ALLOCATION AND ECONOMIC ESTIMATION OF THE NATURAL RESOURCE IN NORTH CENTRAL OKLAHOMA AND NORTHEASTERN IOWA

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PREFACE

The destruction of viable habitats continues to be a major concern for many individuals that perceive the natural resource as a domicile to increase their quality of life by experiencing wild and beautiful things. The purpose of this study was to determine how valuable our scenic beauty and wildlife are to the general public. It was the intent of this research to establish an economic base for the valuation of the natural resource as perceived by the user. With this information, the natural resource could be spared from development upon consideration of alternate economic value.

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

The first attempts to evaluate scenic beauty and wild things in the 19th century, up to the turn of this century, came in the form of Transcendentalism. Henry David Thoreau wrote:

> These motions everywhere in Nature must surely be the circulations of God;. . . the running stream, the waving tree, the roving wind, whence else their infinite health and freedom. I can see nothing so holy as unrelaxed play and frolic in this bower God has built for us (Stevens, 1939, p. 62).

This spiritual philosophy documents Thoreau's belief that the natural world symbolized or reflected spiritual truth and moral law. And nature, especially in its wilder forms, possessed a fertilizing vitality that civilized men needed for strength and creativity (Nash, 1968).

The writings of Henry David Thoreau and Ralph Waldo Emerson shaped John Muir's philosophy that undisturbed nature was a "window opening into heaven, a mirror reflecting the creator" (Muir, 1901, p. 26). It was not until Robert Underwood Johnson, associate editor of Century Magazine, convinced John Muir to write articles for the magazine that the preservation of undisturbed nature began.

John Muir's written articles on the Yosemite Valley and Robert Underwood Johnson's affiliation with several political leaders inspired several legislators to secure Congressional approval of the Act which created Yosemite National Park in 1890 (Clarke, 1979). The Johnson and

Muir team pushed for numerous bills passed by Congress to preserve more of America's natural beauty. It was Muir who provoked Theodore Roosevelt, on a visit to Yosemite Valley in 1902, to set aside 148 million acres of new national forests, doubling the number of National Parks and passing the Monuments and Antiquities Act of 1906 that opened doors for the conservation movement (Melham, 1976).

The opponents to the conservation or idealist movement were mostly politicians from the East and were called materialists. These politicians fought to keep the Western United States' natural resources from being preserved because the East sorely needed the energy that could be produced from these natural resources to insure a healthy economy. Many congressmen could not understand purchasing "natural scenic beauty" that would not bring maximum profit to the general public. The conservationalists in the early 1900's shifted their stance to appease the materialists by proposing that scenic beauty had money value from the vast numbers of sojourners visiting these preserved areas (Nash, 1968).

The preservation of land was the philosophy of Thoreau, Emerson, Muir, and Johnson, but it was the conservation philosophy that the leaders of our country could live with because conservation meant development. Again, American conservationalists had justified their programs in terms of economics or democracy or, less frequently, esthetics and religion. The emphasis in each case was on man's well being. In the 1930's, Aldo Leopold philosophized that the environment did not "belong" to man; he shared it with everything alive. And because of his power, man bore the responsibility of maintaining it in the best interest of the life community (Leopold, 1949). The trend on the use of public land shifted toward Leopold's ethic for man-land relations; that is, scientific rather

than religious or sentimental roots. Leopold's purpose was to expedite the snail's pace at which conservation was proceeding.

During this same decade, Robert Marshall was becoming a force in the movement for preservation of the wilderness. He proposed that the benefits which accrued from the wilderness were separated into three divisions: physical (contribution to health), mental (repose and incitement), and esthetic (Marshall, 1930). The drawback to preservation is concerned with economic loss. Preservation removes lumber, minerals, rangeland, water power, and agricultural possibilities from the marketplace. The materialists believed it would be suicide to lock up such potential material wealth.

In the late 1940's and early 1950's, the approach to conservation changed from scientific, economic, and quantitative to an increasing emphasis of quality and esthetics in the environment. This approach was perhaps caused by the increasing deterioration of the environment from industry, pollution (air and water), pesticides, a denser population, coupled with an increase in leisure time for outdoor recreation. The environment was being observed by the general public and the loss of animals, vegetation, esthetic beauty, and, most importantly, the decrease in the health of people from pollution created this new emphasis on quality and esthetic beauty of our environment (Fisher, 1964).

It was not until February 8, 1965, that Robert Underwood Johnson and John Muir's philosophy for preservation received enthusiastic official endorsement. Lyndon B. Johnson placed emphasis on esthetic rather than material concerns in his special message on natural beauty to the Congress of the United States in explaining his "new conservationism" (Johnson, 1965). The new conservation was addressing Blake's (1964) inspiring book criticizing the wealthy Americans' "interest," whose only objective

was the service of their own monetary means. His displeasure with the haphazard, unrelated, identity-less "goop" that results from short-sighted and irresponsible custodianship of the land or "uglification" was the very thing Lyndon B. Johnson was addressing.

Lyndon B. Johnson knew he had to use his executive power to support beautification to slow the deterioration of our environment from development. He went to the crux of the problem with the following statement in his message to Congress:

> Beauty is not an easy thing to measure. It does not show up in the gross national product, in a weekly paycheck, or in profit-and-loss statements. But these things are not ends in themselves. They are a road to satisfaction and pleasure and the good life. Beauty makes its own direct contribution to these final ends. Therefore, it is one of the most important components of our true national income, not to be left out simply because statisticians cannot calculate its worth (Johnson, 1965, p. 8).

Preservationalists and conservationalists have had to work diligently to lobby for the preservation of land, and have succeeded in having major legislation passed, such as the Creation Act of 1891, the Antiquities Act of 1906, the Weeks Act of 1911, the Surplus Property Act of 1944, the Shipstead-Newton-Nolan Act of 1930, the Historic Sites Act of 1935, the Wilderness Act of 1964, the Land and Water Conservation Fund Act of 1965, the Water Quality Act of 1965, the Estuary Protection Act of 1968, the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, the National Parks and Recreation Act of 1978, and the Alaskan National Interest Lands Conservation Act of 1980, to name only a few. These Congressional Acts are the means in which scenic lands and wildlife habitats are saved from being developed from the economic profits of extracting renewable and nonrenewable resources.

The question becomes: How well are these Congressional Acts performing in the preservation and conservation of our natural heritage?

Van Doren (1984) documented the number of gross acreage in national forests in 1950 at approximately 180 million, and in 1982 approximately 187 million acres, or a 9% increase in the past 30 years. The net wilderness acreage in 1955 was approximately 14 million acres, and in 1982 it increased to 27 million acres, or a 48% increase in the past 27 years. The National Park Service had a total of approximately 25 million acres in 1957 and approximately 79 million acres in 1982--an increase of 30% in the past 25 years.

On the development side of the issue, Steinhart (1983) reported that 320 acres of farmland are urbanized every hour, 1,500 acres of rangeland, and 2,250 acres of forest are converted to urban use daily in the United States. Globally, 18 to 35 million acres of forest alone are being lost each year. This loss of forest areas globally does have an effect on the United States. Many species of bird populations have been declining since 1966 because they rely on the tropical forest in Central and South America for wintering habitats (Evans, 1983). It is quite apparent that profits from development are the driving force in the destruction of diverse habitats.

Transcendentalism, sentimentalism, land-ethics, natural or scenic beauty, quality environments, and conservation will not slow down the rapid pace of development of the natural environment for commercial purposes. This is evidenced in the Mineral King controversy in which a wilderness area was to be developed for a major skiing facility by the United States Forest Service and Walt Disney Productions (Cicchetti, Fisher, and Smith, 1976). The conflict between the development of a wilderness and the preservation of the area by the Sierra Club resulted in a Supreme Court decision. The Supreme Court did not attempt to resolve the issues in the case, ruling instead on the preliminary issue of

the legal standing of the project's opponent. Ultimately, either the courts or federal agency decision makers will have to address the question that occurs to the economist--what are the costs and benefits associated with alternative uses of the resource?

Many environmentalists believe that the only method to save our natural environments, especially scenic beauty and wildlife, is to determine if, or what, economic value they possess in the eyes of the general public. It is imperative to offset commercial economic development with economics of the natural setting. The natural setting of nonmarket goods can be estimated to have economic value by substituting the cost of the trip to and from a natural resource as the market value of the resource, and by determining how much an individual would be willing to pay above the cost of the trip (consumer surplus). These two items emulate elasticity in a supply and demand curve for market goods.

Statement of the Problem

The primary problem of the research process was to determine if the natural resource user perceived that their experiences had any economic value above the total cost of the trip. This would allow the researcher to ascertain if the natural resource had any additional value over its present market price. A number of factors had to be determined before an intrinsic experience could emulate market demands. This research effort included: (1) the income of the participant, (2) the cash the participant would be willing to pay above the trip costs to have the same experience that the activity or natural setting provided on the trip, (3) the marginal cost of the trip, (4) the miles the participant would be willing to travel beyond the total miles of the trip that would equal the participants' experience of the trip, (5) the time the participant would be

willing to volunteer in assisting them to adequately evaluate their experience, and (6) the cash the participant would be willing to pay to remove any inconvenience that occurred on the trip.

The following null hypotheses were developed to specify the statement of the problem:

Ho_1: There are no significant differences between the participants' incomes and the marginal costs of the trip.

Ho_2: There are no significant differences between the participants' incomes and the cash the participants were willing to pay above the total cost of the trip to have the same experience that the activity or natural setting provided on the trip.

Ho_3: There are no significant differences between the participants' incomes and miles the participants were willing to travel above the total miles of the trip to have the same experience that the activity or natural setting provided on the trip.

Ho_4: There are no significant differences between the participants' incomes and time willing to volunteer.

Ho_5: There are no significant differences between the participants' incomes and the cash the participants were willing to pay to remove any inconvenience experienced on the trip.

Subproblems

Several other factors were augmented into the study that addressed relationships of the users' perceptions of the natural resource. These included the following: relationships between the geographic locations, gender, and which provided the most satisfaction of the respondents; and cash willing to pay, miles willing to travel, and total cost of the trip.

The ensuing null hypotheses were developed to specify the statements of the subproblems:

Ho_1: There are no relationships between gender, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants.

Ho_2: There are no relationships between geographic location, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants.

Ho_3: There are no relationships between which provided the most satisfaction for the participants, the main recreation activity or the natural setting, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants.

Other relationships that were applicable to the subproblems in this study integrated attitudes and recreational activities of the participant. This should assist the resource manager toward a more efficient and effective planning strategy for future outdoor use. These components incorporated information that ascertained the participants' activity demands for the natural resource, and the inconveniences that befell the participants during their trips.

Limitations

The principal limitation of this study was the designing of the instrument or questionnaire. The instrument was constructed by the researcher for the express purpose of this study. The research questionnaire was developed from a previous instrument that was utilized in a pretest during the fall semester of 1986 to determine if individuals could accurately evaluate a natural resource by responding to a "cash willing to pay" question. A Pearson's Goodness of Fit statistical

analysis indicated that the instrument used in the pilot study addressing the ability of the participant to evaluate the natural resource was reliable

Delimitations

...s were not randomly selected from all parks ...a or Iowa. The subjects sampled in ... age of 18 that were partici- ... type of selection of ...wn from the two ...e of 18.

...tudy and are ...what loosely asso- ...s to and from an out- ...nal costs (direct trans- ...d as a surrogate price by ...site into concentric zones at ...h... zones are considered to be those ...visitors are homogeneous (Everett, ... expenditures which the consumer ...f commodity use over that which he ...v of diminishing marginal utility. ...ac... al fees to a recreation area could

be collected from each recreator equal to the maximum amount that each recreator would pay for such access measuring all the area under the demand curve (Wennergren and Johnston, 1974).

Elasticity of the Demand Curve. The consumer's response to price changes in that they will significantly alter their consumption patterns, and total revenue will decrease correspondingly to a price increase (Gibbs, 1974).

Inelasticity of the Demand Curve. Consumer reactions are small relative to a price change, and total revenue will increase with an increase in price (Gibbs, 1974).

Marginal Transfer Costs. Those costs to the user for the recreation experience: license and entrance fees, lodging, food costs, consumable supplies, guide service, rental equipment and the like (Brown, Singh, and Castle, 1964).

Outdoor Recreation. Those recreation activities which occur in an outdoor natural environment and which relate directly to that environment (Jensen, 1985).

Travel Time Costs. The outdoor recreation travel time that is considered by the traveler as pleasure driving and adds to the utility of the trip (Norton, 1970).

Trip. The distance traveled from the last overnight stop prior to visiting the area being sampled to the next overnight stop outside of the sampled location.

Cash Willing to Pay. The word "cash" was inserted to precede the willingness to pay question in the research questionnaire. The purpose of this strategy was to minimize a hypothetical response from the participant by using a strong monetary word in a hypothetical situation.

CHAPTER II

REVIEW OF SELECTED LITERATURE

Hotelling (1949) was the first to recognize the opportunity of using travel costs as surrogates for prices and for applying economic analyses to the natural resources in outdoor recreation. Clawson (1959) devised a model from Hotelling's travel cost as a surrogate price by dividing an area surrounding a recreation site into concentric zones at various distances from the site. These zones are considered to be those areas within which the travel costs of visitors are homogeneous. If recreation is treated as a normal good, it can be argued that the travel costs to and from a recreation site indicate the demand for this good. The relationship between visitation rate and cost of a visit can be used to derive a demand curve for the whole recreation experience. This curve can then be used as a model from which a simulated demand schedule can be obtained by estimating the number of visitors who are willing to visit the site for various hypothetical increases in entrance fees.

Researchers should be willing to include all direct transfer costs of the recreation experience: license and entrance fees, lodging, food costs, consumable supplies, guide services, rental of equipment, and the like. These items were included in the transfer cost in the definition of marginal costs on a study of sport fishing in Oregon (Brown, Singh, and Castle, 1964). Cicchetti, Fisher, and Smith (1973) emphasized that increasing travel costs by a given proportion has the effect of increasing benefits by the same proportion, and Burt and Brewer (1971) provided

sound estimates of marginal transfer costs which included all direct expenses of the trip.

There is some empirical evidence indicating that about 50% of total outdoor recreation travel can be considered pleasure driving, with views seen on the journey adding to the utility of the trip (Norton, 1970). However, outdoor recreationalists, such as hunters and fishermen, are destination-oriented, and travel time is primarily a disutility detracting from the time available for those activities (Pearse, 1968). Cesario and Knetsch (1970) documented that the estimated demand curve would lie below the true demand curve if travel time costs were excluded from the value of recreational benefits. This problem can be easily solved by holding travel time costs constant for each observation so that the added price is the added travel and other transfer costs associated with each increment of added distance (Knetsch, 1974).

Burt and Brewer (1971) documented that research in recreation economics has only considered the contribution to a social value of a single, independent site which is rarely found, and applications have merely assumed independence to permit estimation of a value for the development of the site. If services emanating from various outdoor recreation sites are competitive among one another in an aggregate sense, such applications will yield estimated values that are biased upwards. One would expect the bias to be great when closely substitutable sources of recreation are near the recreation site being evaluated. Burt and Brewer applied their theory by estimating demand functions for six lakes in Missouri and presented an application of the estimated system of demand equations to the evaluation for recreation purposes of a system of three lakes that have been proposed for construction.

Burt and Brewer (1971) considered the interrelatedness of the demand for six different lakes when a new reservoir served to lower the costs for recreationists nearby. The new site affected the level of demand for recreation at all sites, thus lowering the net recreation benefit from the introduction of the new site.

Cicchetti, Fisher, and Smith (1976) applied a demand system model in which the demand for recreation at the proposed Mineral King ski site was a function of not only its own price but also of the prices of all of its substitutes. Cicchetti, Fisher, and Smith found that this lowered the estimated net benefits of the new site by 16%. They concluded that it is realistic to consider the choices of recreationalists among alternative recreation sites. Its magnitude depends on the location of the site and the users.

Marginal transfer costs are good substitutes for market price in showing demand functions in outdoor recreation, but value approximations must be included as prerequisites to economically efficient public investment decisions (Wennergren and Johnston, 1974). The individual's recreation demand may be viewed as number of trips or recreation days consumed (quantity demanded) as a function of variable use costs (market price substitute), appropriate demand determinants (such as income, tastes, and preferences), and the costs of alternative recreational sites and activities. Wennergren and Johnston indicated that consumer surplus is a good valuation technique based upon the premise that benefits of the experience accrue solely to the individual, and that the summation of all net benefits to individuals is the total net value derived from the recreation activity or site under study.

Consumer surplus is the excess of the expenditures which a consumer would be willing to pay for level of commodity use over that which he

actually does pay, and satisfies the law of diminishing marginal utility. Hence, Wennergren and Johnston (1974) concluded that one can empirically obtain an estimate of total recreation value for the site, or for sites with similar characteristics (aggregate), with appropriate adjustments for location, quality, etc., and the resulting value may be used to compare benefits among competing alternatives.

Gibbs (1974) agreed that total expenditures and consumer surplus are needed in estimating a demand curve for outdoor recreation. He explained that both values are needed to emulate elasticity of the demand curve in a pricing market. Elasticity is the consumer's response to price changes in that they will significantly alter their consumption patterns, and total revenue will decrease correspondingly to a price increase (Gibbs, 1974). Outdoor recreation is considered inelastic because consumer reactions are small relative to a price change, and total revenue will increase with an increase in price. This phenomenon is caused by the government subsidizing outdoor recreation sites, and not reflecting the true operation costs of the site with a user fee that will finance the operation of the facility. In estimating outdoor recreation demand, total expenditures and willingness to pay (consumer surplus) emulate a true market price which reflects elasticity (Gibbs, 1974).

O'Connell (1977) placed into eight categories the strengths and weaknesses of approaches being used to value outdoor recreation where a market price does not exist. These eight categories were: opportunity cost method, gross expenditure method, cost method, market value comparison method, visitor survey method, single value method, willingness to pay method, and monopoly revenue method. Each method is considered and supported or disputed with available empirical studies.

Opportunity Cost Method

The basic economic concept used in the opportunity cost method is the maximum value the resource could produce in any other feasible use; for example, a forested area set aside for recreation. The net reduction in stumpage and grazing values represents the opportunities foregone by setting the area aside for recreation. O'Connell (1977) perceived the approach useful in establishing a benchmark value, but did not indicate the value of the site for outdoor recreation.

Hyde, Dickerman, and Stone (1982) compared the net annual income revenue flows per acre for grazing and irrigated agriculture in estimating the allocation of development versus preservation in the Snake River Birds of Prey Conservation Area. They concluded that it is unrealistic to expect irrigated agriculture development to yield long-run earnings in excess of grazing earnings. Protection of the Birds of Prey conservation area was not valued for raptor production, esthetics, or bird watching. The study was somewhat biased, as the net benefits of agriculture development (irrigation) were very low due to the high costs (expenditures) necessary for farmers to cultivate this land and to pump water from the Snake River to be subtracted from the total. If one judged the economic benefits on expenditures, the inefficient agricultural development would appear to be feasible. Given the low net benefits of agriculture, the opportunity costs of maintaining the prey base for the Birds of Prey conservation area was also quite low. The opportunity cost of preserving wildlife habitats may often be negligible when the value of development is correctly evaluated (Loomis, Peterson, and Sorg, 1984).

Gross Expenditure Method

The gross expenditure method attempts to measure the value of recreation to the participant in terms of total amount of money he spends on recreation. This approach is useful in determining the amount of money spent for any recreation activity; however, these expenditures do not indicate the value of recreation opportunity. Loomis, Peterson, and Sorg (1984) and Cocheba and Langford (1978) are a few of many researchers that agree with O'Connell (1977).

Cost Method

The cost method assumes that the value of outdoor recreation is equal to the cost of providing the service. Any recreation project which is contemplated can therefore be justified. Its weakness is in not allocating benefits properly to the public. Another weak point is that the results cannot measure recreation value. The cost method does indicate what the value would have to be to justify new investment in recreation facilities. Lundgren (1973) supported this strength because knowing the cost-use ratio of existing facilities can give a manager some valuable information.

Market Value Comparison Method

In utilizing the market value comparison method, the researcher attempts to find a comparable recreation site operated by a private entrepreneur. This method is conceptually correct because the fee charged represents the value of the recreation opportunity to the user, but in practice it is difficult to find similar conditions existing in both public and private recreation opportunities.

Visitor Survey Method

The visitor survey method is based on asking recreation users, with the use of a properly designed questionnaire, the maximum price they would pay to avoid being deprived of the use of a particular area. The questions are usually posed in the form of a bidding game. The method is conceptually correct, but there is a question of reliability when people are asked their opinion of what they will pay for entrance, because they feel that it might be implemented. What people say they will pay and what they will actually pay can be quite different. The willingness to pay method has similar weaknesses and these will be discussed under the willingness to pay method.

Single Value Method

The essence of the single value method is conceptually similar to the market value comparison, but has been expanded beyond a simple comparison approach. In 1964, Senate Document 97 (Supplement No. 1) established a range of values to be used for general and specialized recreation uses in the evaluation of water resource development projects. The values were updated in 1973 and range from $.75 - $2.25 per recreation day for general recreation and $3.00 - $9.00 per recreation day for specialized recreation. The value chosen within the range depends on the level of development at the site, or intensity of use. This approach has been widely adopted because it is theoretically correct and is simple to apply. The main problem is the lack of consideration for elasticity of demand at different recreation sites (Knetsch, 1974). The single value method does not adequately consider differences in quality of recreation sites. Knetsch emphasized that this procedure inappropriately assigns

the greatest value to the alternative which attracts the largest number of people. O'Connell (1977) implied that the artificial range in values cannot adequately reflect the real differences between values of recreation for alternative sites and activities.

Willingness to Pay Method

O'Connell (1977) defined willingness to pay (consumer surplus) as the potential revenue available if actual fees to a recreation area could be collected from each recreator equal to the maximum amount that each recreator would pay for such access. It measures all areas under the demand curve. Variable costs (gross expenditure method) are used as the surrogate price to arrive at the value of a particualr site for recreation. Willingness to pay measures the value of the whole recreation trip. This approach has a strong theoretical basis and is the most direct approach method discussed thus far. One limitation is the expense of gathering the necessary information.

The willingness to pay method, plus the total expenditures of a trip, has been called the "Clawson, Hotelling Clawson," and finally, the "Hotelling, Clawson, Knetsch" models, which have been discussed earlier in this paper. Cicchetti, Fisher, and Smith (1976) adapted the model to estimate price with alternative sites or substitutions, and added a portion of Becker's (1965) model within which most consumption activities are viewed as the outcome of individual or household production processes, combining market goods and time. The model is called the "General Model of Household Behavior." These authors adapted the consumer surplus method to include Silberberg's (1972) suggestion that the price equivalent consumer surplus measure is best viewed as an imputed rent along a specified path for a change in utility or path-dependency problem. Burns

(1973) explained the problem, particularly in the case of multiple price changes or the evaluation of a single price change within a general system of demand equations:

> The complication that arises in such a case is that by allowing more than one variable to change we are admitting the possibility of an infinite number of adjustment paths between any two terminal situations. Since the marginal utility of income may take quite a different range of values along each different adjustment path, so will the sum of the income equivalents take on different magnitudes depending upon the precise path taken between the situations concerned (p. 337).

Cicchetti, Fisher, and Smith (1976) wanted to capture the effects of a monopolist in control of several competing markets. The monopolist would take into account the effects of the demands for the substitutes of price changes in the first market into their analyses, and would derive a generalized measure of consumer surplus. The consumer surplus (willingness to pay) would be based on the benefits associated with simultaneous price changes in all markets. Cicchetti, Fisher, and Smith concluded that the new site would not likely yield a positive net present value.

Cicchetti and Smith (1973) diversified the Clawson model further by incorporating quality of site into it. They researched the impact of congestion on recreation evaluation and focused on the extent of overcrowding and the benefits from reduced crowding. McConnell (1977) emphasized that quality of a site diminishes as the use of the facility increases, and the same site quality variables become important determinants of the demand for a recreation facility.

McConnell (1977) developed a model for estimating the demand for congested recreation sites in densely populated areas on Rhode Island beaches. Site quality variables are important arguments in the individual's demand for recreation because they are determined simultaneously with aggregate demand for a recreation site. This phenomenon suggests

the approach of estimating the impact of congestion and site quality on individual demand functions in order to measure net benefits of the recreation site and to determine the optimal level of aggregate demand. The model supposes that the individual's utility depends on the number of visits of fixed length to the site, the quality of the site, and a composite bundle of other goods. This composite bundle of goods is subject to its price, and the individual's financial income. The trip cost represents the extra costs to the individual, including the opportunity costs of time and of taking another trip. Since the length of the visits is assumed to be fixed, on-site expenditures necessary for the visit is included in the trip costs (McConnell, 1977).

The direct interview approach or willingness to pay method reflected the variation in site quality characteristics during the season. The site quality variables in the study were congestion and air temperature. McConnell (1977) emphasized that management of the maximum use level varies according to type of beach. For example, beach 4, which is located near a wildlife refuge and is noted for its scenic beauty, has a much lower standard than beach 2, which is well known as a "singles" beach, where people go to meet other people (McConnell, 1977).

Wetzstein (1982) attempted to facilitate measuring demand functions for alternative recreational areas or substitutes. These demand functions tend to become too complicated for estimation when the number of areas in a system are relatively large. Wetzstein's study suggested an alternative model, borrowed from internatonal trade theory, which further simplifies demand functions for estimating a large number of areas. The alternative recreational areas are aggregated into one explanatory variable based on separability and constant elasticity of substitution. An application of this model was applied to 22 wilderness areas in

California. The elasticity of substitution for each wilderness area was estimated in order to evaluate the effects of creating additional wilderness areas in California. The results indicated that additions to this recreation system either greatly reduce or increase use at the existing areas. Thus, in order to obtain a true reflection of the benefits that will flow from a new recreational area, planners should account for the degree of substitution resulting from augmenting the recreation system (Wetzstein, 1982).

These studies represent the plethora of directions researchers are taking with the willingness to pay method to estimate demand functions for individuals' reasons for choosing certain outdoor recreation sites.

Monopoly Revenue Method

The monopoly revenue method assumes the existence of a single monopolist owner of all available outdoor recreation opportunities. The rational monopolist owner would want to charge a price for the resource that would maximize total revenue. That price can be determined with the use of the demand curve.

This monopoly revenue method brings us closer to realistic market values for outdoor recreation than any of the other methods. The price is derived from people actually engaged in recreation activity, and has most of the strengths and weaknesses of any market price. However, a problem of noncompatibility is still present. The price is not arrived at by the interaction of supply and demand forces in the actual market place. It also represents a monopoly price which is different from a competitive price. When using this value for investment purposes, it should be applied with considerable caution.

The Clawson-Hotelling method and the monopolist revenue method was applied to the entire state of Arizona to determine the total economic value of benefits assignable to fish and wildlife, and on specific sites within the eight million acre Salte-Verde Basin in the central portion of the state (Martin and Gum, 1974). In both studies it was determined that the household, as a composite of its elements, was the rural outdoor recreation consuming unit. It was rationalized that the household is the basic unit that finances recreation out of a common household budget, and the decision to participate was presumed to have household sanction. Thus, the resultant demand curves gave the number of household-trips (hunting-fishing study) or the number of household-days (site-specific study) that would be taken at alternative levels of "added cost" or "consumer surplus." Added cost in both studies were how much households would pay and participate if a fee were charged. The individual area-activity curve was estimated for a region of Arizona for the hunting and recreation activities, and it was discovered that below $35.00, the demand for deer hunting would be "inelastic"; above the $35.00 fee, demand was "elastic" (Martin and Gum, 1974).

The aggregate area-activity demand curves indicated that the maximum value for total revenue on the statewide schedule was $3,717,064 at a price of $60.00, and "elasticity" occurred above this figure because regions began dropping out of the model until only the best hunting area remained.

The individual site-specific curves' maximum revenue was at a price of $27.00, and "elasticity" was observed above this cost. In studying a specific site, Martin and Gum (1974) found that it was much more usual for the variability to be in days rather than in trips.

The "consumer surplus value" represents the potential revenue available if access fees to a recreation area could be collected from each recreator equal to the maximum amount that each recreator would pay for such access. Thus, unlike normal markets where a single price exists, multiple prices would be necessary if an agency were to attempt to capture all the consumer surplus value of a recreation area.

An alternative concept of resource value is the nondiscriminating monopolist value. This value corresponds to the maximum revenue which could be obtained by charging a single price for access to a resource or a recreation area.

Martin and Gum (1974) reported the monopolist value in their study in Arizona. They perceived that the value for the state aggregate demand for deer hunting ($3,717,046) was lower than the sum of the nondiscriminating monopolist values for all regions contained in the state. The reason is that if different "added costs" were charged for each region, a larger revenue could be extracted than if only a single price was charged at the state level. A larger total return could be obtained if one discriminated between regions rather than charged a single price for the whole state (Martin and Gum, 1974).

Martin and Gum (1974) concluded that there are serious equity considerations that should be made before increases in fees could be justified. However, the nondiscriminating monopolist value gives a resource value that may be compared to values of alternative products of the land resource if decisions relative to competing uses must be made, and can be used as a basis for cost benefit analysis or multiple objective planning.

O'Connell (1977), along with several other economists, recognized that all concerns of man in managing a biological resource cannot be expressed in an economic model. He cited the beauty of landscape, sound

of a flowing stream, and requirements for future generations as examples. O'Connell believed that these resources shoud fit into an environmental quality account.

Several researchers apparently did not agree and conducted studies to estimate demand for wildlife and scenic beauty. Payne and DeGraaf (1975) indirectly estimated expenditures associated with the enjoyment of observing nongame birds with a conservative measure of their importance. Included in their estimates were total retail sales of birdseed, birdhouses, and feeders; field guides; gift books; a portion (1/2 to 2/3) of total dollar sales of binoculars and cameras; and dues paid to bird conservation societies. They believed that their estimates represented a minimum value for expenditures related to bird watching. The total direct expenditure to the enjoyment of nongame birds in 1974 appeared to be about $500 million. They concluded that moderate increases in economic importance and the recreational activities associated with nongame birds are occurring. A substantial portion of these increases will occur at the expense of other recreation activities, including hunting. Payne and DeGraaf (1975) pointed out that expenditures for management of birds and their habitats are very small, relative to expenditures for game management.

Everett (1978) used a modified "Clawson Method" of evaluating recreational resources to estimate the value of wildlife as a recreation resource. He devised a method of asking each interviewee to score from 0-10 their rank of order of interest in wildlife. The method assumed that a visitor who obtained a score of 10 derived all of his recreational experience from wildlife, and those who obtained 9 derived 90% of their recreational experience from the wildlife, and similarly for each score down to zero. Everett used a calculated mean to determine the percentage

of the total recreational experience in the survey area that was due to wildlife, which was 24.69%. The revenue obtained from the willingness to pay response from visitors over a 12-month period came to 10,700 English pounds. He estimated that the recreational value of wildlife for the Dalby Forest Area in England was a conservative 24,000 pounds a year.

Raphael and Jaworski (1979) estimated the gross annual economic return per acre which was directly attributable to wetland products or uses in Michigan's coastal wetlands. Economic values were based on average annual expenditures by participants engaged in fishing or hunting, or on standard values of recreation days as contained in the 1970 National Survey of Fishing and Hunting, and on the harvest and wholesale price for commercial fish, furs, and waterfowl carcasses (home consumption). Using appropriate cost of living factors, based on the Consumer Price Index for Detroit, Michigan, the standard values were extrapolated to the year 1977. The study indicated that nonconsumptive uses of wildlife and wildlife lands increase more rapidly than does hunting use, and will compensate for decreases in consumptive uses wherever they occur.

When the fish, wildlife, and nonconsumptive recreational values of Michigan's coastal wetlands are summed, a direct average annual dollar return value of $489.69 per wetland acre/year was obtained. Sport fishing accounted for $286.00, nonconsumptive recreation was $138.24, waterfowl hunting was $31.23, trapping or furbearers was $30.44, and commercial fishing was $3.78.

A study considering the pricing, allocative, and revenue implications for controlling antlerless tags for hunters in the state of Oregon was conducted using a demand model and the willingness to pay method (Sandrey, Buccola, and Brown, 1983). The design of the study combined tag price and travel cost which was expected to be negatively related to

the volume of tags demanded. The system of linear equations permits the substitutability between hunting areas to be expressed through the negative cross-cost terms. If, under the assumption of small budget shares for hunting, these effects are constrained to be symmetric, the equations can be used to generate consistent indicators of consumer surplus under the multi-area demand equations. Sandrey, Buccola, and Brown also considered that demand for hunting should vary directly with the probability of an elk sighting or kill, and elk hunters display a taste variable such as size, health, and age of the hunted species that may be a source of serious estimation bias (Sandrey, Buccola, and Brown, 1983).

Sandrey, Buccola, and Brown's (1983) analysis makes clear that current tag prices are, on the average, below prices that would balance demand with the department's exogenously determined tag supplies. Prices that would clear the market, thus eliminating the policy of tag drawings, are close to those that would maximize tag revenues.

Cocheba and Langford (1978) presented the results of a study that incorporated a collective good dimension into a wildlife valuation model. They argued that the Hotelling-Clawson-Knetsch method does not value wildlife per se, but the recreation experience and direct consumer's surplus method is biased because willingness to pay questions are "hypothetical" and result in "hypothetical" answers. They concluded that failure to clearly define what is being valued has been a serious problem in the application of both models.

Cocheba and Langford (1978) modified a model devised by Hammock and Brown (1974) which specified the relationship between the value of a recreation day of hunting and the value of a bagged waterfowl. Hammock and Brown theorized that the maximum number of birds that may be legally bagged in one day and the number of days during which waterfowl may be

hunted have the potential to keep the hunter from maximizing his net benefits from hunting. Assuming that both constraints are operational and relaxing one of them at a time, it could be demonstrated that: (1) increasing the bag limit while the season length remains unchanged improves the quality of each of the days the individual hunts during the season, and (2) increasing the season length while leaving the bag limit unchanged results in the individual hunting more days and bagging more waterfowl. Hammock and Brown (1974) referred to these two marginal values as the "quality margin" and the "quantity margin".

In summary, the Hammock and Brown (1974) model specifies the relationship between the value of recreational hunting days and the value of bagged waterfowl, and it defines two interrelated marginal values. In conjunction with their data collection method, it is designed to isolate the value of an additional bagged bird from other inputs which are combined to produce the hunting activity.

Cocheba and Langford (1978) asserted that, in the case of the hunted species, both collective good and private good benefits will be significant. To test this hypothesis, the way in which Hammock and Brown (1974) defined their independent variable has been altered and a collective good dimension has been inserted into the following model: value of consumer's surplus as measured by one household's willingness to pay is multiplied by the before-tax household income, number of seasons hunted by household members (taste variable), the household's bagged waterfowl during a given season, total hours hunted during a given season by household members, and shots fired which missed the intended waterfowl target (a measure of unsuccessful opportunities).

The collective good dimension, explained as shooting at a bird without hitting it, does not preclude others from deriving benefits from the

same bird in the future. The shots missed variable represents a quantifiable collective good dimension of the hunting experience. Hammock and Brown (1974) also hypothesized that using the household as the relevant decision-making unit has the potential to improve the accuracy of the willingness-to-pay estimates.

Hammock and Brown (1974) concluded that it is possible to estimate a "bag" quality margin representing a private good benefit, and a "shots missed" quality margin representing a collective good. The estimates of the two quality margins in conjunction with the estimated probabilities of their occurrence were then used to determine the value of an additional opportunity to shoot at a bird. By relating the number of additional shooting opportunities to a hypothetical bird population level change, it could be illustrated how the value of an additional shooting opportunity can be used to compute the hunting value of an additional bird in the stock for a single hunting season. The empirical analyses produced in this study demonstrates that it is possible to incorporate both the private and collective good into a single model.

King and Richards (1977) noted that the consumer behavior model introduced by Wennergren and Johnston (1974) included price, income, tastes and preferences, price of alternative goods, and expectations. Most empirical demand studies have usually included only price, income, and preference variables.

These authors introduced an expanded consumer behavior model to improve the predictive power of recreation demand and participation studies. The heuristic model makes an incursion into the areas of sociology, psychology, and social psychology. Special attention was given to the definition to three terms used in the model: preferences, choice, and decision. Preferences consist of a preference process resulting in

choice. It is through the preference process that the individual exercises the power of choice. Choice is a set of selections over a range of commodities. Decision is an act in which the individual takes into account certain constraints and opportunities in determining a course of action (King and Richards, 1977).

Preference is developed out of an individual's predilections and judgment. His predilections, governed by the antecedent variables and conditions, are filtered and modified by his social interactions. Such variables as age, education, occupation, family structure, motivations, etc. are among the antecedent variables and conditions. The antecedent conditions, as mediated by social interactions, provide the basis for the preference process. Through the preference process, the individual is able to make choices. Choice, constraints, and opportunities are combined in the decision process (King and Richards, 1977).

The constraints are the price, income, and time variables of the demand model. Opportunities represent the supply side, and are those viewed by the individual. The model explained decision as the process of selecting an action or behavior, whereas participation is action or behavior (King and Richards, 1977). Between the outcome of the decision process and participation, intervening variables may cause participation to differ from the act or behavior selected by the decision process. These intervening variables would include such things as weather, temporary road conditions, auto breakdown, levels of use, illness, etc. These conditions are of short duration and are not important in determining participation in aggregate, but could cause problems if ignored in empirical studies (King and Richards, 1977).

King and Richards (1977) brought out a very important aspect of participation. Research undertaken to explain recreational participation

has tended to be more concerned with activities than with environments. By neglecting the environmental dimension, additional and unaccounted-for variation in participation may be introduced, thereby reducing the explanatory power of consumption studies. The model is meant to apply to recreational commodities defined as activities within environments.

King (1979) conducted two studies to estimate demand for and economic value of a wildlife resource and a trout fishery in southeastern Arizona. He attempted to achieve better measurement of "tastes and preferences" and improving specification of their influence on demand with the heuristic model. Unfortunately, results of this study are not available because the paper was presented prior to the completion of this study.

The project involved three major objectives: (1) estimation of the importance of wildlife using social-psychological measures; (2) estimation of the economic value of Cave Creek Canyon to the wildlife appreciators using it, and (3) determination of the existence of an association between the social-psychological measures of importance and estimates of economic value. The social-psychological measures of the importance of wildlife can be considered as proxy measures of tastes and preferences. This procedure was used by Everett (1978) and discussed earlier in this paper.

King (1979) had visitors respond to the question, "How valuable is it to you that wildlife are: meat sources? subjects for nature study?" The respondents would then rate their response on a 0-10 scale. King presumed that wildlife appreciators with strong preferences for wildlife appreciation would rate the "nature study" source of value higher than the "meat source" of value. He would then use cross-tabulations to identify potential patterns and groupings of responses, indicating

homogeneous sets of respondents with regard to their feelings about the importance of wildlife.

Shaw's (1979) study indicated that asking visitors to rank values of "meat source" and "nature study" could be biased in estimating wildlife value. Shaw's research compared backgrounds and beliefs of members of three wildlife interest groups in Michigan. The three groups were: deer hunters, Audubon Society members, and members of Fund for Animals, Inc.

Similarities between these groups were more significant than contrasts. In spite of basic philosophical differences between hunting advocates and hunting opponents, there was very close agreement on the questions dealing with values of wildlife and threats to wildlife. The group means and rankings for reasons wildlife are considered important ranked "they are part of the ecological balance upon which we are all dependent" as the highest for all three groups. "They are a source of food and furs" was ranked second to last of importance among all three groups.

The group means and rankings for threats to wildlife ranked "loss of habitat due to human development" as the most serious among the three groups, and "legal sport hunting" as one of the least serious threats to wildlife among the three groups.

Shaw (1979) also interviewed 591 wildlife enthusiasts visiting selected prominent bird watching sites in southeastern Arizona in 1977. Esthetic and existence values of wildlife were more important than other possible wildlife values to these individuals. Shaw concluded that it would behoove the natural resource managers to attempt to understand and work with these nonhunting wildlife enthusiasts.

Daniel and Zube (1979) indicated that it is impossible to evaluate esthetic resources in the same manner as market or commodity resources.

There is currently no generally accepted means for determining the amount of loss or gain in esthetic benefits. To achieve the assessment value of esthetic beauty, the resource must be identified, quantity and quality of that resource must be determined, and in order to evaluate esthetic resources, means must be found for assessing the available quantities of different grades of landscape, wildlife species, wilderness areas, recreation opportunities, and other noncommodity resources. The value of one resource can only be understood by reference to the value of some other resource; resources must be assessed in commensurate terms or dollars (Daniel and Zube, 1979).

Daniel and Zube (1979) emphasized that currently there is no straight-forward way to deal with these questions. A major obstacle is the lack of suitable methods for assessing the quantity and quality of esthetic resources and for evaluating them in commensurate terms with other social values. Progress is needed in the development of esthetic evaluation methodologies if these resource allocation questions are to be answered in a way that will serve the social good.

This challenge did not go unanswered. A study was conducted to determine the power of content-identifying methodologies of outdoor recreationalists (Kaplan, 1979). He believed that any scene is perceived as a particular instance of a larger class of scenes and asking people for a simple preference judgment works very well (Kaplan, 1979).

The research did not quantify esthetic beauty, but did recognize the fact that individuals can evaluate scenes in terms of the possibilities for and limitations of action. Indicating that a taxonomy could be incorporated into a design to evaluate esthetic beauty. Spacial configurations were broken into four categories and individuals were to rank photographs for preference on what it permits one to do.

The open-undefined scenes (deep or shallow) photograph was found difficult for the individual to evalute. There were insufficient cues to know exactly what actions are or are not possible. Even a clear judgment as to the distance involved in traversing such an area was hard to make. Such settings received low preference ratings.

Spacious, well-structured scenes received higher prference ratings. These scenes, through greater depth, suggested that there was room to operate. Enclosed scenes or spatially well-defined dimensions with relatively limited depth were not uniformly preferred. These scenes may be visually too unspacious, or lack definition. And, blocked views or "visual access prevented" received the lowest preference rating.

Crocker (1985) addressed qualifying the environment issue by having users rank photographs that depicted stages of forest deterioration by ambient oxidants and have the respondents determine their willingness to pay for their most preferred environment. The study used three photographs of similar forest stock, but of different deterioration. The respondent's willingness to pay was in terms of a fee to be added to the daily $6.00 or $7.00 access fee he had already paid on the interview day. Crocker believed that the bias in willingness to pay was at a minimum due to the close accord between the hypothetical and real situation. The results of the study revealed that users could and were willing to pay more for the slightly injured area, but the willingness to pay figures for moderate and severely damaged areas showed no significant differences.

Crocker (1985) concluded that the consumer surplus values were consistent with other values obtained in numerous travel cost and contingent valuation studies of wilderness activity days. Nevertheless, this comparability does not imply that values derived for activity days at one

site are readily extrapolated to another site. This study has shown that such extrapolations must be adjusted for variations in the landscape as well as for the traditional pecuniary and demographic factors.

Other research developed and applied psychometric instruments for identifying and quantifying the psychological outcomes of outdoor recreation (Haas, Allen, and Manfredo, 1979). The purpose of the study was to define the users' recreation experiences in terms of psychological outcomes and to identify preferred physical resource attributes of the recreation, with attention directed toward the fish and wildlife resource attributes. The study incorporated three areas in Colorado: the Rawah Wilderness, the Flat Tops Wilderness, and the Indian Peaks Backcountry area.

The psychological outcomes research was conducted in the Rawah and Flat Tops Wilderness areas, and the results were compared (mean values) with verbal descriptions of the extent to which the user perceived satisfaction in eight different categories. The "escape pressure" category was omitted due to a low reliability coefficient in the Flat Top area.

The rank-ordered mean responses to the outcome domains were similar to the two areas. "Relationship with nature" was scored as strongly adding to satisfaction by users of both areas. "Achievement," "autonomy," and "reflection on personal values" were scored as moderately adding to satisfaction of users in both areas. "Recollection/sharing" moderately added to satisfaction of Rawah users and only slightly added to satisfaction of Flat Top users. "Risk taking" and "meeting/observing other people" were scored as neutral, neither adding to nor detracting from satisfaction of users in both areas.

The physical setting attributes compared results from the Indian Peaks backcountry and Flat Tops wilderness areas. The major similarities

in the two studies were: (1) the same three setting attribute domains were perceived as contributing the most satisfaction (meadows/forest, water-related, and wildlife); (2) the "dense vegetation," "rugged topography," and "unique natural feature" domains had virtually identical means and moderately added to satisfaction; and (3) "man-made intrusions" detracted from satisfaction.

Lastly, comparisons were made between Indian Peaks and Flat Top users and their fish and wildlife resource attribute domains. Indian Peaks users indicated that "wildlife" contributed more positively to their recreation experience than did the "fish-related" item. The Flat Tops users scored items in both domains similarly and more positively than did the Indian Peaks users. These differences were attributed to the differences in user and area characteristics.

Haas, Allen, and Manfredo (1979) concluded that: (1) preferred recreation experiences can be defined by specific psychological outcomes, (2) preferences can vary among recreationalists, (3) there might be some substitutability among different areas in providing the same kinds of satisfaction, (4) setting attributes can be identified, (5) preferences for several setting attributes can be the same across areas, and (6) preference can vary among users.

Research has been conducted to determine perceptions of the general public to the esthetics of wildlife. Such research is quantifying the need for nonconsumptive wildlife management instead of game management. Arthur (1979) discovered that the general public's perceptions and uses of wildlife indicating a wildlife policy directed toward providing game animals is not consistent with the general public interests and sportsmen across America. In a joint U.S. Department of Agriculture Fish and Wildlife Service study conducted in May-June of 1976, 2,460 respondents (78%

response rate) were asked to rate the importance of several aspects of wildlife on a 0-10 scale, where 0 indicated no importance and 10 indicated extreme importance.

Six important aspects of wildlife revealed that "ecological value" and "existence value," and "viewing pleasure" were rated the same and were most important. "Hunting opportunity," and "food source" scored the lowest in importance of wildlife. Relative enjoyment of three aspects of wildlife had "viewing pleasure" as most important and "hunting opportunity" as least important. This study also discovered that 3,500 waterfowl hunters indicated that aspects of wildlife experiences other than killing game was predominant in determining levels of user satisfaction. Seventy percent of the respondents judged experiencing nature's beauty as more important than bagging a limit. Across all respondents, experiencing the wildlife environment was the most important motive for hunting. Arthur (1979) concluded that the most important determinant of the general public, hunters, and fishermen was experiencing the esthetic aspects of the wildlife environment.

Hay and McConnell (1979) attempted to estimate the net economic value of wildlife watching and photography. The demand variables were: age, income per head of household, sex, etc.; the supply variable was the maximum value of the number of species of breeding birds observed in the ecological strata for each individual. Attempts to estimate wildlife observation and photography were basically a failure. There were inconsistencies in most of the demand variables. The survey gathered information on annual number of occasions of wildlife observing and photography for each individual. These authors speculated that numbers for participation were not true and the variables they were testing were not generated. They indicated that part of the problem in evaluating

observation of wildlife is that the average bird watcher requires certain skills, and knowledge is a function of length of time or participation in the activity. Individuals venture further away from home over time in the desire to see new species, which gives a dynamic effect; experienced bird watchers appear less responsive to supply variables in their own states than less experienced individuals (Hay and McConnell, 1979). The study did appear to support the theory that an increase in diversity of species and natural environment, and increase in the natural environment will increase probability of wildlife watching.

More research evolved from the quantifying and qualifying esthetic values which designated willingness to pay for the bundle of nonuse satisfactions as preserved benefits, and hypothesized that these benefits are separable into option, existence, and bequest demands (Walsh, Loomis, and Gillman, 1984).

Walsh, Loomis, and Gillman (1984) defined option demand as an annual payment of a kind of insurance premium to retain the option of possible future recreation use, in addition to expected consumer surplus. Existence value was the willingness to pay for the knowledge that a natural environment is protected by wilderness designation, even though no recreation use is contemplated. Bequest demand was the willingness to pay for the satisfaction derived from endowing future generations with wilderness resources (Walsh, Loomis, and Gillman, 1984).

The equations of Walsh, Loomis, and Gillman (1984) showed the relationship between willingness to pay and increments in wilderness designation indicated changes in preservation values with each one million acre change in wilderness designation in the range of 1.2 to 10 million acres for which values were reported. As the quantity of wilderness increases, annual household preservation values increase at a slower rate, except

for bequest value, which was linear. For example, total willingness to pay for preservation demand increased from $14/household for 1.2 million acres in 1980 to $19/household for 2.6 million acres in 1981. The equation predicted that preservation value would increase to $25/household with protection of five million acres of wilderness in the state of Colorado and to $32/household with protection of 10 million acres.

Other variables that were positively associated with total preservation value included annual household income, distance to substitutes, education, family size, county population, probability of visiting, importance to scenic beauty, learning about nature, and spiritual inspiration of the wilderness experience. Variables that were negatively associated with preservation value included: distance, preference for preservation without payment, importance of hunting and fishing, promotion of the tourist industry, and risk-taking as part of the wilderness experience.

Option value was related to many of the same socioeconomic variables as total preservation value; however, the effect was often larger, and some additional variables were unique to option value. The income effect was much larger in the option value. An increase of $1,000 in household income, increased the option value to $0.90, and in comparison, the preservation value only increased $0.10. Option value also was related to a preference for recreation opportunities--as expected, hiking and backpacking use, importance of escaping social pressure, and learning about nature were the responses of most importance.

The determinants of existence value differed from those of option value. Existence value was positively related to the importance of preservation of natural scenery, ecosystems, and genetic strains. Still, the more skilled that individuals are in wilderness recreation use, the

more familiar they are with the characteristics of wilderness, and this appreciation contributes to existence demands. All income groups valued existence of wilderness approximately the same. Interestingly, skilled and unskilled salespersons, and clerical workers would pay more for existence demand that would persons in other occupations.

Variables associated with bequest value were distinctly different from the determinants of option and existence values. Retired persons were willing to pay more for bequest demands than were other respondents. Bequest value is correctly defined as the satisfaction from interpersonal transfers of wilderness to indefinite future generations rather than specifically to the children of the respondents (Walsh, Loomis, and Gillman, 1984). The effect of household income was not significantly related to bequest value. This suggests that all income groups value bequest demands approximately the same.

It should be apparent from the review of literature that estimating resource allocations and economic value of outdoor recreation, wildlife, and scenic beauty has taken many different directions. The theory behind evaluating resources is sound, but the well-designed and reliable instrument is not yet available to draw true inference from the general population as to the actual value of the outdoor recreation resource.

Most of these studies contradict what the researcher is actually investigating. The Cocheba and Langford (1978) paper on evaluating wildlife with the collective good aspect of hunting is a good example. They concluded that the "Clawson Method" has not been effectively used to isolate the value of wildlife from the value of the other inputs which are combined to produce the recreational experience, and failure to clearly define what is being valued has been a serious problem in the application of the model.

Cocheba and Langford (1978) incorporated into a modified "Clawson Method" the collective good variable. The information they collected for each variable did not evaluate wildlife, but instead evaluated the recreation activity of hunting or taking that extra shot.

Another weakness is the inaccuracy of determining a demand schedule for outdoor recreation. It would be very difficult to accurately estimate how many times one has recreated in a certain activity, shots fired, and shots missed, for the past 12 months.

CHAPTER III

METHODS AND PROCEDURES

Objectives of the Survey

This survey was conducted to determine an economic base for scenic beauty, wildlife, and the allocation of the natural resource. With this information, the natural resource could be spared from development upon consideration of alternate economic value.

Description of Data Collection Sites

The first data colleciton site was Lake Carl Blackwell in Payne County, Oklahoma. This natural resource area is approximately 12 miles west of Stillwater, Oklahoma. The U.S. Department of Agriculture (USDA) gained control of this area through "Condemnation" and "Eminent Domain" procedures in 1930. The lake was filled in 1947 and the USDA transferred control of the lake with a quitclaim deed to Oklahoma State University in 1954. The surface of the lake is 3,300 acres at maximum pool, with an annual mean flux rate of three to six feet. The measure of flexibility of the lake has been 19 feet. A fixed spillway or dam was constructed as a barrier to hold back the water. The primary purpose of the constructed lake was for water supply and recreation (Environmental Impact Assessment, 1975). There has been no restriction of normal recreational water-based activities on this lake.

The second data collection site was Black Hawk Park in Black Hawk County, Iowa. This park is located approximately 10 miles north of Cedar Falls, Iowa. Black Hawk Park extends in a narrow strip along the Cedar River in a northerly direction for four miles. The nucleus for Black Hawk Park was 325 acres of land leased from the city of Cedar Falls in 1957 for a period of 50 years. The purpose of this acquisition was to preserve and develop a portion of the Cedar River primary flood plain into a recreational and wildlife area. The addition of 775 acres at various times has resulted in a total of 1,100 acres to the park (Menzel, 1973).

Black Hawk Park is under the jurisdiction of the Black Hawk County Conservation Board. The water-based recreation activities in this park are not as diverse as those at Lake Carl Blackwell. Power boating, jet skiing, and water skiing activities are nonexistent in Black Hawk Park. The greatest difference of activities between Black Hawk Park and Lake Carl Blackwell is that Black Hawk has a designated bicycle trail and interpretive programs.

Sampling Procedure

The two geographical natural resource sites for this study were not randomly selected. There were several reasons why the sampling process did not take place. The primary reason was that the researcher did not have the financial backing to travel great distances for the data collection process. The researcher was employed by the University of Northern Iowa, which allowed the data collection process to occur in two different geographical locations.

The target population for this research was current park users. The survey population was individuals over the age of 18 who participated in

outdoor recreation activities that brought them into contact with the natural resource (N=200).

The sampling plan for this proposed research was the quota method of sampling. A number was selected from a random number table each interview day to determine the first subject to interview on site. Every third individual was selected for interviewing after the first selected individual. This process was continued until the end of the data collection period for that day. The random selection process was continued in the event of a nonrespondent; that is, the interviewer selected the next individual that corresponded to the random number.

All clusters of the population were sampled by randomly selecting an individual over the age of 18 out of the group. The method of selecting an individual out of the cluster was determined by a respondent selection table (Appendix A). The size of the group or cluster and the order in which the group was encountered for the survey day determined the sampled respondent. The following example illustrates the procedure: a cluster of five eligible persons is encountered. Since this is the third group of the day, the interviewer selected the third line in the table. The interviewer located the column for "five persons in the group." At the intersection of the third line and fifth column, the number one (1) indicated the person to be interviewed.

The interviewer identified the person that corresponded to the random number by moving clockwise around the cluster from the first person contacted in the group. In this case, the first person would be selected for interviewing. All individuals that appeared to be below the age of 18 were treated as not being part of the cluster. If a randomly selected respondent refused to be interviewed, the researcher would continue in the clockwise fashion and would select the next person that pertained to

the random number. In the example of 1 being the random number, the next individual would be asked to participate in the survey.

Selection of data collection sites within the two natural resource areas was designed on a rotating basis. Respondents were randomly selected from each active area in the order that they were physically positioned within the facility. When all active areas were sampled, the process started again from the original data collection site within the natural resource. The following hypothetical example illustrates the procedure: a facility has a sequence of a campground, beach, campground, and shelter. The campground is the first active area encountered when visiting the facility. Individuals would be sampled from the campground. When the sampling procedure eliminated respondents from this area, the beach would become the second sampled area. As the sampling procedure eliminated respondents from the beach, the second campground would be surveyed. This process would continue until the shelter was randomly surveyed. The first campground would again be surveyed after all the active areas were sampled.

Research Instrument

The questionnaire used to collect the necessary information to estimate the economic value of the two locations chosen in the state of Oklahoma and Iowa is cataloged in Appendix B. Each question or variable of interest on the survey instrument was considered, and every effort was made to minimize loaded, ambiguous, leading, and multiple questions.

The survey instrument was six pages in length, and the format includes the introduction and the order of the questions. The introduction explains the purpose and importance of the research. The intent of the

introduction is to be personal, with confidentiality as an incentive to respond.

The questions on the research instrument were divided into six sections: (1) Qualifying, (2) Demographic Data, (3) Trip Profile, (4) Demand or Trip Time Diary, (5) Intervention, and (6) Consumer Surplus. An important consideration with the format of the survey instrument was the ordering of the questions. On this questionnaire, the easy factual questions were first, with the more complicated and personal questions last. The first question on the instrument was the qualifying question to determine if the respondent was a member of the survey population.

The demographic questions were collapsed from a format used on a pretest of an instrument tested during the fall semester of 1986 to determine if the general public had problems answering questions that valued the natural resource economically. Inferences drawn from the pretest were not valid because the sample was not drawn randomly from the population. The pretest implied that the age and education categories were important variables to measure because there appeared to be significant differences between the two categories. The race/ethnicity, usual occupation, and disabilities categories in the demographic section of the pretest were omitted from the research instrument because these categories appeared to have no significant differences or important variables to measure.

The trip profile was designed to determine the miles to and from the location. The miles on the trip were used to estimate the marginal cost of the trip or the substitute price for a market good. Questions 3, 4, 10.1, and 11 provided necessary information to calculate the marginal cost of the trip. Question 10.1 was designed to satisfy the "travel time cost" concern expressed by Norton (1970). The traveler was asked to

indicate the hours of travel time that was pleasurable because this time would add to the utility of the trip or marginal cost. The marginal cost data was implemented as a "dummy" question to help determine if the respondent was accurately evaluatng the natural resource.

The demand or trip time diary section was designed to estimate the resource allocation for outdoor recreation activities in that particular location, and an estimate of the total amount the trip cost. Question 16 was implemented into the design of the research instrument to provide sound estimates of "marginal transfer costs," which included all direct expenses of the trip (Burt and Brewer, 1971). The total amount of cost of the trip was utilized in the consumer surplus section of the instrument as the respondents' base price for the cash willing to pay question.

The intervention section was designed to estimate what inconveniences occurred on the trip and if an alternative site was part of the planning of the trip. The purpose of this section was to gain insight into the attitude of the respondent and provide this information for the facility manager.

The most difficult questions appeared in the last section. The consumer surplus questions were designed to estimate the value of the natural resource. These questions were designed to give strength to the Hotelling-Clawson-Knetsch method and its ability to value the recreation experience (Cocheba and Langford, 1978). The purpose of the consumer surplus section of the questionnaire was to clearly define which was being valued by the sampled subject, the recreation activity, scenic beauty, or wildlife, and the magnitude it was being valued. Questions 20 and 20.1 defined what was being valued by asking which provided the most satisfaction on the trip: (1) the activity, (2) scenic beauty, or (3)

wildlife. Questions 21, 23, and 24 were designed to assist the participant in valuing their response to questions 20 or 20.1.

Question 21 was inserted into the instrument as a second "dummy" question to address the concerns of Cocheba and Langford (1978) that willingness to pay questions are "hypothetical" and result in "hypothetical" answers. This question determined the miles the respondent would be willing to travel above the total miles of the trip to have the same experience that activity, scenic beauty, or wildlife provided on the trip. The relationship between the miles willing to travel and the cash willing to pay responses could reduce the biases of the hypothetical questions.

Questions 23 and 24 were implemented into the instrument to determine the economic value of the activity, scenic beauty, or wildlife. The cash willing to pay question (#23) was designed to determine the cash an individual would be willing to pay above the total cost of the trip (consumer surplus) to have the same experience that the activity, scenic beauty, or wildlife provided on the trip. Question 24 was implemented into the questionnaire to assist the respondent in accurately estimating the value of their experiences. This question was to aid the evaluation method by inquiring about the hours per month the respondent would be willing to volunteer if they thought their present economic situation would not allow them to accurately evaluate the cash willing to pay question. Question 22 determined which method of payment would help the respondent to accurately price their experience by responding to willingness to pay cash, willingness to volunteer time, or both.

The consumer surplus section of the instrument also examined the respondent's willingness to pay to remove the main inconvenience from the trip (question 25). This question was inserted into the research

instrument to determine the perceived attitude of the respondent toward the management of the facility.

The annual family income question was considered the most personal and was placed last on the research instrument. The question (#26) asked for the respondent's annual family income the previous year, before taxes. Responses to question 26 were separated into 12 income categories, with letters to designate the categories. This strategy was to reduce the effect of the personal question and add to the confidentiality of the survey instrument.

Procedure

Permission was granted by Dr. Don Savage to interview Oklahoma park users (N=100) at Lake Carl Blackwell from July 2 to July 26, 1987, and the Black Hawk County Conservation Board granted permission to gather data from Iowa park users (N=100) from August 15 to November 12, 1987. The purpose for gathering data from two different geographic locations was to add more credibility to the results of the study.

The direct or personal interview method was selected to collect data from the survey population. This method minimized questionnaire nonresponse, and provided an acceptable return rate ratio.

The sampled subject was greeted with a "Hello, how are you today?" The interviewer explained the purpose of the visit, the use of the results of the data collection, and the confidentiality that was provided each respondent.

The respondent was given an information card (Appendix C) with an introduction and an explanation of how the results were to be used. The confidentiality of the subject being interviewed was assured. Only coded data resulted from any interview, permitting no personal identification

of the respondent from the data collected. The information card also had the activities list, all questions that had several responses to choose from, the income categories, and a message of thanks for their cooperation.

The interviewer asked all questions and recorded all responses on a code sheet (Appendix D). The interviewer did not have discretion during the interviewing process. The interviewer was allowed to repeat verbatim any questions the respondent had trouble interpreting. This procedure should have minimized interviewer bias. Lastly, the interviewer expressed his appreciation for the respondents' help by answering the questions on the survey instrument and thanked them for their time.

Methods of Data Analyses

Data from each respondent were inscribed on a code sheet (Appendix D). All data collected were transcribed from the respondent code sheet onto a Fortran coding form. The first three columns on the Fortran coding form identified each survey instrument and had the capability to separate the two locations. The first sampled resource area was numbered 101-200; the second area numbered 201-300. The sample size equaled 200.

All questions with a yes and no response were coded as 1 for "yes" and 2 for "no" (questions A, 2, 12, 18, 19.1). The gender question in the demographic section coded "female" with 1 and "male" with 2, question 8 coded "return home" as 1 and "some other place" as 2, question 20 coded "outdoor activity" as 1 and "natural setting" as 2, and question 20.1 coded "scenic beauty" as 1 and "wildlife" as 2.

The demographic, location of home, type of vehicle, activity, reason for choosing area, alternate site, inconveniences, and family income questions were coded 1 through however many numbers were needed to cover

all possible responses to the question. Those questions that the respondent could only answer with one item out of several were coded with the corresponding numbers to the responses. Those questions the respondent could answer with more than one response were coded 1 for items chosen and 2 for items with no response. All missing data was coded as zero.

All the sampled data was entered into the Wylbur system on an IBM computer at Oklahoma State University. The program package that analyzed the data was the SPSSx. The Analysis of Variance statistical test deciphered the differences between all formal hypotheses that were expressed from the main problems in this study. The significance level for acceptance or rejection of the null hypotheses was a=.05. This level of significance means that the probability of any observed difference occurred by chance. Final judgment on differences between the variables listed in the main problems of this study was based strictly upon the strength of the level of significance and the power of the Analysis of Variance.

The statistical test to interpret the differences between the variables stated in the null hypothesis of the subproblems in this study was the Student T. The acceptance or rejection level of significance for the subproblem null hypotheses was a=.05. Inferences drawn from any differences stated in the subproblems of this research project rests exclusively with the level of significance (a=.05) and the robustness of the Student T test.

A Pearson Correlation Coefficient analysis was conducted to determine if there were any relationships between the marginal cost of the trip, total cost of the trip, cash willing to pay, and miles willing to travel (a=.05). The alpha level of the statistical analysis decided the

acceptance or rejection of the relationships of the variables; that is, relationships existed but not by chance. The level of significance did not infer the relative nature or vitality of the relationships. The nature and strength of the relationships were the standard by which the significance of the differences were assessed. Lastly, chi-square cross-tabulations were used to observe relationships of the participants' demands and allocation for the natural resource (a=.05).

Individual Hypotheses Testing

Problems

The investigaton of Ho_1 required the Analysis of Variance statistical test to ascertain that there were no significant differences between the participants' incomes and the marginal costs of the trip. The level of significance for rejecting the null hypotheses during this test was a=.05. The results of this test will be addressed in Chapter IV.

Inquiry into Ho_2 also required the Analysis of Variance statistical test, with a level of significance set at a=.05 to determine if there were any significant differences between the participants' incomes and the cash willing to pay above the total cost of the trip. The result of this test will be expressed in Chapter IV.

The testing of Ho_3 was attained by the use of the Analysis of Variance to establish if there were any differences between the participants' incomes and the miles they were willing to travel above the total miles of their trip for the experience they received from the trip. The level of significance was a=.05, and the results of this analyses will be reviewed in Chapter IV.

Inquiry into Ho_4 also required the Analysis of Variance statistical test, set with a level of a=.05 to determine if there were any significant differences between the participants' incomes and their time willing to volunteer. The conclusions of this statistical test will be discussed in Chapter IV.

In testing Ho_5, the Analysis of Variance statistical test was employed to determine any significant differences between the participants' incomes and the cash willing to pay to remove any inconvenience experienced on the trip. The rejection level for this null hypothesis was a=.05. The conclusion to the testing of Ho_5 will be reviewed in Chapter IV.

Subproblems

A Student T test with a significance level of a=.05 was applied to the Ho_1 to determine if there were any differences between the cash willing to pay of the participant, regardless of geographic location, gender, and which provided the most satisfaction (activity, scenic beauty, wildlife) for the participant. The results of this test will be discussed in Chapter IV.

The test for Ho_2 was also the Student T, with a significance level of a=.05. The analysis was to determine the difference between miles willing to travel of the participant regardless of geographic location, gender, and which provided the most satisfaction for the participant. Results of this test will be discussed in Chapter IV.

Inquiry into Ho_3 also required the Student T statistical test set with a level of a=.05 to determine if there were any relationships between the total cost of the trip of the participant regardless of geographic location, gender, and which provided the most satisfaction for

the participant. The outcome of this test will be reviewed in Chapter IV.

Validity and Reliability Concerns

The two major concerns of validity and reliability while conducting this study were the interviewing process and the developed instrument. The most important consideration when conducting a survey with the general public is minimizing biases that could enter into the research study. It is well known that it is impossible to conduct a survey without complete bias.

Warde (1984) indicated that interviewer bias tended to increase as the amount of personal contact between the researcher and respondent increased. Warde further believed that nonresponse to the survey process was also a concern for bias. To minimize interviewer bias, the researcher conducted the survey without discretion. "Without discretion" suggests that the interviewer repeats questions verbatim without further interpretation of the question. The researcher attempted to reduce additional bias through subduing any extraneous conversation until after the interview was completed. The interview required approximately 10 minutes of personal contact and was expected to hold interviewer bias to a minimum.

Nonresponse to the survey process decreases when the personal interview method is implemented rather than telephone or mailback questionnaire methods (Warde, 1984). The three methods of surveying the general public were taken into consideration. The personal interview method without discretion was selected to minimize bias and add to the validity of the research that was being conducted.

The second major concern for validity and reliability was the development of the instrument. Lowering the nonresponse error for specific questions on the survey instrument could be accomplished when designing and constructing the questionnaire. Several guidelines have been documented by Warde (1984) to reduce nonresponse error for the questionnaire. Four guidelines appeared to be appropriate for the direct method interview. These guidelines included the following: (1) length of questionnaire, (2) order of questions on the questionnaire, (3) question wording and content, and (4) interest in the survey (Warde, 1984).

The personal interview method did not require that the respondent manually inscribe information on the instrument. This strategy allowed the interviewer to ask each question on the instrument. It was not required that the respondent see or read the actual questionnaire. An information card replaced the need for the instrument. The information card provided details about the purpose of the survey, confidentiality of the respondent, questions from the survey that had several responses to select from, and the income categories. The strategy to use the information card was to decrease nonresponse to the questionnaire.

An important consideration with the format of the survey instrument was the ordering of the questions. The questionnaire was designed to lessen bias or nonresponse by placing the easy and factual questions first, with the more difficult and personal questions last.

Each question or variable of interest was considered and every effort was made to minimize loaded, ambiguous, leading, and multiple questions. Long, involved, embarrassing, and incriminating questions were deleted from the survey questionnaire.

Interest in the survey was considered when designing the instrument to minimize nonresponse bias. Appearance of an instrument assists in

increasing the respondents' interests. This research required that an information card substitute for the actual questionnaire. The information card was 8-1/2 inches in width and 14 inches in length. The laminated card had black type on a light brown background, with all letters being capitalized for easy reading. The introduction on the card and the verbal greeting to the sampled respondent explained the purpose and importance of the research. The intent of the introduction was to be personal, with confidentiality as an incentive to respond.

A pretest was performed on 90 subjects during the fall semester of 1986. A Pearson's Goodness of Fit statistical test positively indicated that individuals were capable of accurately evaluating an intrinsic experience by responding to a question that dealt with the amount of cash the individual would pay for the experience in the natural resource. The current research instrument was designed or developed from the aforementioned pretest. This test predicted that the research instrument could be conducted by other researchers and could produce similar results. This ability to repeat results with the same instrument signified that the questionnaire could be reliable and valid. Lastly, the research instrument was examined and accepted by the committee members that were guiding this research effort.

CHAPTER IV

ANALYSES OF DATA

It was the purpose of this survey to determine how valuable our scenic beauty and wildlife were to the general public. It was the intent of this research to establish an economic base for the valuation of the natural resource as perceived by the user. With this information, the natural resource could be spared from development upon consideration of alternate economic value. The ensuing hypotheses were formed from the aforementioned statement of the problem:

Ho_1 - There are no significant differences between the participants' incomes and the marginal costs of the trip.

Ho_2 - There are no significant differences between the participants' incomes and the cash the participants were willing to pay above the total cost of the trip to have the same experience that the activity or natural setting provided on the trip.

Ho_3 - There are no significant differences between the participants' incomes and miles the paticipants were willing to travel above the total miles of the trip to have the same experience that the activity or natural setting provided on the trip.

Ho_4 - There are no significant differences between the participants' incomes and time willing to volunteer.

Ho_5 - There are no significant differences between the participants' incomes and the cash the participants were willing to pay to remove any inconvenience experienced on the trip.

The following null hypotheses were developed to specify the statement of the subproblems of this research:

Ho_1 - There are no relationships between gender, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants.

Ho_2 - There are no relationships between geographic location, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants.

Ho_3 - There are no relationships between which provided the most satisfaction for the participants, the main recreation activity or the natural setting, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants.

Other relationships that were applicable to the subproblems in this study investigated the attitudes of the participants. This information can assist the resource manager toward a more efficient and effective planning strategy for future outdoor use. These components included information that ascertained the participants' activity demands for the natural resource, and the inconveniences that befell the participants during the trip.

A quota method random sampling technique was used to select 100 subjects from Lake Carl Blackwell in Oklahoma and 100 subjects were sampled from Black Hawk Park in Iowa (N=200). The target population for this research was current park users. The survey population was individuals over the age of 18 that participated in outdoor recreation activities that brought them into contact with the natural resource. The sampling technique involved the selection of a number from a random number table each interview day to determine the first subject to interview on site. Every third individual was selected for interviewing after the

first selected individual. This process continued until the end of the data collection period for that day. The random selection process was continued in the event of a nonrespondent; that is, the interviewer selected the next individual that corresponded to the random number.

All clusters of the population were sampled by randomly selecting an individual over the age of 18 from the cluster. The method of selecting an individual from the cluster was determined by a respondent selection table (Appendix A). The size of the cluster and the order in which the group was encountered for the survey day decided the sampled subject. For example, there are six persons in a group and this is the first cluster confronted for the day. The researcher located the intersection of the first group (first row) and column 6 for group size. The random number at the intersection is 5.

The interviewer identified the person that corresponded to the random number (5) by moving clockwise around the cluster from the first person contacted in the group. All individuals that appeared to be below the age of 18 were treated as not being part of the cluster. In the event that the sampled individual refused to be interviewed, the researcher continued in the clockwise fashion, starting with the person that refused and selecting the next person indicated by the random number.

Samples were selected at Lake Carl Blackwell in Oklahoma from July 2 to July 26, 1987, and from Black Hawk Park in Iowa from August 15 to November 12, 1987. The response rate for the sampled population was 93%. Fourteen individuals refused to respond to the survey. The response rate was calculated by dividing 200 individuals that responded to the survey by the 214 individuals that were asked to participate in the survey.

A direct method interviewing technique was employed to collect information from each randomly sampled respondent. The personal interview method was performed without discretion. The questionnaire was designed to gather information on the respondents' perceived evaluation of their main activity, the scenic beauty, or the wildlife of the natural resource above the total cost of their trip and the allocation of the natural resource.

All data were coded on a sheet at the survey site and transferred to a Fortran code sheet after each interview day. The data were entered into the central computer at Oklahoma State University using the SPSSx program format. The main computer was commanded to compute the designated tests for significant variable differences for hypotheses testing, correlations, crosstabulations, percentages, and frequencies of all pertinent variables. The outcome of the tests are summarized below.

The demographics or description of the population sampled inquired about the respondents' gender, age, education, and employment. The sampled population resulted in 103 males and 97 females responding to the survey. The sampling technique appeared to be valid, especially when 51.5% of the respondents were male and 48.5% were female. A frequency for age was not computed because the chairperson of the committee and the researcher considered that age would be better representative of the data when crosstabulated with resource allocation. These results will be discussed later in this chapter.

Figure 1 displays the frequency of the respondents' education. The greatest frequency (67) demonstrated that respondents were high school graduates. The second greatest frequency indicated that 65 respondents had entered college. It was interesting to note that 93% of the population had graduated from high school, entered college, graduated from

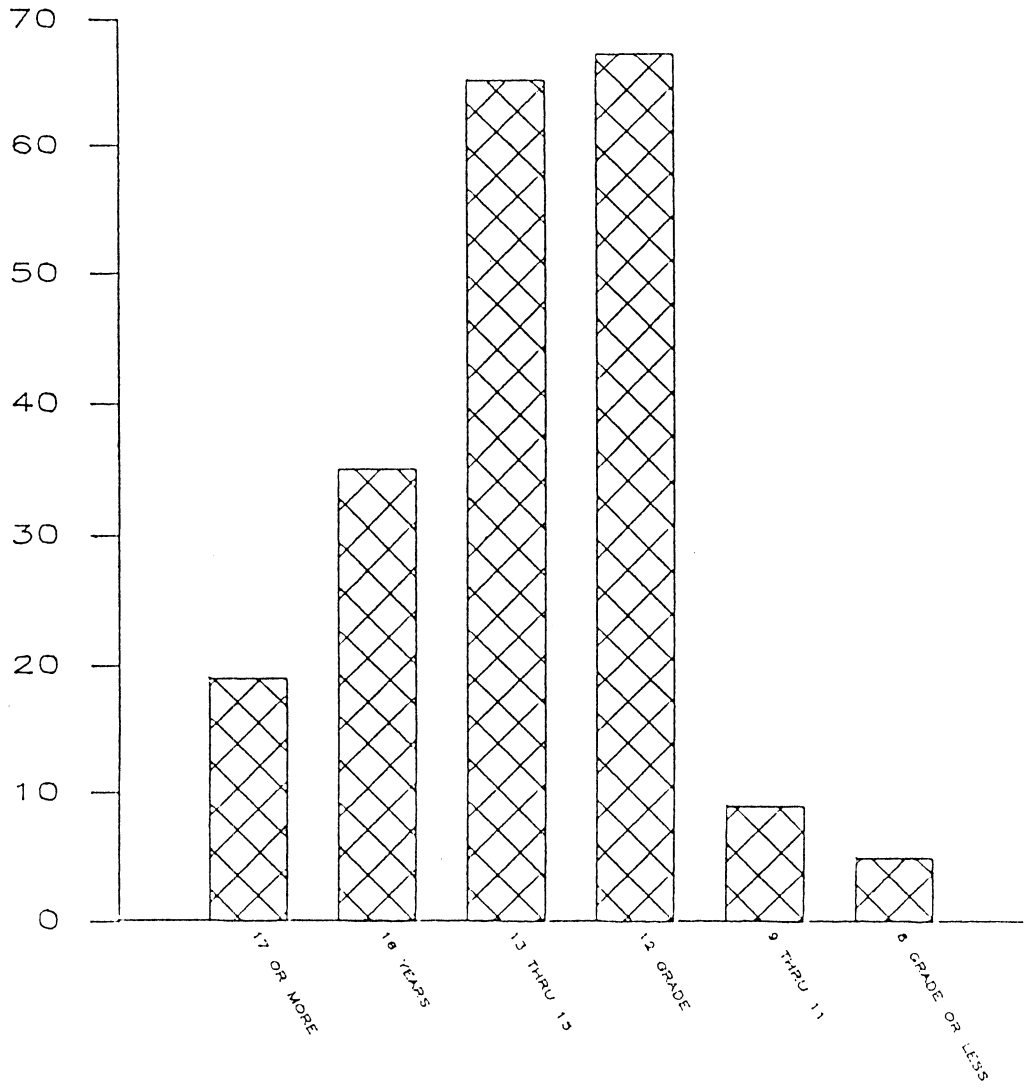

Figure 1. Frequency of Education for Iowa and Oklahoma Participants

college, or received advanced degrees, while 7% of the population sampled had an education of the 11th grade or less. Major universities being within 12 miles of each site surveyed apparently favored such a large percentage of the population entering or earning a college degree. Figure 1 appears to have added confidence to the sampling technique. The shape of the bar graph indicates a normal distribution of education among the respondents. All sampled subjects responded to the education variable, producing a 100% response for this particular question.

Full-time employment of the surveyed population was computed to be 49% of the respondents (Figure 2). Twenty percent of the respondents were students. These figures could have influenced the respondents' evaluation of the natural resource, and the results of the question concerning the respondents' financial status or annual income. One individual refused to answer this question, which yielded a 99% response rate.

Other frequencies that helped to describe the sampled respondents were derived from questions that asked for "income," "main activity," and "main inconvenience" of the participants. Responses to question 26 on the instrument ("What was your annual family income last year before taxes?") are presented in Figure 3. The data revealed that 46% of the Iowan and Oklahoman families of surveyed persons earned between $20,000 and $35,900 per annum for 1986. The frequencies also disclosed that the largest group surveyed was 13%. These subjects earned between $30,000 and $35,000 per annum for 1986. This data indicated that the wage earner for participants in Iowa and Oklahoma resource areas is fairly sound. The frequencies in Figure 3 appear to assimilate a normal distribution for "income" and should support the random sampling procedure. This variable computed a 94% response rate, or 11 missing cases. The large response rate indicated that the "income" question was not too personal.

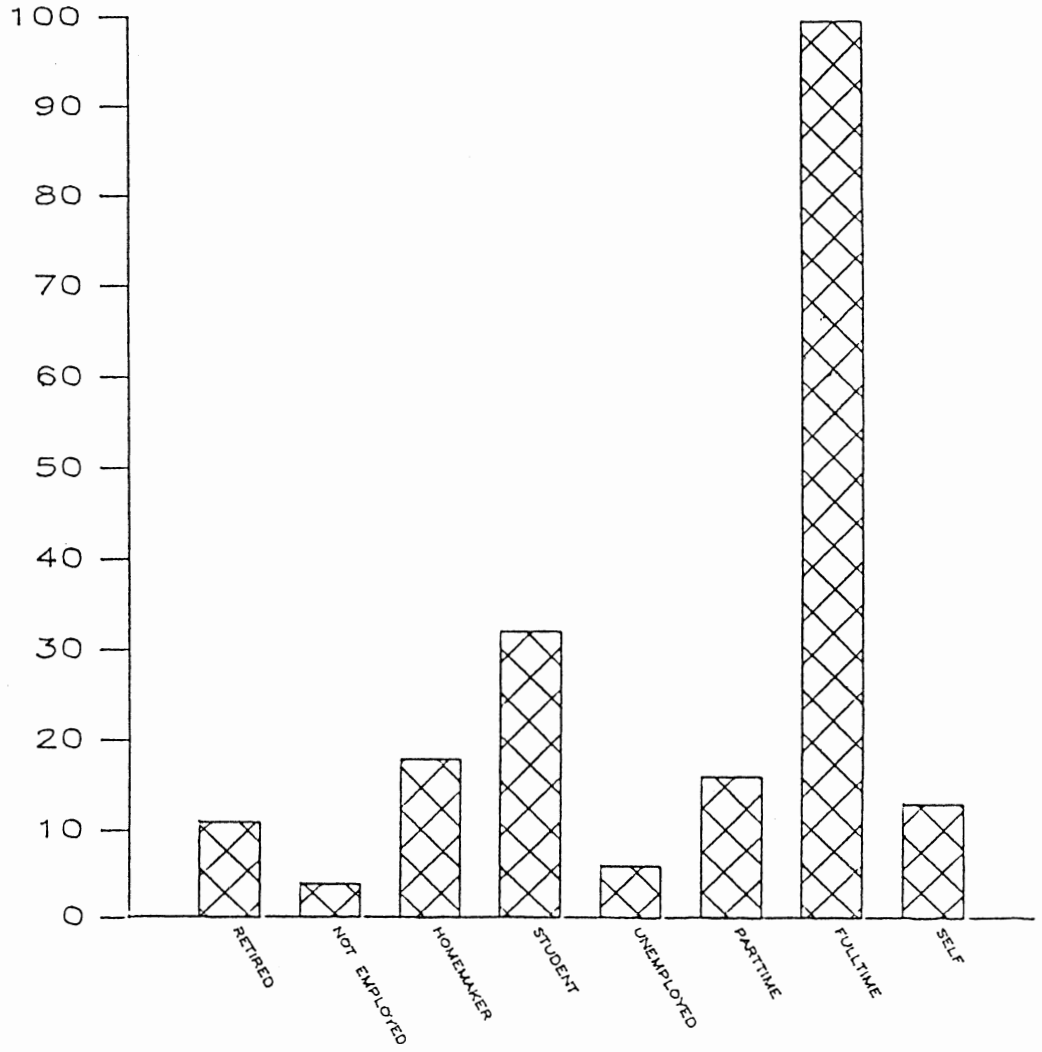

Figure 2. Frequency of Employment for Iowa and Oklahoma Participants

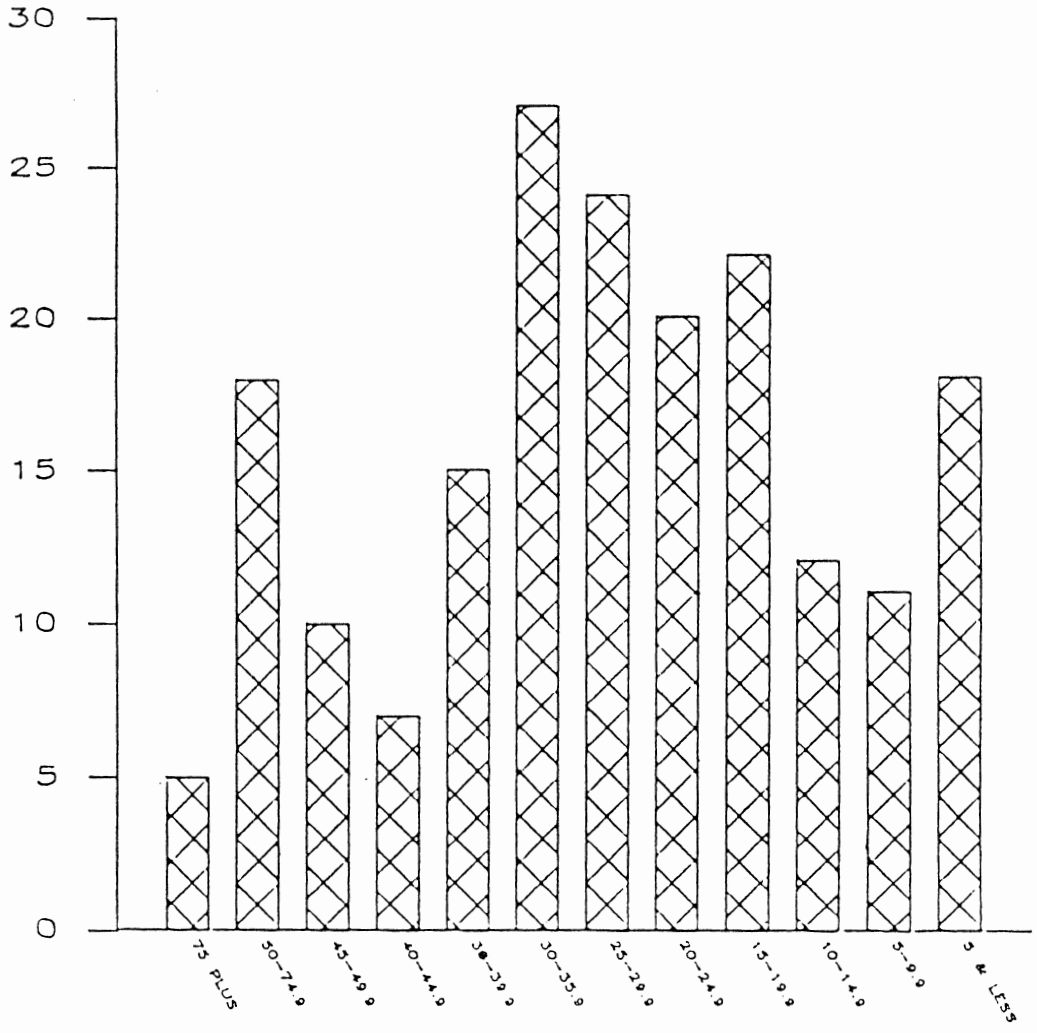

Figure 3. Frequency of Income for Iowa and Oklahoma Participants

Perhaps the confidentiality of the survey added to the validity of this particular variable.

Question 15 on the instrument inquired about the main activity in which the visitor participated. The results of this investigation are presented in Figure 4. "Sun tanning" was the response for 18% of the sampled population, and "relaxation" was the second most popular activity, with 15% of the responses. The third, fourth, and fifth most popular main activities were "camping" (12%), "ranger guided tour" (10%), and "swimming" (7%). The most popular main activity of "sun tanning" was presumably biased by the close proximity of a university at each geographic location surveyed. The fact that "relaxation" was a close second for the main activity response might indicate that natural resource users for both surveyed sites utilized the outdoor recreation area as a place to refresh themselves through a passive activity. The frequency for "camping" could have been higher because many of the sampled participants that responded to "relaxing" were also camping. The responses to the "ranger guided tour" or activity had all Iowa subjects responding because Black Hawk Park was the only facility that offered this type of activity. The "main activity" variable had 74 missing cases, or a 63% response rate. Several of the 74 individuals had difficulty selecting a main activity from several activities that had equal benefits or value.

Question 19 on the survey instrument explored the inconveniences that occurred on the visitors' trip. This question was implemented into the design of the questionnaire to assist the resource manager in determining if there were any verifiable complaints of the facility user. The question was also important to this research because responses could help determine the attitude of the respondents. A respondent that experienced

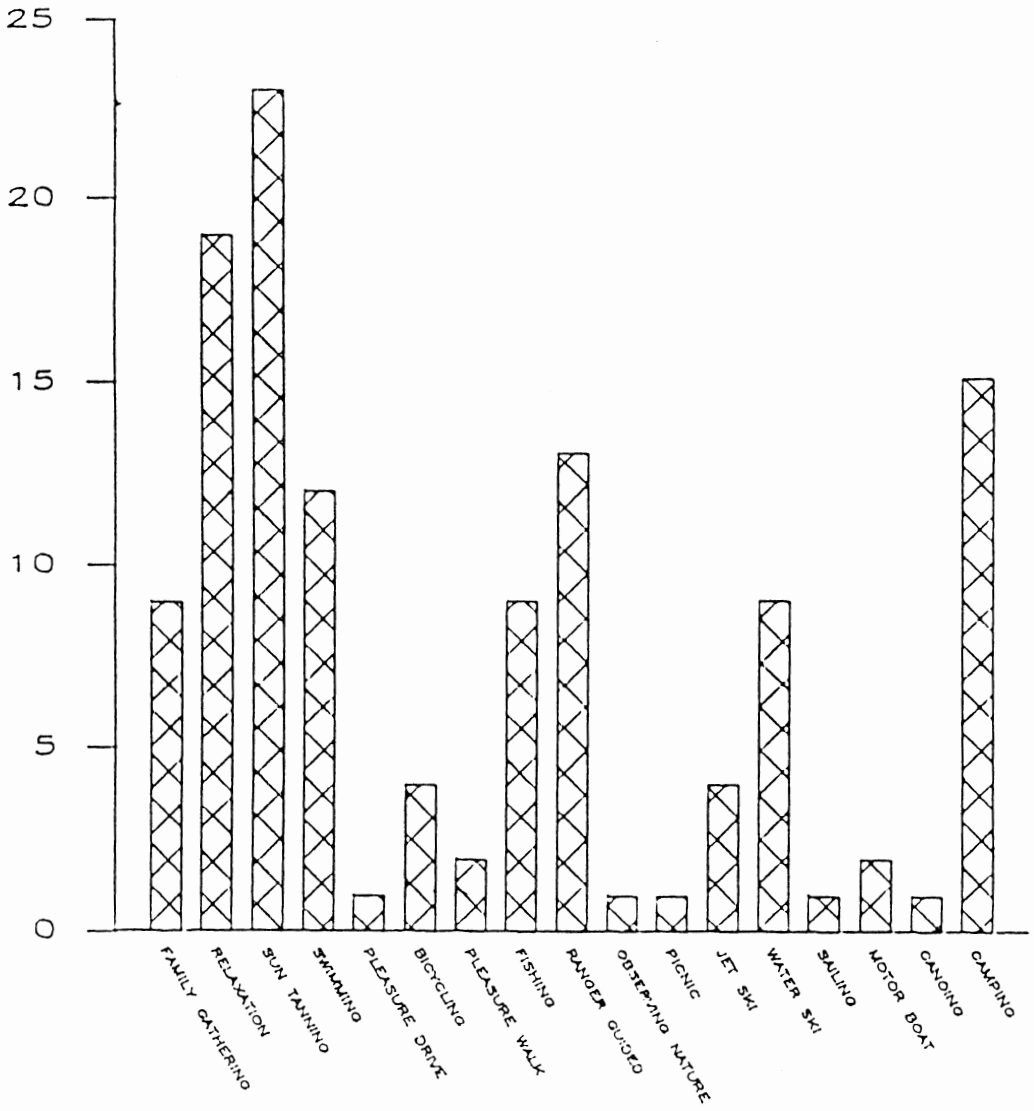

Figure 4. Frequency of Main Activity for Iowa and Oklahoma Participants

a legitimate inconvenience may have a negative attitude towards answering a significant "cash willing to pay" question.

"Weather" and "mosquitos/ticks" or two natural phenomenon were the most frequent responses of the sampled population to the "inconvenience" question (Figure 5). When 10% of the sample complains about the weather and 9% of the sample complains about pests, there should be no concern to the facility managers. Figure 5 also displays that 5% of the sample experienced the inconvenience of "forgotten items," and an additional 5% of the sample responded to "mechanical repairs" as an inconvenience. The resource managers of the two survey sites have no control over forgotten items and mechanical repair inconveniences and should not be disturbed about the attitudes of these individuals. An interesting fact pertaining to Figure 5 is that 92 individuals sampled (46%) did not experience any inconveniences. The results of these frequencies should send a positive message to the resource managers of the two surveyed sites. Apparently, a large segment of the sampled population expressed positive attitudes. This information seems to imply that the sampled respondents should have an unbiased response to the "cash willing to pay" question on the survey instrument. There was a 100% response rate to this question.

Information pertaining to relationships between the two surveyed sites and the main activity that visitors participated in was important to determine the demand for each natural resource. A crosstabulation of site by main activity was computed and the results are displayed in Appendix E. Several cells of the matrix were empty for both sites sampled. Iowans did not consider canoeing, motor boating, water skiing, jet skiing, swimming, or sun tanning a main activity. Oklahomans did not list ranger guided tours or activities and bicycling as a main activity. These results indicated that the facility in Oklahoma provided a lake for

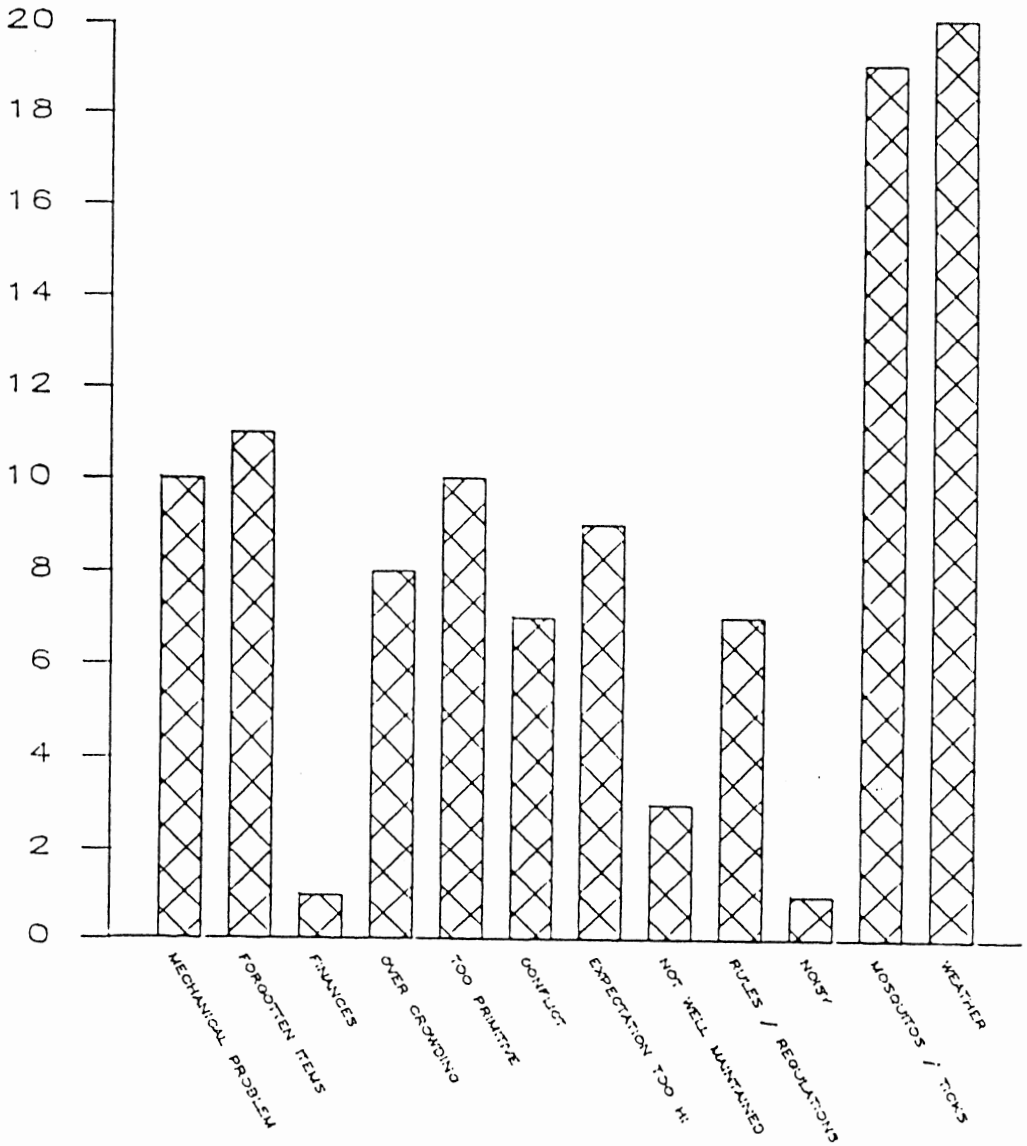

Figure 5. Frequency of Main Inconvenience for Iowa and Oklahoma Participants

visitors to participate in active water-based recreation. The facility in Iowa provided a river for water-based activities that was not conducive to skiing or boating but which offered bicycling and interpretive programs. The results also demonstrated that some main activities are pursued during different times of the year because the Iowa park was surveyed in middle August to November, and swimming or sun tanning was not considered a main activity.

The main activity of sun tanning, with a row percentage of 24%, and relaxing, with a row percentage of 18.9%, were the most significant demands for the Oklahoma resource. A ranger guided tour or activity, with a row percentage of 41.9%, was the most significant demand for the Iowa Park. A chi-square of 85.6 with 16 degrees of freedom, and a probability factor of 0.000 with an alpha level set at a=.05 support the above conclusion.

Question 13 asked the sampled visitor the activities that they participated in during their visit. A crosstabulation set activities in cells according to the respondents' ages, education, and employment. The results of these crosstabulation are presented in Appendix F. The purpose of these crosstabulations was to provide the park manager an allocation of the resource for their perusal. A test for significance was not computed for this data, which causes the researcher to hesitate in drawing any conclusions. The park managers should find an interesting relationship between age and education of the respondent and relaxing as an activity. The total row percentage for the relaxing activity was 76% for both age and education. This total row percentage was also the highest for all activities for both age and education. The crosstabulation indicated that as the visitors' ages and education increased, the relaxation activity decreased. The row percentage for the age group 31 to 40 was

29.3%, and for the education group 12th grade the row percentage was 35.1%. Each age row percentage decreased from 11.3% for the 41 to 50 age group to a 4.7% column percentage for the over 60 group. The education row percentage of the respondents also decreased from a 31.8% for 15 through 15 years of education to a 8.6% for the 17 or more years of education group.

The "consumer surplus" section on the instrument had questions designed to interpret what provided the most satisfaction for the respondent to facilitate a reply to the "cash willing to pay" question. "Which provided the most satisfaction on this trip?" was question 20 on the survey instrument, and the responses to the question were "outdoor recreation activity" and "the natural setting of the location." The satisfaction component was reduced to responses of "scenic beauty" or "wildlife" in question 21.1 if the response to question 20 was "the natural setting of the location."

Appendix G presents the results of a crosstabulation of activity, by which provided the most satisfaction to the respondent. The motor boating activity had 25 of 34 individuals (74%) select the recreational activity as providing the most satisfaction, and 9 of the motor boating respondents (26%) believed that the natural setting provided the most satisfaction. The natural setting provided the most satisfaction for 17 (68%) individuals engaged in the driving for pleasure activity, and 8 individuals (32%) responded that the activity provided the most satisfaction. There appears to be a remote possibility that individuals that are engaged in highly active recreational ventures appreciate the activity, and individuals that participate in passive recreational activities perceive the natural resource as providing the most satisfaction. Other similarities to the above examples are also displayed in Appendix G. A

test for significance was not computed for this crosstabulation, making any conclusions tenuous.

A chi-square test was computed for a crosstabulation of site, by which provided the most satisfaction (Table I). There are significant differences between Iowans and Oklahomans and what provided them the most satisfaction. Sixty-one percent of the surveyed Black Hawk Park respondents and 39% of the Lake Carl Blackwell subjects selected the natural resource as providing them with the most satisfaction. Lake Carl Blackwell's sampled visitors selected the outdoor activity as providing the most satisfaction, with a 59% response rate; Black Hawk Park's outdoor activity satisfaction rate was 41%. The two-by-two matrix computed a 7.04 chi-square value, with a probability factor of 0.008. An alpha level of a=.05 testified that there were significant differences between geographic location and satisfaction of the natural setting and the outdoor activity. These results could lend credibility to an earlier statement that individuals participating in passive outdoor activities perceived the natural setting as providing the most satisfaction. The response rate for question 20 was 97.5%. This figure indicated that biases were minimal and the question had validity.

Table II represents the crosstabulation results of surveyed sites versus the responses to question 21.1; that is, which provided the most satisfaction for the natural setting--scenic beauty or wildlife? Approximately 95% of the sampled population for both sites selected scenic beauty as providing the most satisfaction for the natural setting. These results produced a chi-square value of 0.000 for the 2-by-2 matrix, indicating that the cells did not have the expected frequency. A significance level of .05 was selected for this test, and the probability value equalled 1.000. The extremely high probability factor signified that

TABLE I

CROSSTABULATION OF DATA COLLECTION SITES BY RESPONSES WHICH PROVIDED THE MOST SATISFACTION

PROVIDE SATISFACTION

COUNT / ROW PCT / COL PCT	ACTIVITY (1)	NATURAL SETTING (2)	ROW TOTAL
SITE			
1 OKLAHOMA	63 64.3 59.4	35 35.7 39.3	98 50.3
2 IOWA	43 44.3 40.6	54 55.7 60.7	97 49.7
COLUMN TOTAL	106 54.4	89 45.6	195 100.0

CHI-SQUARE = 7.041 D.F. = 1 SIGNIFICANCE = 0.008

CELLS WITH E.F.< 5 = NONE NUMBER OF MISSING OBSERVATIONS = 5

TABLE II

CROSSTABULATION OF DATA COLLECTION SITES BY WHICH NATURAL SETTING RESPONSES PROVIDED THE MOST SATISFACTION

WHICH NATURAL SETTING

COUNT / ROW PCT / COL PCT	SCENIC (1)	WILDLIFE (2)	ROW TOTAL
SITE			
1 OKLAHOMA	35 94.6 40.2	2 5.4 40.0	37 40.2
2 IOWA	52 94.5 59.8	3 5.5 60.0	55 59.8
COLUMN TOTAL	87 94.6	5 5.4	92 100.0

CHI-SQUARE = 0.000 D. F. = 1 SIGNIFICANCE = 1.000

CELLS WITH E.F.< 5 = 2 OF 4 NUMBER OF MISSING OBSERVATIONS= 108

scenic beauty responses to question 21.1 will occur all the time. These computations did not concern the researcher because neither natural area attracted appreciable quantities of wildlife during the testing period.

A relationship between the marginal cost of the trip and the total money spent on the trip, cash willing to pay, and miles willing to travel were important to the design of the research instrument. A correlation between these variables should indicate the respondents' ability to approximately evaluate the natural resource. The marginal cost for the trip was calculated for each respondent by collecting information on the total miles of the trip, miles per gallon for the vehicle used on the trip, amount paid for a gallon of gas for the trip, and hours the respondent perceived to be pleasurable while traveling to the site.

The marginal cost was calculated by dividing the total miles of the trip (questions 3 and 11) by the estimated miles per gallon the vehicle consumed (question 4), and multiplying the answer by the cost of a gallon of gas purchased for the trip (question 11). An additional $4.00 per hour of pleasure driving to the site was added to the cost of traveling to and from the site. The travel time cost ($4.00) was included in the marginal cost of the trip to represent the full utility of the travel cost to and from the site.

The variable "total money spent on the trip" was included in the relationship to represent the marginal transfer costs or all direct expenses of the trip. Data from the cash willing to pay question was also included in the test to estimate the ability of the respondents to respond to a hypothetical question concerning the evaluation of the natural resource. Finally, the "miles willing to travel" variable was included in the correlation test because of its similarity to the cash willing to

pay question on the instrument, and its relationship to the marginal cost of the trip.

The correlations between these variables are presented in Table III. A Pearson Correlation Coefficient was disclosed that cash willing to pay (p=.007) and miles willing to travel (p=.000) had a relationship to marginal cost. This decision was based upon the significance level a=.05. The power of the relationships was interpreted to be low (r=.417) for cash willing to pay and moderate (r=.592) for miles willing to travel. This outcome suggests that results from a hypothetical question are not totally hypothetical.

TABLE III

PEARSON CORRELATION COEFFICIENT MATRIX

	Total Money Spent	Cash Willing to Pay	Miles Willing to Travel
Marginal Cost	r^2 = .0833 r = .2886 p = .121	r^2 = .1739 r = .4170 p = .007	r^2 = .3505 r = .5920 p = .000

Hypothesis Testing

There were five null hypotheses that specified the statement of the problem and three null hypotheses that addressed the subproblems during this research effort. Ho_1 stated that there are no significant

differences between the participants' incomes and the marginal costs of the trip. An Analysis of Variance with an alpha level of a=.05 tested the differences between the marginal cost of the trip and income of the participants. The null hypotheses could not be rejected because the significance level of F was 0.104 (Table IV). The marginal cost grand mean was $4.88.

TABLE IV

MULTIPLE CLASSIFICATION ANALYSIS BY
MARGINAL COST AND BY INCOME

Grand Mean = 4.88 Variable + Category Income	N	Unadjusted Deviation
1 Less than $5,000	18	-2.58
2 $ 5,000 to $ 9,999	11	-2.60
3 $10,000 to $14,999	12	0.41
4 $25,000 to $19,999	22	1.90
5 $20,000 to $24,999	20	-1.07
6 $25,000 to $29,999	24	2.23
7 $30,000 to $34,999	27	1.12
8 $35,000 to $39,999	15	-1.57
9 $40,000 to $44,999	7	-1.48
Total N	156	-1.48
Sum of Squares = 5048359.799		Mean Square = 631044.975
F = 1.694	D.F. = 8	Significance of F = 0.104

Ho_2 stated that there were no significant differences between the participants' incomes and cash willing to pay above the total cost of their trip to have the same experience that the activity, or natural setting, provided on the trip. An Analysis of Variance tested these

differences and computed a significant level of F=0.415. The alpha level (a=.05) could not reject the null hypothesis for this test. Table V represents the results of this null hypothesis and established the grand mean for consumer surplus as $20.15. It is interesting to note that the participant in the $20,000 to $24,999 income bracket was willing to pay $19.75 above the grand mean, or the most for their experience at the surveyed sites. The grand mean for this test of the second null hypothesis could help determine the value for the natural resource of the sites sampled. Black Hawk Park had approximately 250,000 visitors for the 1987 season and is 1,100 acres in size. The number of visitors multiplied by the grand mean of the consumer surplus equals $5,037,500. Dividing this figure by the 1,100 acres of the park gives a $4,579.54 price per acre.

TABLE V

MULTIPLE CLASSIFICATION ANALYSIS BY CASH WILLING TO PAY AND BY INCOME

Grand Mean = $20.15

Variable + Category Income	N	Unadjusted Deviation
1 Less than $5,000	18	-13.93
2 $ 5,000 to $ 9,999	11	-3.60
3 $10,000 to $14,999	12	-1.23
4 $15,000 to $19,999	22	-8.19
5 $20,000 to $24,999	20	19.75
6 $25,000 to $29,999	24	-2.06
7 $30,000 to $34,999	27	5.04
8 $35,000 to $39,999	15	1.52
9 $40,000 to $44,999	7	-2.72
Total N	156	44 Missing Cases
Sum of Squares = 13805.144		Mean Square = 1725.643
F = 1.031	D.F. = 8	Significance of F = 0.415

Ho_3 states that there were no significant differences between the participants' incomes and miles willing to travel above the total miles of the trip to have the same experience that the activity, or natural setting provided on the trip. An Analysis of Variance was also utilized to compute any differences between income and miles willing to travel, with a significance level set a=.05 (Table VI). Ho_3 was not rejected because a significance of F value computed to be 0.232. The grand mean of miles willing to travel above the total trip was 55.99 miles. The $10,000 to $14,999 income bracket was willing to travel the furthest above all other income brackets. They indicated that they would be willing to travel, on the average, 75.26 miles above the grand mean.

TABLE VI

MULTIPLE CLASSIFICATION ANALYSIS BY MILES WILLING TO TRAVEL AND BY INCOME

Grand Mean = 55.99 Miles

Variable + Category Income	N	Unadjusted Deviation
1 Less than $5,000	18	-32.71
2 $ 5,000 to $ 9,999	11	-7.35
3 $10,000 to $14,999	12	75.26
4 $15,000 to $19,999	22	-3.53
5 $20,000 to $24,999	20	-7.99
6 $25,000 to $29,999	24	14.22
7 $30,000 to $34,999	27	-5.06
8 $35,000 to $39,999	15	-12.99
9 $40,000 to $44,999	7	-0.84
Total N	156	44 Missing Cases

Sum of Squares = 97457.446 Mean Square = 12182.181

F = 1.332 D.F. = 8 Significance of F = 0.232

Ho_4 stated that there were no significant differences between the participants' incomes and time willing to volunteer. The data for both variables were computed with an Analysis of Variance test and resulted in a significance of F level of 0.852. An alpha level of a=.05 for this test caused the null hypothesis not to be rejected (Table VII). The grand mean for the time willing to volunteer per month was 2.26 hours. The participant in the $25,000 to $29,000 income bracket once again chose to volunteer more time per month than did any other income brackets by volunteering 2.20 hours above the recorded grand mean.

TABLE VII

MULTIPLE CLASSIFICATION ANALYSIS BY TIME WILLING TO VOLUNTEER AND BY INCOME

Grand Mean = 2.26 Hours/Month

Variable + Category Income		N	Unadjusted Deviation
1	Less than $5,000	18	-0.42
2	$ 5,000 to $ 9,999	11	-1.80
3	$10,000 to $14,999	12	-1.84
4	$15,000 to $19,999	22	-0.17
5	$20,000 to $24,999	20	1.04
6	$25,000 to $29,999	24	2.20
7	$30,000 to $34,999	27	0.34
8	$35,000 to $39,999	15	-1.72
9	$40,000 to $44,999	7	-0.54
	Total N	156	44 Missing Cases
Sum of Squares = 267.943			Mean Square = 33.493
F = 0.504	D.F. = 8		Significance of F = 0.852

Ho_5 stated that there are no significant differences between the participants' incomes and the cash willing to pay to remove any inconveniences experienced on the trip. The testing of this hypothesis was accomplished by comparing the income bracket of the participants and the response to the cash willing to pay to remove the inconvenience of the trip. An Analysis of Variance computed a significance level of F as 0.075 for the null hypothesis that had an alpha level of a=.05. Again, the null hypothesis could not be rejected (Table VIII). Once again, the participants in the $25,000 to $29,999 income bracket were willing to pay $11.43 above the $6.45 grand mean.

TABLE VIII

MULTIPLE CLASSIFICATION ANALYSIS BY CASH WILLING TO PAY TO REMOVE ANY INCONVENIENCES AND BY INCOME

Grand Mean = $6.45

Variable + Category Income	N	Unadjusted Deviation
1 Less than $5,000	18	-4.50
2 $ 5,000 to $ 9,999	11	-3.54
3 $10,000 to $14,999	12	-5.78
4 $15,000 to $19,999	22	-5.81
5 $20,000 to $24,999	20	-0.20
6 $25,000 to $29,999	24	11.43
7 $30,000 to $34,999	27	4.55
8 $35,000 to $39,999	15	-2.12
9 $40,000 to $44,999	7	-6.31
Total N	156	44 Missing Cases

Sum of Squares = 5686.413 Mean Square = 710.802

F = 1.832 D.F. = 8 Significance of F = 0.075

The Ho_1 of the subproblem stated that there are no relationships between gender, regardless of total money spent for the trip, cash willing to pay, and miles willing to travel of the participants. A Student T test set with a .05 significance level computed the scores of males' and females' responses to the total money spent on their trip. A probability factor for the two-tailed test resulted in a p=.843. The Ho_1 could not be rejected, indicating that there were no significant differences occurring between gender and the total money spent on each trip.

A Student T test set with a .05 significance level also computed the scores of males' and females' responses to the cash that the respondents were willing to pay above the total cost of their trip to have the same experience that the activity or natural setting provided on the trip. A two-tailed probability factor of p=.667 was computed for this subproblem and the results were established that no significant differences occurred between gender and cash willing to pay above the total cost of the trip. It is interesting to note that a computed probability factor p=.000 for variance accepted the hypothesis that women had significant differences on the cash willing to pay response. Females showed a larger range of variance to pay more cash for their experiences that did males.

Once again, a Student T test with a significance level of a=.05 computed the scores of gender and their responses to the miles that they were willing to travel above the total miles of the trip for the same experience that the activity or natural setting provided on the trip. A significant difference between gender and miles willing to travel could not be rejected with a probability factor of p=.078. A computation with a less robust probability factor for the F value resulted in p=.000. This outcome indicated that males appeared to be willing to travel further than females. The results of subproblem Ho_1 with the probability

levels of the separate variance differences and F values are presented in Table IX.

TABLE IX

T-TEST ANALYSIS OF GENDER REGARDLESS OF TOTAL MONEY SPENT, CASH WILLING TO PAY, AND MILES WILLING TO TRAVEL

Variable	Mean	Deviation	F Value	p Value	T Value	p Value
Money Spent						
Female	126.598	199.057	1.10	0.647	0.20	0.843
Male	121.146	190.123				
D.F. = 195.79						
Cash Willing to Pay						
Female	24.82	62.22	2.35	0.000	0.43	0.667
Male	21.60	40.56				
D.F. = 163.55						
Miles Willing to Travel						
Female	41.55	68.90	2.67	0.000	-1.78	0.078
Male	64.84	112.56				
D.F. = 170.61						

Ho_2 of the subproblem stated that there are no relationships between the geographic location, regardless of total money spent for the trip, cash willing to pay, and miles willing to travel of the participant. A Student T test with a significance level of a=.05 computed the scores of

Oklahomans' and Iowans' responses to the total money spent on their trip. The two-tailed probability level for this test resulted in a p=0.007. This computation accepted the hypothesis that there were significant differences between the total money spent on the trip and the geographic locations sampled. The outcome of the probability level (0.007) indicated that Iowans were spending more money for their trip than were Oklahomans.

A Student T test again computed the responses of Oklahomans and Iowans and their responses to cash willing to pay above the total cost of their trip, with a significance level set at a=.05. A separate variance probability level of 0.759 established that this hypothesis could not be rejected. Apparently, Oklahomans and Iowans were willing to pay approximately the same amount of cash above the total cost of their trip (consumer surplus) for the experience the activity or natural setting provided on the trip.

The responses of Iowans and Oklahomans to the miles willing to travel above the total miles of the trip for the same satisfaction of the trip was computed with a Student T test set at a significance level of a=.05. The null hypothesis could not be rejected because the separate variance probability factor was p=0.216. A two-tailed F value probability (p=0.000) did indicate that Oklahomans' variability was greater for willing to travel more miles for the experience that the activity or natural setting provided on the trip than was Iowans'. This test was not as powerful as the variance probability value p=0.216. All computations for the Ho_2 with the appropriate probability levels are presented in Table X.

Ho_3 of the subproblems stated that there are no relationships between which provided the most satisfaction to the participant, regardless

of total money spent for the trip, cash willing to pay, and miles willing to travel.

TABLE X

T-TEST ANALYSIS OF GEOGRAPHIC LOCATION REGARDLESS OF TOTAL MONEY SPENT, CASH WILLING TO PAY, AND MILES WILLING TO TRAVEL

Variable	Mean	Standard Deviation	F Value	p Value	T Value	p Value
Money Spent						
Oklahoma	86.990	161.222	1.81	0.004	-2.73	0.007
Iowa	160.590	216.683				
D.F. = 182.90						
Cash Willing to Pay						
Oklahoma	24.300	49.788	1.20	0.368	0.31	0.759
Iowa	22.030	54.516				
D.F. = 196.39						
Miles Willing to Travel						
Oklahoma	61.820	115.888	3.08	0.000	1.24	0.216
Iowa	45.260	66.052				
D.F. = 157.18						

Table XI represents all the Student T test computations with the appropriate probability levels for Ho_3. A significance level of a=.05 was set for the Student T computation for all responses of sampled

individuals' perceptions of which provided them the most satisfaction on the site; that is, the outdoor recreational activity or the natural setting, and the total money spent for the trip, cash willing to pay, and miles willing to travel of the participant. The Student T probability level for separate variance computed to be p=.468 for the total money spent and which provided the most satisfaction variables. This subproblem null hypothesis could not be rejected. This outcome indicated that there were no significant differences between Oklahomans' or Iowan's total amount of money spent for the trip, and which provided the most satisfaction on the trip. A significance level of a=.05 was set for a Student T test that computed the scores for which provided the most satisfaction on the trip and the cash willing to pay above the total cost of the trip. This null hypothesis could not be rejected with a probability level of p=0.887. Apparently, there were no significant differences between the amount respondents would be willing to pay over the total cost of the trip for the same experience that the recreational activity or the natural setting provided on the trip.

A separate variance probability level of p=0.733 could not reject the null hypothesis of the Student T computation (a=.05) for the data of responses that determined the miles sampled individuals would be willing to travel above the total miles of their trip for the experience that the recreational activity or the natural setting provided on the trip. The computation for the probability of the F value was 0.000 for this hypothesis, and a significance level of a=.05 would reject the hypothesis. This result indicated that individuals showed a greater range to travel further distances for the outdoor recreation activity and not for the natural setting.

TABLE XI

T-TEST ANALYSIS OF WHICH PROVIDED THE MOST SATISFACTION REGARDLESS OF TOTAL MONEY SPENT, CASH WILLING TO PAY, AND MILES WILLING TO TRAVEL

Variable	Mean	Standard Deviation	F Value	p Value	T Value	p Value
Money Spent						
Recreation Activity	115.669	181.167	1.38	0.118	-0.73	0.468
Natural Setting	136.461	212.464				
D.F. = 173.92						
Cash Willing to Pay						
Recreation Activity	23.188	55.331	1.32	0.180	0.14	0.887
Natural Setting	22.134	48.163				
D.F. = 192.74						
Miles Willing to Travel						
Recreation Activity	52.245	110.436	2.23	0.000	-0.34	0.733
Natural Setting	56.786	73.946				
D.F. = 184.35						

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to discover how valuable our scenic beauty and wildlife are to the general public. It was the intent of this research to establish an economic base for the valuation of the natural resource as perceived by the user. With this information, the natural resource could be spared from development upon consideration of alternate economic value. The problem was more precisely clarified in the expressions of null hypotheses founded upon the following questions:

1. Are there relationships between the participants' incomes and the marginal costs of the trip?

2. Are there relationships between the participants' incomes and the cash the participants were willing to pay above the total cost of the trip to have the same experience that the activity or natural setting provided on the trip?

3. Are there relationships between the participants' incomes and the miles the participants were willing to travel above the total miles of the trip to have the same experience that the activity or natural setting provided on the trip?

4. Are there relationships between the participants' incomes and time they were willing to volunteer to assist the participant to accurately evaluate the satisfaction that was provided on the trip?

5. Are there relationships between the participants' incomes and the cash they were willing to pay to remove any inconvenience experienced on the trip?

Other questions were based on subproblem null hypotheses and are as follows:

1. Are there relationships between gender of the natural resource user, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants?

2. Are there relationships between geographic location, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants?

3. Are there relationships between which provided the most satisfaction for the participants on the trip, the main outdoor recreation activity or the natural setting, regardless of total money spent on the trip, cash willing to pay, and miles willing to travel by the participants?

The natural resource could be spared from alternate development if positive answers were analyzed to these questions. This research effort could also be beneficial for the deterrence of the development of natural habitats if the results were questionable. The draining of wetlands, development of fragile habitats, construction of hotels and motels in areas of scenic beauty, and the changing of river courses by man are only a few examples that continue to depreciate the quality of life of humans when pursuing an outdoor leisure experience. An opposite view would be to satisfy man's quality of life by providing all the necessary amenities that are provided in cities in natural resource areas. Burch (1969) addressed the above dichotomy with his compensatory hypothesis: "The compensatory hypothesis suggests that whenever the individual is given

the opportunity to avoid his regulary routine, he will pick a directly opposite activity" (p. 132). If Burch's assumption is true, it would be necessary to preserve areas that had the opposite affect of intercity life and activities. A demand for this type of research should exist to determine what needs are placed on natural resource areas and how valuable they are to the general public.

To ascertain the economic value of the natural resource, a questionnaire was designed to gather information on variables believed necessary to validate the objectives of the research. An inferential statistical test was computed to conclude if significant differences existed between the sampled participants' incomes and the following: (1) marginal cost of the trip, (2) cash the participants were willing to pay above the total cost of the trip to have the same experience that the activity or the natural setting provided on the trip, (3) miles the participants were willing to travel above the total miles of the trip to have the same experience the activity or natural setting provided on the trip, (4) time the participants were willing to volunteer, and (5) cash the participants were willing to pay to remove any inconveniences from the trip.

The research instrument also gathered information to determine if significant differences occurred between gender, geographic location, and which provided the most satisfaction to the respondent, regardless of the total money spent on the trip, cash willing to pay, and miles willing to travel of the participants. These variables were analyzed by computing a T test on the available data.

Findings

The outcome of the statistical analyses produced the ensuing results associated with the problem statements:

1. There were no significant differences between incomes of the participants and marginal cost of the trip. The grand mean of all sampled respondents' marginal costs of the trip was $4.88.

2. There were no significant differences between incomes of the participants and cash the respondents were willing to pay above the total cost of the trip. The grand mean for all sampled respondents' cash willing to pay for the same experience the activity or natural setting provided on the trip was $20.15 above their total cost of the trip.

3. There were no significant differences between the incomes of the participants and the miles the respondent was willing to travel above the total miles of their trip. The grand mean of miles willing to travel above the total was 55.99 miles.

4. There were no significant differences between the incomes of the participants and time willing to volunteer per month to assist the respondent in accurately evaluating the natural resource. The grand mean for hours willing to volunteer per month for those individuals that responded to this question was 2.26 hours.

5. There were no significant differences between the incomes of the participants and cash willing to pay to remove any inconveniences on the trip. The grand mean for all respondents' cash willing to pay to remove any inconveniences from the trip was $6.45.

The results of statistical analyses that pertained to the statements of the subproblems were as follows:

1. There were no significant relationships between gender, regardless of total money spent for the trip, cash willing to pay, and miles willing to travel of the participant. The same statistical analysis with less robustness did indicate that females were willing to pay more for the experience of the activity or natural setting provided on their trip

than were males, and males appeared to be willing to travel farther for the experience that the activity or natural setting provided them on the trip than were females.

2. A significant relationship did exist between the two geographic locations and the total money spent on the trip. Iowans were spending more money for the total cost of their trip than were Oklahomans.

3. There were no significant relationships between Oklahomans and Iowans, regardless of the cash respondents were willing to pay and the miles repsondents were willing to travel on the trip. The same statistical test with less robustness did indicate that Oklahomans were willing to travel more for the same experience that the activity or natural setting provided on the trip than were Iowans.

4. There were no significant relationships between the main activity or the natural setting providing satisfaction, regardless of total money spent for the trip, cash willing to pay, and miles willing to travel of the participants. The results of a test with less power indicated that sampled individuals would be willing to travel farther for the satisfaction provided by the main recreational activity and not the natural setting.

Other interesting outcomes were as follows:

1. Cash willing to pay had a low relationship, and miles willing to travel had a moderate relationship to the marginal cost of the trip. This suggested that sampled individuals did not have great difficulties in deriving a monetary figure for the evaluation of the natural setting or the main activity.

2. A significant relationship did exist between Iowans and Oklahomans about which provided them the most satisfaction. Iowans perceived

the natural setting as providing the most satisfaction, and Oklahomans perceived the main activity as providing the most satisfaction.

3. A relationship appeared to exist between the age and education of the respondent and their willingness to participate in active recreational pursuits.

4. Sun tanning and relaxation were the most significant demands for the Oklahoma resource, and a ranger-guided tour or activity was the most significant demand for the Iowa resource.

5. Forty-six percent of the sampled population did not experience any inconveniences on their trip, and the 29% that did respond to inconveniences on the trip selected inconveniences over which the manager of the resource had no control.

Conclusions

The following inferences and conclusions were drawn when the outcomes, parameters, limitations, and delimitations were taken into account:

1. The annual income brackets of sampled individuals did not relate to the average marginal cost of the trip, which equalled $4.00. This result implied that individuals from north central Oklahoma and northeastern Iowa incurred approximately the same cost to travel in a vehicle to and from an outdoor recreation area.

2. The annual income brackets of sampled respondents did not relate to the miles an individual was willing to travel above the total miles of their trip. The grand mean for miles willing to travel was 55.99 miles. It can be concluded that individuals from north central Oklahoma and northeastern Iowa would be willing to travel an additional 60 miles to experience the same satisfaction that the activity or natural setting

provided on their trip, regardless of their annual incomes. This outcome signified that the natural resource indeed has a greater economic value than the current market price of the area. A moderate relationship between marginal cost of the trip and miles willing to travel above the total miles of the trip substantiates that individuals were capable of responding to hypothetical cash willing to pay questions as though they were parting with actual dollars, and with accuracy. There was also a slight possibility that individuals from Oklahoma would travel farther for the satisfaction of the main outdoor activity than individuals from Iowa. The facility manager from Oklahoma should expect that individuals frequenting the natural resource gain more satisfaction from the activity rather than the natural setting.

3. The annual income brackets of sampled individuals did not relate to the cash a respondent was willing to pay above the total cost of the trip for the experience that the activity or natural setting provided on the trip. The grand mean for the cash willing to pay response was $20.15. Regardless of their annual income, individuals from Oklahoma and Iowa were willing to pay approximately the same amount for the satisfaction experienced on the trip above the total cost of the trip. This information allowed for the inference to be drawn that the outdoor recreation resource area does have economic value above the current market price. This signified that the development of natural habitats has more value than the market price for the land and could be spared from total destruction. A value of $4,579.54 per acre was calculated for Black Hawk Park in Iowa and indicated that this natural resource could be spared from development upon consideration of alternate economic value. There was a slight relationship suggesting that females were willing to pay

more for the experience of the activity or the natural setting provided on the trip.

4. The annual income brackets of individuals sampled in Oklahoma and Iowa did not relate to the time the respondent would volunteer per month to assist the subject in accurately evaluating the natural resource. The grand mean for time to volunteer was 2.26 hours per month. Facility managers should not expect individuals from north central Oklahoma and northeastern Iowa to volunteer much more than 2.26 hours per month, regardless of their annual incomes.

5. The amount of annual incomes of Iowans and Oklahomans did not relate to the cash respondents were willing to pay to remove any inconveniences from their trip. Neither sampled populations would pay much more than an average of $6.45 to remove any inconvenience. Respondents also indicated that there were no inconveniences experienced on the trip (46%), and 29% of the sample indicated that the inconveniences experienced on the trip could not be controlled by the resource managers. Administrators of both resource facilities are apparently managing the resource to the best of their abilities.

6. The gender of the sampled respondent did not affect the total amount of money spent on the trip, cash willing to pay, and miles willing to travel of the participant.

7. A relationship did exist between the sites in Oklahoma and Iowa, and total money spent on the trip. Both Oklahomans and Iowans were willing to pay approximately the same amount of cash above the total cost of the trip and travel the same distance above the total miles of the trip for the satisfaction of the activity or natural setting experienced on their trip. Individuals from Oklahoma and Iowa apparently had similar values for outdoor recreation natural resource areas.

8. The sampled population did not favor the main recreational activity or the natural setting as providing the most satisfaction on the trip, regardless of total money spent on the trip, cash willing to pay above total cost of the trip, and miles willing to travel above the total distance of the trip.

9. The consumer surplus for the natural resource was inelastic. The revenues from use of the natural resources will increase as the demand for the resource increases. Inelasticity for demand was predicted because the purpose of the research was not to determine how much an individual would be willing to pay to gain access to the outdoor recreation area, but what would the value of the experience of the trip in the natural resource be due to the satisfaction level.

10. Iowans perceived that the natural setting provided them with the most satisfaction; Oklahomans perceived the main activity as providing them with the most satisfaction. Individuals from Oklahoma participated in active water-based activities such as motor boating, water and jet skiing, and swimming. Iowans participated in activities that were more passive in character. Planners of the natural resource should consider this outcome and preserve scenic beauty for the more passive activities and should develop the nonscenic areas for highly active recreational pursuits.

11. A slight relationship existed between the ages and education of the respondents. As the ages and education of the sampled individuals increased, their willingness to relax and become passive decreased. Managers of these facilities cannot assume that the mature and educated users of the natural resource desire an area that does not provide some type of active leisure delivery plan.

In summary, all of the null hypotheses of the problems and subproblems in this research effort (except for the relationship between geographic locations and total money spent on the trip) could not be rejected. In reality, the only conclusion that could be drawn from this research is that individuals from Iowa spent more money on their trip than did individuals from Oklahoma. The fact that only one null hypotheses could be rejected has significance. The research instrument or questionnaire must be reliable and valid when the gender, location of two different regions of the midwestern United States, and the income of the respondents has no significant difference between the cash willing to pay, miles willing to travel above the total miles of the trip, cash willing to pay to remove any conveniences, time willing to volunteer, and which provided the most satisfaction on the trip (the main activity or the natural setting). All respondents of the questionnaire answered the questions within the limits of the computed analyzed statistical tests. It was significant that two separate regions of the United States perceived the natural resource similarly. The research effort also disclosed that the users of the natural resource could evaluate their experiences economically and did indicate that the outdoor natural resource area could be spared from development upon consideration of alternate economic value.

Recommendations

The following recommendations were generated upon the findings, parameters, limitations, and delimitations of the study:

1. A duplication of the research instrument and interviewing process should be simultaneously conducted in separate regions of the country during the same time, dates, and seasons, by several trained personnel in

order to achieve a preferable representation of the allocation of the resource.

2. A duplication of the research instrument and interviewing process should be conducted for one year to gain insight into the activities pursued during different times of the year and to what magnitude and range they are evaluated.

3. The survey process should interview random sampled subjects as they are exiting the natural resource area to attain a more accurate demand for the resource and attitudes of the facility user.

4. A duplication of the research instrument and interviewing process should be simultaneously conducted at two sites that have significant differences between natural beauty, development, and recreational opportunities to establish if significant differences do occur in distinct areas.

5. The survey sites should be randomly selected so that inferences could be drawn from the population utilizing natural areas within the region.

6. Play money should be exchanged between the interviewer and sampled respondents to emulate the total cost of the trip and the cash respondents would be willing to pay above that cost to determine that individuals are accurately evaluating the satisfaction they experienced on their trip. This strategy could help determine elasticity demand for the natural resource.

LITERATURE CITED

Arthur, L. M. 1979. The esthetic value of wildlife: Perceptions of the American public and sportsman. General Technical Report (No. RM-68), Rocky Mountain Forest and Range Experiment Station. USDA Forest Service, p. iii.

Becker, G. S. 1965. A theory of the allocation of time. Economic Journal, 75, pp. 493-517.

Blake, P. 1964. God's Own Junkyard: The Planned Deterioration of the American Landscape. New York: Holt, Rinehart, and Winston.

Brown, W. G.; Singh, A.; and Castle, E. M. 1964. An economic evaluation of the Oregon salmon and steelhead sport fishery. Agric. Exp. Station (Bulletin 78). Corvallis, Oregon: Oregon State University, p. 92.

Burch, W. R., Jr. 1969. The social circles of leisure: Competing explanations. Journal of Leisure Research, 1, pp. 125-147.

Burns, M. E. 1973. A note on the concept and measure of consumer's surplus. American Economic Review, 63, p. 337.

Burt, O. R. and Brewer, D. 1971. Estimation of net social benefits from outdoor recreation. Econometrica, 39(5), September, pp. 813-827.

Cesario, F. J. and Knetsch, J. L. 1970. The time bias in recreation benefit estimates. Water Resour. Res., 6, pp. 700-704.

Charbonneau, J. J. and Hay, M. J. 1978. Determinants and economic values of hunting and fishing. (Proceedings of the 43rd North American Wildlife Conference, Phoenix, Arizona, March 18-22, p. 391.)

Cicchetti, C. J. and Smith, K. V. 1973. Congestion, quality deterioration and optimal use: Wilderness recreation in the Spanish Peaks Primitive Area. Social Science Research, 2, March, p. 15.

Cicchetti, C. J., Fisher, A. C., and Smith, K. V. 1976. An econometric evaluation of a generalized consumer surplus measure: The Mineral King controversy. Econometrica, 44(6), November, pp. 1259-1276.

Cicchetti, C. J., Fisher, A. C., and Smith, K. V. 1973. An economic and econometric model for the valuation of environmental resources with an application to outdoor recreation at Mineral King. (Proceedings of the Annual Meeting of the American Economic Association, December 28-30, New York, New York,, p. 216.)

Clarke, J. M. 1979. The Life and Adventures of John Muir. San Diego: Word Shop.

Clawson, M. 1959. Methods of Measuring the Demand for the Value of Outdoor Recreation. Washington, D.C.: Resources for the Future.

Cocheba, D. J. and Langford, W. A. 1978. Wildlife valuation: The collective good aspect of hunting. Land Economics, 54(4), November, pp. 490-504.

Crocker, T. D. 1985. On the value of the condition of a forest stock. Land Economics, 61(3), August, pp. 255-254.

Daniel, T. C. and Zube, E. H. 1979. Assessment of esthetic resources. General Technical Report (No. RM-68), Rocky Mountain Forest and Range Experimental Station, USDA Forest Service, p. 3.

Environmental Impact Assessment of Lake Carl Blackwell. 1975. Stillwater, Oklahoma: Oklahoma State University, School of HPEL.

Evaluation of Public Willingness to Pay User Charges for Use of Outdoor Recreation Areas and Facilities. 1976. Washington, D.C.: Heritage Conservation and Recreation Service, U.S. Superintendent of Documents, p. 395.

Evans, B. 1983. Think globally. Audubon, 85(4), July, p. 122.

Everett, R. D. 1978. The monetary value of the recreational benefits of wildlife. Journal of Environmental Management, 8, p. 204.

Fisher, J. L. 1964. Some new directions. Resources for the future. Annual report, Baltimore: John Hopkins Press.

Gibbs, K. C. 1974. Economics and administration regulations of outdoor recreation use. (Proceedings of National Symposium on Outdoor Recreation Economics, New Orleans, Louisiana, November 11-13, p. 100.)

Guralnik, D. B. 1983. Webster's New World Dictionary. New York: Warner Books.

Haas, G. E.; Allen, D. J.; and Manfredo, M. J. 1979. Some dispersed recreation experiences and the resource settings in which they occur. General Technical Report (No. RM-68), Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, pp. 21-26.

Hammock, J. and Brown, G. M., Jr. 1974. Waterfowl and wetlands: Toward bioeconomic analysis. Baltimore: Johns Hopkins University Press (Resources for the Future, Inc.).

Hay, M. J. and McConnell, K. E. 1979. An analysis of participation in nonconsumptive wildlife recreation. Land Economics, 55(4), November, pp. 460-471.

Hotelling, H. 1949. An economic study of the monetary evaluation of recreation in the national parks. (Correspondence of U.S. Department of the Interior, National Park Service, June 18, 1947.)

Hyde, W. F.; Dickerman, A.; and Stone, D. 1982. Development versus preservation in the Snake River Birds of Prey Conservation Area. American Journal of Agriculture Economics, November, p. 756.

Jensen, C. R. 1985. Outdoor Recreation in America. Minneapolis, Minnesota: Burgess.

Johnson, L. B. 1965. Natural beauty. (Message from the President of the United States.) Congressional Record, 89th Congress, 1st session, 111, pt. 2 (February 8).

Kaplan, S. 1979. Concerning the power of content-identifying methodologies. General Technical Report (No. RM-68), Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, p. 6.

King, D. A. 1979. User-based assessments of the value of fish and wildlife resources. General Technical Report (No. RM-68), Rocky Mountain Forest and Range Experiment Station, USDA Forest Service.

King, D. A. and Richards, M. T. 1977. Determinants of choice in outdoor recreation: Avenues in application of economics. General Technical Report (WO-2), USDA Forest Service, pp. 91-97.

Knetsch, J. L. 1974. Outdoor recreation and water resource planning. Water Res. Mono. (3), American Geophys. Union, Washington, D.C., p. 16.

Leopold, A. 1949. A Sand County Almanac and Sketches Here and There. New York: Oxford University Press.

Loomis, J. B.; Peterson, G.; and Sorg, C. 1984. A Field Guide to Wildlife Economic Analyses. Washington, D.C.: American Wildlife and Nature Resources.

Lundgren, A. L. 1973. Economic bases for allocating resources in outdoor recreation. General Technical Report (NC-9), North Central Forest Experiment Station, St. Paul, Minnesota.

Marshall, R. 1930. The problem of the wilderness. Scientific Monthly, xxx.

Martin, W. E. and Gum, R. L. 1974. Using economic demand functions for rural outdoor recreation. Experimental Station Tech. (Bulletin 211), University of Arizona, p. 74.

McConnell, K. E. 1977. Congestion and willingness to pay: A study of beach use. Land Economics, 53(2), May, pp. 185-195.

Melham, T. 1976. John Muir's Wild America. Washington, D.C.: National Geographic Society.

Menzel, M. 1973. History of our county parks. (Unpub. handbook of Black Hawk County Parks, Black Hawk Conservation Board, Cedar Falls, Iowa, p. 3).

Muir, J. 1901. Our National Parks. Boston: Houghton.

Nash, R. 1968. The American Environment: Readings in the History of Conservation. Menlo Park, California: Addison-Wesley.

Norton, G. 1970. Public outdoor recreation and resource allocation: A welfare approach. Land Economics, 46, p. 416.

O'Connell, P. F. 1977. Economic evaluation of non-market goods and services. General Technical Report (No. WO-2), USDA Forest Service, pp. 82-90.

Payne, B. R. and DeGraaf, R. M. 1975. Economic values and recreational trends associated with human enjoyment of nongame birds. (Symposium of Forest and Range Habitats for Nongame Birds, Tucson, Arizona, May 6-9, pp. 6-10.)

Pearse, P. H. 1968. A new approach to the evaluation of non-priced recreational resources. Land Economics, 44, p. 87.

Raphael, N. C. and Jaworski, E. 1979. Economic value of fish, wildlife, and recreation in Michigan's coastal wetlands. Coastal Zone Management Journal, 5(3), p. 180.

Sandrey, R. A.; Buccola, S. T.; and Brown, W. G. 1983. Pricing policies for antlerless elk hunting permits. Land Economics, 59(4), November, pp. 432-443.

Shaw, W. W. 1979. Current research on esthetic values of wildlife. General Technical Report (No. RM-68), Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, p. 70.

Silberberg, E. 1972. Duality and the many consumer's surpluses. American Economic Review, 62, pp. 942-952.

Steinhart, P. 1983. The edge gets thinner. Audubon, 85(6), November, p. 94.

Stevens. B. 1939. Thoreau, Report of the Universe. New York: John Day.

Van Doran, C. S. 1984. Statistics on Outdoor Recreation. Washington, D.C.: Resources for the Future.

Walsh, R. G.; Loomis, J. B.; and Gillman, R. A. 1984. Valuing option, existence, and bequest demands for wilderness. Land Economics, 60(1), February, p. 14.

Warde, W. D. 1984. Sample survey methods. (Unpub. textbook, Oklahoma State University, Stillwater, Oklahoma.)

Wennergren, B. E. and Johnston, W. E. 1974. Economic concepts relevant to the study of outdoor recreation. (Proceedings of National Symposium on Outdoor Recreation Economics, New Orleans, Louisiana, November 11-13, pp. 5-6.)

Wetzstein, M. E. 1982. An economic evaluation of a multi-area recreation system. Southern Journal of Agricultural Economics, 2, December, p. 51.

APPENDIXES

APPENDIX A

RESPONDENT SELECTION TABLE

RESPONDENT SELECTION TABLE

	Size of Group (persons)								
	2	3	4	5	6	7	8	9	10
First group	1	1	1	2	5	4	5	5	5
Second group	2	3	2	5	3	1	1	7	5
Third group	1	3	3	1	4	5	3	7	5
Fourth group	2	3	3	1	5	7	2	4	9
Fifth group	1	2	1	4	5	5	8	8	5
Sixth group	1	3	1	2	4	1	6	9	4
Seventh group	2	3	2	1	3	7	6	7	10
Eighth group	2	2	4	1	5	2	4	5	10
Ninth group	1	2	1	2	2	2	6	8	1
Tenth group	2	1	3	4	6	4	2	3	2

(For the eleventh group, go back to the "first group" in the table and start over.)

APPENDIX B

RESEARCH QUESTIONNAIRE

INTRODUCTION

This survey is being conducted to determine how valuable our scenic beauty and wildlife are to the general public. It is the intent of this research to establish an economic base for the valuation of the natural resource as perceived by the user. With this information the natural resource could be spared from development upon consideration of alternate economic value.

The results will be used to determine if wildlife and scenic beauty have any economic valuation to the general public. Considering the necessity to gather this information from users of the habitat. It is necessary for the respondents to this survey to be as objective and honest as possible.

Your participation in this survey is voluntary and confidential. Any personally identifiable information will be used with extreme care and will be destroyed within ninety days.

Q A. Are you recreating at this location.

0 Yes 0 No

DEMOGRAPHIC DATA

Gender 0 Female 0 Male

Age 0 less than 20 0 20 to 25 0 26 to 30

0 31 to 40 0 41 to 50 0 51 to 60

0 over 60

Education Completed

0 8th grade or less

0 9th through 11th grade

0 12th grade

0 13 through 15 years

0 16 years (college graduate)

0 17 or more years (graduate school)

Employment

0 Self-employed 0 Student

0 Employed full time 0 Homemaker

0 Employed part time 0 Not employed

0 Unemployed, laid off, on relief 0 Retired

TRIP PROFILE

A trip is defined as the distance traveled from the last overnight stop prior to visiting this area to the next overnight stop outside of this location.

1) First, what is your zip code for your permanent home?

Zip Code_____ State_____

1.1 Is your home located in a

0 Suburban Area 0 Rural Area 0 City

2) Did you start this trip from (city in first Q)?

0 Yes 0 No

3) How many miles did you travel to get here?

miles _____

4) What type vehicle are you traveling in?

0 Motorcycle 0 Car/truck/Van 0 Motor-Home 0 Trailor/5th wheel

5) When did you leave to begin this trip?

month day time

6) When did you first arrive at this location?

month day time

7) When will you be leaving at the end of your visit to (location)?

month day time

8) When you leave here, will you?

0 Return home or to your last overnight destination prior to this visit.

0 Return to some other location.

9) When will that be?

month day time

10) How many hours of traveling time did it take you to get here from home or last overnight destination prior to this visit?

Hours_____ 10.1 How many of those traveling hours were considered driving for pleasure? _____

11) How many miles is it to your next overnight stop outside of this location?

Miles_____

12) Have you ever been here before?

0 Yes 12.1) How many times in the past twelve months for outdoor recreation purposes? _____

0 No

DEMAND
TRIP TIME DIARY

I would like to ask you about some of the outdoor recreation activities in which you have participated or plan to participate during this visit to (location).

13) In which of these activities did you participate or plan to participate?

13.1) How many hours did you yourself participate in (activity)?

14) Were there any other outdoor recreation activities in which you particpated that are not on the list?

14.1) How many hours did you yourself participate in (activity)?

15) Of the activities you mentioned, which one was the main activity for visiting this area?

Activity _____

16) Approximately how much money will be spent on this trip (last overnight destination to next overnight destination)?

Total Amount_____ minus Trip Cost = Utitlity_____

INTERVENTION

17) For which of the following reasons did you choose (location) as a place to (main activity), rather than some other place?

0 Convenient location
0 Good facility
0 Wildlife
0 Scenic beauty
0 To see object or attraction
0 Wanted to try new area
0 Other areas to crowded
0 Escape Pressures

17.1) Any other reasons that are not on the list?

Reasons_____

17.2) Which was the main reason?

Reason_____

18) Was (location) your first choice when planning your trip?

0 Yes 0 No

18.1) If no, which of the following responses caused you to select (location) as an alternate site?

0 Distance in miles
0 Time alloted for trip
0 Group changed your mind
0 Finances
0 Wanted to try new area

19) Which inconveniences have occurred on this trip?

0 Area hard to locate
0 Finances
0 No Hot Water
0 Mosquitoes/Ticks
0 To noisy
0 Over crowded
0 Weather
0 Forgotten Items
0 Mechanical repairs
0 Illness
0 To many rules and regulations
0 Facility not well maintained
0 Facility did not meet my expectations
0 Conflict with other park visitor or user

0 Area to primitive for my satisfaction

0 Area to overly developed for my satisfaction

19.1) Are there any main inconveniences that have occurred on this trip that are not on the list?

0 Yes 0 No

19.2) Inconvenience not on list_____

19.3) What is the main inconvenience that has occurred on this trip?

Main inconvenience on this trip?_____

CONSUMER SURPLUS

20) Which provided the most satisfaction on this trip?

0 Outdoor Recreation Activity

0 The Natural Setting of This Location.

20.1) If the natural setting is selected, which of the following responses provided you with the most satisfaction?

0 Scenic Beauty 0 Wildlife

21) How much farther would you be willing to travel in miles to have the same experience that (Activity, Wildlife, Scenic Beauty) provided on this trip?

When answering the next few questions, you will have a choice of two types of payment that will help you accurately price the actual value the (Activity, wildlife, scenic beauty) provided.

The two types of payment are the amount of cash you are willing to pay and/or the amount of time you are willing to volunteer in one months time. The volunteer time can be donated anytime or place as long as it is directed towards assuring the availability of the area, and should parallel your skills, knowledge, and experience in your job or hobby. Example; I am a maintenance worker and gardener. I could use my volunteer time on site to help the maintenance crew and or design an entrance garden plot at home.

22) In your opinion, which method of payment will help you to accurately, price the actual value of (Activity, wildlife, scenic beauty)?

0 Cash 0 Volunteer time 0 Both

Remember, if you choose both methods of payment, the second choice of payment will add to your willingness to pay for your experience at this location.

23) How much cash would you be willing to pay above_____ to have the same experience that (Activity, wildlife, scenic beauty) provided on this trip?

Amount_____

24) How much time would you be willing to volunteer per month to have the same experience that (Activity, wildlife, scenic beauty) provided on this trip?

Amount/month_____

25) How much cash would you be willing to pay to remove the (inconvenience) on this trip?

Amount_____

26) Please refer to the activities card and tell me which of the income categories on the card best describes your annual family income last year before taxes.

0 A 0 B 0 C 0 D 0 E 0 F 0 G 0 H 0 I 0 J 0 K 0 L

I APPRECIATE YOUR HELP BY ANSWERING THESE QUESTIONS AND THANKYOU FOR YOUR TIME.

APPENDIX C

INFORMATION CARD

INFORMATION CARD

INTRODUCTION

THIS SURVEY IS BEING CONDUCTED TO DETERMINE HOW VALUABLE OUR SCENIC BEAUTY AND WILDLIFE ARE TO THE GENERAL PUBLIC. IT IS THE INTENT OF THIS RESEARCH TO ESTABLISH AN ECONOMIC BASE FOR THE VALUATION OF THE NATURAL RESOURCE AS PERCEIVED BY THE USER. WITH THIS INFORMATION THE NATURAL RESOURCE COULD BE SPARED FROM DEVELOPMENT UPON CONSIDERATION OF ALTERNATE ECONOMIC VALUE.

THE RESULTS WILL BE USED TO DETERMINE IF WILDLIFE AND SCENIC BEAUTY HAVE ANY ECONOMIC VALUATION TO THE GENERAL PUBLIC. CONSIDERING THE NECESSITY TO GATHER THIS INFORMATION FROM USERS OF THE HABITAT. IT IS NECESSARY FOR THE RESPONDENTS TO THIS SURVEY TO BE AS OBJECTIVE AND HONEST AS POSSIBLE.

YOUR PARTICIPATION IN THIS SURVEY IS VOLUNTARY AND CONFIDENTIAL. ANY PERSONALLY IDENTIFIABLE INFORMATION WILL BE USED WITH EXTREME CARE AND WILL BE DESTROYED WITHIN NINETY DAYS.

TRIP DEFINITION: THE DISTANCE TRAVELED FROM THE LAST OVERNIGHT STOP PRIOR TO VISITING THIS AREA TO THE NEXT OVERNIGHT STOP OUTSIDE OF THIS LOCATION.

ACTIVITIES LIST

14) IN WHICH OF THESE ACTIVITIES DID YOU PARTICIPATE OR PLAN TO PARTICIPATE DURING THIS VISIT TO THIS LOCATION?

0 CAMPING (MOTOR HOME, TENT, TRAILER)	0 BACKPACKING
0 CANOEING	0 DAY HIKING
0 MOTOR BOATING	0 WALKING FOR PLEASURE
0 SAILING	0 RUNNING OR JOGGING
0 WATER SKIING	0 BICYCLING
0 JET SKIING	0 HORSEBACK RIDING
0 PICNICKING	0 SIGHTSEEING
0 PHOTOGRAPHY (NATURE) (OTHER)	0 DRIVING FOR PLEASURE
0 OBSERVATION OF NATURE (WILDLIFE) (NATURAL SETTING)	0 DRIVING VEHICLES OFF ROAD

0 ATTENDING RANGER GUIDED WALK OR ACTIVITY	0 SWIMMING OUTDOORS IN A LAKE, STREAM, RIVER
0 FISHING	0 SUNTANNING
0 HUNTING	0 RELAXING
0 PARTICIPATING IN OUTDOOR SPORTS OR GAMES	0 FAMILY GATHERING

INTERVENTION

18) FOR WHICH OF THE FOLLOWING REASONS DID YOU CHOOSE THIS LOCATION AS A PLACE TO PARTICIPATE IN MAIN ACTIVITY, RATHER THAN SOME OTHER PLACE.

0 CONVENIENT LOCATION	0 TO SEE OBJECT OR ATTRACTION
0 GOOD FACILITY	0 WANTED TO TRY NEW AREA
0 WILDLIFE OBSERVSATION	0 OTHER AREAS TO CROWDED
0 SCENIC BEAUTY	0 ESCAPE PRESSURES

19.1) WHICH OF THE FOLLOWING RESPONSES CAUSED YOU TO SELECT THIS LOCATION AS AN ALTERNATE SITE?

0 DISTANCE IN MILES

0 FINANCES

0 LIMITED TIME FOR TRIP OF CHOICE

0 WANTED TO TRY NEW AREA

0 TRAVELING COMPANIONS CHANGED YOUR MIND

20) WHICH INCONVENIENCES HAVE OCCURRED ON THIS TRIP?

0AREA HARD TO LOCATE	0 WEATHER
0 FINANCES	0 FORGOTTEN ITEMS
0 MOSQUITOES/TICKS	0 TO NOISY
0 MECHANICAL REPAIRS	0 OVERCROWDED
0 TO MANY RULES AND REGULATIONS	0 NO HOT WATER
0 FACILITY NOT WELL MAINTAINED	0 ILLNESS

0 FACILITY DID NOT MEET MY EXPECTATIONS

0 CONFLICT WITH OTHER PARK VISITOR(S) OR USERS.

0 TOO PRIMITIVE FOR MY SATISFACTION

0 TO OVERLY DEVELOPED FOR MY SATISFACTION

26) WHAT WAS YOUR ANNUAL FAMILY INCOME LAST YEAR BEFORE TAXES?

0 LESS THAN $5,000

0 $5,000 TO $9,999

0 $10,000 TO $14,999

0 $15,000 TO $19,999

0 $20,000 TO $24,999

0 $25,000 TO $29,999

0 $30,000 TO $34,999

0 $35,000 TO $39,999

0 $40,000 TO $44,999

0 $45,000 TO $49,000

0 $50,000 TO $74,999

0 $75,000 AND ABOVE

APPENDIX D

RESEARCH QUESTIONNAIRE CODE SHEET

SAMPLE NUMBER_____ LOCAL_____ DATE_____

DEMOGRAPHIC

GENDER 1 FEMALE 2 MALE

AGE 1 LESS THAN 20 2 20/25 3 26/30 4 31/40

5 41/50 6 51/60 7 OVER 60

EDUCATION 1 8/LESS 2 9/11 3 12 4 13/15

5 16 6 17/MORE

EMPLOYMENT 1 SELF 2 FULL 3 PART TIME 4 UNEMP.

5 STUDENT 6 HOMEMAKER 7 NOT EMP 8 RETIRED

1. PERMANT HOME ZIP_____ STATE_____

1.1 HOME LOCATED 1 SUB 2 RURAL 3 CITY

2. DID YOU START THIS TRIP FROM 1 YES 2 NO

3. MILES TRAVELED TO GET HERE MILES_____

4. TYPE VEHICLE 1 MOTORCYCLE(MPG_____) 2 CAR (MPG_____)

3 MOTOR HOME(MPG_____) 4 TRAILER(MPG_____)

5. WHEN LEAVE MONTH_____ DAY_____ TIME_____

6. WHEN FIRST ARRIVE _____ _____ _____

7. WHEN LEAVE LOCATION _____ _____ _____

8. WHEN YOU LEAVE 1 RETURN HOME 2 RETURN SOME OTHER PLACE

9. WHEN WILL THAT BE _____ _____ _____

10. HOURS OF TRAVELING TIME HOURS_____

11. MILES TO NEXT STOP. _____ COST GAL. _____

12. HAVE YOU EVER BEEN HERE BEFORE 1 YES 12.1 TIMES_____
2 NO

13 & 13.1 ACTIVITIES PARTICIPATED IN AND HOURS FOR EACH.

14. & 14.1 ACTIVITIES NOT ON THE LIST_____

15. MAIN ACTIVITY_____

16. MONEY SPENT ON TRIP TOTAL AMOUNT _____

17. REASON CHOOSE LOCATION _____ _____ _____ _____

17.1 OTHER REASONS NOT ON THE LIST_____

17.2 WHICH MAIN REASON _____

18. WAS LOCATION FIRST CHOICE 1 YES 2 NO

18.1 SELECT AS AN ALTERNATE SIGHT _____ ____ ____ _____

19. INCONVENIENCES ON TRIP. _____ _____ _____ _____ _____

_____ _____ _____ _____ _____

19.1 MAIN INCONVENIENCES NOT ON THE LIST 1 YES 2 NO

19.2 INCON. THAT WERE NOT ON LIST_____

19.3 MAIN INCONV. ON TRIP_____

20. PROVIDE THE MOST SATISFACTION 1 OUTDOOR 2 SETTING

20.1 IF NAT. 1 SCENIC BEAUTY 2 WILDLIFE

21. HOW MUCH FARTHER WILLING TO TRAVEL _____

22. WHICH METHOD

23. CASH WILLING TO PAY ABOVE TRIP COST _____

24. WILLING TO VOLUNTEER

25. CASH WILLING TO PAY TO REMOVE INCONV._____

26. ANNUAL FAMILY INCOME LAST YEAR BEFORE TAXES

APPENDIX E

CROSSTABULATION OF GEOGRAPHIC LOCATION BY MAIN ACTIVITY

SITE	COUNT / ROW PCT / COL PCT	MNACT Camping 1	Canoeing 2	Motor Boating 3	Sailing 4	Water Skiing 5	Jet Skiing 6	Picnicking 7	Observation of Nature 9	Ranger Activity	Fishing 11	ROW TOTAL
OKLA	1	11 11.6 73.3	1 1.1 100.0	2 2.1 100.0	1 1.1 100.0	9 9.5 100.0	4 4.2 100.0	1 1.1 100.0			4 4.2 44.4	95 75.4
IOWA	2	4 12.9 26.7							1 3.2 100.0	13 41.9 100.0	5 16.1 55.6	31 24.6
(CONTINUED)	COLUMN TOTAL	15 11.9	1 .8	2 1.6	1 .8	9 7.1	4 3.2	1 .8	1 .8	13 10.3	9 7.1	126 100.0

SITE	COUNT / ROW PCT / COL PCT	MNACT Walking 16	Bicycling 18	Driving Pleasure	Swimming 23	Sun Tanning 4	Relaxing 25	Family Gathering	ROW TOTAL
OKLA	1	1 1.1 50.0			12 12.6 100.0	23 24.2 100.0	18 18.9 94.7	8 8.4 88.9	95 75.4
IOWA	2	1 3.2 50.0	6 12.9 100.0	1 3.2 100.0			1 3.2 5.3	1 3.2 11.1	31 24.6
	COLUMN TOTAL	2 1.6	6 3.2	1 .8	12 9.5	23 18.3	19 15.1	9 7.1	126 100.0

CHI-SQUARE	D.F.	SIGNIFICANCE	MIN E.F.	CELLS WITH E.F.< 5
85.61289	16	0.0000	0.246	25 OF 34 (73.5%)

APPENDIX F

CROSSTABULATION OF RECREATION ACTIVITY BY AGE, EDUCATION, AND EMPLOYMENT

AGE

ACTIVITY		COUNT / ROW PCT / COL PCT	1 LESS THAN 20	2 20 TO 25	3 26 TO 30	4 31 TO 40	5 41 TO 50	6 51 TO 60	7 OVER 60	ROW TOTAL
CAMPING	1		0	13	11	25	12	6	9	76
			0.0	17.1	14.5	32.9	15.8	7.9	11.8	38.8
			0.0	26.0	29.7	47.2	52.2	46.2	81.8	
CANOEING	2		0	1	2	1	1	0	0	5
			0.0	20.0	40.0	20.0	20.0	0.0	0.0	2.6
			0.0	2.0	5.4	1.9	4.3	0.0	0.0	
MOTOR BOATING	3		0	9	8	9	7	1	1	35
			0.0	25.7	22.9	25.7	20.0	2.9	2.9	17.9
			0.0	18.0	21.6	17.0	30.4	7.7	9.1	
SAILING	4		0	0	1	0	0	0	2	3
			0.0	0.0	33.3	0.0	0.0	0.0	66.7	1.5
			0.0	0.0	2.7	0.0	0.0	0.0	18.2	
WATER SKIING	5		0	9	6	9	5	0	0	29
			0.0	31.0	20.7	31.0	17.2	0.0	0.0	14.8
			0.0	18.0	16.2	17.0	21.7	0.0	0.0	
JET SKIING	6		2	2	1	0	0	0	0	5
			40.0	40.0	20.0	0.0	0.0	0.0	0.0	2.6
			22.2	4.0	2.7	0.0	0.0	0.0	0.0	
PICNICKING	7		2	17	15	22	9	5	6	76
			2.6	22.4	19.7	28.9	11.8	6.6	7.9	38.8
			22.2	34.0	40.5	41.5	39.1	38.5	54.5	
PHOTOGRAPHY	8		0	1	1	5	0	0	1	8
			0.0	12.5	12.5	62.5	0.0	0.0	12.5	4.1
			0.0	2.0	2.7	9.4	0.0	0.0	9.1	
	COLUMN TOTAL		9	50	37	53	23	13	11	196
			4.6	25.5	18.9	27.0	11.7	6.6	5.6	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

ACTIVITY	COUNT / ROW PCT / COL PCT	AGE LESS THA 20 (1)	20 TO 25 (2)	26 TO 30 (3)	31 TO 40 (4)	41 TO 50 (5)	51 TO 60 (6)	OVER 60 (7)	ROW TOTAL
OBSERVATION OF NATURE (9)	COUNT	2	8	9	24	13	6	4	66
	ROW PCT	3.0	12.1	13.6	36.4	19.7	9.1	6.1	33.7
	COL PCT	22.2	16.0	24.3	45.3	56.5	46.2	36.4	
RANGER ACTIVITY (10)	COUNT	0	1	1	7	2	0	0	11
	ROW PCT	0.0	9.1	9.1	63.6	18.2	0.0	0.0	5.6
	COL PCT	0.0	2.0	2.7	13.2	8.7	0.0	0.0	
FISHING (11)	COUNT	0	10	7	11	5	5	2	40
	ROW PCT	0.0	25.0	17.5	27.5	12.5	12.5	5.0	20.4
	COL PCT	0.0	20.0	18.9	20.8	21.7	38.5	18.2	
HUNTING (12)	COUNT	1	2	0	0	0	0	0	3
	ROW PCT	33.3	66.7	0.0	0.0	0.0	0.0	0.0	1.5
	COL PCT	11.1	4.0	0.0	0.0	0.0	0.0	0.0	
SPORTS & GAMES (13)	COUNT	0	7	9	9	1	3	1	30
	ROW PCT	0.0	23.3	30.0	30.0	3.3	10.0	3.3	15.3
	COL PCT	0.0	14.0	24.3	17.0	4.3	23.1	9.1	
DAY HIKING (15)	COUNT	0	0	2	5	3	0	0	10
	ROW PCT	0.0	0.0	20.0	50.0	30.0	0.0	0.0	5.1
	COL PCT	0.0	0.0	5.4	9.4	13.0	0.0	0.0	
WALKING (16)	COUNT	0	10	8	23	10	5	4	60
	ROW PCT	0.0	16.7	13.3	38.3	16.7	8.3	6.7	30.6
	COL PCT	0.0	20.0	21.6	43.4	43.5	38.5	36.4	
JOGGING (17)	COUNT	0	2	2	2	1	0	0	7
	ROW PCT	0.0	28.6	28.6	28.6	14.3	0.0	0.0	3.6
	COL PCT	0.0	4.0	5.4	3.8	4.3	0.0	0.0	
COLUMN TOTAL		9	50	37	53	23	13	11	196
		4.6	25.5	18.9	27.0	11.7	6.6	5.6	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

ACTIVITY	COUNT / ROW PCT / COL PCT	AGE: LESS THAN 20 (1)	20 TO 25 (2)	26 TO 30 (3)	31 TO 40 (4)	41 TO 50 (5)	51 TO 60 (6)	OVER 60 (7)	ROW TOTAL
BICYCLING	18	1	6	3	8	6	2	2	28
		3.6	21.4	10.7	28.6	21.4	7.1	7.1	14.3
		11.1	12.0	8.1	15.1	26.1	15.4	18.2	
SIGHTSEEING	20	2	8	8	14	7	5	1	45
		4.4	17.8	17.8	31.1	15.6	11.1	2.2	23.0
		22.2	16.0	21.5	26.4	30.4	38.5	9.1	
DRIVING FOR PLEASURE	21	0	9	3	7	0	4	2	25
		0.0	36.0	12.0	28.0	0.0	16.0	8.0	12.8
		0.0	18.0	8.1	13.2	0.0	30.8	18.2	
SWIMMING	23	5	27	19	17	3	1	1	73
		6.8	37.0	26.0	23.3	4.1	1.4	1.4	37.2
		55.6	54.0	51.4	32.1	13.0	7.7	9.1	
SUN-TANNING	24	8	28	19	11	6	1	1	74
		10.8	37.8	25.7	14.9	8.1	1.4	1.4	37.8
		88.9	56.0	51.4	20.8	26.1	7.7	9.1	
RELAXING	25	9	38	24	44	17	11	7	150
		6.0	25.3	16.0	29.3	11.3	7.3	4.7	76.5
		100.0	76.0	64.9	83.0	73.9	84.6	63.6	
FAMILY GATHERING	26	0	11	7	25	6	6	4	59
		0.0	18.6	11.9	42.4	10.2	10.2	6.8	30.1
		0.0	22.0	18.9	47.2	26.1	46.2	36.4	
COLUMN TOTAL		9	50	37	53	23	13	11	196
		4.6	25.5	18.9	27.0	11.7	6.6	5.6	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

196 VALID CASES 4 MISSING CASES

EDUCAT

ACTIVITY		8 GRADE OR LESS (1)	9 THRU 11 (2)	12 GRADE (3)	13 THRU 15 (4)	16 YEARS (5)	17 OR MORE (6)	ROW TOTAL
CAMPING	1	5	5	35	23	6	2	76
		6.6	6.6	46.1	30.3	7.9	2.6	38.6
		100.0	62.5	53.8	35.4	17.1	10.5	
CANOEING	2	0	0	1	0	3	1	5
		0.0	0.0	20.0	0.0	60.0	20.0	2.5
		0.0	0.0	1.5	0.0	8.6	5.3	
MOTOR BOATING	3	1	0	11	16	4	3	35
		2.9	0.0	31.4	45.7	11.4	8.6	17.8
		20.0	0.0	16.9	24.6	11.4	15.8	
SAILING	4	0	0	0	2	0	1	3
		0.0	0.0	0.0	66.7	0.0	33.3	1.5
		0.0	0.0	0.0	3.1	0.0	5.3	
WATER SKIING	5	1	0	7	13	6	2	29
		3.4	0.0	24.1	44.8	20.7	6.9	14.7
		20.0	0.0	10.8	20.0	17.1	10.5	
JET SKIING	6	0	0	3	2	0	0	5
		0.0	0.0	60.0	40.0	0.0	0.0	2.5
		0.0	0.0	4.6	3.1	0.0	0.0	
PICNICKING	7	4	7	28	22	11	5	77
		5.2	9.1	36.4	28.6	14.3	6.5	39.1
		80.0	87.5	43.1	33.8	31.4	26.3	
PHOTOGRAPHY	8	0	0	3	2	1	2	8
		0.0	0.0	37.5	25.0	12.5	25.0	4.1
		0.0	0.0	4.6	3.1	2.9	10.5	
COLUMN TOTAL		5	8	65	65	35	19	197
		2.5	4.1	33.0	33.0	17.8	9.6	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

EDUCAT

ACTIVITY	COUNT / ROW PCT / COL PCT	8 GRADE OR LESS (1)	9 THRU 11 (2)	12 GRADE (3)	13 THRU 15 (4)	16 YEARS (5)	17 OR MORE (6)	ROW TOTAL
OBSERVATION OF NATURE	9	1	1	24	19	11	10	66
		1.5	1.5	36.4	28.8	16.7	15.2	33.5
		20.0	12.5	36.9	29.2	31.4	52.6	
RANGER ACTIVITY	10	0	0	2	1	4	4	11
		0.0	0.0	18.2	9.1	36.4	36.4	5.6
		0.0	0.0	3.1	1.5	11.4	21.1	
FISHING	11	2	2	19	11	3	3	40
		5.0	5.0	47.5	27.5	7.5	7.5	20.3
		40.0	25.0	29.2	16.9	8.6	15.8	
HUNTING	12	0	0	1	2	0	0	3
		0.0	0.0	33.3	66.7	0.0	0.0	1.5
		0.0	0.0	1.5	3.1	0.0	0.0	
SPORTS & GAMES	13	1	1	14	10	3	1	30
		3.3	3.3	46.7	33.3	10.0	3.3	15.2
		20.0	12.5	21.5	15.4	8.6	5.3	
DAY HIKING	15	0	0	3	3	2	2	10
		0.0	0.0	30.0	30.0	20.0	20.0	5.1
		0.0	0.0	4.6	4.6	5.7	10.5	
WALKING	16	2	4	27	12	8	7	60
		3.3	6.7	45.0	20.0	13.3	11.7	30.5
		40.0	50.0	41.5	18.5	22.9	36.8	
JOGGING	17	0	0	0	2	4	1	7
		0.0	0.0	0.0	28.6	57.1	14.3	3.6
		0.0	0.0	0.0	3.1	11.4	5.3	
COLUMN TOTAL		5	8	65	65	35	19	197
		2.5	4.1	33.0	33.0	17.8	9.6	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

EDUCAT

ACTIVITY	COUNT / ROW PCT / COL PCT	1	2	3	4	5	6	ROW TOTAL
		8 GRADE OR LESS	9 THRU 11	12 GRADE	13 THRU 15	16 YEARS	17 OR MORE	
BICYCLING	18	0	0	8	8	8	4	28
		0.0	0.0	28.6	28.6	28.6	14.3	14.2
		0.0	0.0	12.3	12.3	22.9	21.1	
SIGHTSEEING	20	1	4	12	11	10	7	45
		2.2	8.9	26.7	24.4	22.2	15.6	22.8
		20.0	50.0	18.5	16.9	28.6	36.8	
DRIVING FOR PLEASURE	21	1	1	11	7	5	0	25
		4.0	4.0	44.0	28.0	20.0	0.0	12.7
		20.0	12.5	16.9	10.8	14.3	0.0	
SWIMMING	23	1	5	21	28	10	8	73
		1.4	6.8	28.8	38.4	13.7	11.0	37.1
		20.0	62.5	32.3	43.1	28.6	42.1	
SUN-TANNING	24	1	4	22	29	12	6	74
		1.4	5.4	29.7	39.2	16.2	8.1	37.6
		20.0	50.0	33.8	44.6	34.3	31.6	
RELAXING	25	4	8	53	48	25	13	151
		2.6	5.3	35.1	31.8	16.6	8.6	76.6
		80.0	100.0	81.5	73.8	71.4	68.4	
FAMILY GATHERING	26	3	4	21	18	9	4	59
		5.1	6.8	35.6	30.5	15.3	6.8	29.9
		60.0	50.0	32.3	27.7	25.7	21.1	
COLUMN TOTAL		5	8	65	65	35	19	197
		2.5	4.1	33.0	33.0	17.8	9.6	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

197 VALID CASES 3 MISSING CASES

ACTIVITY	COUNT / ROW PCT / COL PCT	EMPLYMT SELF (1)	FULLTIME (2)	PARTTIME (3)	UNEMP (4)	STUDENT (5)	HOMEMAKER (6)	NOT EMPLOYED (7)	RETIRED (8)	ROW TOTAL
CAMPING	1	6	41	6	2	2	8	4	6	75
		8.0	54.7	8.0	2.7	2.7	10.7	5.3	8.0	38.3
		46.2	41.8	37.5	33.3	6.3	47.1	100.0	60.0	
CANOEING	2	2	2	0	0	0	1	0	0	5
		40.0	40.0	0.0	0.0	0.0	20.0	0.0	0.0	2.6
		15.4	2.0	0.0	0.0	0.0	5.9	0.0	0.0	
MOTOR BOATING	3	5	23	1	0	2	0	1	2	34
		14.7	67.6	2.9	0.0	5.9	0.0	2.9	5.9	17.3
		38.5	23.5	6.3	0.0	6.3	0.0	25.0	20.0	
SAILING	4	1	2	0	0	0	0	0	0	3
		33.3	66.7	0.0	0.0	0.0	0.0	0.0	0.0	1.5
		7.7	2.0	0.0	0.0	0.0	0.0	0.0	0.0	
WATER SKIING	5	7	17	1	0	2	0	1	0	28
		25.0	60.7	3.6	0.0	7.1	0.0	3.6	0.0	14.3
		53.8	17.3	6.3	0.0	6.3	0.0	25.0	0.0	
JET SKIING	6	0	1	0	0	3	1	0	0	5
		0.0	20.0	0.0	0.0	60.0	20.0	0.0	0.0	2.6
		0.0	1.0	0.0	0.0	9.4	5.9	0.0	0.0	
PICNICKING	7	7	37	6	2	8	7	3	6	76
		9.2	48.7	7.9	2.6	10.5	9.2	3.9	7.9	38.8
		53.8	37.8	37.5	33.3	25.0	41.2	75.0	60.0	
PHOTOGRAPHY	8	3	2	0	1	0	2	0	0	8
		37.5	25.0	0.0	12.5	0.0	25.0	0.0	0.0	4.1
		23.1	2.0	0.0	16.7	0.0	11.8	0.0	0.0	
COLUMN TOTAL		13	98	15	6	32	17	4	10	196
		6.6	50.0	8.2	3.1	16.3	8.7	2.0	5.1	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

ACTIVITY	COUNT / ROW PCT / COL PCT	EMPLYMT ISELF (1)	FULLTIME (2)	PARTTIME (3)	UNEMP (4)	STUDENT (5)	HOMEMAKER (6)	NOT EMPL RETIRED (7)	RETIRED (8)	ROW TOTAL
OBSERVATION OF NATURE	9	5	33	8	2	8	6	0	4	66
		7.6	50.0	12.1	3.0	12.1	9.1	0.0	6.1	33.7
		38.5	33.7	50.0	33.3	25.0	35.3	0.0	40.0	
RANGER ACTIVITY	10	1	6	1	0	1	2	0	0	11
		9.1	54.5	9.1	0.0	9.1	18.2	0.0	0.0	5.6
		7.7	6.1	6.3	0.0	3.1	11.8	0.0	0.0	
FISHING	11	4	22	1	1	5	2	1	4	40
		10.0	55.0	2.5	2.5	12.5	5.0	2.5	10.0	20.4
		30.8	22.4	6.3	16.7	15.6	11.8	25.0	40.0	
HUNTING	12	0	0	1	0	2	0	0	0	3
		0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0	1.5
		0.0	0.0	6.3	0.0	6.3	0.0	0.0	0.0	
SPORTS & GAMES	13	2	15	3	1	4	3	1	1	30
		6.7	50.0	10.0	3.3	13.3	10.0	3.3	3.3	15.3
		15.4	15.3	18.8	16.7	12.5	17.6	25.0	10.0	
DAY HIKING	15	1	7	1	0	0	1	0	0	10
		10.0	70.0	10.0	0.0	0.0	10.0	0.0	0.0	5.1
		7.7	7.1	6.3	0.0	0.0	5.9	0.0	0.0	
WALKING	16	3	30	6	2	3	11	1	4	60
		5.0	50.0	10.0	3.3	5.0	18.3	1.7	6.7	30.6
		23.1	30.6	37.5	33.3	9.4	64.7	25.0	40.0	
JOGGING	17	0	4	1	0	1	1	0	0	7
		0.0	57.1	14.3	0.0	14.3	14.3	0.0	0.0	3.6
		0.0	4.1	6.3	0.0	3.1	5.9	0.0	0.0	
COLUMN TOTAL		13	98	16	6	32	17	4	10	196
		6.6	50.0	8.2	3.1	16.3	8.7	2.0	5.1	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

EMPLYMT

ACTIVITY	COUNT / ROW PCT / COL PCT	1 ISELF	2 FULLTIME	3 PARTTIME	4 UNEMP	5 STUDENT	6 HOMEMAKER	7 NOT EMPL	8 RETIRED	ROW TOTAL
18 BICYCLING		1	15	5	1	5	0	0	1	28
		3.6	53.6	17.9	3.6	17.9	0.0	0.0	3.6	14.3
		7.7	15.3	31.3	16.7	15.6	0.0	0.0	10.0	
20 SIGHTSEEING		4	17	5	2	9	5	1	2	45
		8.9	37.8	11.1	4.4	20.0	11.1	2.2	4.4	23.0
		30.8	17.3	31.3	33.3	28.1	29.4	25.0	20.0	
21 DRIVING FOR PLEASURE		1	9	3	1	5	3	0	2	24
		4.2	37.5	12.5	4.2	20.8	12.5	0.0	8.3	12.2
		7.7	9.2	18.8	16.7	15.6	17.6	0.0	20.0	
23 SWIMMING		6	37	3	2	14	6	3	1	72
		8.3	51.4	4.2	2.8	19.4	8.3	4.2	1.4	36.7
		46.2	37.8	18.8	33.3	43.8	35.3	75.0	10.0	
24 SUN-TANNING		1	38	4	3	20	4	2	1	73
		1.4	52.1	5.5	4.1	27.4	5.5	2.7	1.4	37.2
		7.7	38.8	25.0	50.0	62.5	23.5	50.0	10.0	
25 RELAXING		7	74	13	4	25	15	4	8	150
		4.7	49.3	8.7	2.7	16.7	10.0	2.7	5.3	76.5
		53.8	75.5	81.3	66.7	78.1	88.2	100.0	80.0	
26 FAMILY GATHERING		4	27	5	1	2	11	3	6	59
		6.8	45.8	8.5	1.7	3.4	18.6	5.1	10.2	30.1
		30.8	27.6	31.3	16.7	6.3	64.7	75.0	60.0	
COLUMN TOTAL		13	98	16	6	32	17	4	10	196
		6.6	50.0	8.2	3.1	16.3	8.7	2.0	5.1	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

196 VALID CASES 4 MISSING CASES

APPENDIX G

CROSSTABULATION OF MAIN RECREATION ACTIVITY BY WHICH PROVIDED THE MOST SATISFACTION

PRVIDSAT

ACTIVITY		COUNT / ROW PCT / COL PCT	OUT ACTIV 1	NAT SETTING 2	ROW TOTAL
CAMPING	1		39	35	74
			52.7	47.3	38.1
			37.1	39.3	
CANOEING	2		1	4	5
			20.0	80.0	2.5
			1.0	4.5	
MOTOR BOATING	3		25	9	34
			73.5	26.5	17.5
			23.8	10.1	
SAILING	4		3	0	3
			100.0	0.0	1.5
			2.9	0.0	
WATER SKIING	5		21	7	28
			75.0	25.0	14.4
			20.0	7.9	
JET SKIING	6		5	0	5
			100.0	0.0	2.6
			4.8	0.0	
PICNICKING	7		48	27	75
			64.0	36.0	38.7
			45.7	30.3	
PHOTOGRAPHY	8		6	2	8
			75.0	25.0	4.1
			5.7	2.2	
COLUMN TOTAL			105	89	194
			54.1	45.9	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

PRVIDSAT

ACTIVITY	COUNT / ROW PCT / COL PCT	IDUT ACTIV 1	NAT SETTING 2	ROW TOTAL
OBSERVATION OF NATURE	9	23 35.9 21.9	41 64.1 46.1	64 33.0
RANGER ACTIVITY	10	4 36.4 3.8	7 63.6 7.9	11 5.7
FISHING	11	20 51.3 19.0	19 48.7 21.3	39 20.1
HUNTING	12	2 66.7 1.9	1 33.3 1.1	3 1.5
SPORTS & GAMES	13	16 53.3 15.2	14 46.7 15.7	30 15.5
DAY HIKING	15	3 30.0 2.9	7 70.0 7.9	10 5.2
WALKING	16	21 35.6 20.0	38 64.4 42.7	59 30.4
JOGGING	17	4 57.1 3.8	3 42.9 3.4	7 3.6
COLUMN TOTAL		105 54.1	89 45.9	194 100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

(CONTINUED)

PRVIDSAT

ACTIVITY	COUNT / ROW PCT / COL PCT	IOUT ACTIV	WAT SETTING 2	ROW TOTAL
BICYCLING	18	17	11	28
		60.7	39.3	14.4
		16.2	12.4	
SIGHTSEEING	20	16	28	44
		36.4	63.6	22.7
		15.2	31.5	
DRIVING FOR PLEASURE	21	8	17	25
		32.0	68.0	12.9
		7.6	19.1	
SWIMMING	23	43	28	71
		60.6	39.4	36.6
		41.0	31.5	
SUN-TANNING	24	44	29	73
		60.3	39.7	37.6
		41.9	32.6	
RELAXING	25	75	73	148
		50.7	49.3	76.3
		71.4	82.0	
FAMILY GATHERING	26	27	31	58
		46.6	53.4	29.9
		25.7	34.8	
COLUMN TOTAL		105	89	194
		54.1	45.9	100.0

PERCENTS AND TOTALS BASED ON RESPONDENTS

194 VALID CASES 6 MISSING CASES

VITA

James Martin Reidy, III

Candidate for the Degree of

Doctor of Education

Thesis: ALLOCATION AND ECONOMIC ESTIMATION OF THE NATURAL RESOURCE IN NORTH CENTRAL OKLAHOMA AND NORTHEASTERN IOWA

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