this number. Calvin estimated that nearly 30 percent of the total Oregon s-s angling licenses sold during 1961 were not purchased at the same time the general angling licenses were purchased (12). Suppose, there are 100 total general angling licenses sold in 1962 and 70 out of the 100 have s-s angling licenses and 30 percent of 70 is 21. These 21 who pick up their s-s angling licenses at some later date are nearly 41 percent of 51 (100 minus seventy percent of 70 which is 49). According to this example, the 41 percent of the general anglers who do not purchase their s-s angling licenses at the same time they purchase their general angling licenses would buy their s-s angling licenses at some later date.

and vacation anglers tend to be underrepresented if given equal (one months' weight) consideration because they are almost sure to fish for salmon and/or steelhead during the month that they bought their s-s angling licenses. On the other hand, annual anglers with s-s angling licenses usually do not fish for salmon and/or steelhead every month that they are eligible to fish. For this reason, the s-s daily and vacation anglers needed to be assigned a weight greater than that of one month for the s-s annual anglers.

3) The third consideration was to schedule or to allocate the sample among the 12 months of the years. Since, the anglers who purchased their s-s angling licenses in January have greater chance to fish over the 12 months, those anglers were given a greater representation in the sample than the anglers who purchased their s-s angling licenses during the later months. Also, since the months of July, August, September, and October represent the heavy s-s fishing season, it was decided to give a weight to the four months twice that for all the other months.

To achieve the objectives outlined above under 2) and 3) the 1962 angling license patterns were projected both for the annual and daily-vacations, from the previous years' license sales. All months were arbitrarily given a weight of 0.5 except for July, August, September, and October where the weight was doubled. Monthly cumulative weights were assigned on the basis of the number of

months that the annual s-s angler would be eligible to fish. The relatively weighted month-equivalents for the annual s-s angling licenses were obtained by multiplying the monthly cumulative weight with the corresponding projected 1962 s-s angling licenses. This information is summarized in Table 1.

Table 1. Projected 1962 Sales of Annual Licenses With S-S Angling Licenses and Assigned Weights for each Month With Projected Eligible Month-equivalents of S-S Angling

Month	Monthly weights	Cumulative weights	Projected 1962 annual s-s angling licenses	Month-equivalents for annual licenses with s-s angling licenses
January	.5	8.0	16,300	130,400
February	.5	7.5	27,600	207,000
March	.5	7.0	9,600	67,020
April	.5	6.5	13,900	90,350
May	.5	6.0	20,600	123,600
June	.5	5.5	9,200	50,600
July	1.0	5.0	10,000	50,000
August	1.0	4.0	14,000	56,000
September	1.0	3.0	10,000	30,000
October	1.0	2.0	5,000	10,000
November	.5	1.0	2,400	2,400
December	.5	.5	--	--
	8.0		138,600	817,370

For an annual license purchased in January with a s-s angling license, there are 12 months of fishing possible. Therefore, each annual s-s angler who purchased the angling license in January was given a weight of 8.0. Those annual s-s angling licenses purchased in February were given a weight of 7.5, the March licenses a weight

of 7.0, etc. This system of weights is referred to as cumulative weights in Table 1.

The daily and vacation month-equivalents were computed in a similar way except that for the months of July, August, September, and October a weight of 3.0 (six times that of the ordinary annual s-s angler weight which is .5) was assigned, and a weight of 1.5 (three times .5) was given to the remaining months. The sum of daily and vacation month-equivalents was 346,800. The total of both the month-equivalents added to 1,164,170 (346,800 + 817,370).

From the above totals and the month-equivalents an approximate composition of the sample was determined which approximately satisfied the objectives outlined under 2) and 3) of this section. For example, the daily and vacation anglers should constitute approximately 30 percent (346,800 x 100 ÷ 1,164,170) of the total sample. The size of each monthly sub-sample for daily and vacation anglers was determined simply by the daily and vacation month-equivalents multiplied by the ratio 5,751/1,164,170. Exactly the same process was applied to determine the annual monthly sub-samples.

Sample Selection

The sample was drawn from the primary population which embodies the secondary population. A scheme to select the sample was designed in correspondence with the desired sample size and

composition.

Normally all the population units (duplicate slips of the angler licenses sold which record the name and address of the angling license holder, type of license and the information whether s-s angling license was obtained or not) of a given month are collected at the Oregon State Game Commissions' (OSGC) Office at Portland during the first week of the following month. From these slips (placed in the order as they arrive from the agents) available at OSGC the monthwise sample was selected by using a mixture of systematic and purposive sampling techniques. A set of K values were determined based on the size of the monthly sub-samples desired and the total number of projected 1962 angling licenses sold in each month. Each month the value of K changed so as to allow the rate of sampling to change from month to month. The value of K for each month was as follows:

January	40	May	140	September	110
February	40	June	180	October	300
March	60	July	110	November	800
April	60	August	110	December	---

A different procedure for each of the four sets of months (January to June, July, August, and September to November) was followed. For January to June, as a unit to be sampled (determined by the K value) was reached, it was determined if a s-s angling

license had been purchased. If that unit did not have a s-s angling license recorded the next unit in order was examined for a s-s angling license. The units were examined in order till a unit with a s-s angling license was found. Such a unit was called a valid unit. The search for the next valid unit was begun at the last K^{th} unit and not from the valid unit. After the first two valid units were selected the third valid unit was determined by examining the absence of a s-s angling license in the unit. That is, the unit found in order without a s-s angling license was the third valid unit. Again the fourth, fifth, and sixth (next three) valid units were selected in a similar way as first, second, and third valid units respectively. This process was continued till the whole monthly sample was selected.

During the month of July, for each set of six valid units selected the first two were daily or vacation license holders with s-s angling licenses, the third a daily or vacation without a s-s angling license, the fourth and fifth annuals with s-s angling licenses, and the sixth was an annual without a s-s angling license.

For each set of the eight valid units selected in August, the first two units were annuals with s-s angling licenses, third an annual without a s-s angling license, and fourth to eighth units were daily or vacation angling license holders. During September to November, for each set of 12 valid units selected the first three units were same

as in August and the fourth to twelveth units were daily or vacation license holders.

It may be noticed in the above paragraphs that no special provision was made for daily and vacation anglers, in the selection of the sample, from January to June; but from July to November they were purposely sampled heavy. This was done to make sure that the desired number of such anglers was present in the sample, since 82 percent of the total daily and vacation anglers buy their angling licenses during the period July to November.

Distribution of the Questionaire Mailings During 1962

The mailing pattern followed corresponded approximately to the weighing system used in determining the composition and selection of the sample. For example in Table 2 of 587 units drawn in January, 492 were mailed the s-s expenditure questionaires during 1962, at the average of about 30 during each month except for the months of July, August, September, and October when the rate was doubled to 60. Similarly, out of 1,280 total units drawn in February 1,067 were sent the questionaires during 1962 at the average of 71 per month except for July, August, September, and October when the rate was doubled to 142. The differences between the units drawn and the units mailed in the months of January to September exist because these (units drawn minus units mailed) units were

purposely planned to be used for the personal interview survey.

In Table 2, the right hand most column shows 7,984 total units drawn during the year and 5,751 mailed. .This total of 5,751 is made up of the units mailed in 12 months. During February 103 units mailed represented 30 from January and 73 from February. Also, in Table 2, of the 540 August units to whom the questionaires were mailed, there were 360 units who were sent the questionaire in August. This upsurge in numbers of the questionaires sent to August units reflects the fact that 300 daily anglers who bought their angling licenses in August were sent the questionaire in August. A similar situation appears for the months of September and October.

Personal Interview Survey

The primary purpose of the personal interview survey was to obtain the s-s anglers reaction, in terms of their patronizing the s-s sport fishing, towards 1) the hypothetical increases in the price of the s-s angling license and 2) the hypothetical increases in distance to the s-s fishing facility. Information with regard to number of fishing trips and days taken, time actually spent fishing, total miles traveled, number of fish caught, age, profession, income, expenditures on durable angling equipment, education, experience in fishing, family status, the choice of substitutes etc. was also obtained.

Table 2. Number of Units (Names of Angling License Holders) Drawn Per Month and Distribution of Mail Survey for the 12 Months of 1962.

Names drawn and month of mailing	Months												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Total names drawn	587	1280	686	912	1565	594	478	783	734	313	52	-	7,984
Total names sampled for mailing in various months	492	1067	560	741	780	396	330	540	480	313	52	-	5,751
January	42	-	-	-	-	-	-	-	-	-	-	-	42
February	30	73	-	-	-	-	-	-	-	-	-	-	103
March	30	71	40	-	-	-	-	-	-	-	-	-	141
April	30	71	40	57	-	-	-	-	-	-	-	-	198
May	30	71	40	57	65	-	-	-	-	-	-	-	263
June	30	71	40	57	65	36	-	-	-	-	-	-	299
July	60	142	80	114	130	72	34	-	-	-	-	-	632
August	60	142	80	114	130	72	74	360	-	-	-	-	1,032
September	60	142	80	114	130	72	74	60	360	-	-	-	1,092
October	60	142	80	114	130	72	74	60	60	257	-	-	1,049
November	30	71	40	57	65	36	37	30	30	28	33	-	457
December	30	71	40	57	65	36	37	30	30	28	19	-	443

In this survey the respondent was an individual s-s angler compared to that of the mail questionaire survey where the responding unit was on angler-family. Another varying feature of this survey was that the data associated with the fishing trips was based on the recollections of 11 months (January to November, 1962). To minimize the memory bias and to facilitate the respondents the 11 months were divided into four quarters as shown in the personal interview questionaire (Appendix 2). It may be mentioned that the final structure of the personal interview questionaire was determined after a number of pretests. Five pretests of approximately 10 interviews each were taken before the final format of the questionaire was adopted.

Sample Selection

As indicated earlier the personal interview sample was originally planned to be drawn from 2,233 (7,984 minus 5,751 from Table 2) units selected from the months of January to September. These 2,233 units were not mailed any s-s expenditures questionaire, since they were meant to be used for the personal interview survey. Later on, with the thought that intercourse of data from the personal interview survey with the mail survey data might be desired, it was decided to draw the personal interview sample from the units with s-s angling licenses to whom the expenditure questionaires

had been mailed during the months of January to September. Another consideration in drawing the personal interview sample was to draw the units only from those towns and cities for which postal area population estimates were available.[1] The population figures were needed for giving the appropriate weights to the calculations.

An approximately proportionate sample of 452 units with s-s angling licenses was drawn from the months of January to September, 1962. The sample comprises of the units from the following Oregon towns and cities:

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[1]Postal area population was desired because the angler addresses correspond to the postal areas. For example an angling license holder gives his address Box 102, Rt. 3, Corvallis. Although his postal address is Corvallis he may not be included in the census population figures of Corvallis city. Furthermore the census divisions also do not correspond to the postal area boundaries. To obtain the postal area population estimates a special survey was taken in which the post masters of various postal areas in Oregon were requested to furnish the population figures of their respective areas. Estimation of the postal area population was also attempted by means of a prediction model which did not work because of duplication involved. For example a family may have a house-mail-delivery besides some post office boxes.

Coastal region	Willamette valley region	Southeast-central region	Metropolitan region
Astoria	Albany	Bend	Eugene
Coos Bay	Cottage Grove	Burns	Portland
Newport	Lebanon	John Day	Salem
North Bend	Medford	K. Falls	
Toledo		Madras	
		Nyssa	
		Ontario	
		Prineville	
		Redmond	
		Vale	
Units Drawn 109	110	113	120

Interviewing Process

The course to be followed for soliciting personal interview data involved the consideration that the process to be used should ensure the maximum possible objectivity[1] and accuracy of data with minimum cost (including the researchers' opportunity cost in terms of time). Based on the above consideration it was decided to have the interviews taken by Clark, Bardsley, and Haslacher Research Consultants, Portland - a private professional research establishment.

[1]Sometimes the researcher when engaged in personal interviewing himself can inadvertently lead the respondents to answers which would prove his hypothesised explanations of the research problem (51, p. 268-283).

It was also decided to acquire 300 complete personal interview questionaires. The research organization was provided with the names and addresses of 343 units selected out of 452 units. This sample of 343 is comprised of 81 from the coastal, 90 from the Willamette Valley, 91 from the southeast-central and 80 units from the metropolitan regions.

A brief summary of the interviewing response is as follows:

Total units in the sample		343
Unavailable units for reasons beyond the control of the Portland research organization		26
Moved to seasonal residence	14	
No s-s angling license	9	
Deceased or ill	3	
	26	
Net number of units in the sample		317
Interviews completed[1]		305
Rate of completion		96%

One reason for the exceptionally high rate of completion is that all the sample names and addresses were screened and checked for

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[1]The sequence of the information for a given questionaire in the four sets of question numbers - 5 to 7, 79 to 81, 86 to 88, and 89 to 91 - may not agree with the other questionaires' sequence (Appendix 2). This is because these sequences were rotated so as to avoid any sequence bias.

accuracy before handing over to the research organization.

All interviews were personally conducted by trained interviewers of the research organization. A comprehensive set of instructions (Appendix 2) were given to the interviewers for correct understanding of the procedure in conducting the interview.

CHAPTER IV

ESTIMATION OF EXPENDITURES BY SALMON-STEELHEAD ANGLERS

The estimation of total expenditures in Oregon by the s-s anglers during 1962 was based on sample estimates which in turn were based on the responding units of the sample. A brief summary of the sample response is presented in the following section.

Mail Sample Response

Response of the anglers to the mail questionaire was surprisingly good, considering the complexity of the questionaire. Out of the total 5,751 questionaires mailed 4,392 were returned - complete or partially complete which gives 76.37 percent response. One reason for this promising response is that the respondents were reminded with follow-up letters. On the first mailing, the introductory letter and a questionaire were sent. If no reply was received within about two weeks, a first reminder letter and another questionaire were mailed to the respondent. If there was still no response within the next two weeks, a second reminder and another questionaire were mailed (Appendix 1). This procedure was followed for each month during 1962. Monthwise response for each of the three mailings appears in Table 3. For example, during March

Table 3. Total Questionaires Mailed and Returned for the 1st, 2nd, and 3rd Mailing During 1962

Month of mailing	1st Mailing			2nd Mailing		3rd Mailing		Total No. returned excluding post office nondelivery
	Total No. mailed	Total No. returned	Total No. post office nondelivery	Total No. mailed	Total No. returned	Total No. mailed	Total No. returned	
Jan.	42	28	--	14	7	7	2	37
Feb.	103	37	3	63	42	21	11	90
Mar.	141	46	3	92	48	44	26	120
Apr.	198	75	3	120	68	52	20	163
May	263	67	3	193	91	102	30	188
June	299	77	12	210	110	100	52	239
July	632	161	21	450	176	274	148	485
Aug. Nondailies	732	199	31	502	240	262	111	550
Aug. Dailies	300	56	29	215	102	113	54	212
Sept. Nondailies	792	218	33	541	266	275	107	591
Sept. Dailies	300	63	28	209	88	121	56	207
Oct. Nondailies	849	235	25	589	273	316	157	665
Oct. Dailies	200	42	13	145	58	87	43	143
Nov. Nondailies	424	137	13	274	136	138	49	322
Nov. Dailies	33	8	3	22	5	17	9	22
Dec.	443	120	16	307	174	133	64	358
Total	5,751	1,569	236	3,946	1,884	2,062	939	4,392

the total number of units to whom the questionaires were sent (first mailing) was 141. Out of 141, 46 plus 3 (post office nondelivery) questionaires were returned within 15 days after the first mailing. 92 units (141 minus 46 minus 3) were sent the first reminder, out of which 48 returned the questionaires. The second reminder was sent to 44 units (92 minus 48), out of which 26 returned the questionaires. Consequently, during March, the total number of the questionaires returned (excluding post office nondelivery) was 120 out of 141 total mailed, which is approximately 85 percent response.

For the year as a whole, the percentages of returnwise response were as follows:

1st return in response to 1st mailing	27.28
Post Office nondelivery	4.10
2nd return in response to 2nd mailing	32.76
3rd return in response to 3rd mailing	16.33
	80.47
Nonresponse	19.53
	100.00

The results of Table 3 suggest that the response rate for winter and spring fishermen was comparatively higher than for the summer and fall fishermen. The sample average response for the winter fishermen was 85 percent and 78 percent in spring which compares to 74 percent

in summer and 75 percent in fall. The falling response rate starting from late spring to early fall is partly due to the fact that the daily anglers population is concentrated in this period. The response rate for daily anglers was comparatively lower than for the annual anglers. The sample daily anglers average response for the months of August to November approached 70 percent. Another reason for the higher response during winter and spring is perhaps due to the occurrence of enthusiastic fishermen during this period.

A recapitulation of Table 3 is presented in Table 4. Since the names and addresses from the license receipts are sometimes not very legible, 236 addresses were incorrect, and the post office returned the questionaires undelivered as shown in the last column of Table 4. Of course, there may have been several hundred additional questionaires which were delivered, but not to the proper person because of discrepancies in names and/or addresses. Considering the problem of incorrect names and/or addresses the return of 4, 392 questionaires as indicated in Table 4 shows remarkably good cooperation by angler-families with the survey.

The distribution of 4, 392, the total questionaires returned, among the angler-families with one or more s-s angling licenses and the angler-families with no s-s angling licenses is shown in Table 5. The bulk of the questionaires, an estimated 3, 872, were distributed to angler-families with one or more s-s angling licenses and one

Table 4. Total Questionaires Mailed and Nonresponse During Each Month of 1962

Month	Total questionaires mailed	Questionaires returned: Total	At least partially complete	Unusable	Nonresponse including post office nondelivery	Post office nondelivery returned
January	42	37	30	7	5	-
February	103	90	78	12	13	3
March	141	120	108	12	21	3
April	198	163	141	22	35	3
May	263	188	170	18	75	3
June	299	239	204	35	60	12
July	632	485	417	68	147	21
August	1,032	762	626	136	270	60
September	1,092	798	649	149	294	61
October	1,049	808	695	113	241	38
November	457	344	293	51	113	16
December	443	358	315	43	85	16
TOTAL	5,751	4,392	3,726	666	1,359	236
Percent of total questionaires mailed:		76.37	64.79	11.58	23.63	
Adjusted[1] percent of total questionaires mailed:		79.64	67.56	12.08	20.36	

[1] 236 Post office nondelivery returns were deducted from both the total questionaires mailed and the total nonresponse leaving the totals equal to 5,515 (5,751 minus 236) and 1,123 (1,359 minus 236), respectively.

or more other than all daily angling licenses. Table 5 shows that the nonresponse was much higher from the s-s angler-families with all daily angling licenses, giving an estimated nonresponse of 227, or over one-half. The nonresponse from the non s-s angler-families with all daily angling licenses is even higher - approximately 70 percent.

It may be noticed that the estimated sample nonresponse of nearly 62 percent from both the s-s and non s-s angler-families with all daily angling licenses in Table 5 is higher compared to approximately 30 percent average nonresponse from the daily anglers for the months of August to November, in Table 3. This is because the classification in Table 3 is based upon the returns corresponding to the mailings. In other words if a unit was mailed a questionaire as a daily angler the returned questionaire was classified as a daily in spite of the fact that the responding family may have one or more annual (any type of angling license but the daily) licenses. In Table 5, however, a responding family was classified as an annual if it had at least one nondaily angling license. That is, the annual angling family so classified must have had at least one annual angling license and in addition it may have had any combination of the other types of angling licenses including dailies.

The classification made in Table 5 can be questioned. One could say, for example, an angler-family with four daily and one annual

Table 5. Distribution of the Mail Sample Among Angler-families With S-S and Angler-families Without S-S Angling licenses

Description of the questionaire	Angler-families with s-s licenses		Angler-families without s-s licenses		
	With all daily angling licenses	With other than all daily angling licenses	With all daily angling licenses	With other than all daily angling licenses	Total
Usable	155[1]	2,738	77[2]	756	3,726
Unusable	28	489	14	135	666
Nonresponse	227	645	212	39	1,123
Total	410	3,872	303	930	5,515

[1]Out of 255 usable questionaires from s-s angler-families with daily angling licenses, 100 turned out to be families with one or more annual licenses so that these 100 families were classified as other than all daily angling license families, leaving only 155 s-s families with all daily angling licenses.

[2]Out of 105 usable questionaires from daily anglers without s-s angling licenses, 28 happened to be from angler families where other family members held licenses other than all daily angling licenses, leaving only 77 families with all daily angling licenses.

angling licenses cannot justifiably be classified as an annual angler-family. It is admitted that the arbitrary decision to classify such an angler-family as an annual angler-family is a limitation of this study. One way to avoid this would be to solicit the information on a per angler rather than family basis; then the respondents could be classified license-typewise and sample estimates be made accordingly. This would, however, raise the question of partitioning the angling expenses made by the family as a whole which was discussed in the preceding chapter.

From the economic point of view the angler-family with four daily and one annual angling licenses is more likely to engage in sport fishing in a manner similar to that of an angler-family with no daily and one annual angling license. The sample average durable expenditures for s-s angling by the angler-families with four daily and one annual angling licenses were $36.00 and the same average for the angler-families with no daily and one annual license was $33.61. Of course, such average expenditures figures for s-s angling would be higher for the angler-families with a greater number of annual as well as daily angling licenses. On the average, an angler-family with two annual and 1.56 daily licenses spent $78.83 on durable equipment for s-s fishing whereas the angler-family with four annual and two daily angling licenses spent an average of $175.87 for similar items.

Besides the above justification of classifying the angler-families holding a mixture of annual and daily angling licenses into the annual angler-families group, the relative percent of such families in the sample response was so small that it did not make any significant difference which side they were grouped. The s-s angler-families with two or more daily and one or more annual angling licenses constituted only 3.47 percent of the total usable s-s response units. The s-s angler-families with only one daily and one or more annual angling licenses represented 5.58 percent of the total usable s-s response units. The remaining 90.95 percent were the s-s angler families with one or more annual angling licenses only.

Estimation of either durable or current expenditures involves peculiar problems. Consequently, a separate discussion of each category was made.

Estimation of Durable Expenses

It was mentioned in the preceding chapter that the sample angler-families were asked to allocate the costs of their durable equipment between all fishing, s-s fishing, and nonfishing purposes. But many respondents, due to the complicated nature of cost allocation, failed to complete the cost allocation section even though they filled in the rest of the questionaire properly. The number of angler-families who completely allocated their costs of durable equipment were

1,079 or slightly less than half of the angler-families who actually spent money on such equipment. There were 606 angler-families who spent nothing in the preceding 12 months on durable equipment. These figures are shown in Table 6. Ninty-four respondents indicated the percent of durable equipment cost allocated to s-s angling but then did not indicate what percent of cost was allocated to all angling.

The number of the respondents who made complete allocation of durable costs to s-s angling provided a basis for estimating durable expenditures by all s-s anglers.

Table 6. Classification of Usable Questionaires from Salmon-steelhead Angler-families According to Their Allocation of Durable Equipment Expenditures

Description of the questionaires	Number of s-s angler-families
Complete allocation of durable angling expenses	1,079
Incomplete allocation of durable angling expenses	1,114
Zero spent on durable angling equipment	606
Allocation of durable angling expenses to salmon-steelhead angling only	94
Total	2,893

Although the sufficiency of the number of respondents providing a basis for estimating the durable expenditures by all s-s anglers

is subject to criticism, such a number (1,079 in Table 6) was deemed satisfactory considering the complexity of cost allocation. In the same nexus, it may be mentioned that the average total expenditure for durable equipment items was almost the same for the angler-families who allocated their costs as for those angler-families who did not allocate their costs. The respondents not allocating costs averaged $204.42 per angler-family for all durable equipment whereas those who did allocate costs averaged $199.48 per angler-family. This suggests that the durable expenditures by all s-s anglers (based on the respondents completely allocating the durable costs) would not be overestimated unless, of course, the angler-families who did not allocate were spending a significantly smaller proportion of their total durable expenditures for s-s fishing.

From Table 7 it can be seen that the durable s-s angler expenditures varied, according to the month when the angling license was purchased. The earliest angling license buyers were represented by January in Table 7. These s-s angler-families averaged almost $150 per year in durable equipment related to s-s angling. As might be expected the s-s daily angler-families averaged $7.70 per year which was much less than the $84.92 per year averaged

by the annual s-s angler-families.[1]

In order to estimate the total expenditures for durable equipment made by all s-s anglers, an assumption first had to be made concerning what the anglers who did not respond would have spent. Although there is no single completely satisfactory answer to this problem, some assumptions seem more reasonable than others. In classifying the respondents according to how quickly they sent in their questionaires, the following pattern was observed:

	Average expenditures for s-s durable equipment
Respondents in 1st return	$112.59
Respondents in 2nd return	68.31
Respondents in 3rd return	67.64

From this pattern it would appear that average expenditure per angler-family might have continued to decline, had further efforts been made to follow up on the nonresponding angler-families. Therefore, to have taken the average of the above respondents could have biased upward the estimate for the total population of anglers (47, p. 9-31). Consequently, a simple least-squares regression was used to extrapolate a value of $56.74 as the projected average

[1] This average of $84.92 differs somewhat from the weighted average which could be computed from the figures in Table 7. However, $84.92 is the better estimate since it is weighted according to actual license sales during 1962 (Appendix 3A) whereas a weighted average from Table 7 would be based upon the sample numbers.

Table 7. Average Amount Spent in 12 Months on Durable Equipment Which Was Allocated to S-S Angling

Month Game Commission received license receipts	Actual number of respondents who allocated their costs	Adjusted number of respondents[1]	Average amount of durable expenditures allocated to s-s angling
January	119	151	$147.74
February	250	316	91.82
March	110	139	102.40
April	132	167	70.75
May	166	210	51.44
June	59	75	102.13
July	61	77	97.90
August	55	70	113.53
September	51	64	38.77
October	40	51	26.08
November	9	11	76.82
December	-	-	-
Daily angler-families	27	34	7.70
Sum of daily and nondaily angler-families	1,079	1,365	

[1] Adjusted to include the same proportion of anglers who spent nothing in the group of anglers that allocated as in the group which did not allocate.

s-s durable expenditure for the annual nonrespondents. The regression equation is as follows:

$$Y_i = 38.661926 + 72.302303\ X_i$$

Where Y = predicted average expenditures for s-s durable equipment

X = An arbitrary weight given to each of the three returns and nonresponse. Return 1st, 2nd, 3rd, and the nonresponse were given the weights of 1, 1/2, 1/3 and 1/4 respectively.

i = number of return (1, 2. . . . 4). 4 is nonresponse.

A similar method was followed for extrapolating an estimate of $5.50 as the projected amount that the nonresponding daily angler-families might have spent.

Another problem involved in making a final estimate of durable equipment expenditures concerned the division of total s-s angling licenses between angling families with only daily licenses and families which held other than daily angling licenses. Only incomplete information was available concerning which types of anglers held the s-s angling licenses. The best information available on this matter were figures compiled under the direction of Dr. Lyle Calvin (12). These figures pertained to 1961 but were projected to 1962. The main deficiency of these data arises because approximately 30 percent of the anglers buy their s-s angling licenses sometime after they have purchased their general angling licenses, rather

than at the same time. Nevertheless, using 70 percent of the anglers of 1961 as a base, an estimate of the distribution of the s-s angling licenses among daily and nondaily general angling licenses was made and is presented in Table 8.

Table 8. Estimated Distribution of the Total 1962 Oregon S-S Angling License Sales Among Daily and Other Than Daily Angling Licenses

Allocated to	S-S anglers		Total
	With daily angling licenses	With other than daily angling licenses[1]	
Usable	12,503	133,145	145,648
Unusable	2,259	23,779	26,038
Nonresponse	18,312	31,366	49,678
Total	33,074	188,290	221,364

The figures in Table 8 and the preceding averages for respondents and nonrespondents provided the basis for estimating the total durable expenditures made in Oregon which were allocated to s-s

[1]The original estimate of 54,412 and 166,952 total 1962 daily and other than daily s-s angling licenses sold respectively were adjusted for the shift made when daily angling license holders were found to be members of families with other than all daily angling licenses. Nearly 39 percent of the daily angling license holders with s-s angling licenses were members of families who had angling licenses other than daily angling licenses. Therefore, the total daily s-s angling licenses were reduced by 21,338 and this figure (21,338) was added to the other than daily s-s angling license total.

angling. The average and total durable expenditures allocated to s-s angling and the estimated number of s-s angler-families (computed from the figures in Appendix 3A and Table 8) for the year 1962 are summarized in Table 9.

Table 9. Distribution of the Total Durable Expenditures Allocated to S-S Angling Between S-S Angler-families With All Daily and With Other Than All Daily Angling Licenses

Description	Total No. of s-s angler-families	Amount of durable expenses allocated to s-s angling	
		Average	Total
With all daily angling licenses:			
Respondents	9,006	$ 7.70	$ 69.300
Nonrespondents	11,172	5.50	61,500
Total	20,178		130,800
With other than all daily angling licenses:			
Respondents	95,736	84.92	8,129,900
Nonrespondents	19,136	56.74	1,085,800
Total	114,872		9,215,700
Total	135,050		9,346,500

From Table 9 it is seen that over nine million dollars were spent during 1962 in Oregon by s-s anglers for durable items such as tackle, boating equipment, special clothing, and camping equipment because of the Oregon s-s sport fishery. However, the limitations of the above estimate should be pointed out. One obvious limitation is involved in the way that nonresponse was handled.

Probably a better procedure would have been to have followed up the nonresponse by personal interview to see if the nonresponse differed significantly from the responding anglers. Higher costs would, however, have been involved in obtaining these data.

Estimate of Variance and Confidence Limits

In chapter 3 it was postulated that the estimate of variance for the durable expenditures data obtained in this study would be higher than the variance associated with the data obtainable under alternative methods. The variance for the mean expenditures, based on the responding angler-families, was estimated as 99.20 (19, p. 68) which gave a standard error of nearly 9.66. With this relatively high variance some caution needs to be exercised with regard to the estimate of total expenditures for durable equipment allocated to s-s angling.

Assuming the variance of the nonresponding units (which also includes unusable respondents) is the same as that for the responding units, the 95 percent confidence interval about the mean of the durable expenditures allocated to s-s angling for all s-s angler-families was as follows:

Mean = $9,346,500 ÷ 135,050 = $69.21;

Standard error = 9.96;

t value at the 95 percent confidence limit = 1.96 with

134,938 degrees of freedom;

confidence interval = $69,21 \pm 19.52$.

The above interval assumes that the mean value is normally distributed.

Using the above confidence limits it is estimated that the total expenditures figure for durable equipment allocated to s-s angling in Oregon during 1962 lies somewhere between approximately 6.7 and 12 million dollars.

Amount Spent for Various Durable Items

The breakdown of the total figure in Table 9 into various durable equipment items is given as follows:

Item	Total durable expenses allocated to s-s angling	Percent
Tackle and gear	$1,904,800	20.38
Boat equipment	5,493,900	58.78
Special clothing	362,600	3.88
Camp equipment	1,434,700	15.35
Other equipment	150,500	1.61
Total	9,346,500	100.00

It is evident from the above figures that the expenditures for boat equipment associated with s-s angling accounted for over half the

total durable expenditures allocated to s-s angling. The other equipment which composed only 1.61 percent of the total s-s durable expenses included the items not enumerated in the questionaire. These items include ropes, auto-pickups, life-jackets, etc. solely bought for angling and camping purposes.

Estimation of Current Expenses

Although some of the same problems are faced in the estimation of current s-s expenditures as for durable equipment, the estimates of current expenditures merit considerably more confidence. For one thing, the allocation problem was slightly of different nature and was less troublesome. The allocation problem, in this case was concerned with separating out the s-s share of the expenses incurred on those fishing trips where the s-s angler-families fished for both (s-s and other than s-s) kind of fish on the same trips. If an angler-family had fished only for salmon and/or steelhead on a given trip, the current expenses of the trip were recorded on Page 2 of the questionaire (Appendix 1) and all costs of that trip were counted as having been spent on s-s fishing. On the other hand, if the angler-family had fished for "other" fish (i.e., other than salmon or steelhead), then all current costs of the trip, were counted as spent for "other" fish. The only borderline cases were occasional trips where the anglers had fished for both s-s and

"other" fish. In such cases, for lack of anything better, the cost was split evenly between s-s fishing and "other" fishing. However, these borderline cases were relatively few, as can be seen from the right side of Table 10 where 215 angler-families are listed as having fished for both salmon-steelhead and "other" fish. Even here, most of these 215 families did not fish for both on the same fishing trip. Therefore, the problem of allocating current expenses between salmon-steelhead and "other" fishing was not an important difficulty.

Probably the most troublesome problem related to current expenditures was that of projecting a figure for the nonresponse angler-families. There were minor problems in determining what constituted nonresponse. For example, in the left half of Table 10 there were 313 angler-families who returned questionaires which were not complete on Page 2 (Appendix 1). Some of these families failed to indicate whether they had fished or not. Since the information from these angler-families was not complete enough to use for one reason or another, these 313 (243 with s-s angling licenses plus 70 without s-s angling licenses) families were finally classed as nonresponse. This left 3,413 (3,726 minus 313) total usable units both with and without s-s angling licenses. Out of these 3,413 angler-families 2,650 (2,893 minus 243) had s-s angling licenses. The returnwise response of these 2,650 s-s angler-families and

Table 10. Number of Responding Angler-families With Usable Questionaires Who Fished for Salmon-steelhead, "Other," or for Both Salmon-steelhead and "Other" Fish During Each Month of 1962

	Total responding angler-families:			Total fishing angler-families:			
Month	Who fished	Who did not	Who did not complete Page 2 of the mail questionaire	Who fished for salmon-steelhead only	Who fished both for salmon-steelhead and "other" fish	Who fished for "other" fish only	Total
January	13	14	3	13	0	0	13
February	24	47	7	16	2	6	24
March	43	50	15	26	6	11	43
April	68	62	11	24	13	31	68
May	94	66	10	15	11	68	94
June	107	79	18	16	17	74	107
July	224	146	47	52	45	127	224
August	264	305	57	111	57	96	264
September	206	388	55	100	36	70	206
October	133	532	30	79	23	31	133
November	40	229	24	33	1	6	40
December	55	224	36	46	4	5	55
TOTAL	1,271	2,142	313	531	215	525	1,271

the average s-s current expenditures for each return are given as follows:

	Number of respondents	Average s-s current expenditures
1st return	1,031	$10.62
2nd return	1,155	7.50
3rd return	464	6.50
	2,650	

From the above returnwise averages it appears that average s-s current expenditures, like durable expenditures per angler-family, might have continued to decline had further efforts been made to follow up on the nonresponding angler-families in the sample. For similar reasons explained in the estimation of s-s durable expenditures, a simple least-squares regression equation was estimated for each month to extrapolate the monthwise average s-s current expenditures for nonrespondents. These extrapolated averages appear in Table 11.

Another problem involved in the estimation of current expenditures concerned the conversion of total miles travelled for s-s fishing into dollars. In various studies automobile transportation costs have been based on a figure between 7 to 10 cents per mile. Armstrong used 7 cents per mile to convert the mileage into expense (1, p. 7). Davis computed expenditures on automobile

transportation at 8 and 10 cents per mile depending upon the type of automobile used (23, p. 58). Davis mentions that the figures of 8 and 10 cents per mile are identical to the charges made by the University of Arizona Garage when an automobile is used by any department of the University (these charges were based on the need of fleet replenishment, cost of maintenance, gasoline, oil and other lubricants). Pelgen used a figure of 7 1/2 cents a mile (46, p. 7).

In this study, the expenditures on automobile transportation were computed at 4 1/2 cents per mile. This figure was based on the cost per mile observed by the Oregon State Motor Pool. The Pool, for the biennial 1959-61, calculated .04490 (.02586 cents of operating plus .02404 cents of overhead cost) cents as an average total cost per mile for all the vehicles under the Pool (40, p. 23). Mileage was computed only when the respondent used his automobile to go fishing. In case the respondent was paid by the riders in his car, the amount was deducted from his transportation expenses so as to avoid any double accounting. This was necessary because if anyone of those riders happened to be a respondent, then the amount he paid (for transportation) to the driver or owner of the automobile would be counted as his transportation expense.

Based on the preceding discussion in this section monthwise average and total current expenses were estimated. These monthwise current expenses are shown in Table 11. The average figures

in Table 11 were multiplied by the relative monthly total eligible units (Appendix 3B) in order to obtain the total s-s current expenditures by s-s anglers.

It is seen in Table 11 that over 8 million dollars were spent by all s-s anglers for current expenses in Oregon during 1962. Nearly thirteen percent of this amount is made by the projected current expenses by all nonresponse (both daily and annual license holders) units.

Assuming the normal distribution of the mean s-s current expenses and the same variance for nonresponse as that of responding units, the 95 percent confidence interval for the mean s-s current expenses was as follows:

Mean = $8,155,000 ÷ (9,006 + 11,172 + 855,375 + 170,276) = $7.80;

Standard error = .545332;

Confidence interval = $7.80 - 1.07

Using the above confidence limits it is estimated that the total s-s current expenditures figure in Oregon during 1962 lies somewhere between approximately 7 and 9.3 million dollars.

Amount Spent for Various Current Items

The break down of the total s-s current expenditures figure into various current expenditure items is given as follows:

Table 11. Estimated Average and Total Current Expenses For S-S Angling in Oregon During 1962.

	Angler-families with Other Than all Daily Licenses			
	Average s-s Current Expenses		Total s-s Current Expenses	
Month	Per respondent family	Projected per non-respondent family	For all respondent families	Projected for all non-respondent families
Jan.	$7.73	$5.52	$ 243,565	$ 34,765
Feb.	6.77	4.83	254,951	36.355
March	8.27	5.90	381,338	54,374
April	8.28	5.91	499,582	71,275
May	4.59	3.28	302,467	43,204
June	7.05	5.03	495,347	70,646
July	13.48	9.62	1,058,220	150,957
August	16.60	11.85	1,458,061	208,050
Sept.	9.66	6.89	893,676	127,410
Oct.	5.94	4.24	559,720	79,860
Nov.	3.46	2.47	327,956	46,797
Dec.	5.67	4.05	542,823	77,501
Total for families with other than all daily licenses	--	--	7,017,706	1,001,194

	Angler-families with only Daily Licenses			
	Average s-s Current Expenses		Total s-s Current Expenses	
	Per respondent family	Projected per non-respondent family	For all respondent families	Projected for all non-respondent families
Average of Jan. to Dec.	$7.81	$5.84	$70,337	$66,244

Item	Total current expense allocated to s-s angling	Percent
Transportation	$2,391,000	29.32
Lodging	511,300	6.27
Food and beverage including liquor	2,847,700	34.92
Charter boats and guide service	912,600	11.19
Bait, lures and other tackle	796,700	9.77
Boat and motor rental	260,200	3.19
Tackle and gear rental	105,200	1.29
Other	330,300	4.05
Total	$8,155,000	100.00

It is seen from the above figures that the expenditures for food, beverage and liquor on fishing trips account for over one-third of the total s-s current expenditures. The relative shares of food, beverage and liquor expenses was unfortunately not traceable from the data of this study.[1] It is important to know the expenditures made for food only because the inclusion of food expenditures in the

[1] Although it is possible to obtain the expenses on food, beverages and liquor separately, the need of this breakdown was not foreseen at the time the questionaire was prepared. The previous studies on fishermens' expenditures also do not show these items separately.

total estimates is subject to criticism. One may argue that the amount spent for food on fishing trips would be spent regardless whether one goes fishing or does not. This argument holds weight only if the recreationists do not buy any restaurant and tavern services and meet their food needs just like they would at home. To determine roughly whether the sport fishermen bought their food, beverage, and liquor items at restaurants or from some grocery store while on fishing trips, a representative sample of 251 mail sample questionaires were thoroughly examined. Out of these 251 angler-families 61 had spent on food items. From these 61 angler-families it was estimated that the amount spent for food items averaged about $3.24 per angler per fishing day. The magnitude of this average suggests that the fishermen, in general, do buy restaurant and tavern services associated with the food expenses. Therefore, money spent for food and beverages represent, for the most part, expenditures that would not have been made had the angler stayed home.

Estimation of Durable Plus Current Expenses

The estimate of total expenditures related to Oregon s-s sport fishery were obtained simply by adding the s-s durable and current expenditures as shown below:

Total s-s durable expenditures =	$ 9,346,500
Total s-s current expenditures =	8,155,000
Total	$17,501,500

It should be mentioned that expenditures shown above do not include expenditures by angler-families for general angling licenses and s-s angling licenses. The license fees resulting from the Oregon s-s sport fishery would probably add at least another $500,000. Such an estimate assumes that part of the general angling license fee of s-s anglers would be allocated to s-s fishing. The addition of $500,000 into $17,401,500 brings the total to $18,001,500.

In order to place confidence limits around this total figure the following points were considered: 1) The same assumptions made for durable and current expenditures confidence limits apply to the total (durable plus current) expenditures confidence limits. 2) The average current expenditures and the variance were computed based on the total eligible angler-family months of fishing. For example, there were 135,050 total s-s angler-families but the total eligible angler-family months of fishing were 1,045,829 units (Appendix 3B)[1].

[1]The number of eligible angler-family months of fishing was greater because it accounted for the relative number of angler-families eligible to fish during each month of the year. For example, in Appendix 3B, there were 31,509 eligible responding annual angler-families in January and 37,659 (31,509 + 6,150) angler-families in February. The number of eligible annual angler-families increased with successive months. The total eligible units were 1,045,829 (855,375 + 170,276 + 9,006 + 11,172).

Based on the eligible angler-familiy units the following s-s current expenditure averages were estimated:

Eligible s-s angler-families	Average expenses
With all daily angling licenses	
Respondent families	$7.81
Nonrespondent families (predicted)	5.84
With other than all daily angling licenses	
Responding families	8.20
Nonresponding families (predicted)	5.86

Associated with the above averages was a variance of .297387.

To allow amalgamation of the above expenditure estimates with the durable expenditure figures both (durable and current) should have the same basis of estimation. It was decided to modify the current expenditure estimates from per eligible angler-family to per angler-family basis. This put both the durable and current expenditures on the same basis, since the durable expenses were on a per angler-family basis. Therefore, the average total s-s current expenditures per angler-family were estimated to be $60.39, and the associated variance was 20.25. To compute the joint variance of current and durable expenses the correlation coefficient between the durable and current expenditures was needed. Although the correlation coefficient on an annual basis could not be obtained from the available data, some indication of sign and magnitude was obtained from

the correlation between the monthly current expenses and the annual durable expenditures on the responding angler-families. This correlation coefficient was 0.17635. Thus the joint variance was estimated from the following mathematical relationship:

$$\sigma^2_{D+C} = \sigma^2_D + \sigma^2_C + 2\rho\,\sigma_D\,\sigma_C$$

Where D = durable expenses;

C = current expenses;

ρ = correlation coefficient;

σ^2 = variance;

σ = standard error.

Substituting the figures in the above relationship a rough estimate of the variance of the total (durable plus current) expenditures was 135.26.

Based on the above considerations and computations the 95 percent confidence interval was as follows:

Mean = \$18,001,500 ÷ 135,050 = \$133.40;

Standard error = 11.63013;

Confidence interval = \$133.40 $\pm$ 22.80.

Using the above confidence limits, it is estimated that the total expenditures for Oregon s-s sport fishery in 1962 were likely to be somewhere between 15 and 21.1 million dollars. These figures include \$500,000 angling license fees.

It merits mentioning that the usual assumption - normal distribution of mean - underlying the confidence interval of the mean tends to become a property as the sample size increases, provided that the population has a finite variance (according to the central limit theorem). Therefore, in the light of this proposition and the relatively large sample the assumption of "normality" underlying the various confidence intervals presented in this chapter (pages 71, 77 and 83) may be called a property or a reality.

Average Expenses by Nonresident S-S Sport Fishermen

Since the objective of this study was focused on total and net expenditures the nonresident (including daily angling licenses) anglers were not given any special treatment in the sample. They were free to be chosen in the sample within the framework of the sampling scheme. Consequently they were processed with the total sample and their share of expenditures was included in the estimates presented in the preceding sections of this chapter.

The nonresident average expenditure figures, however, were approximated from the nonresident response units. There were 112 response units (out of 112, 46 were with all daily angling licenses) with s-s angling licenses who spent a total of $2,139 for durable equipment allocated to s-s angling; this gives an average of

approximately $19.10 per s-s angler-family. The same 112 responding units spent a total of $1,172 for s-s current expenses, which gives an average of nearly $10.46 per s-s angler-family.

It needs to be mentioned that the reliability of the above averages is questionable because of the small sample size.

Value-Added by S-S Sport Fishery

It was mentioned in Chapter II that the total expenditure figures were needed to derive the value-added (income generated within the state) estimates. Although it is beyond the scope of this study to derive the value-added estimates for Oregon s-s sport fishery, the total expenditure estimates do provide partial answers to the problem of value-added estimates.

CHAPTER V

ESTIMATION OF NET ECONOMIC VALUE

In this chapter is presented an estimate of the net economic value of the Oregon s-s sport fishery. Although the estimation of the net value figure is difficult, it is crucial from the practical point of view, since it represents the value which can be compared to the figures associated with the benefit-cost analysis.

With the given socio-political framework under which the sport fishery operates the estimation of its net value requires the simulation of market pricing mechanism (which does not exist for recreation in general and sport fishing in particular). From the simulated market pricing mechanism it is possible to estimate the demand relationship and consequently the net economic value. The following factors were thought of as influencing the sport fishing demand relation (42, p. 25-29):

1. Cost of availing the fishing opportunity;
2. distance between the s-s fishing facility and the fishermen's place of residence;
3. income;
4. time involved in reaching the s-s fishing spot;
5. substitutes for s-s sport fishing;
6. fishing success per unit of time;

7. the relative degree of population congestion of the fishermen's place of residence;
8. personal tastes and likings;
9. education;
10. age;
11. sex;
12. occupation.

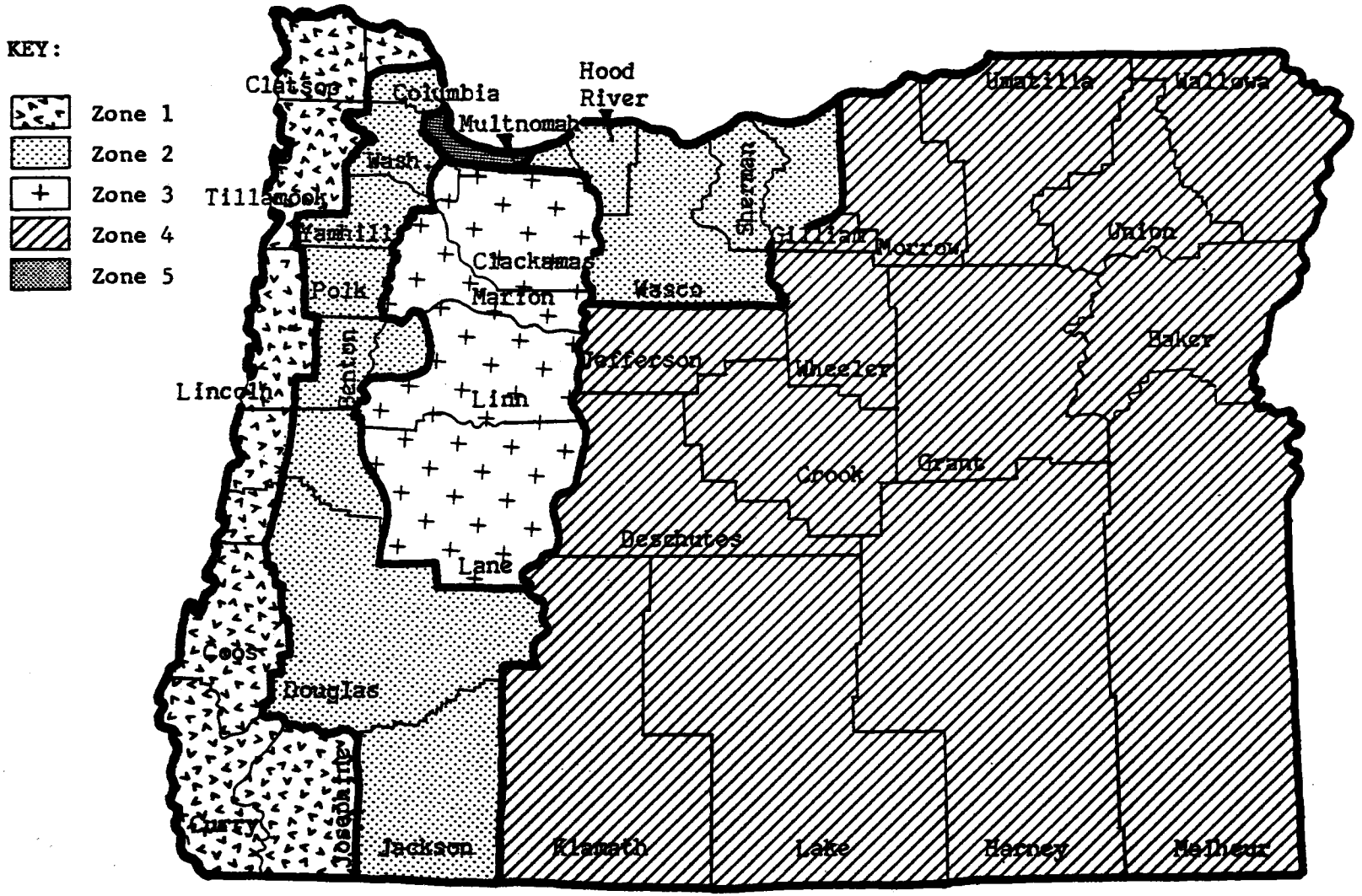
It may be mentioned that the above factors were not listed in any special order of importance.

Application of Clawson Method

All applications of Clawson's method that have been reported until now have been concerned with estimation of outdoor recreational demand for a particular site or area. The application of Clawson's method to estimate the net value of the sport fishery presents some complication in that s-s fishing is not confined to any one location in Oregon. The Oregon coast and coastal rivers (including Columbia River) exhibit main attraction for s-s fishermen, although other rivers and streams in the state also provide some s-s fishing.

Despite the fact that s-s angling is not confined to any one area of the state, it is still possible to set up distance zones based upon the average distance that most s-s anglers of an given area travel when they go s-s fishing. In Figure 1, Oregon is divided into five

Figure 1. Geographic Location of the Five Distance Zones in Oregon



distance zones, based primarily on average distance traveled for s-s angling. Zone 1 represents the geographical area closest to the main s-s fishing attraction and the zone 4 is the most distant.

The 2,281 resident s-s angler-families who had sufficiently completed the mail questionaire regarding income, s-s fishing days taken, miles travelled for s-s fishing, and the current expenditures were classified into appropriate distance zones. The average miles per s-s trip and the number of s-s angler-families in each distance zone are given as follows:

Zone No.	Average No. of miles per s-s fishing trip	Number of s-s angler-families
1	37	349
2	105	629
3	140	582
4	220	196
5	120	525
		2,281

It may be noticed from above that the angler-families in zone 1 averaged only 37 miles per s-s fishing trip since these families lived close to the ocean and coastal rivers where most of the s-s fishing was done. Also, as might be expected, the angler-families of zone 4 travelled farthest, 220 miles per s-s fishing trip.

Based on the above classification of our data, average total variable cost per s-s fishing day was computed for each distance zone. A strong relationship exists between the average number of miles per s-s trip and the average total s-s variable cost, as shown in Table 12. Of course, some correlation between the total s-s variable cost and the average number of s-s miles would be expected since slightly over one-fourth of s-s variable cost resulted from miles driven on s-s fishing trips.

Table 12. Average Number of Miles Per S-S Fishing Trip, Variable Cost Per S-S Fishing Day, Population, Total S-S Fishing Days in Sample, and Per Capita S-S Days X 10^4

1	2	3	4	5	6
Distance zone	Average No. of miles per s-s fishing trip	Average variable cost per s-s fishing day	Zone population	Sample s-s fishing days	s-s fishing days X 10^4/ zone population
1	37	$4.02	184,147	455	24.71
2	105	6.14	455,923	721	15.81
3	140	6.00	473,861	704	14.86
4	220	12.00	229,786	808	6.27
5	120	6.71	481,421	144	16.78

Using the figures in columns three and six of Table 12 the estimated Clawson type of demand function fitted in natural logrithms is given as follows:

$$\ln Q = 3.82150164 - .16590273\, p(\ln e)$$

Or

$$Q = 45.67\, e^{-.1659\, p}$$

where Q = s-s fishing days per capita;

e = 2.71828...;

ln e = 1;

p = average variable cost per angler per s-s fishing day.

The above function is graphed in Figure 2. Clawson recognized that the approximated demand relationship between cost of park visit per day and number of park visit days taken per unit of population was an oversimplification. There may be many factors (enumerated earlier) operating other than the cost in the demand relationship. For instance, the relative number of s-s days taken in each distance zone might be influenced by the amount of time consumed in reaching the s-s fishing spot, the availability of the substitutes, income, and so forth. This consideration is explored in the later part of this chapter.

Nevertheless, Clawson's procedure can be used to predict the estimated number of s-s fishing days taken per zone as p values are increased for each zone. Thus a demand function can be simulated or derived based on the projected s-s fishing days associated with the relative increases in p values.

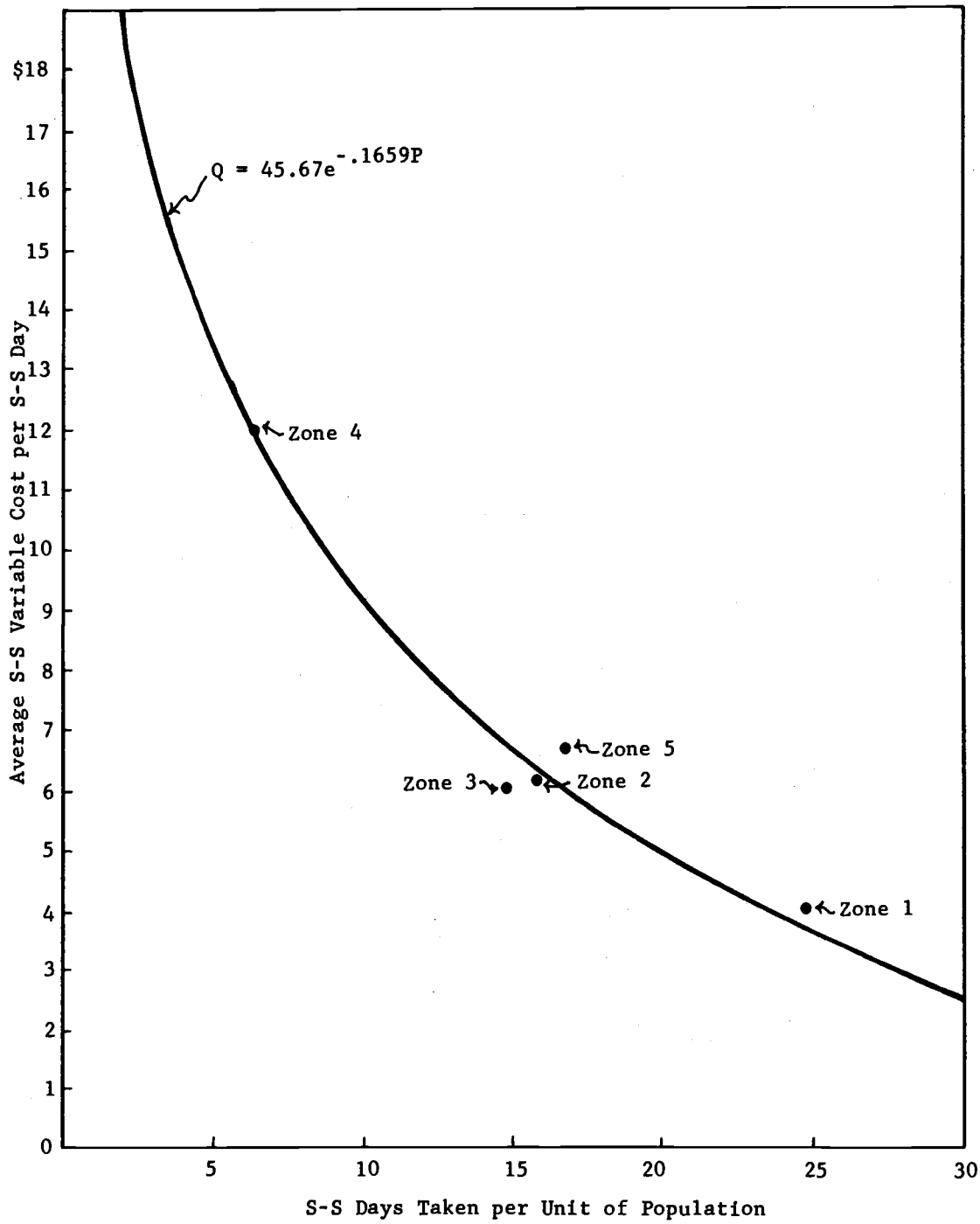


Figure 2. Relationship between Average Cost per Fishing Day and the Number of S-S Days Taken per Unit of Population by the Five Main Distance Zones in Oregon.

The projected total number of s-s days taken at several assumed Δp (increase in average variable cost per angler per s-s fishing day) values is shown in Table 13. Figures in the bottom row of Table 13 indicate the projected total s-s fishing days for the State of Oregon.

Table 13. Predicted Number of S-S Days Taken By The Five Distance Zones With Assumed Increases in S-S Fishing Costs Per Day

Distance zone	Total s-s days taken at Δp: $0[1]	$1	$2	$4	$6	$8
	(s-s days)	(s-s days)	(s-s days)	(s-s days)	(s-s days)	(s-s days)
1	171,429	144,800	122,900	88,500	63,400	45,500
2	298,587	253,500	213,600	153,700	110,400	79,100
3	317,617	269,100	227,700	163,500	117,400	84,300
4	56,921	48,200	40,900	29,200	21,100	15,100
5	286,839	242,800	206,500	147,800	105,900	76,100
Total[2]	1,131,392	958,300	811,500	582,800	418,200	300,000

[1] Estimated s-s days taken at zero Δp correspond to the actual total s-s days (estimated from the sample) taken during 1962 in Oregon.

[2] Figures in this row correspond to the State total and may not check exactly due to rounding.

A compendium of Table 13 is presented as below:

Increase in the s-s variable cost per angler per s-s fishing day	Predicted s-s days taken	Predicted possible annual revenue
$1	958,300	$ 958,300
$2	811,500	$1,623,000
$4	582,800	$2,331,200
$5	493,500	$2,467,500
$6	418,200	$2,509,200
$7	354,100	$2,478,700
$8	300,000	$2,400,000

The above predicted total s-s days associated with the relative Δp values are graphed in Figure 3. Estimates from the curve in Figure 3 assume that the main reason for the difference in the number of s-s fishing days taken by near distance zone as compared to far was the extra monetary cost involved in traveling from the far distance zones. Based on the above assumption a net economic value (revenue) of nearly one million dollars per year could be realized by the owner of the Oregon s-s sport fishery by charging Δp of $1.00 per s-s angler for each day of s-s fishing. A maximum net economic value of about 2.5 million dollars per year exists when the s-s anglers are charged Δp of $6.00 per angler for each day of s-s fishing.

This presents a question of whether Δp should be realized by

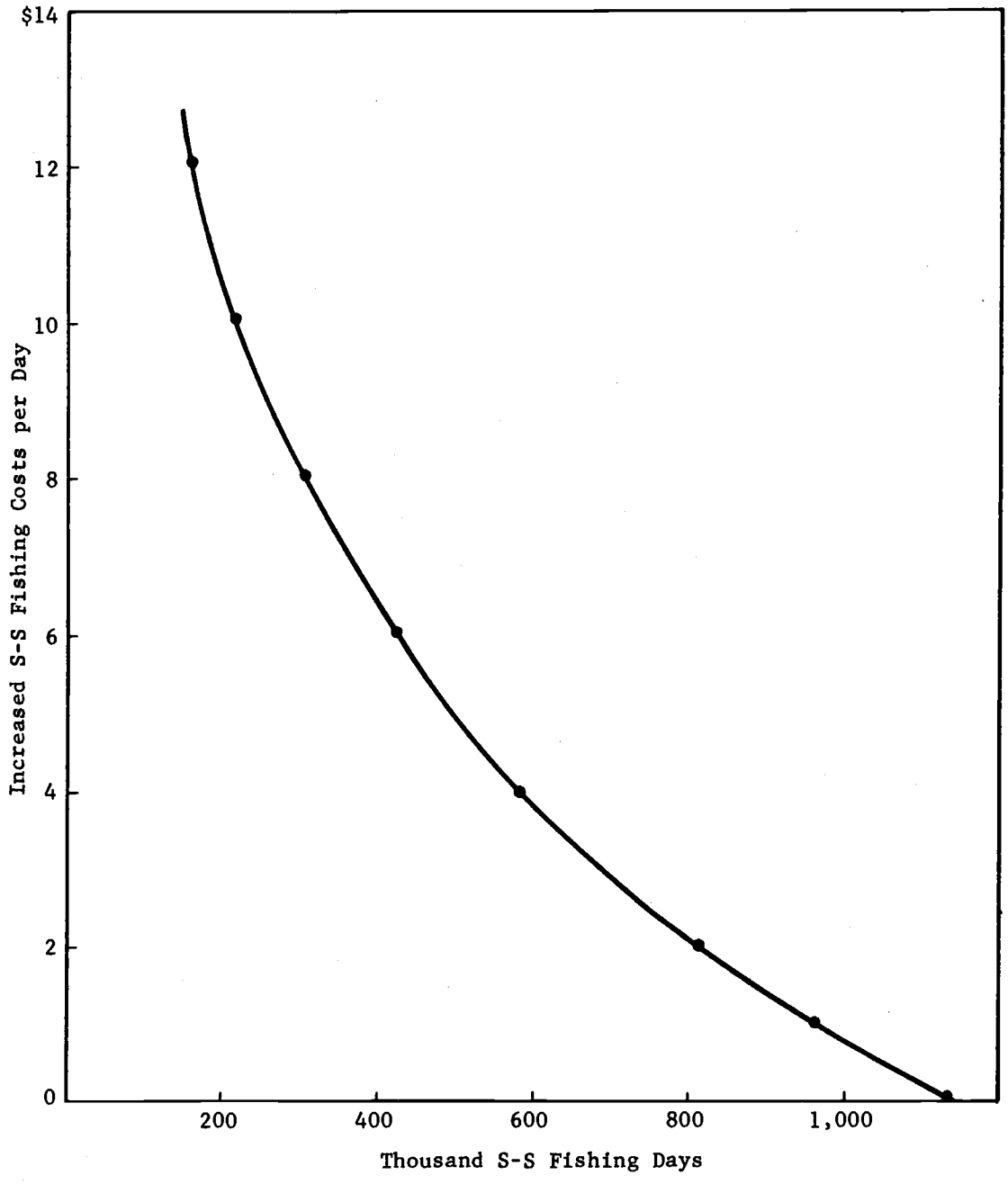


Figure 3. Projected Effect of Increased Cost per S-S Day on Number of S-S Fishing Days Taken by Anglers (Projection by Clawson Model).

increasing the angling license fees or through some other appropriate course. The above net value estimation assumes that s-s fishermen would react to such a daily charge the same way they react to their other variable fishing costs, such as traveling expenses, purchase of bait or lures, charter boats, etc., as listed on Page 2 of the mail questionaire (Appendix 1).

Estimation of Net Economic Value With Simultaneous Equations Model

In the earlier part of this chapter 12 variables were listed which were thought of as influencing the demand relationship. Unfortunately the mail questionaire data did not correspond to all of these variables. However, the mail questionaire did provide information for most of the important variables. Within the range of mail questionaire (Appendix 1) data and the possible use of information available in the personal interview questionaire (Appendix 2), it was originally anticipated that an interdependent system of three structural equations might best describe the behavior of s-s variable cost per fishing day in relation to per capita s-s days of fishing and s-s catch.

At this point, first the data needed further classification. The 2,281 s-s angler-families in the five distance zones were further subdivided into income level groups within the distance zones. It was decided to include approximately 66 angler-families per subzone

within each distance zone. As shown in Table 14 there were 5 subzones in the distance zone 1. In subzone 1 of distance zone 1, the 70 angler-families were composed of 55 angler-families with lowest income[1] and 15 angler-families with income next to the lowest income level.

Table 14. Division of Five Main Distance Zones into Subzones Based on Family Income Levels

Distance zone	Number of completed questionaires per distance zone	Number of subzones	Number of families per subzone[2]
1	349	5	69.8
2	629	10	62.9
3	582	9	64.7
4	196	3	65.3
5	525	8	65.6
Total	2,281	35	-

[1] On page 1 of the mail questionaire (Appendix 1) seven possible income groups are shown. The median values of these income groups were used except for the groups under $3000 and above $20,000. For each of these two income groups a weighted average income was computed based upon the number of 1959 individual gross adjusted income tax returns for the State of Oregon. Thus average incomes of $2,000 and $39,000 were estimated for the income groups below $3,000 and above $20,000 respectively.

[2] An integer number of families was grouped within each subzone. For example, in zone 1 there were four subzones with 70 families and one subzone with 69.

These 15 families were selected from the next to lowest income group at random and in proportion to the relative number of 1) returnwise responding s-s angler-families who fished and 2) returnwise responding s-s angler-families who did not fish. This procedure of randomly proportionate selection of the angler-families was followed so as to give the subzones (where two or more income groups were mixed) an equal chance to contain the same relative number of units responding to 1st mailing, 2nd mailing, and 3rd mailing since how quickly the angler-families returned the questionaire reflected their degree of fishing activity. For the income groups in any of the five distance zones where there were one or more possible subzones, the allocation of the units among the subzones within the income group was done in a similar way as explained above.

Based on the above procedure the 2, 281 units were consolidated into 35 observations. In the subsequent text the distance zone will be referred by zone k and the subzone by j.

The formation of the 35 observations on the basis of family income level was pursued 1) to determine clearly the relation of family income (as one of the important exogenous variables) with other variables in the system; and 2) to allow a more thorough analysis.

Coming back to the three equation structural model the hypothesized relation was as follows:

$$(1)\ Y_{1j} = \beta_{10} + \beta_{13}Y_{3j} + \gamma_{11}X_{1j} + \gamma_{12}X_{2j} + \gamma_{13}X_{3k} + u_{1j}$$

$$(2)\ Y_{2j} = \beta_{20} + \beta_{23}Y_{3j} + \gamma_{22}X_{2j} + \gamma_{24}X_{4j} + u_{2j}$$

$$(3)\ Y_{3j} = \beta_{30} + \beta_{31}Y_{1j} + \beta_{32}Y_{2j} + \gamma_{32}X_{2j} + u_{3j}$$

where j = 1, 2, 3... 35 subzones;

k = 1, 2, 3... 5 distance zones;

X_1 = sum of s-s caught in the j^{th} zone divided by the sum of s-s fishing days of the j^{th} zone;

X_2 = average family income of the j^{th} zone;

X_3 = weighted average miles per s-s fishing trip of the k^{th} zone;

X_4 = sum of total miles traveled for s-s fishing in the j^{th} zone divided by the sum of s-s fishing days of the j^{th} zone;

Y_1 = sum of s-s caught in the j^{th} zone divided by the estimated human population[1] of the j^{th} zone;

Y_2 = sum of s-s variable cost of the j^{th} zone divided by the sum of s-s fishing days for that j^{th} zone;

Y_3 = sum of s-s fishing days of the j^{th} zone divided by the estimated human population of the j^{th} zone;

u = error term.

X_1, X_2, X_3 and X_4 were defined as exogenous variables, while Y_1, Y_2, and Y_3 as endogenous variables. Some idea of the relationship

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[1] Each subzone was allocated equal portions of human population of the distance zone.

between different variables was obtained from an inspection of the correlation coefficients listed in Table 15. In Table 15, income (X_2) is highly correlated with variable cost per s-s fishing day (Y_2). Later, it was seen that income also exerted a significant influence on Y_1 and Y_3. However, inspection of the correlation coefficients in Table 15 does not by itself indicate which variables would be most useful for prediction purposes. For example, X_1 is highly correlated with Y_1. This relationship between X_1 and Y_1 is of a spurious nature since both variables have same numerator.

Table 15. Correlation Between Variables from 35 Subzones

	X_1	X_2	X_3	X_4	Y_1	Y_2	Y_3
X_1	1.0	.47544	-.08717	.14375	.73385	.32196	.02869
X_2		1.0	.07422	.28222	.39074	.49330	.17967
X_3			1.0	.79836	-.47989	.62656	-.54557
X_4				1.0	-.40582	.87286	-.66454
Y_1					1.0	-.15314	.65239
Y_2						1.0	-.50251
Y_3							1.0

Estimation of the structural parameters of Equations (1), (2), and (3) was made by using the two-stage least squares technique.

Two-Stage Least Squares Method.

Considering the hypothesized structure of the model in equations (1), (2), and (3), the estimating problems, and the relative superiority (in terms of root-mean-square error and estimating bias) of the various methods of estimating the structural parameters, two-stage least squares method was chosen (33, p. 224-294).[1]

For the valid application of ordinary least squares method towards the estimation of parameters of the model the following assumptions concerning the disturbance term u need to be satisfied:

1. $E(u_t) = 0$ for all t, that is, the u_t are random variables with zero expectation;
2. $E(u_t^2) = \sigma^2$ for all t, that is, the u_t have constant variance σ^2, independent of X exogenous variables; in other words variances of u_t are homoscedastic;
3. $E(u_t u_{t+s}) = 0$ for $s \neq 0$ and for all t, that is, u_t are serially independent; in other words u_t is not autocorrelated;
4. X exogenous variables and disturbance term are independent of each other, that is, X are random variables distributed independent of u;
5. Y endogenous variables and u are independent of each other;

where t is a time period and s a series of t.

Assumptions number 1 to 4 tend to become the properties of the

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[1] Johnston (33, p. 225-295) makes a comprehensive evaluation of the various methods of estimating the parameters of simultaneous structural equations.

disturbance term u, but the assumption number 5 is not valid because Y and u are definitely correlated to each other.

One way to avoid this fundamental difficulty of correlation between the disturbance term u and endogenous variables Y would be to express the structural Equations (1), (2), and (3) in some alternate manner. Such alternate Equations are presented as below:

$$(4)\quad Y_{1j} = \beta_{10} + \gamma_{11}X_{1j} + \gamma_{12}X_{2j} + \gamma_{13}X_{3k} + \gamma_{14}X_{4j} + e_{1j}$$

$$(5)\quad Y_{2j} = \beta_{20} + \gamma_{21}X_{1j} + \gamma_{22}X_{2j} + \gamma_{23}X_{3k} + \gamma_{24}X_{4j} + e_{2j}$$

$$(6)\quad Y_{3j} + \beta_{30} + \gamma_{31}X_{1j} + \gamma_{32}X_{3j} + \gamma_{33}X_{3k} + \gamma_{34}X_{4j} + e_{3j}$$

The above system of equations is called the reduced form of the original structural model where the e_{ij} are the new error terms. The basic characteristic of the reduced form is that the original system has been solved to express the current values of the endogenous Y variables as functions of all other (exogenous) vairables in the system, so that each equation of the reduced form contains only one current endogenous variable. Under the properties 1 to 4 (mentioned earlier) of the disturbance term u, the least squares technique may be applied directly to estimate the coefficients of the reduced form equations. The estimators of structural parameters, though formed from the unbiased estimators of the reduced form parameters, are not unbiased. They will, however, be consistent estimators of structural parameters (33, p. 234-235). This suggests that the reduced form model would not work by

itself.

Two-stage least squares method offers a solution to the problem of correlation between Y and u. This method attempts to tackle the problem of correlation between Y and u by replacing the independent endogenous variables in the system (Equations 1, 2, and 3) by their predicted $\hat{Y}$ values (estimated by the reduced form Equations 4, 5, and 6) and then apply least squares to the reformed set of three Equations. Since $\hat{Y}$ values in the reformed structural equations are an exact function of the given set X exogenous variable and the X variables are uncorrelated with u by property assumption, therefore, the two-stage least squares method bears the promise of giving consistent estimators of the parameters of the structural relations.

Net Economic Value

Results of the structural Equations (1), (2), and (3) (estimated by two-stage least squares) did not show any near significant (at 95% confidence level) effect of Y_{3j} on the dependent variable (Y_{2j}) in Equation (2). This raised a penetrating question as to whether s-s variable cost per s-s fishing day should be affected by the quantity of s-s days of fishing, as would be true for an ordinary market situation. For most commodities, the producers and consumers of the commodity are different groups of people for the most part, and price

and quantity produced tend to be interdependent. But in the case of outdoor recreationist (in this case s-s angler) his "price" or variable cost per unit of quantity (Y_{3j}) taken is already to a great extent predetermined by his income and the distance from the recreational site. If this viewpoint is correct, variable Y_{2j} can be considered as exogenous or as a linear combination of other exogenous variables.

Also, the variable X_1 (number of s-s caught per hour of actual fishing)[1] could not be used in the system without introducing a spurious correlation with Y_1 (because both the variables X_1 and Y_1 have same numerator) which would, in turn, distort the relationship of Y_1 to the other interdependent variables.

Taking out the variable X_1 from the system and assuming that Y_{2j} was a function of only X_2 and X_4 the following two structural equation model was fitted:

$$(7)\quad Y_1 = 0.26389 + 0.00374X_2 - 0.00272X_3 + 0.24354\hat{Y}_3$$

$$(8)\quad Y_3 = 1.40732 + 1.45823\hat{Y}_1 - 0.09866\hat{Y}_2$$

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[1] Variable X_1 as originally defined (number s-s caught per s-s fishing day) was changed with the thought that an angler from a distance zone may take more fishing days per fishing trip than an angler from the closer distance zone. To obtain an appropriate measure of fishing success, variable X_1 was revised to as number of s-s caught per hour of time spent for actual fishing. Estimate of actual fishing hours was obtained from the personal interview questionaire (Appendix 2).

In the Equations (7), (8) and the Equations to follow all symbols were same as previously defined except that Y'_2 was a least squares estimate from Equation (9).

$$(9)\quad Y'_2 = 0.51351 + 0.01917X_2 + 0.09070X_4$$

Associated with Equation (9) was $R^2 = 0.828$ and a highly significant effect of X_2 and X_4. Variables $\hat{Y}_1$ and $\hat{Y}_3$ in Equations (7) and (8) were reduced form estimates from Equations (10) and (11).

$$(10)\quad \hat{Y}_1 = 0.84983 + 0.00717X_2 - 0.00215X_3 - 0.07438Y'_2$$

$$(11)\quad \hat{Y}_3 = 2.40586 + 0.01408X_2 + 0.00233X_3 - 0.30543Y'_2$$

Although the exact sampling distribution of the structural estimators was not known, a crude estimate of significance of the variables was made on the basis of their sample standard deviations (5, p. 619-636). Table 16 presents the R^2 values and t ratios associated with the variables of Equations (7), (8), (10) and (11). Although the variable X_3 was below statistical significance at the 0.05 level, the variable was retained because of its logical importance in the structural system.

The system of simultaneous equations represented by Equations (7) and (8) was reduced to Equation (12) and (13). This was done by substituting the mean values of X_2, X_3 and Y'_2 of each distance zone into Equations (7) and (8) to find Y intercept values for each of

Table 16. T Ratios Associated with the Variables and R^2 Values of Equations (7), (8), (10), and (11)

Equation	t ratios of variables: $\hat{Y}_1$	Y'_2	$\hat{Y}_3$	X_2	X_3	R^2
Structural Equation (7):						
Data in real numbers	-	-	1.59959	2.30679	-1.36654	.46
Structural Equation (8):						
Data in real numbers	4.50532	-2.61578	-	-	-	.56
Reduced form Equation (10):						
Data in real numbers	-	-1.59963	-	3.41698	-.94910	.46
Reduced form Equation (11):						
Data in real numbers	-	-4.35092	-	4.44127	.68058	.59

the five distance zones. Then these intercept values (of both equations) were weighted by the relative populations of each distance zone to arrive at the Y intercept values which represent the State.

(12) $Y_1 = .18541 + .24354Y_3$

(13) $Y_3 = .71502 + 1.45823Y_1$

From Equations (12) and (13) matrices A, A^{-1}, and Z are as below:

$$A = \begin{vmatrix} 1.0 & -.24354 \\ -1.45823 & 1.0 \end{vmatrix}$$

$$A^{-1} = \begin{vmatrix} 1.55071777 & .37766181 \\ 2.26130317 & 1.55071777 \end{vmatrix}$$

$$Z = \begin{vmatrix} .18541 \\ .71502 \end{vmatrix}$$

Multiplying A^{-1} and Z

$$Y_1 = .557554$$

$$Y_3 = 1.528062$$

Using the above results aggregate statewide Equations (14) and (15) were developed.

(14) $Y_1 = 412,819 - 27,588\Delta Y'_2$

(15) $Y_3 = 1,131,392 - 113,278\Delta Y'_2$

From Equation (15) predicted number of s-s days were computed

at various assumed increases in s-s variable cost per angler per s-s day of fishing. These figures are given in Table 17.

Table 17. Predicted Number of S-S Days Taken With Assumed Increases in S-S Fishing Costs per Angler per S-S Fishing Day

Increase in the s-s variable cost per angler per s-s fishing day	Predicted s-s days taken	Predicted annual revenue
$0	1,131,400	$ 0
1	1,018,100	1,018,100
2	904,800	1,809,600
3	791,600	2,374,800
4	678,300	2,713,200
5	565,000	2,825,000
6	451,700	2,710,200
7	338,400	2,368,800
8	225,200	1,801,600

The figures in Table 17 show that a maximum net value of 2.8 million dollars per year exists for the Oregon s-s sport fishery when the s-s anglers are charged with $\Delta Y'_2$ of $5.00 per angler for each day of s-s fishing.

Further applications of the preceding model can be made under

alternative assumptions. For example suppose that anglers were forced to travel greater distance because of loss of s-s runs on local rivers; in such a case the anglers reaction can be predicted from the preceding econometric model. According to Equation (9) s-s variable costs were increased about $1.00 every 11 miles per s-s day travelled.[1] These dollar equivalents in miles per s-s fishing day are listed in Table 18.

A significant reduction in number of predicted s-s days in Table 18 resulted from the assumption that increased costs came about because of increases in travel required. The results from Table 17 and 18 were plotted in Figure 4. This feature of the econometric model could be used for estimating potential losses to anglers for loss of s-s runs in local rivers.

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[1] This coefficient of approximately 9 cents per mile was twice the rather conservative charge of 4.5 cents per mile charged against mileage listed in the questionaires. The higher coefficient came about because other nonmileage costs tended to increase with higher mileage. An example would be meals and lodging.

Table 18. Predicted Number of S-S Days Taken With Increases in Cost Assumed to Occur Because of Increased Travel Required

Assumed increases in s-s fishing costs per day per angler	Estimated increase in miles per s-s day	Estimated increase in miles per s-s trip[1]	Estimated catch of fish	Estimated s-s fishing days	Predicted net economic value
$0	-	-	412,800	1,131,392	$ 0
1	11.03	15.70	336,200	946,600	946,600
2	22.05	31.41	259,600	761,800	1,523,600
3	33.08	47.11	182,900	577,000	1,731,000
4	44.10	62.82	106,300	392,200	1,568,000
5	55.13	78.52	29,700	207,400	1,037,000

Similarly, such a model might have implications for fishery improvement programs. Also the figures in Table 18 as compared to Table 17 indicate a potential reduction in the net economic value of the s-s sport fishery resource if it should become necessary for anglers to travel greater distance for s-s fishing. A reduction in net economic value of over one million dollars per year is indicated

[1] $D = 0.4186 + 1.4244M$;
Where D = Estimated increase in average distance per trip;
M = Estimated increase in s-s miles traveled per s-s day.
$R^2 = 0.64$.

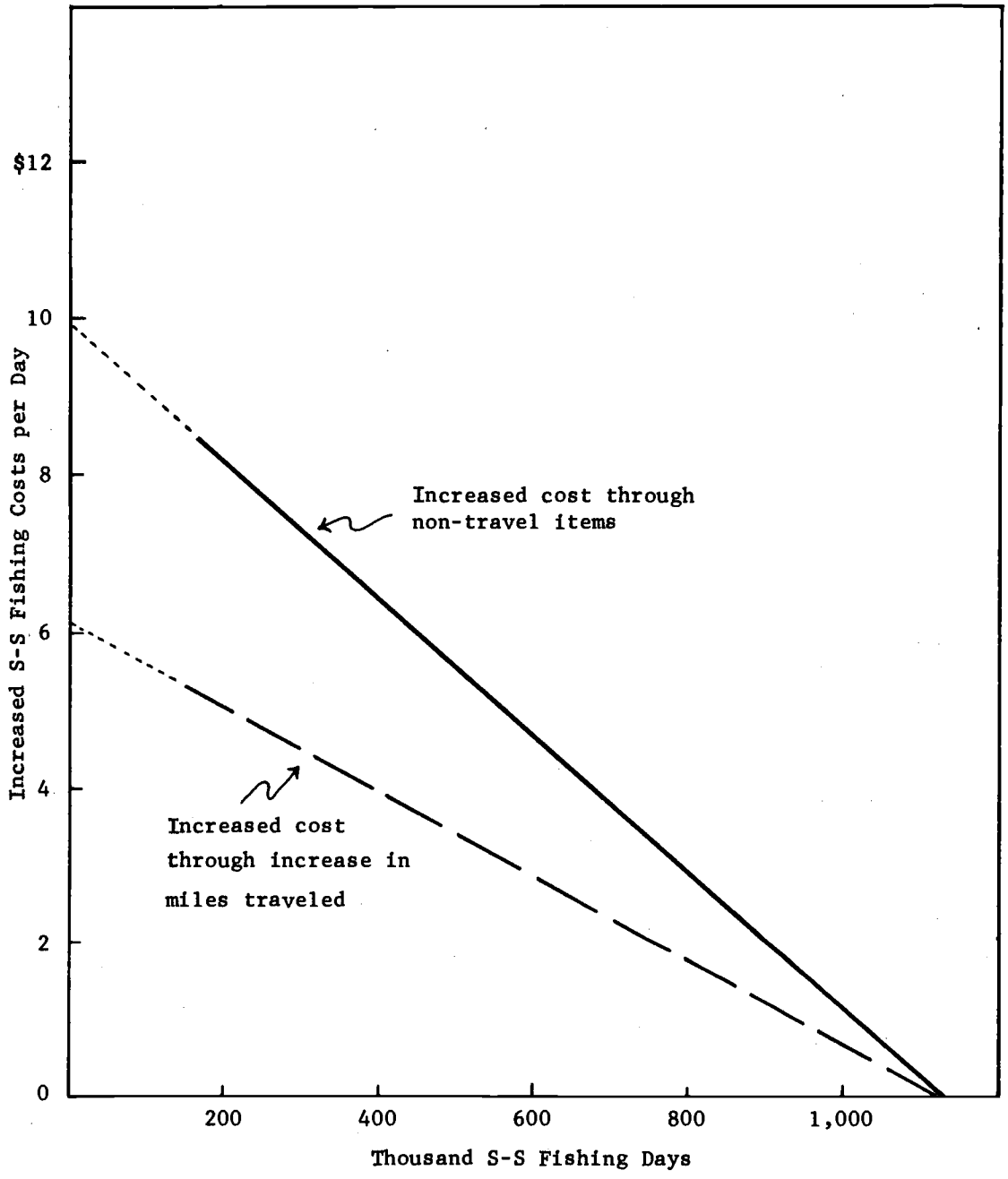

Figure 4. Projected Effect of Increased Cost per S-S Day on Number of S-S Fishing Days Taken by Anglers (Projection by Simultaneous-equation Model) with Different Assumptions Regarding Impact of Cost and Income.

by Table 18 as compared to Table 17. These relationships were shown graphically in Figure 4.

Another interesting type of prediction can be made from the econometric model about the future value of the s-s sport fishery resource. If we assume that population and family income continued to increase from 1962 to 1972 at about the same rate as for the post World War II period, the following increases might be expected. Population could increase 18 percent and family income about 35 percent. Projecting these increases in population and income into the econometric model allows a prediction to be made concerning the net economic value of the s-s sport fishery resource in 1972. According to the projections in Table 19, net economic value of the s-s sport fishery (over and above present license fee revenues) will reach nearly four million dollars per year by 1972. Some caution is called for in making such projections, of course. The projections are based on the assumption that conditions will, in general, be similar to those of 1962 and that Equations (7), (8), and (9) are good approximations of the basic relationships involved.

Estimation of Net Economic Values with Single Equation Model

Although a system of structural equations has certain logical advantages when estimating relationships between interdependent

Table 19. Projected Number of S-S Days Taken in 1972 With Various Increases in S-S Fishing Costs Per Day

Assumed increases in s-s fishing costs per day per angler	Predicted s-s days to be taken	Projected net economic value
$0	1,454,000	$ 0
1	1,320,000	1,320,000
2	1,187,000	2,374,000
3	1,053,000	3,159,000
4	919,000	3,676,000
5	786,000	3,930,000
6	652,000	3,912,000
7	518,000	3,626,000
8	385,000	3,080,000
10	117,000	1,170,000

variables, such as s-s days taken and s-s caught, it is not certain that the results from a simultaneous equation model should always be preferred. In many cases it is possible to obtain information of interest from ordinary least squares regression.

It was mentioned earlier that s-s variable cost per day of s-s fishing did not tend to be interdependent with per capita s-s fishing days taken. Y_1 definitely showed interdependence with Y_3. Having knowledge of the above relationships the following single equation

model was fitted.

$$(16)\quad Y_3 = 2.4730 + 0.00993X_2 - 0.00320X_3 - 0.17456Y_2$$

Equation (16) was fitted in terms of real data. The R^2 value and t ratios of the variables in the single equation are given as below:

	t ratios of the variables:			
Equation	X_2	X_3	Y_2	R^2
(16)	3.30559	-1.06845	-3.24461	.51

Converting Equation (16) in terms of aggregate for the State as a whole, and as a function only of increased cost over the present cost (ΔY_2), Equation (17) was obtained.

$$(17)\quad Y_3 = 1,131,392 - 127,758\Delta Y_2$$

Using Equation (17) the total number of s-s days at various ΔY_2 levels were predicted. These predicted figures are shown in Table 20.

A maximum net value (revenue) of slightly less than 2.5 million dollars exists at ΔY_2 between $4 and $5 per s-s day of fishing per angler for Oregon s-s sport fishery during 1962.

It may be observed that the Clawson model was a special case of the single equation approach where only the cost variable was retained as the independent variable. Consequently, it was not too

Table 20. Predicted Number of S-S Days Taken With Assumed Increases in S-S Fishing Costs Per Day

Assumed increases in s-s fishing cost per day per angler	Predicted s-s days	Predicted net economic value
$0	1,131,400	$ 0
1	1,003,600	1,003,600
2	875,900	1,751,800
3	748,100	2,244,300
4	620,400	2,481,600
5	492,600	2,463,000
6	364,800	2,188,800
7	237,100	1,659,700
8	109,300	874,400

surprising that there was fairly close agreement between the Clawson model and the single equation model presented above.

Comparison of the Results From Three Models

It was encouraging to observe the similarity of the results from the three econometric models. This provided some basis for confidence in these estimates of net economic value. The underlying economic logic was similar even though it was not identical among

the three methods. However, the computational procedures were different, yet the results were quite comparable as illustrated below:

Method	ΔY_2 (additional variable cost) per s-s fishing day per angler to maximize net revenue	Total net revenue
Clawson	$6	$2.5 million
Simultaneous equations	$5	$2.8 million
Single equation	$4 to $5	$2.5 million

Although the ΔY_2 level was slightly higher in Clawson's method than the single equation, the net value figure was nearly the same. This difference in ΔY_2 level was likely because the Clawson model used was fitted in logrithms which allows the quantity-price relationship to be curvilinear in real numbers.

It needs to be stated that the net value figure of around 2.5 million dollars per year assumes that s-s fishermen would react to such a daily charge (ΔY_2) the same way they react to their s-s variable fishing costs.

To arrive at the total net value of the s-s fishery's resource over a specified period of time the net value can be capitalized at appropriate rate of interest and by accounting for possible increase or decrease of the net value figure due to quantitative changes in the variables.

CHAPTER VI

ANALYSIS OF THE PERSONAL INTERVIEW SURVEY

A brief analysis of the personal interview data was made to investigate 1) the reactions of respondents towards various levels of hypothetical increases in s-s angling license fees and s-s fishing distance; 2) some basic relationships involved in fishermen's demand for s-s fishing.

The data collected through personal interview was not related to the mail survey data. In fact, to make full use of voluminous data gathered through the surveys would involve further research producing another thesis.

Respondent Reactions Toward Alternative S-S Tag Prices and S-S Fishing Distance

In questions 5, 6, and 7 of the personal interview questionaire (Appendix 2) the respondents were asked to score (between zero and ten) their willingness to buy a s-s tag at the alternative prices ($3, $10, and $20).[1] Respondent scores are summarized in Table 21.

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[1] A similar approach can be followed to have the respondents score their willingness to pay the alternative costs per day of fishing.

Table 21. Respondent Scores to Buy a S-S Tag at Alternative Prices and Expected Willingness to Pay For a S-S Tag

	Alternative tag price	Number of respondents who scored: 0	1	2	3	4	5	6	7	8	9	10	Σn_i	$\Sigma k_i n_i$	Weighted average price score ($\Sigma k_i n_i / \Sigma n_i$)
Respondents	$ 3	55	8	13	12	6	29	15	5	14	10	138	305	$583.8	$1.91
	$10	193	11	8	11	10	31	4	2	4	3	28	305	632.0	2.07
	$20	258	9	3	5	2	8	2	1	1	0	16	305	530.0	1.74
Respondent friends	$ 3	60	7	6	14	8	29	11	5	18	7	140	305	583.8	1.91
	$10	183	17	10	13	5	23	8	5	8	3	30	305	685.0	2.25
	$20	247	9	7	5	3	10	3	1	1	0	19	305	626.0	2.05

Where i = score 0, 1, ... 10; n = number of respondents; j = tag price $3, $10, $20;

k_i = tag price $_j$ X score $_i$ / 10.

The upper half of Table 21 presents the reactions of the respondents themselves while the lower half scores the reactions of closest friends of the respondents (Appendix 2, questions 79, 80, and 81).

Zero score means that the respondent would not buy a s-s tag at the increased prices. If the respondent scored ten, the liklihood of his buying a s-s tag was one hundred percent. In the upper half of Table 21, at $3 s-s tag price, 138 out of 305 respondents scored ten, 55 zero and the remaining 112 respondents scored between zero and ten.

In Table 21, converting these scores into a weighted average of their willingness to pay for a s-s tag a maximum of $2.07 was estimated. The expected s-s tag price was slightly higher ($2.25) for closest friends of the respondents. This difference might be due to the prestige factor associated with having comparatively richer friends.

As it was anticipated, respondents' expected willingness to pay for a s-s tag was found to be partly influenced by the sequence order of the questions 5, 6, and 7 (Appendix 2). The expected willingness to pay associated with the sequence order of the questions 5, 6, and 7 are given as below:

Expected willingness to pay for a s-s tag corresponding to the sequence of the tag price increases:

Alternative tag price	(3-10-20)	(10-20-3)	(20-10-3)	(10-3-20)	(3-20-10)	(20-3-10)
$3	$1.76	$1.74	$2.35	$1.75	$1.83	$2.06
10	1.88	2.05	2.04	1.94	1.65	2.92
20	1.52	1.65	1.96	1.49	.83	2.96
Number of respondents	50	57	53	51	46	48

The respondents' expected willingness to pay scored highest when the sequence of the tag prices was $20-3-10 and it scored lowest with the sequence of $3-20-10. This sequence effect was supposedly cancelled out since nearly equal number of respondents were randomly associated with each of the six sequences.

To trace out the factors influencing the degree of willingness to pay an increased s-s tag price the following regression equation was estimated:

$$(18)\quad Y = 7.54663 - 0.99408p + 0.00468X_1 + 0.48601X_2 - 0.01609X_3 + 0.02110X_4 + 0.02912p^2$$

Where Y = score;

p = hypothetical increase in s-s tag price;

X_1 = family income

X_2 = education

X_3 = age

X_4 = experience in fishing.

Absolute t ratios corresponding to the variables of Equation (18) are given as below:

			Variables		
p	X_1	X_2	X_3	X_4	p^2
12.86292	3.49892	4.98530	1.97298	2.54593	9.02456

All of the variables in Equation (18) were statistically significant at 95 percent confidence level. Income, education, and experience in fishing were positively correlated with fishermen's degree (score) of patronizing the s-s fishing at various s-s tag prices. Age did not affect Y much and showed negative correlation. Education affected Y even more than income. Adverse reaction to s-s tag price increases ($3, $10, and $20) was fairly strong, although a relatively constant weighted average score for the various alternative s-s tag prices was indicated.

Occupational effect was reflected in income, for example, respondents who were professionals and managers were also earning higher income. Respondents classified in agriculture and unskilled occupations showed lower incomes.

Geographic location of fishermen's residence also indicated a significant effect on the s-s tag price score. For example, respondents from the coastal region showed their willingness to pay

a maximum s-s tag price of $2.93 which compared to $1.88 for the metropolitan region and $2.04 for the southeast-central region. This indicates that location and distance factors play an important part in determining an individual's demand for s-s fishing. Persons living in a metropolis have more readily available substitutes for s-s fishing whereas persons close to s-s fishing spot might find fishing a more desirable recreation. It may be pointed out that the above results agree with the ORRRC's hypothesized patterns of demand for outdoor recreation in general (42: p. 27-29).

In questions 86 to 91 (Appendix 2) respondents were asked how many less trips (from the trips they had taken in 1962) they would take if they had to travel 20, 40, and 90 miles (one way) farther to go fishing.[1] Their reactions to these questions are summarized as follows:

Round trip increase in distance	S-S Fishing: Expected trips	S-S Fishing: Expected total miles	"Other" Fishing: Expected trips	"Other" Fishing: Expected total miles
0[2]	6.50	597	9.01	616
40	5.49	763	6.97	827
80	4.24	775	5.08	847
180	2.65	769	3.04	831

[1]These distance increases were arbitrarily chosen. Perhaps the data could be improved by having these distance increases broken into smaller increments. This, of course, would be desirable for the s-s tag price increases also.

[2]Figures corresponding to zero round trip increase in distance are actual trips and miles taken per angler during 1962.

It may be noticed from the above figures that a fisherman would travel a maximum of 775 and 847 miles per year for s-s and "other" fishing respectively, although he would take fewer trips. This maximum was reached when he had to travel 40 miles one way farther. Expected number of trips declined with increasing distance to fishing facility. This relationship reflects a pattern of fishermen's demand for fishing.

The following regression equation was fitted to determine the effect of various factors on expected total s-s miles to be traveled.

$$(19)\quad Y = -9.41110 + 8.00324d + 10.04462X_1 - 221.63798X_2 + 19.92522X_3 + 5.71794X_4 - 0.08107d^2 - 0.02204X_1^2 + 22.19415X_2^2 - 0.19453X_3^2$$

Where Y = expected total miles traveled for s-s fishing per year per angler;

d = hypothetical increase in distance (0, 20, 40, and 90 miles one way);

X_1, X_2, X_3, and X_4 were same as that of Equation (18).

Following t ratios were obtained for the individual variables in Equation (19):

$d = 2.05826$	$d^2 = -2.03989$
$X_1 = 5.53317$	$X_1^2 = -5.30633$
$X_2 = -1.56425$	$X_2^2 = 0.97072$

$X_3 = 1.38571$ $X_3^2 = -1.22581$

$X_4 = 2.10138$

X_1, X_1^2, X_4, d, and d^2 were statistically significant at 95 percent confidence level, while most of the remaining variables had fairly large t ratios.

Fishermen were willing to travel farther as the income increased, but when the income reached $20,000 and over their expected total distance traveled declined. This might be due to the reason that people in upper income brackets are more involved in their professions.

Although the t ratio associated with age was below the 0.05 significance level, some indication of the relationship between age and the willingness to travel farther distances could be obtained. The willingness to travel farther increased as age increased, but when age approached 52 and above the desire to travel farther was reduced.

Equation (19) indicates that the fishermen were willing to travel a maximum distance in order to fish for salmon and/or steelhead when the hypothetical distance was increased to 50 miles one way; beyond 50 miles their expected total distance traveled decreased.

Effect of education, in Equation (19), was not explainable because of illogical signs. Presumably this discrepancy could have been introduced through sampling because respondents showed carelessness in telling their educational status.

Fishermen's experience showed a significant positive effect on their willingness to travel farther distances to fish for salmon and/or steelhead.

Purpose of Angler Trips

In questions 28, 50, and 72 (Appendix 2) respondents were asked how many trips out of the total fishing trips they had made during 1962 were taken mainly for fishing.[1] Answers to these questions are summarized as below:

Percent of trips mainly for fishing	Number of respondents making fishing trips for: s-s fishing	"other" fishing	s-s and "other" fishing
Below 20	-	-	-
20-33	3	1	2
34-50	4	2	-
51-66	2	2	-
67-75	2	2	-
76-99	3	3	-
100	236	217	32
	250	227	34
Respondents who made no fishing trips during 1962	55	78	271
Total	305	305	305

[1] Sometimes people may take fishing trips when the primary purpose is not fishing. The main reason for their trips may be for business, vacationing or visiting.

From the figures presented above it is evident that over 94 percent of the respondents (fishing for s-s, "other", or both) made fishing trips mainly for fishing purposes.

Respondents who fished for both s-s and "other" on the same trips were relatively few, 34 in number. The relative number of respondents who fished for both s-s and "other" on the same trips, in the personal interview survey, compares to that of the number (Table 10) in the mail survey.

Substitutes For S-S Fishing

In question 78 (Appendix 2) respondents were asked how they would spend the time spared if they were unable to fish for salmon and/or steelhead. Table 22 presents a summary of the answers to the above question.

Table 22 indicates that "working in the house and garden" ranked first, "do nothing and stay at home" second, "drinking", "goofing", and "chasing" third, and "other" fishing ranked fourth as substitutes for s-s fishing. Only 6 percent of the respondents who indicated their choices of substitutes for s-s fishing chose "other" fishing as a substitute. The results in Table 22 suggest that "other" fishing is by no means a close substitute for s-s fishing.

To determine the relationship of s-s fishing with "other" fishing the following functions were fitted:

Table 22. Number of Respondents Indicating Their Choice of Substitutes for S-S Fishing

Choice	Number of respondents indicating the following substitutes for s-s fishing						
	1 "Working in the house and garden"	2 "Do nothing stay at home"	3 "Drinking, goofing, and chasing"	4 "Other" fishing	5 Hunting	6 Watch TV	7 Pleasure driving
First	89	31	17	20	8	8	7
Second	15	15	11	7	13	9	12
Third	10	7	12	-	1	4	2
Fourth	2	1	1	-	4	3	-
Total	116	54	41	27	26	24	21

	8 Visit friends	9 Read	10 Swimming	11 Visit scenic places	12 Golf	13 Boating	14 Others	15 Nothing mentioned	Total
First	3	6	5	2	7	6	43	53	305
Second	3	6	-	4	2	1	44	163	305
Third	7	2	6	4	2	1	11	236	305
Fourth	2	1	-	1	-	2	8	280	305
Total	15	15	11	11	11	10	106	732	1,220

(20) $Y' = -83.06335 + 0.06558M + 0.88407T + 10.09877S$

(21) $Y = -0.41081 + 0.00838M + 0.09127T + 0.37375S$

(22) $Y = 2.41551 + 0.15461T + 0.92603S$

Where Y' = Total time (hours) spent on s-s fishing trips;

Y = Total number of s-s fishing trips;

M = Total miles traveled for s-s fishing;

T = Total number of "other" fishing trips;

S = Total number of s-s caught.

All of the above variables were on per angler and per year basis. Absolute t values for Equations (20), (21), and (22) are given as follows:

t ratios of the variables:

Equation number	M	T	S	R^2
(20)	3.70956	42.40799	3.91129	.86
(21)	12.49556	2.25643	3.82990	.48
(22)	--	3.13148	8.65070	.22

All of the variables in Equations (20), (21), and (22) were statistically significant at 95 percent confidence level.

The preceding results indicated that "other" fishing was not as close a substitute for s-s fishing as anticipated. It, in fact, showed a significant (at 0.05 level) positive correlation with s-s fishing.

CHAPTER VII

TEST OF HYPOTHESES, SUMMARY, AND CONCLUSIONS

Test of Hypotheses

Three hypotheses were made for the study; namely, 1) income, fishing success, distance traveled to fishing spot, and cost of fishing have significant effect on s-s fishing days taken; 2) the Clawson model suited for park demand can also be applied towards determining fishing demand; and 3) "other" fishing is a close substitute for s-s fishing; and the anglers living at farther distances from the s-s fishing spot do progressively less s-s fishing.

Test of the first hypothesis was demonstrated in various econometric models presented in Chapters V and VI. All of the variables, except average distance traveled to fishing spot, had significant effect on s-s fishing days taken at 0.05 level. Although the effect of distance variable was below significance level it had the logical sign. The fact that it was below the 0.05 significance level could have been because it was insufficiently measured. Time factor certainly is an important consideration along with the distance traveled. Due to lack of data the time factor could not be incorporated in the various models. Therefore, the first hypothesis, while not rejected, was

not completely tested.

Although the application of the Clawson model presented some complications resulting from the fact that s-s fishing was not confined to any one location in Oregon, it was still possible to estimate s-s fishing demand using his technique. As explained in Chapter V the application of Clawson's approach to estimate s-s fishing demand produced quite comparable results obtained through other methods. However, the Clawson type demand function was not as suitable for projecting future s-s fishing demand.

The first part of the third hypothesis was hard to verify. However, "other" fishing did not appear to be as much a substitute for s-s fishing as expected. It exhibited a significant (at 0.05 level) positive correlation with s-s fishing.

The second part of the third hypothesis is accepted as true. As evidenced in column six of Table 12 per capita s-s fishing days taken progressively declined for the farther distance zones. This conclusion was further substantiated with the results presented in the first part of Chapter VI.

Summary and Conclusions

Gross and net economic value of the Oregon s-s sport fishery was estimated from angler expenditures data obtained from a mail survey during 1962. Questionaires were mailed during each month

of 1962, in an effort to minimize errors from faulty recollection or memory bias. Out of 5, 515 questionaires supposedly delivered to respondents, almost 80 percent were returned and at least partially completed.

It was estimated that in 1962 s-s sport anglers spent over 9 million dollars annually on durable equipment items primarily for s-s fishing. Percentage-wise breakdown of this figure into various durable equipment items is given as follows:

Item	Total durable expenses allocated to s-s angling	Percent
Tackle and gear	$1, 904, 800	20. 38
Boat equipment	5, 493, 900	58. 78
Special clothing	362, 600	3. 88
Camp equipment	1, 434, 700	15. 35
Other equipment	150, 500	1. 61
Total	9, 346, 500	100. 00

It was also estimated that over eight million dollars were spent by s-s sport anglers during 1962 on current expense items associated with s-s fishing trips. Total expenditures (except for angling licenses) by s-s sport anglers was estimated to be $17. 5 million. Percentage-wise breakdown of this figure into various current

expense items is presented as follows:

Item	Total current expenses allocated to s-s angling	Percent
Transportation	$2,391,000	29.32
Lodging	511,300	6.27
Food and beverage including liquor	2,847,700	34.92
Charter boats and guide service	912,600	11.19
Bait, lures, and other tackle	796,700	9.77
Boat and motor rental	260,200	3.19
Tackle and gear rental	105,200	1.29
Other	330,300	4.05
Total	8,155,000	100.00

Counting expenditures for angling licenses connected with s-s, total expenditures by sport anglers were estimated to be in the neighborhood of $18 million, plus or minus $3 million. The gross economic value of the s-s sport fishery was, therefore, approximately $18 million.

Net economic value of the s-s sport fishery in 1962 was also estimated. Net economic value was defined as the estimated value of the sport fishery resource if it were privately owned and a market

existed for the opportunity of fishing for s-s. Net economic value was estimated to be in the range of $2.4 to $3.0 million per year, as of 1962. This value was estimated through three different econometric models producing quite comparable results.

A further econometric analysis of the expenditure data indicated that the s-s sport fishery should become increasingly valuable with increasing population and higher family incomes. A 40 percent increase in net economic value to $4 million annually within ten years is possible if income and population trends of the past 15 years continue.

A brief analysis was made of the data collected from 305 respondents through personal interview survey to investigate 1) the basic relationships involved in s-s fishing demand; and 2) angler reactions towards alternative increases in the s-s tag price and s-s fishing distance.

In Chapter VI, angler reactions (scores) were converted into weighted average price scores. A maximum expected s-s tag price of $2.07 was estimated. Income, education, and experience in fishing were positively correlated with fishermen's degree (score) of patronizing the s-s fishing at various s-s tag prices. Age showed negative correlation. Occupational effect was reflected in income.

As might be expected, adverse reaction to s-s tag price increases was fairly strong, although a relatively constant weighted

average score for the various s-s tag prices was indicated. This adverse reaction was biased downward probably because of the "values" people hold against pricing public fishing facilities.

Geographic location of fishermen's residence also indicated a significant effect on the s-s tag price score. Respondents from the coastal region showed their willingness to pay a maximum s-s tag price of $2.93 which compared to $1.98 for the metropolis and $2.04 for the southeast-central region.

Expected number of s-s and "other" fishing trips declined with the increasing distance. As shown in Chapter VI, 20 miles (one way) increase in distance reduced the expected number of s-s trips from 6.50 (actually taken without any distance increase) to 5.49; 40 miles (one way) increase in distance further decreased the trips to 4.24; and the 90 miles (one way) brought the number of s-s trips down to 2.65 per angler per year.

Fishermen were willing to travel farther as the income increased, but when the income reached $20,000 and over their expected total distance traveled declined. The willingness to travel farther increased as age increased but when age approached 52 and above the desire to travel farther was reduced. Fishermen were willing to travel a maximum distance in order to fish for s-s when the hypothetical distance was increased to 50 miles (one way); beyond 50

miles their expected total distance traveled decreased.

As shown in Chapter VI over 94 percent of the respondents made fishing trips mainly for fishing purposes. The results indicate that "other" fishing was not as close a substitute for s-s fishing as expected. In fact, it indicated a significant (at 0.05 level) positive correlation with s-s fishing.

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APPENDICES

APPENDIX 1

Introductory Letter, Follow-up Letters, and
Mail Salmon-Steelhead Expenditure Questionaire

OREGON STATE UNIVERSITY

IN COOPERATION WITH

OREGON GAME COMMISSION

Dear Mr. Oregon Angler:

You have been selected as a representative angler to help establish the value of salmon and steelhead as a wildlife resource. You can help by filling out the enclosed questionnaire which itemizes the fishing expenditures made by you or other members of your family. Of course, your answers will be treated confidentially and used only for the purpose of this study.

This list of your expenditures, together with those of others, will provide valuable knowledge of the economic importance of fishing in Oregon. This knowledge can then be used to obtain better protection and management of our sport fishery in the years ahead.

Please fill out page one of the questionnaire *even if you did not fish during October* and place in the enclosed envelope and mail today. No stamp is required. Thanks very much.

DEPARTMENT OF AGRICULTURAL ECONOMICS
Oregon State University
in Cooperation with the Oregon State
Game Commission

Encls.

First Reminder

A few days ago we asked you to help us by completing an itemized list of your fishing expenditures for the month of November. This information you mail us can be used to estimate the economic importance of fishing in Oregon. In turn, this knowledge can be used to obtain better protection and management for our salmon and steelhead in the years ahead.

Since we have not heard from you, we would appreciate it if you would fill out the enclosed questionnaire and mail it in the attached envelope today. *The information on page one is needed even though you may not have fished during November.* If you have already mailed the earlier questionnaire, please disregard this one.

Many thanks.

Department of Agricultural Economics
Oregon State University
in Cooperation with the Oregon State
Game Commission

Second Reminder

Some time ago we asked you to help us by supplying certain information about your fishing expenditures for the month of October. The information that you can give is very important to us, so we are sending another questionnaire in case the others have been lost or mislaid. *Even if you did not fish during October, please complete the first page of the questionnaire.*

Your list of expenditures, together with those of others, can provide a basis for obtaining better protection and management of our sport fishery in the years ahead. Of course, all information supplied will be kept confidential and used only for the purpose of this study.

If you would please fill out the questionnaire and mail it in the attached envelope, it would help us greatly. Fishing in the future can be improved by your cooperation.

DEPARTMENT OF AGRICULTURAL ECONOMICS
Oregon State University
in Cooperation with the Oregon State
Game Commission

SALMON-STEELHEAD EXPENDITURE QUESTIONNAIRE 1

1) How many members are in your family (residing at home)? .....
How many 1962 angling licenses (excluding one-day licenses) have been purchased by your family? .....
How many one-day angling licenses? .....
How many salmon-steelhead tags? .....
What was the total cost of these 1962 licenses for your family? ..... (Include only half the cost of combination angler's and hunter's licenses.)

2) Please record below the expenditures made for equipment during the past 12 months because your family engages in fishing. We realize it will be necessary to charge only a part of certain costs to angling but we believe you can do this better than we can.

EXAMPLE: *Assume you purchased a boat this past year and used it a total of 100 hours. Of this 100 hours, 50 hours were used for all angling of which 25 hours were for salmon and steelhead angling. In this case 50 percent should be allocated to all angling and 25 percent should be allocated to salmon and steelhead fishing.*

For tackle, all of the cost is allocated to angling.

	Cost (only if purchased during past 12 months)	Percent of cost for past 12 months allocated to angling	Percent of cost for past 12 months allocated to salmon-steelhead angling
Tackle			
Rod		100	
Reel		100	
Line		100	
Creel		100	
Tackle box		100	
Landing net		100	
Other tackle		100	
Boating equipment			
Boats			
Boat trailer			
Outboard motor			
Other			
Special clothing			
Rubber boots			
Coats			
Rainwear			
Waders			
Other			
Camping equipment			
Tents			
House trailer			
Campers			
Sleeping bag			
Lantern			
Stove			
Other			
Other equipment expenditures not enumerated above			

3) What was the approximate total yearly income of your family in 1961? (Check appropriate space.)

Under $3,000 ☐
$3,000- $5,000 ☐
$5,000- $7,000 ☐
$7,000-$10,000 ☐
$10,000-$15,000 ☐
$15,000-$20,000 ☐
Over $20,000 ☐

Did any member of your family fish in Oregon during June, 1962? Yes ☐ No ☐

If yes, please fill in the information below for days fished in Oregon.

2

June 1962	Give number of family members fishing each day for:			If fish were caught, how many?				Transportation on fishing trips			How much did you spend during June for:						
															Rental of		
	Salmon	Steelhead	Other fish	Salmon	Steelhead	Jacks	Other fish	Mileage for your own car	Amount paid to you by others (not family)	Other transportation costs	Lodging	Food and beverage including liquor	Charter boats and guide service	Bait, lures and other tackle	Boat and motor	Tackle and gear	Other
Fri. 1																	
Sat. 2																	
Sun. 3																	
Mon. 4																	
Tue. 5																	
Wed. 6																	
Thu. 7																	
Fri. 8																	
Sat. 9																	
Sun. 10																	
Mon. 11																	
Tue. 12																	
Wed. 13																	
Thu. 14																	
Fri. 15																	
Sat. 16																	
Sun. 17																	
Mon. 18																	
Tue. 19																	
Wed. 20																	
Thu. 21																	
Fri. 22																	
Sat. 23																	
Sun. 24																	
Mon. 25																	
Tue. 26																	
Wed. 27																	
Thu. 28																	
Fri. 29																	
Sat. 30																	

APPENDIX 2

Instructions For Interviewing, Scale Card, and Personal Interview Questionaire

INSTRUCTIONS FOR INTERVIEWING - OSU SALMON-STEELHEAD STUDY - CBH-19/62

As you will note on the questionnaire, we are conducting this study for Oregon State University. In your introduction, always identify yourself as an Oregon State interviewer, not as an interviewer for CBH. If needed, use the OSU ID card. Please do not lose this card, since it must be returned to us after your assignment has been completed. You will find in almost all instances that the OSU name will "open the doors for you." Be most careful that your actions reflect credit on the University.

Whom to Interview

You will be given a list of people to interview, together with a quota. In most cases, your quota will consist of nine out of every ten names given you. That is, to fill your quota, you must complete interviews with approximately nine out of every ten persons listed on your assignment sheet.

Important! You must interview the person whose name and initials appear on the assignment sheet. For example, let's assume your first name is A.B. Jones. You must interview the person in the family at that address whose initials are "A.B." In most cases this will be a man. If the initials belong to a man, you must interview him -- not his wife. If, however, the initials are those of a woman, go ahead and interview her. The names on your list represent persons who have purchased a salmon-steelhead tag for last year. If, by chance, you find that the person you are interviewing did not purchase a salmon-steelhead tag, you must inquire who, within the family, purchased a salmon-steelhead tag, and interview that person.

The addresses in most cases have been checked out and found to be correct. In a few cases, however, you will have to inquire where the person lives in the community (this will be mostly in rural areas.) In some areas, you will be furnished maps to assist you in locating respondents (again, mainly in rural areas).

Since a majority of respondents will be men, a goodly portion of your interviewing must be done toward evening and on the weekend. If not, you will be wasting your time and our money. Of course, some interviewing may be accomplished during the daytime, but most of it will probably be evening or weekend interviewing. Whether you make appointments to conduct interviews or approach the respondent without advance notice, we will leave to your discretion. Perhaps a mixture of both methods will work best.

General Instructions

As with any study, we want you to ask the questions as printed on the questionnaire. If you put the questions in your own words, we would be getting the answers to many questions, not the standardized one printed on the questionnaire.

Leave and administer the questionnaires in the exact order you received them. Each questionnaire is slightly different and it is imperative that they remain in the order in which you received them. No need to worry about this, however -- just use the questionnaires in the sequence they are in.

Don't let the length of the questionnaire frighten you -- many questions are skipped, and you will find that the schedule goes easily and rather quickly. Fishermen are an interesting "breed," and we think you will find them most cooperative. At least, we did in our pre-testing.

Now, let's go over the questionnaire . . . . . .

Introduction - We found in pretesting that the introduction printed on the questionnaire worked very well. If the person seems suspicious or wants additional information, tell him that the study is being conducted for the University all over the state -- that results are confidential -- that findings are tabulated for the state as a whole -- not for any one person. You migt also say that the questions are on interesting topics, such as what a person does with his leisure time . . . . then launch the first question.

> It is important that you do <u>not</u> say the study is about fishing, since this might bias response to the first question. After the first question, it is obvious that the study revolves around fishing activities.

#1 - Ask as worded and record response in the space provided. List the activities in order horizontally across the sheet in the white space provided. No need to probe on this question. The question should, of course, never be left blank. If the person failed to name any leisure time activities, write his response in the white space, as given, and go on to the next question. In most cases, however, respondents will name a, or some, leisure time activities.

#2 - Ask the question, then circle the code number of the answer given. Circle the code number <u>only</u> -- not the word or words that follow it in the answer box. "D.K." as usual, stands for "Don't Know." Notice that if the answer to #2 is "D.K.," that you skip over question 3 and ask #4.

#3 & 4 - These should give you little or no difficulty. Ask as worded, and circle appropriate code number.

#5,6,7 - There are several sets of questions similar to this in the study. Read the first two sentences, then hand respondent the card. Then, continue reading the question as worded. Circle the number given to you by the respondent. Notice that you have two cards for the question which are identical, except that the "Very likely" and "Not at all likely" poles are alternated. Use one card on the first respondent, the other card on the second respondent, alternating the cards with every respondent.

If the respondent should ask you if prices of steelhead tags are going up, say you haven't the slightest idea -- that the price is set by the state, not you or, for that matter, the University. Just say you are conducting a survey and that you want to get his reaction on the supposition posed in the study.

Incidentally, if the respondent should volunteer information beyond the answer asked for, write the information in the margin. The more writing, the better we like it. Never, of course, "coach" the respondent or suggest answers to him. We want his answers and opinions only -- not a mixture of yours and his.

#8 - 12 - This also launches a series of questions which are similar. Read #8, and record the answer in the "8" box below. If respondent fished for salmon-steelhead, record the number of times, and go ahead and ask questions 9 through 12, recording response in the proper boxes.

#8 - 12 (Cont.) - If the respondent did not fish for salmon-steelhead during that period, circle code "0" in the "8" box, and skip immediately to question 13. Notice in this series of questions that we are asking for information about trips which were taken to fish for salmon-steelhead only. We do not want the respondent to include any trips when he also fished for other kinds of fish.

Questions 13-17, 18-22 and 23-27 are similar, except that they pertain to different time periods.

#28 - Before you ask this question, go back to questions 8-12, 13-17, 18-22 and 23-27 and add up the number of times the respondent went fishing for salmon-steelhead only. Then, when you ask #28, insert that number when you come to the blank space on the second line of the question. If all trips were taken mainly for the purpose of fishing, circle code 1 and go on with question 29. If some were taken for other purposes, circle code 2, then find out how many were taken mainly for fishing, and record the number on the line at the base of the question.

#29 - This asks for an average number. If the respondent should balk, or hesitate, simply say: "Well, just on the average -- just your best estimate?" or something in a similar vein.

#30 - 51 - This set of questions is identical to that which you just finished, except that it concerns fishing for other than salmon-steelhead. Generally, preceding directions will apply here. After you get into the questions, you may find that the respondent feels he is answering the same questions he did before. If this should occur, explain to him that these questions concern fishing for other than salmon-steelhead -- that they actually are different -- and very important.

#52 - 73 - Again, these are similar to preceding questions, except that they apply to fishing trips when the respondent fished for both salmon-steelhead and some other kind of fish. Be sure that you do not skip any questions that should be asked, since we will have to ask you, in such a case, to return on your own time to pick up the missing information.

#74 - This question actually has three different parts, each of which requires an answer.

#75 - An easy question. But, notice the "road signals" in parentheses. If, for example, code 2 or 1 is circled, you would skip to question 78. If either code 5, 4, or 3 is circled, you would continue on with question 76.

#76 - 77 - On these questions, you may have to ask the respondent to supply you with his "best estimate." That is, if the respondent "doesn't know," follow up with -- "Well, just your best estimate?"

#79 - 81 - These are similar to an earlier set of questions. Again, use the cards indicated and alternate their usage from one respondent to another. That is, use the card with "Very Likely" at the left-hand side on one respondent, then switch to the card with "Very Likely" at the right-hand side for your next interview.

#82 - 84 - Easy questions. On #84 you may have to ask: "Just the approximate number?" If the respondent hesitates or seems unable to give you an exact figure. A few may say something like, "All my life," in which case you will have to ask him to translate the answer into terms of years.

#85 - On this question, use the card provided. We would like you to put a figure on <u>each line</u>. If it is "none," write in "0." This question includes Oregon licenses only.

#86 - 91 - These are similar questions. Read as worded, and record answer given. If the respondent says "less" trips, you must then find out how many "less," and record on the line provided.

#92 - Please write in the individual age of each child, so that the number given balances out to the "No. of children."

#93 - 94 - Here we get into some slightly "personal" questions. However, experience tells us that you will have very little difficulty unless you, yourself, are afraid of the questions. If the respondent should ask why you are asking for such information, just tell him that we have to know a little about fishermen to help analyze the results. Also say that the results are tabulated for the state as a whole and not for any one person. On age, always ask for "approximate age," as worded. Never ask: "Are you over or under a certain figure?" Such a question usually gets an under-estimation. If the person absolutely refuses to give age, estimate his age and put "Est." by the code you circle. However, <u>never estimate age until you have first asked the question</u>.

#95 - 96 - You have a separate instruction sheet on how to record occupation. Please study this before you commence interviewing. On income, hand the respondent the card, read the question, then just ask him to call his answer by number. If, by chance, someone should refuse, then we want you to estimate income. If you should have to estimate it, please write "Est." by the code number. Again, however, never estimate income unless you get a refusal. <u>You must ask the question, in each instance</u>.

#97 - There must be two answers to this: (1) a sex code circled, and (2) position in the family written in on the line to the right.

#98 - This is your interpretation of the reception received. If the the respondent cheerfully cooperated, you would circle code 3- for "positive" cooperation. If, on the other hand, the respondent was antagonistic or hard to interview, you would circle code 1. If the person was neither very cooperative nor hard to interview -- but just in between -- you would circle code 2 for "Neutral."

#99, 100 - On #99, this is actual length of interview itself. On #100, there will be no "substitution." Just circle whether you made the interview on the original call, 1st callback or 2nd callback. If it took more than two callbacks to produce the interview, cross out "Substitution" and write in the number of callbacks.

NOW, one final step and you are through with the interview. On the back of the questionnaire, there is a sheet which the respondent should fill out. Just hand him the questionnaire, back side up, and ask him to fill in the information requested. The form is self-explanatory, but if you find he is having difficulty filling it out, or if you feel he needs some "help," go ahead and help him fill it out, by asking the questions. Don't forget this final sheet, since a completed form must be returned with each schedule.

GOOD LUCK! WE'RE COUNTING ON YOU FOR ANOTHER GOOD JOB.

And, best wishes for a HAPPY HOLIDAY SEASON!

Sincerely,

Roy Bardsley &
Dave Worden

Clark, Bardsley & Haslacher
1320 S.W. Broadway
Portland 1, Oregon
CA 3-2447

Card for Questions 5,6,7,79,80 & 81.

Not at all likely	0	1	2	3	4	5	6	7	8	9	10	Very likely

Card for Questions 5,6,7,79,80 & 81.

Very likely	10	9	8	7	6	5	4	3	2	1	0	Not at all likely

Question 96-TOTAL FAMILY INCOME

1 Less than $2,999

2 $3,000 - $3,999

3 $4,000 - $4,999

4 $5,000 - $5,999

5 $6,000 - $6,999

6 $7,000 - $9,999

7 $10,000 - $14,999

8 $15,000 - $19,999

9 $20,000 or more

Just call you answer by number, please.

Question 85.

Adult residence

Juvenile residence

One-day angling

Salmon-steelhead tags

Others (Name)

CBH-19/62/Final OREGON STATE UNIVERSITY 11/26/62

Hello, I'm working on a survey for Oregon State University, and would like to ask you a few interesting questions, if you don't mind.

1- First, would you mind naming some of the things you, yourself, did for leisure time during the past year? (NOTE TO INTERVIEWER: list in order mentioned. DO NOT PROBE!)

2- 5 A lot
4 Quite a bit
3 A little
2 Not at all
1 D.K. (Skip to Q4)

Here, in Oregon, some people spend part of their leisure time fishing, while others don't spend much time fishing. How much fishing, if any, have you done in the past year--a lot, quite a bit, a little, or none at all?

3- 5 A lot
4 Quite a bit
3 A little
2 Not at all
1 D.K.

Some people who fish enjoy it quite a lot, while others don't like to fish. How much do you like to fish--not at all, a little, quite a bit, or a lot?

4- 3 Yes
2 No
1 D.K.

Many people fish for different kinds of sport fish in Oregon. For example, salmon and steelhead are sport fish. Have you happened to fish for either salmon or steelhead this past year?

5- 0 = Not at all
1
2
3
4
5
6
7
8
9
10 = Very
11 = D.K.

Because fishing pressure is becoming so heavy, more and more money will be needed to maintain the salmon-steelhead sport fishery in the years to come. Because of these increased costs of maintaining the salmon and steelhead, it might become necessary to raise the price of the salmon-steelhead tags. Using this card, please tell me how likely you would be to buy a salmon-steelhead tag next year if the price were raised from one dollar to three dollars. "10" means you would be very likely, running all the way across to "zero" meaning you would be not at all likely to buy one. Just select the one number that best represents how likely you would be to buy a steelhead tag next year if it cost three dollars.

6- 0 = Not at all
1
2
3
4
5
6
7
8
9
10 = Very
11 = D.K.

Now suppose that next year, 1963, the price for salmon-steelhead tag is raised from one dollar to ten dollars. Using this same card, how likely would you be to buy a salmon-steelhead tag next year if the price were ten dollars? Just select the one number that best represents your likelihood to buy.

7- 0 = Not at all
1
2
3
4
5
6
7
8
9
10 = Very
11 = D.K.

Once more, let's suppose the price of salmon-steelhead tags were to be raised next year. Using the same card, how likely would you be to buy a salmon-steelhead tag next year if the price were raised from one dollar to twenty dollars?

8- Now, I'd like to ask you a few questions about your fishing in Oregon. Thinking back from September 1 of this year until now, how many times, if any, did you go fishing for salmon or steelhead only? Don't count any trips when you also fished for other kinds of fish. (INTERVIEWER: If respondent fished for salmon-steelhead, ask questions 9-12. If respondent did not fish for salmon-steelhead skip to question 13.)

8	9	10	11	12
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for salmon-steelhead fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for salmon-steelhead fishing? Count from time you left home until you returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for salmon-steelhead? Hours_____ 11 D.K.

13- Thinking back to last summer -- from July 1 of this year until September 1, how many times during this period, if any, did you go fishing for salmon or steelhead only? Again, don't count any trips when you fished for other kinds of fish, too. (INTERVIEWER: If respondent fished for salmon-steelhead, ask questions 14-17. If respondent did not fish for salmon-steelhead, skip to question 18.)

13	14	15	16	17
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for salmon-steelhead fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for salmon-steelhead fishing? Count from time you left home until returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for salmon-steelhead? Hours_____ 11 D.K.

18- Thinking back to last spring -- from March 1 of this year until July 1, how many times, if any, did you go fishing for salmon or steelhead only? Don't count any trips when you fished for other kinds of fish, too. (INTERVIEWER: If respondent fished for salmon-steelhead, ask questions 19-22. If respondent did not fish for salmon-steelhead, skip to question 23.)

18	19	20	21	22
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for salmon-steelhead fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for salmon-steelhead fishing? Count from time you left home until returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for salmon-steelhead? Hours_____ 11 D.K.

23- Finally, thinking back to last winter--from January 1 of this year until March 1, how many times, if any, did you fish for salmon-steelhead? As before, please do not count any trips when you fished for other kinds of fish too. (INTERVIEWER: If respondent fished for salmon-steelhead, ask questions 24-29. If respondent did not fish for salmon-steelhead, skip to question 28.)

23	24	25	26	27
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for salmon-steelhead fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for salmon-steelhead fishing? Count from time you left home until you returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for salmon-steelhead Hours_____ 11 D.K.

ASK QUESTIONS 28 & 29 OF EVERYONE WHO ANSWERED ANY OF QUESTIONS 9-12, 14-17, 19-22 or 24-27. In other words, ask of everyone who went salmon-steelhead fishing in questions.

28- 1 All fishing
2 Some for other purpose

You say you went fishing for salmon-steelhead _____times this year. Were all of these trips taken mainly for the purpose of fishing, or were some of them taken mainly for some other purpose?

_____No. trips mainly for fishing.

(If some taken for OTHER purpose, ask)
About how many of these trips were taken mainly for fishing?

29- _____Average No.
11 D.K.

On the average throughout this year, how many members of your family who also fished for salmon-steelhead, accompanied you on your fishing trips for salmon-steelhead?

ASK OF EVERYONE

30- Now I'd like to ask you a few questions about your fishing for other kinds of fish than salmon or steelhead. Thinking back from September 1 of this year until now, how many times, if any, did you go fishing for other than salmon or steelhead? Don't count any trips when you also fished for salmon or steelhead. (INTERVIEWER: If respondent fished for other kinds, ask questions 31-34. If respondent did not fish for other kinds skip to question 35.)

30	31	32	33	34
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for other than salmon-steelhead fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for this other fishing? Count from time you left home until you returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for other than salmon or steelhead? Hours_____ 11 D.K.

35- Thinking back to last summer -- from July 1 of this year until September 1, how many times during this period, if any, did you go fishing for other than salmon or steelhead? Again, don't count any trips when you fished for salmon or steelhead too. (INTERVIEWER: If respondent fished for other kinds, ask questions 36-39. If respondent did not fish for other kinds, skip to question 40.)

35	36	37	38	39
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for this other fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for this other fishing? Count from time you left home until you returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for other than salmon or steelhead? Hours_____ 11 D.K.

40- Thinking back to last spring -- from March 1 of this year until July 1, how many times, if any, did you go fishing for other than salmon or steelhead. Don't count any trips when you fished for salmon or steelhead too. (INTERVIEWER: If respondent fished for other kinds, ask questions 41-44. If respondent did not fish for other kinds, skip to question 45.)

40	41	42	43	44
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for this other fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for this other fishing? Count from time you left home until you returned Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for other than salmon or steelhead? Hours_____ 11 D.K.

45- Finally, thinking back to last winter -- from January 1 of this year until March 1, how many times, if any, did you go fishing for other than salmon or steelhead? As before, please do not count any trips when you fished for salmon or steelhead too. (INTERVIEWER: If respondent fished for other kinds, ask questions 46-51. If respondent did not fish for other kinds, skip to question 50.)

45	46	47	48	49
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip for this other fishing? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip for this other fishing? Count from time you left home until you returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip when out for other than salmon or steelhead. Hours_____ 11 D.K.

ASK QUESTIONS 50 & 51 OF EVERYONE WHO ANSWERED ANY OF QUESTIONS 31-34, 36-39, 41-44 or 46-49. In other words, ask all who went fishing for other than salmon-steelhead.

50- 1 All fishing
2 Some for other purpose

You say you went fishing for other than salmon-steelhead _____ times this year. Were all of these trips taken mainly for the purpose of fishing, or were some taken mainly for some other purpose?

_____Trips mainly for fishing

(If some for OTHER purpose) About how many of these trips were taken mainly for fishing?

51- _____Average No.
11 D.K.

On the average throughout this year, how many members of your family who also fished for other than salmon-steelhead, accompanied you on these fishing trips?

ASK OF EVERYONE

52- This time I'd like to ask you about any trips when you fished for both salmon-steelhead and some other kind of fish on the same trip. Again, thinking back from September 1 of this year until now, how many times, if any, did you go fishing for both salmon-steelhead and some other kind of fish? (INTERVIEWER: If fished for both, ask questions 53-56. If did not fish for both, skip to question 57.)

52	53	54	55	56
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip? Count from time you left home until you returned? Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip? Hours_____ 11 D.K.

57- Thinking back to last summer -- from July 1 of this year until September 1, how many times during this period, if any, did you go fishing for both salmon-steelhead and some other kind of fish on the same trip? (INTERVIEWER: If fished for both, ask questions 58-61. If did not fish for both, skip to question 62.)

57	58	59	60	61
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip? Count from time you left home until you returned? Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip? Hours_____ 11 D.K.

62- Thinking back to last spring -- from March 1 of this year until July 1, how many times during this period, if any, did you go fishing for <u>both</u> salmon-steelhead and some other kind of fish on the same trip? (INTERVIEWER: If fished for both, ask questions 63-66. If did not fish for both, skip to question 67.)

62	63	64	65	66
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip? Count from time you left home until you returned. Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip? Hours_____ 11 D.K.

67- Finally, thinking back to last winter -- from January 1 of this year until March 1, how many times, if any, did you go fishing for <u>both</u> salmon-steelhead and some other kind of fish on the same trip? (INTERVIEWER: If fished for both, ask questions 68-73. If did not fish for both, skip to question 72.)

67	68	69	70	71
0 None 11 D.K. _____ Times	What was the average round trip distance you traveled per trip? Miles_____ 11 D.K.	On how many of these trips, if any, did you drive your own car? No._____ 11 D.K.	What was the average number of hours you spent per trip? Count from time you left home until you returned? Hours_____ 11 D.K.	What was the average number of hours you actually spent fishing per trip? Hours_____ 11 D.K.

ASK QUESTIONS 72 & 73 OF EVERYONE WHO ANSWERED ANY OF QUESTIONS 53-56, 58-61, 63-66, or 68-71. In other words ask of everyone who fished for both during year.

72- 1 All fishing
2 Some other purpose

_____No. trips mainly for fishing

You say you went fishing for both salmon-steelhead and some other kind of fish _____ times this year. Were all of these trips taken mainly for the purpose of fishing, or were some taken mainly for some other purposes?

(If some for OTHER purpose) About how many of these trips were taken mainly for fishing?

73- _____Average No.
11 D.K.

On the average throughout the year, how many members of your family <u>who fished for both salmon-steelhead and some other kind of fish</u> on the same trip, accompanied you on these fishing trips?

ASK OF EVERYONE

74- _____No. Salmon
11 D.K.

Not counting jacks, approximately how many salmon, if any, did you, yourself, catch between last January and now? (If respondent hesitates, ask: Just your best estimate?)

_____No. Steelhead
11 D.K.

How many steelhead, if any, did you catch during this past year? (Just your best estimate?)

_____No. Jacks
11 D.K.

What about jacks -- how many of those, if any, did you catch during the past year? (Just the approximate number?)

75- 5 Very likely
4 Quite likely
3 Not too
2 Not at all (Skip to Q-78)
1 D.K. (Skip to Q-78)

Suppose for some reason you were unable to fish for salmon or steelhead. How likely would you be to spend this extra time earning more money--very likely, quite likely, not too likely, or not at all likely?

76- _____Hours
11 D.K.

Altogether, about how many hours would you have worked if you had been unable to fish for salmon steelhead?

77- _____Dollars
11 D.K.

About how much would this have increased your yearly income?

(INTERVIEWER: If you asked this question, skip now to Q-79.)

78- How would you probably spend this extra time if you were not fishing for salmon or steelhead? (PROBE FOR SPECIFICS!)

Anything else?

ASK OF EVERYONE

79- 0 = Not at all, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 = Very, 11 = D.K.

Now let's talk about the price of salmon-steelhead tags again for a minute. If the price of a salmon-steelhead tag is raised from $1 to $3 in 1963, how likely do you think your closest friend who fishes would be to buy a tag for $3. As before, "10" on this card means he would be very likely, running all the way across to zero, meaning he would be not at all likely to buy one. Just select the one number that best represents how likely this close friend would be to buy a steelhead tag next year if it cost $3.

80- 0 = Not at all, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 = Very, 11 = D.K.

Well, if the price of a salmon-steelhead tag is raised from $1 to $10 in 1963, how likely do you think your closest friend who fishes would be to buy a salmon-steelhead tag next year if the price were $10. Just select the one number that best represents his likelihood to buy.

81- 0 = Not at all, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 = Very, 11 = D.K.

Once more, let's suppose the price of salmon-steelhead tags were to be raised next year. Using the same card, how likely would your closest friend who fishes be to buy a salmon-steelhead tag next year if the price were raised from $1 to $20.

82- 1 Yes
2 No
3 About equal

When you go fishing for salmon or steelhead, do you usually take your family with you, or not?

83- 1 Yes
2 No
3 About equal

When you go fishing for other than salmon-steelhead do you usually take your family with you, or not?

84- _____Years
11 D.K.

For about how many years have you been fishing in the Pacific Northwest?

85- _____Adult residence
_____Juvenile residence
_____One-day angling
_____Salmon-steelhead tags
_____Others (name)

Taking this card (HAND RESPONDENT CARD), would you please tell me how many 1962 angling licenses, if any, your family purchased in each of these groups? (Include Oregon licenses only.)

INTERVIEWER: If respondent did not fish for salmon-steelhead skip to Q. 89.

86- 1 Same
2 Less . . How many less? _____
3 D.K.

The distance people travel sometimes influences the number of fishing trips they take during a year, because of time and money. For example, just suppose your usual salmon-steelhead fishing place were closed, and you had to travel 20 miles farther one way or 40 miles farther round trip, to go salmon-steelhead fishing -- would you probably make the same number of trips that you did last year, or would you make less trips?

87- 1 Same
2 Less . . How many less? _____
3 D.K.

Well, say you had to go 40 miles farther one way or 80 miles farther round trip, than your usual salmon-steelhead fishing place -- would you probably make the same number of trips that you did last year, or less trips?

88- 1 Same
2 Less . . How many less? _____
3 D.K.

Well, if your favorite salmon or steelhead fishing place were closed for salmon-steelhead, and you had to travel 90 miles farther one way or 180 miles farther round trip, to go salmon-steelhead fishing-- would you probably make the same number of trips you did last year, or would you make less trips?

INTERVIEWER: If respondent did not fish for other than salmon-steelhead, skip to Q.92.

89- 1 Same
2 Less . . How many less? _____
3 D.K.

If your usual fishing place for other than salmon-steelhead were closed, and you had to travel 20 miles farther one way or 40 miles farther round trip to fish for other than salmon-steelhead -- would you probably make the same number of trips that you did last year, or would you make less trips?

90- 1 Same
2 Less . . How many less? _____
3 D.K.

Well, say you had to go 40 miles farther one way or 80 miles farther round trip to go fishing for other than salmon-steelhead -- would you probably make the same number of trips that you did last year, or less trips?

91- 1 Same
2 Less . . How many less? _____
3 D.K.

Now, suppose your favorite fishing place for other than salmon-steelhead were closed, and you had to travel 90 miles farther one way or 180 miles farther round trip to go fishing for other than salmon-steelhead -- would you probably make the same number of trips that you did last year, or would you make less trips?

92- 1 Not married
2 Married
_____ No. of Children
_____ Age of each child. (Write in)

Here are a few questions about yourself. First, are you married?
(If YES) If you have children living with you now, would you kindly tell me the age of each child?

93- 5 Completed college
4 Some college
3 Completed high school
2 Some high school
1 Grade school or no schooling

Would you mind telling me the last grade you completed in school?

94- 1 Less than 25
2 25 - 29
3 30 - 34
4 35 - 39
5 40 - 44
6 45 - 49
7 50 - 54
8 55 - 59
9 60 - 64
0 65 and over

May I ask your approximate age?

95- _____ Industry
_____ Specific job

What is the occupation of the head of the household?

96-
1 Less than $2,999
2 $3,000 - $3,999
3 $4,000 - $4,999
4 $5,000 - $5,999
5 $6,000 - $6,999
6 $7,000 - $9,999
7 $10,000 - $14,999
8 $15,000 - $19,999
9 $20,000 or more

Which one of these groups comes closest to your family's (your) total yearly gross income -- that is, your yearly income from all sources before taxes or expenses? Just call your answer by number, please. (HAND RESPONDENT INCOME CARD.)

INTERVIEWER: Fill in remaining data by observation.

97-
1 Male
2 Female

Position in household (such as husband, wife, son, daughter, grand-father, grand-mother.) _____ (Write in)

98-
3 Positive
2 Neutral
1 Negative

Respondent rating on cooperation.

99-
1 30 minutes or less
2 1 hour
3 1½ hours or more

Length of actual interview.

100-
1 Original call, assigned
2 1st callback
3 2nd callback
4 Substitution

Was this interview made on the original call to the assigned person, on the 1st callback, the 2nd callback to the assigned person, or was it an interview with a "substitute" person?

101- _____ Phone number (For verification purposes only)

X I hereby certify this interview was actually taken at the following address with the person listed, and represents a true and accurate account of that interview.

_____ (Respondent's name) _____ (Address) _____ 1962 (Date)

_____ (City or Town) _____ (Interviewer's signature)

SALMON-STEELHEAD EXPENDITURE QUESTIONNAIRE

Please help us record the expenditures you made for fishing equipment during the past 12 months. We realize it will be necessary to charge only a part of certain costs to angling but we believe you can do this better than we can.

EXAMPLE: Suppose that you purchased a boat this past year and used it a total of 100 hours. Suppose that of this 100 hours, 50 hours were used for angling of which 25 hours were for salmon and steelhead angling. In this case 50 percent should be allocated to all angling and 25 percent should be allocated to salmon and steelhead fishing.

For tackle, all of the cost is allocated to angling.

	Cost (only if purchased during past 12 months)	Percent of cost for past 12 months allocated to angling	Percent of cost for past 12 months allocated to salmon-steelhead angling
TACKLE			
Rod		100	
Reel		100	
Line		100	
Creel		100	
Tackle Box		100	
Landing net		100	
Other tackle		100	
BOATING EQUIPMENT			
Boats			
Boat trailer			
Outboard motor			
Other			
SPECIAL CLOTHING			
Rubber boots			
Coats			
Rainwear			
Waders			
Other			
CAMPING EQUIPMENT			
Tents			
House trailer			
Campers			
Sleeping bag			
Lantern			
Stove			
Other			
Other equipment expenditures not enumerated above			

APPENDIX 3

Estimated Distribution of the Total 1962 Oregon Salmon-Steelhead Angling Families Among Daily and Other Than Daily Angling Families

APPENDIX 3 TABLE A. Estimated distribution of the total 1962 Oregon salmon-steelhead angling families among daily and other than daily angling families /1

Month	Total	Salmon-steelhead angling families			
		With daily angling licenses	With other than daily angling licenses	With other than daily angling licenses	
				Responding	Nonresponding
Jan.	9,635	68	9,567	7,973	1,594
Feb.	17,999	126	17,873	14,896	2,977
Mar.	8,403	58	8,345	6,955	1,390
Apr.	10,274	161	10,113	8,428	1,685
May	12,998	229	12,769	10,642	2,127
June	8,235	181	8,054	6,712	1,342
July	10,042	335	9,707	8,090	1,617
Aug.	18,501	4,187	14,314	11,930	2,384
Sept.	23,505	9,080	14,425	12,022	2,403
Oct.	8,256	3,250	5,006	4,172	834
Nov.	3,543	1,244	2,299	1,916	383
Dec.	3,659	1,259	2,400	2,000	400
Total	135,050	20,178	114,872	95,736	19,136

/1 The total monthly salmon-steelhead angling license sales were obtained from Oregon State Game Commission. They are converted into angling families by multiplying with a constant of .610080134 (Number of angling families per salmon-steelhead angling license holder). The allocation among dailies and other than dailies was determined from Dr. Calvin's statistical study (10).

APPENDIX 3 TABLE B. Estimated distribution of the total 1962 Oregon salmon-steelhead angling families among daily and other than daily angling families /1

		Salmon-steelhead angling families				
				With other than daily angling licenses		
Month	Total	With daily angling licenses	With other than daily angling licenses	Responding	Nonresponding	Eligible Responding
Jan.	38,073	266	37,807	31,509	6,298	31,509
Feb.	7,512	133	7,379	6,150	1,229	37,659
Mar.	10,304	163	10,141	8,452	1,689	46,111
Apr.	17,454	385	17,069	14,225	2,844	60,336
May	7,018	345	6,673	5,561	1,112	65,897
June	6,337	1,099	5,238	4,365	873	70,262
July	14,423	4,535	9,888	8,241	1,647	78,503
Aug.	18,839	7,642	11,197	9,332	1,865	87,835
Sept.	9,254	3,641	5,613	4,678	935	92,513
Oct.	3,052	993	2,059	1,716	343	94,229
Nov.	1,054	387	667	556	111	94,785
Dec.	1,730	589	1,141	951	190	95,736
Total	135,050	20,178	114,872	95,736	19,136	855,375

/1 The original data was obtained from Dr. Calvin, contained in his study (10). The figures are adjusted for the salmon-steelhead angling licenses purchased at different times than the general angling licenses. Also, the salmon-steelhead license holders are converted into salmon-steelhead angling families.