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Economic Rent Values for Pheasant Hunting in Utah

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ECONOMIC RENT VALUES FOR

PHEASANT HUNTING IN UTAH

by

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Braulio Rodriguez V.

TABLE OF CONTENTS

LIST OF TABLES

Table | Page

Table | Page

LIST OF FIGURES

ABSTRACT

Economic Rent Values for Pheasant

Hunting in Utah

by

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A conceptual model relating recreation resource values to the concept of economic rent was developed. The model argues that recreation sites possess both quality and location characteristics which serve as rent producing agents. Sites of better quality extract economic rents relative to those of lesser quality while those located most advantageously to user origins earn location rents relative to those more distantly located. The economic rent values are expressed by the differential use costs and recreationist activity associated with individual site usage.

A methodological procedure was developed which generates estimates of total rent values for a given site. The procedure permits identification of rent values separately related to site location and quality.

Application of the model was made by estimating recreation values for pheasant hunting in Utah using 1966 data. These data were collected by mail survey from hunters following the 1966 hunting season. Approximately 1,025 questionnaires were used in the analysis.

The total rent value estimated from the model was approximately 5.8 million dollars. About 83 percent of the total was attributed to site quality and 17 percent to location. No attempt was made to analyze the variables related to quality. In only three counties, Juab, Millard, and Utah, were location values found to exceed those resulting from quality. Total rent values were highest for Weber, Cache, Box Elder and Davis counties.

(103 pages)

INTRODUCTION

The demand for outdoor recreation in the United States has been increasing as a result of increased population, higher per capita real income, more leisure time, and improvement in road systems across the country. According to projections made by Clawson (1959), by the year 2000, there will be twice the population relative to 1950, and people will be spending almost twice as much money as in 1950. In relation to the leisure time available, the average time worked per week has been decreasing steadily from around 70 hours in 1850 to 40 hours in 1950 and the future prospect is for shorter working days and weeks and longer and more widespread leisure time. By the year 2000, the average work week is predicted to be about 38 hours.

In post war years, the rate of use attendance in national forests, state parks and national parks has been increasing 8 to 10 percent per year. If this trend continues, it is predicted that by the year 2000, there will be 3.4 billion annual visits to the national forest system. It is estimated that about 5 to 8 percent of all family expenditures are for recreation and that each year about 4 to 5 billion dollars are spent for outdoor recreation activity. In 1900 the average traveler covered about 500 miles a year whereas today, the total is 5,000 miles. It is predicted that the average will be 9,000 miles per year by the year 2000, as a consequence of the accelerated improvement in the means of transportation as well as increase in availability of leisure time (Clawson, 1959).

These trends suggest a need for new and better ways to value resources as a means of establishing suitable criteria for public resource allocation policies. Somehow the benefits "recreationists" derive from public expenditures on sites and facilities must be related to the variable use costs to provide some proxy for market price.

The evaluation of benefits derived from recreation is a problem to the extent that use of recreational facilities is not rationed by entrance or other quid pro quo fees. In the public sector, recreation is often provided at a nominal cost so that the price mechanism does not provide a very meaningful guide to consumer preference and consumer willingness to pay. Thus, a satisfactory measure of social benefits (opportunity costs) is lacking. Yet, in the public sector, social benefits and social costs are relevant to investment decisions.

Most authors who are interested in recreation planning agree that the presence of intangibles (aesthetics) is not a critical obstacle to the evaluation of recreational benefits. The chief obstacle is that recreation is a public economic good which has not historically been subject to conventional market pricing.

For a number of years economists have attempted to devise a suitable system for attaching a value to the recreational use of resources. Most of these attempts have been centered on the demand point of view. For example, valuation techniques have been based on demand curve estimation and upon theoretical implications of demand analysis. Despite considerable progress, no definitive methods have been developed which allow us to measure the recreational values sought. Thus, there is a continuing need to refine and extend research efforts in this area. This need constitutes the justification for this thesis. Our aim is to extend our scientific knowledge of this important valuation area.

OBJECTIVES

The objectives of this thesis are:

1. To develop a conceptual model relating recreation resource values to the concept of economic rent.

2. To make empirical estimates of economic rent values for a selected recreation activity in Utah.

REVIEW OF LITERATURE
AND STATE OF CURRENT KNOWLEDGE

Recreation Literature

Possibly the first attempt to develop a methodology for evaluating recreation was made by Harold Hotelling (1949) in the form of a recommendation he gave to the National Park Service. He recommended, as the first step, identification of zones around a given park in terms of average cost of travel to the park. All groups within each concentric zone would have similar costs. Hotelling assumed that the cost of the most distant zone established the average group or visitor value at the site. This cost represents the gross benefit received for each visitor in the intra-marginal zones. The difference between individual travel costs and the benefit assumed to be received by every visitor is the consumer surplus for each visitor.

Trice and Wood (1958) made a significant study in connection with the proposed development of the Upper Feather River Basin in California. They suggest that primary benefits from recreation are personal and varied and are, therefore, not readily measurable in dollar terms and that this "fundamental tenet" is concurred in by virtually all who have given the problem careful consideration.

They also state that the method proposed to be useful should provide a value which has the following characteristics:

1. It is in terms of a standard unit of time and expressed in dollars.

2. It is representative of recreational enjoyment for which there is no expenditure by the recreationist and for which the state is not directly reimbursed.

3. It is separately derived independent of cost of providing recreational facilities.

4. It must consist of a single figure which applies to recreationists in the area being studied, as a group without regard to the form of recreation being enjoyed or to differences among individuals as to capacity to enjoy recreation benefit.

5. It must be peculiar to the area under consideration even though similar areas may have similar values.

6. It is reasonable in amount and subject to test based upon judgment value of informed people.

The authors emphasize that many so-called recreation expenditures are normal expenditures under slightly different circumstances; for example, food, clothing, etc., and that even those expenditures, over and above normal living cost, are not necessarily measures of recreational enjoyment, but are the prices paid for goods and services for which a market is established. They conclude by saying:

> Dollars spent in pursuit of recreation appear to be more significant as indicators of secondary benefits to this business community than as measures of primary recreational benefit. (Trice and Wood, 1958, p. 200)

The methodology developed by Trice and Wood in the Feather River Project was the same as that proposed by Hotelling in 1949 because they thought this procedure fulfilled the characteristics they considered necessary.

Clawson (1959) published his method for approximating a demand curve. He plotted the number of trips per 100,000 population from each origin to a selected park against the cost to reach the site. Clawson assumed entrance to the park was free and made the cost of visits variable. He designated variable use costs as the independent variable and number of visits the dependent variable.

According to Clawson, three assumptions underlie this demand curve estimation.

1. It is a static concept in that population, income, tastes, and means of travel remain unchanged.

2. The marginal value of money remains constant no matter how much of the product (recreation) an individual purchases.

3. Price alone is the limiting factor which determines the volume (number of visits).

Based on the observed variable cost-use relationship, Clawson derived a demand curve by varying the fee per visit and calculating the impact on the use of the recreation site. If fees were increased, the number of visits per 100,000 population would decrease. On the other hand, if fees were decreased, the number of visits per 100,000 population would increase. So, in this way, his demand curve measures the relation existing between the number of visits and the entrance fees. Two assumptions were made in considering the demand curve for the site:

1. The user would view an increase in fees rationally.

2. The experience of the user from one location zone provides a measure of what people in other location zones would do if cost in money and time were the same.

Robert K. Davis (1963) applied a different technique to get "willingness to pay". This technique was called the consumer survey method and consists of five types of questions. These are as follows

1. Details of the trip including expenditures, time, budget activities, visits, etc.

2. The respondent's outdoor recreation habits aside from the trip.

3. Open-end questions dealing with reasons of choosing the area, degree of satisfaction, and areas that are substitutes.

4. Personal information including leisure time, type of residence, education, income and occupation.

5. Reference in outdoor recreation including willingness to pay.

This method is equivalent to Clawson's idea and argument, but the measure of willingness to pay, or consumer surplus, was obtained by asking the user how much he was willing to pay.

Knetsch (1963), in his publication, intended to examine some likely approaches to the problem of providing information on demand relationships and values. He reviewed the Clawson demand curve, after which he made this comment:

> The first comment we might make on the method relates to some of its more or less implicit restrictions. One of the strongest is the assumption that the demand schedule is essentially the same for all distance groups . . . realistically there is little reason for believing that this would be the case. (Knetsch, 1963, p. 390)

Knetsch also considers those factors that could cause distortion to this assumption such as income, age, population densities, availability of alternative parks or other multiple substitutes and other socio-economic variables.

He agrees that the value or benefit in an economic sense derived from the use of one resource is given by the value it has for the consumer and it is determined by the willingness to pay. He says, "The demand curve does seem to give the relevant information" (Knetsch, 1963, p. 392). But, he points out two things which should be noticed. One is the appropriate accounting of benefits and the second is the possible capitalization of potential benefits in land resources, but, in conclusion, he says this problem can be solved with more and better information and, therefore, the method as a whole.

Another interesting study was done by William G. Brown (1964). He plotted the relationship between average variable costs per day and the number of days taken per unit population for five distance zones in connection with salmon-steelhead fishing in Oregon. This curve corresponds to what Clawson (1959, p. 7) called the demand curve "for the recreation experience as a whole", and was, according to Brown (1964, p. 21), "an over-simplification as there may have been factors other than cost which affected the number of per capita visits in the more distant areas, for example, time, alternate sites, etc."

Brown then projected the number of salmon-steelhead fishing days taken by fishermen from the five zones using a graduated scale of price. He plotted increased fishing costs per day against thousands of fishing days taken per period. This curve corresponds to Clawson's derived demand for visits to national parks at various assumed fees.

To identify other variables he stratified the sample according to family income and it was found this variable exerts a statistically significant influence.

In 1964 Dr. E. B. Wennergren, in his publication, "Valuating Non-Market Price Recreational Resources", made an improvement in the theoretical implication of demand analysis for recreation. He stated that "most, if not all, commodities have some degree of aesthetic value associated with their usage or consumption and yet are subject to economic valuation" (Wennergren, 1964, p. 303).

The general hypothesis in this work is that individual user travel and on-site cost to a particular boating site constitutes a substitute price and, as such, is the principal determinant of the quantity consumed. The assumptions Wennergren made were:

1. The boater spends his income and other resources in such a way as to maximize the total derived utility or satisfaction.

2. The boater has perfect knowledge, or at least acts on his expectation as though he had such knowledge regarding the various costs of boating and the utility or satisfaction that he receives for the different quantities that may be taken.

3. The boating experience generates a total utility function which, at some point, encounters diminishing marginal utility. It is expected that as increased amounts of boating are taken, a quantity will be reached beyond which the addition to total utility will be a decreasing rate.

4. The units of utility and cost are equivalent and a net utility can be derived.

5. Major decisions pertaining to individual boating trips are made prior to departure, and the boating activity is a causal agent in the individual's decision to undertake the outdoor experience.

Based on these hypotheses and assumptions, Wennergren argues that a boater will allocate his boating expenditures both at the site and in total in such a way that the marginal value per dollar expended at each alternative site visited during the season is equal. He also distinguishes between individual and aggregate boater demand and states "the level of elasticity of the individual schedules is a function of the income of the individual, his taste preferences and quality factors associated with the site."

Having defined the statistical demand function, he determines the consumer's surplus as a measure of site value of a selected recreation activity.

Omer J. Carey (1965) reviewed the progress and problems of the economics of outdoor recreation. He criticized the method of evaluation proposed by Hotelling and later used by Trice and Wood. He states that "it doesn't measure the value of recreation, rather it is a value derived from the value of the service and goods received."

Carey also pointed out that the simplificiation of assuming that on-site experience is the recreation benefit involved in the trip and that to charge the entire cost of the trip to recreational opportunity even though there might have been visits to other recreation areas on the same trip, left room to doubt the reality of this estimation procedure. He agrees with other authors' criticism that "the consumer surplus approach requires at least the qualification that the marginal utility of money be constant and that individual preference scales be identical."

Carey also talks about the willingness to pay as a measure of recreation benefit and refers to Clawson, criticizing his approach, as follows:

1. It is assumed that the experience of visitors from one zone provides an indicator of what people of other zones would do if cost in money and time were the same.

2. He assumes that the recreation experience involves only one major recreation site.

3. The demand curve may vary considerably among visitors not only because of the differing preference scale, but also because of differing reasons for the visit.

Concerning the consumer survey method as a means to estimate willingness to pay, Carey suggested that it is an expensive method in terms of time and money; nevertheless, this approach has certain advantages over the Clawson method for determining willingness to pay. Also, through this method, willingness to pay can be obtained or detected just by the group method. This method, however, has the weakness of the Clawson procedure; it cannot deal with a newly developed or planned recreation site.

David W. Seckler (1966) analyzed the abuses which had been made by different authors on the treatment of outdoor recreation evaluation. In this publication, Seckler confesses a strong sympathy with those who argue the qualitative aspect of recreation experience. After he compares the three methods (consumer surplus, marginal cost to marginal utility, and non-discriminatory monopoly), he concludes that, assuming that the marginal utility curve of the users is identical with the statistical demand curve, the second technique is most valuable.

He does not believe that statistical demand curves measure the utility function of recreational facilities. He goes on to explain:

> . . . rather, they reflect the diminishing marginal utility of income. The slope and position of the statistical demand curve is largely a function of income distribution. The rate of purchase of any commodity of any time is determined by: (1) the marginal utility of commodity to that individual, and (2) the marginal utility of the income. Unless one knows the values of at least one of these determinants, nothing can be inferred about utility from observation of transaction.
>
> Economic values are measured basically for what people are willing to give up. It is the willingness to give up income on the part of the consumer which establishes values through the economy. (Seckler, 1966, pp. 486-488)

Seckler describes a demand curve corrected by the income effect and states that were income distributed more uniformly, demand curves for most goods would be flatter.

Peter H. Pearse (1968) describes a new approach, but it is an indirect method of getting consumer surplus. In this work, he criticizes the basic assumption of demand curve estimation. He states finally that there is a critical assumption that not only the recreationist, but also the whole population from which recreationists are drawn, have similar characteristics and preferences. He goes on to say:

> Several attempts have been made to overcome the rigidity of these latter assumptions about similarities in preferences by incorporating variables relating to income levels, availability of substitute areas, congestion and so on. But specification of the different effects has met with

> limited success, in large part, because of multi-collinearity between such variables as distance, time, and cost and difficulty of measuring such factors as congestion, availability of alternatives and quality of site. (Pearse, 1968, p. 87)

Pearse confines the evaluation of the recreationists themselves, but his objective is the consumer surplus just as in the case of previous authors. In doing so, he avoids the necessity of assumptions about the characteristics and homogeneity of the population from which recreationists are drawn. In order to set up his calculation, he introduces the assumption that "the recreationist who pursues the activity in question and has similar income also has similar preference for recreation and incurs similar marginal cost per recreation day" (Pearse, 1968, p. 90). Pearse imagines that a recreationist will respond to a toll in the same way that he responds to an equal increment in travel cost and the only purpose of the journey is assumed to be the enjoyment of on-site recreation.

In Pearse's procedure, required data include income levels and travel costs of visitors to the area under consideration and the number of visits made by each person.

In order to quantify the willingness to pay for the access to a particular site, he stratifies the sample on the base of income levels and within each class, visitors are ranked by their fixed costs. The visitor with the higher travel cost in an income class is assumed to have no consumer surplus. He states:

> Each intramarginal recreationist (X) in this group will continue to purchase recreation until his fixed cost is raised to exceed that of the marginal visitor.
>
> The maximum toll that each visitor would be prepared to bear is the difference between his fixed cost and that of the highest cost visitor in the same income class. (Pearse, 1968, p. 87)

But, in conclusion, the new approach rests in that it indirectly approaches the consumer surplus measure for recreation activity.

SUMMARY OF LITERATURE

A review of the literature in the area of recreation demand estimation and resource valuation reveals three methods which have been used to date in attempting to place economic values on non-market priced recreation resources. These methods are oriented toward consumer values. The methods include the following: consumer surplus (discriminating monopolist), monopoly revenue (non-discriminatory monopolist), and consumer survey. Beardsley (1968) summarized these methods as follows.

Consumer Surplus

A demand curve (DD^1) can be drawn based upon cost of use and use rate per time period as observed from behavior of visitors from various origins.

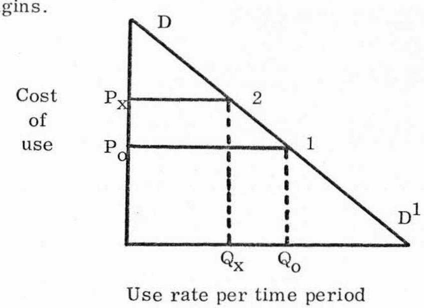

Figure 1. Illustration of consumer surplus based on demand curve.

This is a typical Marshallian demand curve to which is applied the usual assumptions that:

1. The persons, their income and tastes remain constant,

2. The marginal utility of money remains constant for individuals and between different persons,

3. Additional units of the commodity encounter diminishing marginal utility at some point.

A visitor living at some location (1) incurs a cost per unit of recreation at this site or P_o and purchases Q_o units per time period. For this purchase of all units previous to the Q_oth unit, for example, the Q_xth, he also incurs a cost of P_o but he would have willingly paid as much as P_x, as do visitors at origin 2, which represents the gross utility of Q_xth unit purchased.

The excess utility (consumer surplus) which he obtained is:

$$OP_x - OP_o = P_oP_x.$$

As the consumer purchases additional units, O_x approaches Q_o, and the surplus utility (consumer surplus) per unit is zero.

Mathematically, the total consumer surplus for the visitor in question equals the integral of the demand curve (DD^1) from Q_o to O minus the integral of the price line ($P_o{}^1$) from Q_o to O.

This analysis relies upon five basic assumptions:

1. Visitors attempt to maximize their satisfaction with their available income and resources.

2. Visitors have perfect knowledge, or at least act as though they do, regarding cost of use of the site and the satisfaction derived from it.

3. The utility derived from use of the site at some point diminishes at the margin.

4. Measurement units of cost and utility are equivalent, permitting the derivation of net utility.

5. The utility obtained from a unit of use of the site is the reason for the visitor's decision to purchase it.

Monopoly Revenue

This model attempt to derive the value of an outdoor recreation opportunity in terms of its monetary price in the usual market sense. It is based upon the same demand curve (DD^1) as the consumer surplus model. The curve is derived in the same manner and the same assumption is applied to its use. From this curve a second demand curve (DD_1) is drawn showing the relationship between increased entrance fees for use of the recreation site and number of users who would visit it at each price as illustrated in Figure 2.

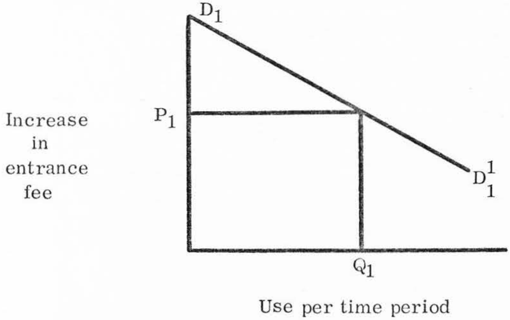

Figure 2. Illustration of monopoly revenue based on demand curve.

Two additional assumptions are implicit in demand curve $D_1D_1{}^1$:

1. Visitors would view a fee increase rationally as in the manner in which they would regard any other increase in costs of use.

2. Users from one location would purchase recreation from the site in the same amount as users at another location do if their costs were the same.

The demand curve $D_1D_1{}^1$ is derived from DD^1 in Figure 1 as follows.

A visitor living at location 1 presently pays P_o per unit of use and purchases Q_o units. If an entrance fee equal to P_oP_x were imposed on the site, they would react by purchasing Q_x units as do visitors at location 2. Similarly, the reactions of visitors at all locations to the fee increase may be determined. Total number of use units sold at this entrance fee is plotted as one point on DD_1. In like manner, additional fee increases are postulated and the results plotted as points on DD_1.

Along the curve DD_1 gross revenue from fee collections equals PQ (price times quantity) for all possible levels of fee and the corresponding levels of use.

The point at which revenues from fee collections would be maximized may be calculated such as P_1, Q_1. This is determined by maximizing the mathematical statement of the demand function. The maximum revenue is concluded to be the recreational value generated by the resource per unit of time (PUT).

It is the "market value" which could be realized by a private monopolist who owned the site and sold use of it in such a manner as to maximize his gross revenue.

Consumer Survey

The consumer survey method is identical to the monopoly revenue valuation except for the manner in which the demand curve, D_1D_1, is established. This method attempts to value recreation benefits by direct on-site questioning of users concerning their willingness to pay for use of the site. The demand curve, D_1D_1, in this case is developed from the visitor responses concerning their willingness to pay additional cost of use of the site.

THEORETICAL MODEL

To support the consistency of the theoretical model from the consumer point of view, the logic of utility theory will be presented as an explanation of the consumer maximizing conditions as they relate to any type of consumer activity. Utility theory also forms a logical basis for the conceptual model to be developed in order to analyze consumer behavior related to recreation consumption.

Total Utility and Marginal Utility

Assuming that utility is cardinally measureable, that utility obtained from one good, including money, is not affected by the rate of consumption of another and calling "util" a utility unit, the relationship existing between the amount consumed of a selected good and the total utility generated by this good is of an increasing-decreasing nature. This means that the total utility function increases but at a decreasing rate. The basis for this argument is that once an individual decides to consume a good, the utility generated by the first unit is greater than the utility generated by the second unit. In other words, successive units of consumption add less to the total utility than the previous units. A level of consumption is finally reached at which the next unit results in a reduction of total utility.

This relationship can be presented graphically by the curve A in Figure 3 which expresses the total utility curve.

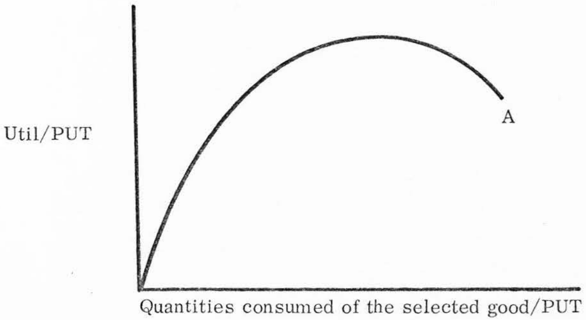

Figure 3. Relationship between quantities of good consumed and the total utility generated by the selected good.

Marginal utility is the utility generated by each additional unit of the selected good consumed. The relationship existing between the marginal utility and the units of good consumed is of a decreasing nature. This is so because every successive unit of consumption adds less utility. This relation can be presented as follows in Figure 4.

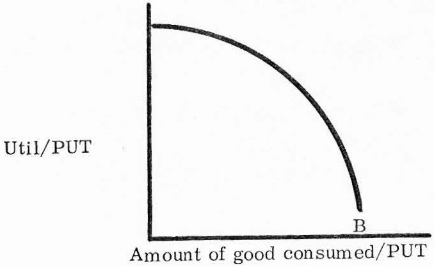

Figure 4. Relationship between the units consumed of a selected good and their marginal utilities.

B represents the additional utility generated by varying use rates for a selected good.

Consumer Equilibrium

If a given consumer chooses a good, say Z, and pays a price, P_z, for every unit of Z he consumes, he will keep on consuming more units of Z up to that point where the utility generated by consuming the last unit of Z is equal to the price he pays. Beyond this point, the utility generated by an additional unit of the good taken is worth less than the price he is paying. If he stops consuming short of this amount, the additional utility related to the next unit will exceed the price or cost he must pay. It would be irrational to consume when either of these two relationships holds.

Graphically, equilibrium can be represented as follows:

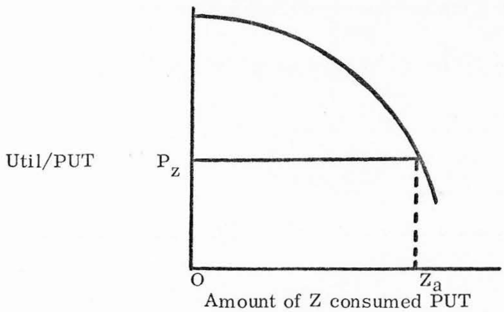

Figure 5. Consumer equilibrium situation.

where OP_z is the price the consumer is paying in order to get the good Z. OZ_a is the amount of good Z consumed where P_z equals marginal utility. MUV_z represents the relationship existing between the marginal utility generated by each unit of Z taken and the units consumed.

Consumer Equilibrium Related to the Recreation Site Selection

In order to apply these concepts to the problem of an outdoor recreation activity, pheasant hunting will be used as an illustration. Three points of emphasis seem relevant in defining the consumer equilibrium relative to recreation.

1. To a consumer, pheasant hunting activity represents a bundle of want-satisfying values just as does any other consumption good.

2. The consumer must pay some amount in order to enjoy this outdoor recreation experience.

3. The consumer equilibrium point for pheasant hunting activity at any selected site can be established in the same way as it is done for any other consumption good.

Assuming we have selected a pheasant hunting site and also that the marginal utility of pheasant hunting can be expressed in terms of dollars, instead of working with marginal utility, the relationship is going to be given in terms of marginal utility value (MUV). The equilibrium situation can be presented as follows

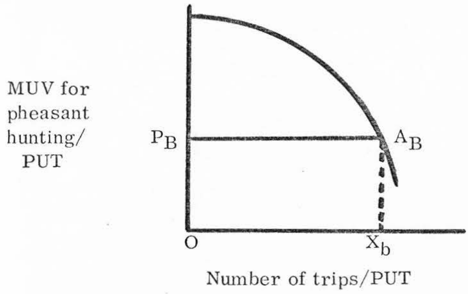

Figure 6. Consumer equilibrium for pheasant hunting activity.

where OP_B represents the price the consumer pays for pheasant hunting recreation in order to enjoy this selected recreation experience.

The price OP_B can be established on the basis of travel and on-site expenditure per trip the consumer must incur for each site visited.

A_B represents the relationship existing between the utility generated and the additional units of recreation experience taken by a consumer.

These units of recreation experience can be defined in terms of trips, hunter days, birds per hunter day, etc. In this case, if a trip is defined as the unit of consumption, the first trip taken by the selected consumer to the selected site generates the largest amount of satisfaction. This satisfaction may be valued above the travel and on-site costs he must bear in order to reach the site. But successive trips generate a decreasing utility per trip so he will keep on visiting the selected site up to a point where the value of the utility or satisfaction generated by the marginal trip is equal to the expenditures he makes in order to reach the selected site.

An additional trip beyond the point of equilibrium provides the consumer an amount of utility worth less than the expenditure he has to make in order to reach the recreation site. Such consumption would be irrational.

OX_b represents the number of trips taken to the selected hunting site which equates marginal utility value with the expenditure OP_B. In case the consumer faces many different alternative sites, the equilibrium distribution among sites is reached when

$$\frac{MUV_{s1}}{P_{s1}} = \frac{MUV_{s2}}{P_{s2}} = \ldots\ldots = \frac{MUV_{sn}}{P_{sn}} = 1$$

where s1, S2 . . . . Sn are various pheasant hunting sites. MUV is the value of the added utility received from the marginal trip; Ps is the travel and on-site cost to the S site.

This maximizing condition assumes sufficient consumer resources to allow the individual to take the necessary number of trips to maximize his utility.

In the absence of unlimited consumer resources, the consumer will take trips to alternative hunting sites such that:

$$\frac{MUV_{s1}}{P_{s1}} = \frac{MUV_{s2}}{P_{s2}} = \ldots\ldots = \frac{MUV_{sn}}{P_{sn}}.$$

Quality Implication in the Conceptual Model

Reasons for site selection and the factors which give rise to a ranking of one site above another are not explicitly considered in the marginal utility function represented in Figure 6. One critical factor is site quality. Recreationists expect to extract greater levels of utility from sites of higher quality.

Given sites of differing qualities a recreationist would prefer those sites of higher qualities. The rationale for singling out recreation quality is contained in the following general proposition.

> If a single consumer or producer at a single point of time pays, or is willing to pay, different prices for two grades of a particular commodity, the difference in price must represent a true difference in quality. For, if he knowingly pays more for one grade, he must consider it is worth just that much more to him than the other; and his assessment is sufficient. (Micholson, 1967, p. 512)

Several points are important to this proposition. A consumer facing goods of different qualities is willing to pay a higher price for goods which represent higher levels of quality which generate a higher level of satisfaction. To do this, it is necessary to assume that there is no time implication in the selection process which would invalidate the previous proposition. Time is fixed in this way because, without it, it is virtually impossible to guarantee that the difference in price represents difference in quality.

The quality proposition or qualit effect can be considered by building on the condition of utility maximization where a selected recreation activity is considered as a consumer good in the quality of the good consumed. This upward shift in the total utility curve is reflected directly in upward shift in the marginal utility value curve for the good in question (with the same intensity). Analytically, the same situation can be presented in recreation consumption.

If a consumer faces two alternative pheasant hunting sites with different levels of quality, this quality differential is reflected in the individual utility curves for the two sites. The site of higher quality has the higher utility curve and can be represented as follows:

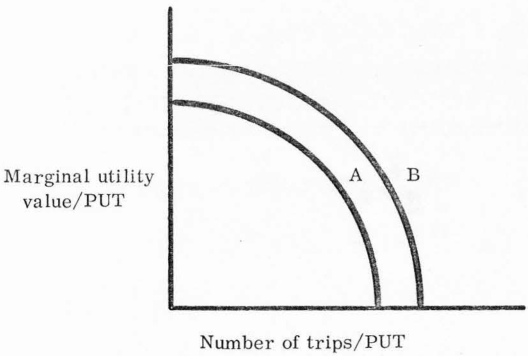

Figure 7. Effect of quality in the marginal utility value curve for pheasant hunting.

where A equals marginal utility value curve for site A and B equals the marginal utility curve for site B.

Measure of Quality

If a consumer faces a choice between sites A and B for pheasant hunting, and assuming that both sites are located at the same distance from the origin of the hunter, a consumer would be expected to prefer site B to site A. He would be expected to take more trips to site B than to site A since both sites would involve equal costs (P). Graphically, this situation can be represented as in Figure 7.

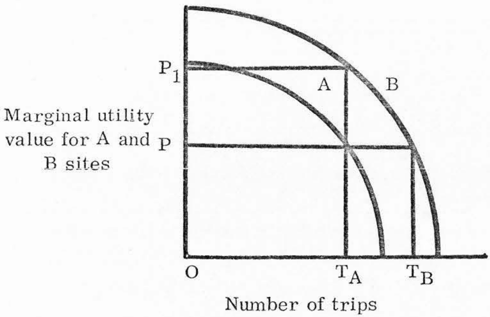

Figure 8. Alternative measurement of quality site.

The difference in number of trips taken between T_B and T_A can be considered an expression of the quality site B has above site A.

Another situation is presented when site B is located at a greater distance from the origin. The consumer now has to pay a higher price (P_1) to reach site B. As stated in the quality proposition, a consumer facing the same good with different quality and price, the differential price is a measure of quality. This is the situation described. The difference in expenditure between two recreation sites can be viewed as a measure of quality. This is represented by PP_1 in Fugure 7.

Economic Rent as a Total Measure of Resource Value

The concept of economic rent helps to explain the value placed on land resources as well as much of the incentives we have for resource ownership. It influences the allocation of land resource between individuals as well as between competing uses. The scope of the economic rent concept not only applies to the payment made to the land by participating in the productive process, as does any other production factor, but elements of economic rent can also be identified in the distribution of the cost related to the development, maintenance and improvement of the resource in question.

In identifying the sources of economic rent related to any land resource usage, the following statement is important.

> Ricardo's explanation of the rent in terms of differences in land quality deals with only one factor that affects rent paying capacity. Location is another important rent determinant. (Barlowe, 1958, p. 156)

This statement suggests that two kinds of rent determine the value of any land. One rent is what Ricardo termed fertility or productivity rent and the other is one which Petty and Von Thunen termed location rent.

Thus, it is clear that, in addition to the quality measures (productivity) already discussed, consideration must also be given to location factors. The location a production site (origin) has relative to market site can generate rents. Some sites located near a particular origin or production site command rent which is related to the highest cost or no rent site.

Sites with differing productive capacity give rise to different quality or productivity rents. Then it would appear that total value of a resource is the product of both a location and a quality or productivity rent.

Recreation Resource Value

Recreation resources generate use values just as do agricultural resources and such values are of the same general type.

Location value is generated in the sense that if a selected recreation site for a given type of activity has various origins, spatially distributed at different distances from the site, the closer the origin is to the site the greater is the advantage or location rent it enjoys in relation with the other origins. Quality values refer to the payment or retribution to the conditions under which the recreation activity is consumed. The conditions involve the characteristics of the site which attract and accommodate users due to natural environment, size of area, manmade facilities, camping tables, boat launching, etc. These things represent quality factors which the consumer pays for in order to enjoy the recreation experience at the selected site.

The notion of location rents can be illustrated by the following model

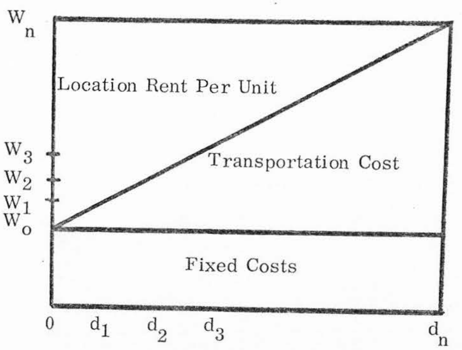

Figure 9. Location rent as a function of the distance.

where d_1, d_2 . . . d_n are the distances per unit of activity from origins (θ_1, θ_2 . . . θ_n) to the recreation site. W_1, W_2 . . . W_n equals the travel costs per unit from the origins (θ_1, θ_2 . . . θ_n) to the selected site. Od_n equals the distance of the farthest origin which uses the site. Ow_n is the travel and on-site cost per unit of activity for the most distant origin of use. Ow_o equals the fixed cost per unit of activity.

The fixed costs associated with use of the site are constant regardless of the distance or origin of use and therefore are of no consequence as a source of economic rent. These costs might include such items as guns, campers and other types of hunting equipment, the use of which is not variable in relation to the amount of hunting or the distance from the site.

The rent generating factors are related to those variable costs associated with distance from the site. For example, hunters living at that origin which is zero miles from the site have fixed costs of Ow_o. As hunters' points of origin move to greater and greater distances, the fixed costs remain constant but the variable cost related to distance increases, i. e., W_1, W_2 . . . W_n. The most distant site has a variable cost W_n. Since the intermediate origins are more favorably located, they realize economic rent per unit of activity in relation to the most distant origin. For hunters living at any site, the rent amounts to W_oW_i per unit of activity. The amount of rent declines as distance increases until at the most distant origin there is no rent. The total site rent value is a product of the rent per unit and the total units of activity associated with each origin.

METHODOLOGY

In a previous section it was pointed out that quality rent and location rent exists for land used for recreation activity and is a basis for determining resource values.

The development of this methodology is intended to estimate the total annual economic rent value for a site and to separate these two sources of the economic rent.[1] The base for this rests on the fact that rent values related to total observed site activity includes both quality and location values. All that is necessary is to estimate one of the two values and then attribute the residual to the remaining source of value. The following methodology proposes a means of estimating the total rent value for a recreation site and the location value associated with the site. The residual of these two values is then attributed to site quality. In essence, the methodology replicates calculation of economic rents consistent with the rent model illustrated in the previous section. One calculation is based on total activity related to the recreation site. The second calculation is related only to location or distance considerations.

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[1]Total annual economic rent of a site is the sum of all the differences between individual trip variable cost and the cost of the marginal trip. This amount can be discounted as necessary to obtain capitalized value of the site in question.

Observed Distribution of Activity Table

This table reflects the distribution of activity as it has been empirically measured. It has the following features

	S_1	S_2	S_3										S_m	
θ_1	X_{11}	X_{12}	X_{13}										X_{1m}	B_1
θ_2	X_{21}	X_{22}	X_{23}										X_{2m}	B_2
θ_3	X_{31}	X_{32}	X_{33}											B_3
θ_n	X_{n1}	X_{n2}											X_{nm}	B_n

Figure 10. Observed distribution of activity table.

where θ_i for i = 1 . . . n represents origins where people come from to enjoy the selected recreation experience. These origins are scattered spatially at different distances. S_j for j = 1 . . . m represents sites where people enjoy recreation experiences. X_{ij} for i = 1 . . . n and j = 1 . . . m represents the volume of observed activity between site i and origin j. This volume of activity has to be defined in terms of an established unit, for example, trips, hunter days, and so on. In this analysis, the number of trips is used for this variable. B_i for i = 1 . . . n is the total volume of activity from any origin i.

In the case of pheasant hunting B_i represents the total number of trips taken from any i origin.

Expected Value Table

In this part the goal is to reflect distribution of activity among sites and origins which minimizes distribution cost.

In order to obtain this information, a least cost distribution model is used. The solution discussed is a least cost situation in which the known variables are: (1) different origins spatially distributed at different distances from alternative recreation sites, (2) the transportation cost from any origin to any recreation site, (3) the total activity from any origin, and (4) the capacity of each site. This model generates the minimum cost distribution of numbers of trips among all the recreation sites. Mathematically it is as follows.

Let subscript i indicate the origin area (i = 1 . . . n); subscript j indicate the destination area (j = 1 . . . m); X_i^o = number of trips from origin i; X_j^d = capacity of site j; X_{ij} = number of trips from origin i to site j; C_{ij} = per unit transfer cost from origin i to site j; C = total cost of transportation.

So, given

$$X_i^o,\ X_j^d,\ C_{ij}$$

X_{ij} is found for all i and j which minimizes

$$C = \sum_{i=1}^{n} \sum_{j=1}^{m} X_{ij} C_{ij}$$

subject to these restrictions

$$X_i^o = \sum_{j=1}^{m} X_{ij}$$

$$X_j^d = \sum_{i=1}^{n} X_{ij}$$

$$\sum_{i=1}^{n} X_1^o = \sum_{j=1}^{m} X_j^d$$

$$X_{ij} \geq 0.$$

The rationale in applying this general scheme to the situation in which activity among site and origin is at minimum cost is as follows:

1. We have two arrays in which the first one represents all possible origins and the second represents all of the sites which have provided recreation experience for the origins in question.

2. The same recreation activity is offered at any of the sites. This implies the assumption that the recreation "commodity" (pheasant hunting) is homogeneous.

3. The total demand from any origin is expressed in terms of an established unit of activity, number of trips.

4. Site capacities are defined in terms of the same units which are used to define demand.

5. Transportation and on-site cost from any origin to any site are known. This cost can be expressed in terms of the total mileage per unit--cost per mile per unit, etc.--depending upon the conditions under which the research is conducted.

6. Assuming there is only a single best route connecting sites and origins, it is possible to relate origins to the demand for any site such that distribution cost among sites and origins will be minimized. To accomplish this it is necessary to establish what may be called the least cost table or expected distribution of activity table. This expected value table has the following features:

	S_1	S_2	S_3										S_m	
	C_1	C_2	C_3											
θ_1	X^o_{11}	X^o_{12}	X^o_{13}	X^o_{14}										B_1
θ_2	X^o_{21}	X^o_{22}	X^o_{23}											B_2
θ_3														B_3
θ_n	X_{n1}	X_{n2}	X_{n3}										X^o_{nm}	B_n

Figure 11. Expected distribution of activity.

where θ_i for $i = 1 \ldots n$ are the same origins defined in the observed table. S_j for $j = 1 \ldots m$ are the same sites defined in the observed table. B_i for $i = 1 \ldots n$ is the same amount of activity defined in the previous table of observed value which is used to be distributed at the minimum cost. C_j for $j = 1 \ldots m$ is the capacity established for any site j defined in terms of the same unit or demand is defined. X_{ij}^o for $i = 1 \ldots n$, $j = 1 \ldots m$ is the amount of activity from origin i to site j which has to be developed in order to minimize the cost of distribution for the selected activity among sites j and origin i. This amount of activity is defined in terms of the same unit used to define capacity and demand, i. e., number of trips.

Calculation of Economic Rents and Quality Residual

Both the observed and expected value tables must be arranged as follows: (a) In both tables for a selected site S_j, the origins are ranked according to the distance they lie from the selected site. Thus, for site (S_j), origins θ_1, θ_2, and $\theta_3 \ldots \theta_n$ have to be ordered according to distance. It may be assumed that θ_1 is the nearest origin and θ_n, the most distant. (b) Calling W_1, W_2, and $W_3 \ldots W_n$, the cost of transportation from origin θ_1, $\theta_2 \ldots \theta_n$ to the site S_1 and Z_1, $Z_2 \ldots Z_n$, the total volume of activity for origins θ_1, $\theta_2 \ldots \theta_n$ to site S_1; and M_1, $M_2 \ldots M_n$ the rent per unit for the site with respect to the origins

$\theta_1, \theta_2 \ldots \theta_n$. In order to calculate the total resource value, this procedure is applied first to the observed value table as follows:

$$W_n - W_1 = M_1 \times Z_1 = N_1$$

$$W_n - W_2 = M_2 \times Z_2 = N_2$$

$$\cdot$$
$$\cdot$$
$$\cdot$$

$$W_n = W_n = 0 \times Z = \frac{N_n}{\Sigma N}$$

where N_i, $i = 1 \ldots n$ is the total rent per origin i, and ΣN is the total rent value for all origins associated with site S_1. (c) Following the same procedure for the expected value table, the pure location rent for the site in question is obtained. ΣY is the total pure location rent for S_1 in question. (d) Having ΣN, which is the total rent value and ΣY the pure location rent value, the value attributed to quality factors is obtained by subtraction

$$\Sigma N - \Sigma Y = Q_1$$

where Q_1 equals total annual rent value due to quality for site S_1.

The rationale for the methodological procedure is that the total site rent value is composed of location and quality components. Thus, the observed table and its associated rent value contains both location and quality values. The redistribution of hunter activity in a least cost fashion, as expressed in step 2 and the expected value table, defines the allocation of hunter activity which would be expected if location were the only criteria used in selecting alternative hunting sites. Conceptually, hunters motivated only by cost or distance consideration would follow a least cost pattern of site usage. Therefore, the value generated by the least cost distribution or table can logically be attributed to location. Since the observed activity table contains both quality and location values, the subtraction of the location value leaves a residual value which can be attributed to site quality.

Importance of the Capacity Constraint

Capacity of a recreation site might be defined in several ways, but only one is employed in this initial treatment and test of the model. For the present purposes, capacity is always defined as equal to the number of trips or use currently being made of a given site.

If in some sense capacity is "underestimated", then when making the least cost distribution, some trips from nearby origins may be "forced" to go to further sites. This would tend to reduce the location value for the site in question and to over-estimate the quality value. Simultaneously, the location value of other sites would be raised.

If capacity is "over-estimated" the results will be reversed.

Data Collection Procedure

The data were collected from mail questionnaires distributed to resident Utah hunters following the 1966 pheasant hunting season. A total of 2284 questionnaires were sent to a sample of hunters drawn randomly from a master sample of approximately 35,000 which had been previously randomly selected from holders of 1966 hunting licenses by the Utah Fish and Game Department. Approximately 45 percent of the questionnaires were returned and used in the study.

The number of hunters residing in each city was estimated from existing records of the Utah Fish and Game Department since actual counts were not available. Estimates of the percentage of hunters residing in each city were also obtained from the master sample of 35,000 hunters provided by the Utah Fish and Game Department. The percentage of sample list hunters living in each city was multiplied by the total license sales in 1966 to estimate the number of resident license holders in each city.

Information was obtained from the mail questionnaire of the hunter's city of origin, the various counties hunted during the season, distances traveled, the number of trips to each county, and trip expenses. The variable cost of travel was independently estimated at $.06 per mile traveled. Average total variable costs per trip from each city of origin to each hunting area were likewise calculated from the questionnaire data.

Distances from origins to sites were calculated by the most direct routes as measured on a published road map. A major city within each county was used as a common measuring point in calculating mileage to that county (site). In order to reflect in-county travel by out-of-county hunters, a constant mileage was added to all out-of-county hunters. This constant was equal to the in-county travel reported by hunters living in the major city used for calculating distances. The major cities used and the miles reported as in-county travel which were added as constants are shown in Table 1.

Table 1. Miles traveled from the main city in each county to the pheasant hunting site

Main City	Miles	Main City	Miles
Brigham	65	Price	44
Logan	30	Clearfield	22
Duchesne	30	Huntington	87
Cedar City	48	Nephi	21
Delta	49	Morgan	83
Salt Lake City	34	Richfield	37
St. George	10	Provo	29
Vernal	44	Roy	23

RESULTS OF THE STUDY

In this study, estimations for quality and pure location rent values were made for 16 pheasant hunting counties. The distribution of counties hunted and those for which the location and quality values were made is consistent with the 1965 report of pheasant hunt activity prepared by the Utah Fish and Game Commission.

This report shows that only 26 of the State's 29 counties had hunting activity. Of the 26 counties with hunting activity, only 17 had hunting activity involving one percent or more of the total hunters during that season.

Individual estimates of quality and location value were made for the following counties: Box Elder, Cache, Carbon, Davis, Duchesne, Emery, Iron, Juab, Millard, Morgan, Salt Lake, Sevier, Uintah, Utah, Washington, and Weber.

The presentation of the complete data, procedure and valuation will be as follows: Table 2 is the observed activity table which summarizes information regarding the observed pheasant hunting activity existing among the 16 selected sites and 118 origins reported by the questionnaires. This activity is expressed in terms of the number of trips taken from any of the 118 origins to any of the 16 sites. Table 3 is the expected or least cost

Table 2. Observed distribution of pheasant hunting activity for 16 sites and 118 origins, Utah, 1966

Sites	Box Elder	Cache	Carbon	Davis	Duchesne	Emery	Iron	Juab	Millard	Morgan	Salt Lake	Sevier	Uintah	Utah	Washington	Weber	Total
Origins																	
American Fork							86	86	86		173		173	3109			3713
Annabella												82		500			582
Beaver									267								267
Benjamin														36			36
Bennion											27						27
Bountiful	540	270	67	3780		135					472			202			5466
Brigham City	3004	650															3654
Castle Dale			6			6											12
Cedar City	34					440	2862					110			142		3588
Centerville				356	59												415
Central														4166			4166
Clarkston		320															320
Clearfield	379	253		3984		63				63	127			63		316	5248
Linton				300													300
Coalville													62			410	472
Collinston	54																54
Cresent	894										63			83			1040
Draper											2299			405			2704
Duchesne					1667												1667
Dragerton						193											193
Delta									899								899
Dugway									80					40			120
Enterprise									109						327		436

Table 2. Continued

Sites	Box Elder	Cache	Carbon	Davis	Duchesne	Emery	Iron	Juab	Millard	Morgan	Salt Lake	Sevier	Uintah	Utah	Washington	Weber	Total
Origins																	
Elsinore												350					350
Farmington	205			5526													5731
Garland	617															68	685
Granger	53			160	106						428			266		53	1066
Green River						425							84				509
Flowell																	90
Grantsville									246								246
Genola														81			81
Goshen														82			82
Helper			251			251											502
Heber City					114								114	456			684
Hinckley														220			220
Holladay	72			632	36												740
Honeyville	243																243
Howell	175																175
Hooper	89															1513	1602
Hunter	79										158			79			316
Huntington						182									359		541
Hurricane							60										60
Holden									72								72
Harrisville	36															144	180
Kaysville	124			2053													2177
Kearns	276	276									1288			20			1860
Kenilworth	366	122		5243	61				61							61	5914

Table 2. Continued

Sites	Box Elder	Cache	Carbon	Davis	Duchesne	Emery	Iron	Juab	Millard	Morgan	Salt Lake	Sevier	Uintah	Utah	Washington	Weber	Total
Origins																	
Eureka									64								64
Logan	1816	7455									125						9458
Magna	86	430									1290			86			1892
Midvale	61	182									1578		243	182			2246
Morgan	222	111								222							555
Murray	605	345		9	86	86					2072		86	546			3835
North Ogden	1541	356														355	2252
North Salt Lake	40			160										40			240
Ogden	7972	1393		388						154	78					15943	25928
Perry	135																135
Pleasant Grove	62													2339			2401
Plymouth	54																54
Roy	1646	1140		1225						82						10015	14108
Salt Lake City	1773	1727	96	3307	671	287		96	1295	48	6714	335	96	4459		287	21191
Sandy	79				158	251			79		1506						2073
Hyde Park		676															676
Hyrum		1288															1288
Lehi		185							92					739			1016
Lewiston		122															122
Millville		200															200
Newton		327															327
North Logan		9															9

Table 2. Continued

Sites	Box Elder	Cache	Carbon	Davis	Duchesne	Emery	Iron	Juab	Millard	Morgan	Salt Lake	Sevier	Uintah	Utah	Washington	Weber	Total
<u>Origins</u>																	
Orem		63		63		63		380				63		3103		63	3798
Providence		1189															1189
Provo		63	63		63	189			190					78			646
Richmond		611															611
Riverton		193		97							1422			237			1949
Roosevelt					1667	88							263				2018
Price			1330		95	1235	190						95	95			3040
Mapleton				27				55						911			993
Payson				21		78		27						35			161
Kamas					70									70			140
Myton					110												110
Paragonah							36										36
Parowan							3082							195	85		3362
Levan								301									301
Nephi								848	94								942
Park City								340			632						972
Santaquin														962			962
Monroe									304			684					988
Oasis									36								36
Scipio									55								55

Table 2. Continued

Sites	Box Elder	Cache	Carbon	Davis	Duchesne	Emery	Iron	Juab	Millard	Morgan	Salt Lake	Sevier	Uintah	Utah	Washington	Weber	Total
<u>Origins</u>																	
Joseph												219					219
Redmon												195					195
Richfield												2597					2597
Salina												662					662
Lapoint													110				110
Linden														36			36
Salem														362			362
Plain City																23	23
Snowville	46																46
South Ogden	55	55														55	165
Springville	77	77							52					2000			2206
Sunset	985	197		1576												296	3054
Tooele	61	122			61				547			61	243				1095
Tremonton	2663	95															2758
Wellsville	82	451															533
Bountiful (W.)	18			12					6								36
Willard	820																820
Woods Cross	75			447		149								372			1043
Smithfield		3860															3860
Washington		55														2115	2170
Vernal					79								2850				2929
Summit							54										54
Sunnyside						9											9

Table 2. Continued

Sites	Box Elder	Cache	Carbon	Davis	Duchesne	Emery	Iron	Juab	Millard	Morgan	Salt Lake	Sevier	Uintah	Utah	Washington	Weber	Total
<u>Origins</u>																	
Sutherland									72								72
Taylorsville											65						65
Venice												23					23
Spanish Fork													79	2220			2299
South Jordan														410			410
St. George															576		576
Totals	28046	25036	1813	29366	5103	4130	6370	2133	4796	569	20517	5381	4498	29285	1489	31779	200, 311

Table 3. Expected distribution of activity for the 16 sites and 118 origins, pheasant hunting, Utah, 1966

Sites	Box Elder Brigham City	Cache Logan	Carbon Price	Davis Clearfield	Duchesne Duchesne	Emery Huntington	Iron Cedar City	Juab Nephi	Millard Delta	Morgan Morgan	Salt Lake Salt Lake	Sevier Richfield	Uintah Vernal	Utah Provo	Washington St. George	Weber Roy	Total
Origins																	
American Fork														3713			3713
Annabella												582					582
Beaver									267								267
Benjamin														36			36
Bennion																27	27
Bountiful		5466															5466
Brigham City	3654																3654
Castle Gate														12			12
Cedar City							3588										3588
Centerville				415													415
Central														4166			4166
Clarkston		320															320
Clearfield																5248	5248
Linton																300	300
Coalville										14				458			472
Collinston	54																54
Cresent				1040													1040
Draper														2704			2704
Duchesne					1667												1667
Dragerton			193														193
Delta									899								899

Table 3. Continued

Sites	Box Elder Brigham City	Cache Logan	Carbon Price	Davis Clearfield	Duchesne Duchesne	Emery Huntington	Iron Cedar City	Juab Nephi	Millard Delta	Morgan Morgan	Salt Lake Salt Lake	Sevier Richfield	Uintah Vernal	Utah Provo	Washington St. George	Weber Roy	Total
<u>Origins</u>																	
Dugway									120								120
Enterprise															436		436
Eureka								64									64
Elsinore												350					350
Farmington				5731													5731
Myton					110												110
Garland	685																685
Granger											1066						1066
Green River						509											509
Flowell									90								90
Grantsville				246													246
Genola														81			81
Goshen														82			82
Helper														502			502
Heber City														684			684
Hinckley									220								220
Holladay											740						740
Honeyville	243																243
Howell	175																175
Hooper		1602															1602
Hunter											316						316
Huntington						541											541
Hurricane									60								60

Table 3. Continued

Sites	Box Elder Brigham City	Cache Logan	Carbon Price	Davis Clearfield	Duchesne Duchesne	Emery Huntington	Iron Cedar City	Juab Nephi	Millard Delta	Morgan Morgan	Salt Lake Salt Lake	Sevier Richfield	Uintah Vernal	Utah Provo	Washington St. George	Weber Roy	Total
Origins																	
Holden									72								72
Harrisville		180															180
Kaysville				2177													2177
Kearns											1860						1860
Kenilworth					2767	2321		826									5914
Logan		9458															9458
Magna											1892						1892
Midvale											2246						2246
Morgan										555							555
Murray											3835						3835
North Ogden	2033	219															2252
No. Salt Lake				240													240
Ogden	16177															9751	25928
Perry	135																135
Pleasant Grove														2401			2401
Plymouth	54																54
Roy																14108	14108
Salt Lake City				15384							3462					2345	21191
Sandy											2073						2073
Hyde Park		676															676
Hyrum		1288															1288
Lehi														1016			1016

Table 3. Continued

Sites	Box Elder Brigham City	Cache Logan	Carbon Price	Davis Clearfield	Duchesne Duchesne	Emery Huntington	Iron Cedar City	Juab Nephi	Millard Delta	Morgan Morgan	Salt Lake Salt Lake	Sevier Richfield	Uintah Vernal	Utah Provo	Washington St. George	Weber Roy	Total
Origins																	
Lewiston		122															122
Millville		200															200
Newton		327															327
North Logan		9															9
Orem														3798			3798
Providence	1189																1189
Provo														646			646
Richmond		611															611
Riverton											1949						1949
Roosevelt					559								1459				2018
Price			1620			759								661			3040
Mapleton														993			993
Payson														161			161
Kamas														140			140
Paragonah							36										36
Parowan							1053		2309								3362
Levan								301									301
Nephi								942									942
Park City									225					747			972
Santaquin														962			962
Monroe												988					988
Oasis									36								36

Table 3. Continued

Sites	Box Elder Brigham City	Cache Logan	Carbon Price	Davis Clearfield	Duchesne Duchesne	Emery Huntington	Iron Cedar City	Juab Nephi	Millard Delta	Morgan Morgan	Salt Lake Salt Lake	Sevier Richfield	Uintah Vernal	Utah Provo	Washington St. George	Weber Roy	Total
<u>Origins</u>																	
Scipio									55								55
Joseph												219					219
Redmon												195					195
Richfield												2597					2597
Salina									235			427					662
Lapoint													110				110
Lindon														36			36
Salem														362			362
Plain City	23																23
Snowville	46																46
South Ogden		165															165
Springville														2206			2206
Sunset				3054													3054
Tooele									82		1013						1095
Tremonton	2758																2758
Wellsville		533															533
W. Bountiful				36													36
Willard	820																820
Woods Cross				1043													1043
Smithfield		3860															3860
Washington							1693								477		2170

Table 3. Continued

Sites	Box Elder Brigham City	Cache Logan	Carbon Price	Davis Clearfield	Duchesne Duchesne	Emery Huntington	Iron Cedar City	Juab Nephi	Millard Delta	Morgan Morgan	Salt Lake Salt Lake	Sevier Richfield	Uintah Vernal	Utah Provo	Washington St. George	Weber Roy	Total
Origins																	
Vernal													2929				2929
Summit									54								54
Sunnyside														9			9
Sutherland									72								72
Taylorsville											65						65
Venice												23					23
Spanish Fork														2299			2299
South Jordan														410			410
St. George															576		576
Totals	28046	25036	1813	29366	5103	4130	6370	2133	4796	569	20517	5381	4498	29285	1489	31779	200,311

activity table. This table shows how user activities are redistributed in order to minimize the total distribution cost of the observed trips among the sites. In other words, it shows the distribution of the observed trips which would minimize the cost of travel from the 118 origins to the various sites, assuming that only distance considerations are important.

To avoid unnecessary duplication, illustration of the procedure for deriving quality and location values for a site or county will be presented for only one county. The other county estimates are presented in the appendix, Tables 8 through 37.

Duchesne County, situated in northeastern Utah, will be used to illustrate the procedure used in this analysis. From the observed value table, one can see the volume of activity reported from the various origins to Duchesne County. Tables 4 and 5 summarize the calculation of the location and quality rents for Duchesne County. Column 1 in Table 4 shows the adjusted round-trip mileage traveled by hunters from the various origins to hunt in Duchesne County. These adjusted mileages are ranked according to the distances. Taking the most distant origin, in this case Tooele, as the non-rent origin, column 2 is formed by subtracting from the Tooele distance (328 miles), the distance of each of the other origins. This gives the location advantage in miles of each origin hunting in Duchesne County relative to the most distant origin reporting use of the county.

Column 3 is the translation of the location advantage to value by

Table 4. Observed activity and total economic rent value for Duchesne County, Utah, pheasant hunting, 1966

	Adjusted round trip mileage	Location advantage in mi. units (base = 328)	Location advantage in dollars (1 mi. = $.06)	Number of trips taken	Economic rent per origin
Duchesne	30	298	$17.88	1,667	$29,805
Myton	84	244	14.64	110	1,610
Roosevelt	102	226	13.56	1,667	22,604
Kenilworth	121	207	12.42	61	757
Price	137	191	11.46	95	1,088
Vernal	148	180	10.80	79	853
Heber City	168	160	9.60	114	1,094
Kamas	202	126	7.56	70	529
Provo	228	100	6.00	63	378
Salt Lake City	270	58	3.48	671	2,335
Holladay	278	50	3.00	36	108
Murray	280	48	2.88	86	247
Farmington	292	36	2.16	106	228
Sandy	292	36	2.16	158	341
Centerville	297	31	1.86	50	109
Tooele	328	0	0	61	0
Total Trips				5,103	
Total Economic Rent					$62,086

Table 5. Least cost activity and location rent value, Duchesne County, Utah, pheasant hunting, 1966

	Adjusted round trip mileage	Location advantage in mi. units (base = 121)	Location advantages in $ per unit (1 mile = $.06)	Number of trips taken	Economic rent per origin
Duchesne	30	91	$5.46	1,667	$9,101
Myton	84	37	2.22	110	244
Roosevelt	102	19	1.14	559	637
Kenilworth	121	0	0	2,767	0
Total Trips				5,103	
Total Location Rent					$9,982

multiplying the values in column 2 by $ .06, the assumed travel cost per unit. Column 4 is the total number of trips reported taken to Duchesne County from the various origins. Column 5 is the product of columns 3 and 4. Each line in column 5 is the economic rent of that origin and the sum of column 5 is the total annual economic rent value associated with Duchesne County. The total value is $62,086.

To calculate the pure location value the observed trip activity was reallocated on the basis of a minimum cost distribution. Table 5 gives information about the distribution of activity between the observed origins and Duchesne recreation such that the cost of distribution of the activity is at a minimum. This method defines the distribution of trips among origins related entirely to location. The quality factors related to the activity are left out. Applying the least cost location model to the expected distribution of activity, the pure location value is obtained. In the Duchesne case it is $9,982.

To obtain the quality value relative to the total annual economic rent, the pure location rent is subtracted from the total rent value. In this case the quality value is $52,104 = $62,086 - $9,982.

A summary of the values calculated for the other counties are shown in Table 6.

Table 6 contains a summary of the location and quality values generated by the analysis for each of the 16 counties. In addition, the location and quality rent values for each county are expressed as a percentage relative to the total value.

The total annual economic rent for the 16 counties was calculated to be $5,835,643 of which $4,831,577 was attributed to quality value and $1,004,066 to location rents.

Based on the total annual economic rent, the highest values were found in Weber County, 21.05 percent; Cache County, 18.70 percent; Box Elder County, 15.84 percent; and Davis County, 13.17 percent. Salt Lake County with 8.76 percent and Washington County with 8.80 percent followed in that order. Juab had the lowest value representing only .29 percent of the total.

Of the total quality value of $4,831,577, Weber County also had the highest value with $1,123,448, followed by Cache County with $935,071,

Table 6. Location and quality rents for 16 counties in Utah, pheasant hunting, 1966.

County	Quality	Per-centage	Location	Per-centage	Total economic rent	Total
	$				$	
Box Elder	873,371	18.08	51,312	5.11	924,683	15.84
Cache	935,071	19.36	153,852	15.32	1,089,553	18.70
Carbon	37,720	.78	4,666	.46	42,386	.74
Davis	608,811	12.61	159,825	15.91	768,636	13.17
Duchesne	52,104	1.07	9,982	1.00	62,086	1.06
Emery	60,889	1.26	7,021	.62	67,910	1.16
Iron	148,533	3.07	25,916	2.58	174,449	2.98
Juab	3,067	.06	14,315	1.43	17,382	.30
Millard	32,421	.67	52,098	5.18	84,519	1.44
Morgan	83,046	1.72	1,598	.16	84,644	1.45
Salt Lake	422,724	8.75	88,270	8.79	510,994	8.76
Sevier	83,090	1.73	15,241	1.63	98,331	1.69
Uintah	125,750	2.61	7,295	.73	133,045	2.28
Utah	207,365	4.29	306,663	30.52	514,028	8.80
Washington	33,537	.69	585	.06	34,122	.58
Weber	1,123,448	23.25	105,427	10.50	1,228,875	21.05
Total	$4,831,577	100.00	1,004,066	100.00	$5,835,643	100.00

Box Elder County with $873,371 and Davis County with $608,811. The smallest quality value was found in Juab.

In order to explain the reasons and causes that made Weber appear with the highest quality rent value, one must view the basis on which the calculations are made and the variables which are important to the model.

Weber County had the highest observed number of total trips which amounts to 31,779. The most distant origin utilizing hunting in Weber was about 719 miles away. There were 2,115 trips taken from this origin as seen in the appendix, Table 22.

According to appendix Table 37 which expresses the location rent value, the farthest distance traveled from any origin to Weber County in order to minimize the distribution cost is about 84 miles. This difference in mileage and the number of trips taken above the minimum necessary to minimize the cost of distribution is one important reason for the higher quality value for Weber County.

A similar situation arises in the explanation of the high quality value for Cache County. It is observed that the farthest distance traveled to Cache County was about 824 miles, but with fewer trips taken than the farthest distance to Weber. The greatest distance traveled for the least cost distribution was about 114 miles. On the other hand, for Juab County, which had the lowest quality value, it is observed that the farthest distance traveled was about 221 miles. For the least cost distribution the farthest distance traveled was 205 miles. The difference here is much less than the other two counties. In an intuitive way one can see the rationale for the different quality values assigned to each site in this manner. Of the total location rent, the highest value was assigned to Utah County which had 30.52 percent of the total value. Other counties important in location value were Davis County with 15.91 percent, Weber County with 10.50 percent, and Cache County with 15.32 percent. The lowest value was for Washington County which accounted for only .06 percent of the total location rent. Salt Lake County had 8.79 percent. It is evident from observing these values that the sites (counties) located closest to heavy demand origins in the State had the highest location values, i. e., those counties most favorably located with respect to population centers.

Table 7 summarizes the location and quality rent values for every site as a percentage of the total site rent with respect to a particular origin.

It is observed that of the total economic rent, the quality value represents 82.8 percent and location rent 17.2 percent. However, Juab County, which ranked very low in total value, had the highest percentage of its total value represented by location rent. Such a situation seems related to two factors: (1) its proximity to population centers, (2) the absence of quality factors which attract hunters. A similar situation is presented for Utah County which is situated a few miles to the north of Juab. Utah County had a location rent which represented 59.6 percent of the total economic rent value calculated for the county.

Table 7. Percentage of location and quality rents for 16 counties in Utah, pheasant hunting, 1966

	Location Value	Percent	Quality Value	Percent	Total Economic Rent	Percent
	$				$	
Box Elder	51,312	5.6	873,371	94.4	924,683	100
Cache	153,852	14.2	935,701	85.8	1,089,553	100
Carbon	4,666	11.1	37,720	88.9	42,386	100
Davis	159,825	20.8	608,811	79.2	768,636	100
Duchesne	9,982	16.1	52,104	83.9	62,086	100
Emery	7,021	10.4	60,888	89.6	67,910	100
Iron	25,916	15.0	145,533	85.0	174,449	100
Juab	14,315	82.4	3,067	17.6	17,382	100
Millard	52,098	61.6	32,421	38.4	84,519	100
Morgan	1,598	1.9	83,046	98.1	84,644	100
Salt Lake	74,270	14.6	436,731	85.4	510,994	100
Sevier	15,241	15.5	83,090	84.5	98,331	100
Uintah	7,295	5.5	125,750	94.5	133,045	100
Utah	306,663	59.6	207,365	40.4	514,028	100
Washington	585	1.8	33,537	98.2	34,122	100
Weber	105,427	8.6	1,123,448	91.4	1,228,875	100
Total	$1,004,066	17.2	4,831,577	82.8	$5,835,643	100

On the other hand, Washington County, situated in the southern part of the State and distant from most major population centers had a quality value which represents 98.2 percent of its total economic rent. Morgan and Iron Counties showed similarly high quality and low location values.

In general, the model provides what appears to be consistent results and provides a useful means of distinguishing between location and quality values. It suggests that quality values are most important in determining the total value for pheasant hunting in Utah. However, at this stage of development, the model does not permit analysis of the components of the quality value.

SUMMARY

The primary objective of this study was to develop a conceptual model to value recreation activity using the concepts of economic rent. A secondary objective was to make an empirical test of the model developed in the first objective.

The theoretical model incorporates the relationship existing between the distance traveled by recreationists and number of trips taken from origins and the quality implication of the sites.

From the location theory point of view, the model reflects the location advantage a site has when it is related to other sites and the demand origins.

It was concluded that value of any land use is reflected in the total economic rent value and the sources of this economic rent value are location and quality rent values.

Based on the above formulation, a methodology was developed which enables the calculation of both location and quality rent values to recreation sites. The technique was applied to the case of pheasant hunting in Utah.

Data was collected from a total of 2,284 questionnaires sent to a sample of pheasant hunters drawn randomly from a master sample of approximately 35,000 randomly selected license holders in 1966.

An estimation of total economic rent, quality and location rent values was made for Box Elder, Cache, Carbon, Davis, Duchesne, Emery, Iron, Juab, Millard, Morgan, Salt Lake, Sevier, Uintah, Utah, Washington, and Weber Counties.

The total economic rent for the 16 selected county sites was $5,835,643 of which $1,004,066 (17.2 percent) corresponded to location rent and $4,831,577 (82.8 percent) to the quality rent values.

Sites visited by more distant origins generated the highest quality values. This was the case for Weber County which had the largest total value of all counties, 22.99 percent of the total State value. Cache County with 23.25 percent, Box Elder with 18.08, and Davis County with 12.61 percent followed in that order. The lowest quality value was for Juab with .06 percent of the State total.

Within county values showed some deviation from the State totals. Of the total value recorded by Juab County, 82.4 percent was related to location value. Utah County also had a high percentage of its total value related to location. Washington and Morgan Counties had less than 2 percent of their total value associated with location, thus reflecting a high proportion of intra-county quality value.

CONCLUSIONS AND RECOMMENDATIONS

The model presented in this thesis represents a forward step because it presents a logical means of separating quality and location factors, even for a site that attracts users from many origins. As a consequence, more reasonable conclusions about site value can be drawn. It is possible to say something about each of the two value components--location and quality. It is possible, for example, to speculate about "attractive power" if quality value is high.

The model highlights interrelationships among sites. Thus, it is possible to test the effect of simulating deterioration or improvement of a given site by noting or monitoring the accompanying shifts in the valuation of the whole system of sites. This feature extends to the introduction of new sites (the characteristics of planned new sites).

For example, in the case of a new site, the first step is to set up the expected capacity of the site. Then the relevant travel distances are measured, and the values added to the system model. On the basis of the original number of "trips," the computer will provide a redistribution of trips and indicate what happens to total value in the system. These steps can be repeated as necessary, following a simulated move of the site location, until acceptable minimum value for the objective function is discovered.

Situations involving new investments (upgrading) in existing sites are of two classes: (a) investments which are user cost lowering, such as improved roads or on-site facilities, due to the fact that site fees or taxes are unchanged; (b) investments which do not lower costs, indeed users pay more, but obtain better service. In the former case, trip costs to the affected site will fall, necessitating recomputation of values in the model system. And, as a consequence, the first indication or effect will be a reduction in total system value. But this will be counterbalanced by the model "pulling" users from greater distances who are now able to pay the price. The whole system will stabilize at some value greater than associated with the initial effect.

If planned investment is not cost lowering from an individual user standpoint, the analysis becomes more complex. In such cases, it probably will be necessary to split recreationists into social or economic categories and "run" the model with different groups. The planned investment could probably be shifted among various potential sites in order to create some basis for judging the most suitable choice if funds are limited.

Suitable means must be found to establish site capacities, especially if "tests" of the above nature are employed as planning devices. It will be necessary to define optimum individual recreation or use in terms of such variables as hunter success or number of boats per specified area, etc.

Then, since lake areas or numbers of available birds or game area are known or subject to estimation, site capacities can be set.

The three obvious areas needing further improvement, refinement and analysis are: (a) determine appropriate units of recreation and establish relationships between such units; (b) refine the definition of capacity; and (c) investigate socio-economic factors which determine quality value.

The model is sensitive to the units selected to measure recreation output or generation. And, it is also sensitive to the capacity values assigned sites because there is a direct relationship with the estimated location and quality values. An over-estimation of capacity leads to an over-estimation of location rent and an under-estimation of quality value.

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APPENDIX

Table 8. Observed activity and total economic rent value for Box Elder County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 702)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Honeyville	11	691	41.46	243	10,074
Garland	15	687	41.22	617	25,432
Snowville	16	686	41.16	46	1,893
Howell	20	682	40.92	175	7,161
Willard	20	682	40.92	820	33,554
Collinston	27	675	40.50	54	2,187
Perry	28	674	40.44	135	5,459
Tremonton	35	667	40.02	2663	106,573
Plymouth	45	657	39.42	54	2,128
Wellsville	45	657	39.42	82	3,232
Brigham City	65	637	38.22	3004	114,812
Harrisville	98	604	36.24	36	1,304
North Ogden	101	601	36.06	1541	55,568
Ogden	107	595	35.70	7972	284,600
South Ogden	111	591	35.46	55	1,950
Logan	114	588	35.28	1816	64,068
Roy	114	588	35.28	1646	45,934
North Salt Lake	115	525	31.50	40	1,260
Clearfield	119	583	34.98	379	13,257
Kaysville	143	559	33.54	124	4,158
Bountiful	159	543	32.58	540	17,593
West Bountiful	159	543	32.58	18	586
Woods Cross	165	537	32.22	75	2,416
Morgan	168	534	32.04	222	7,112
Salt Lake City	177	525	31.50	1773	5,584
Holladay	182	520	31.20	72	2,246
Murray	184	518	31.08	605	18,803
Granger	195	507	30.42	53	1,612
Sandy	195	507	30.42	79	2,403
Kearns	200	502	30.12	276	8,313
Midvale	200	502	30.12	61	1,837
Magna	208	494	29.64	86	2,549
Sunset	212	490	29.40	985	28,959
Tooele	242	460	27.60	61	1,683
Elsinore	247	455	27.30	205	5,596

Table 8. Continued

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 702)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Pleasant Grove	247	455	27.30	62	1,692
Springville	275	427	25.62	77	1,972
Cresent	279	423	25.38	894	22,689
Kenilworth	409	293	17.58	366	6,434
Cedar City	702			34	
Total Economic Rent					924,683
Total Number of Trips				28,046	

Table 9. Observed activity and total economic rent value for Cache County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 824)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Hooper	10	814	48.84	89	4,346
Millville	16	808	48.48	200	9,696
Hyde Park	17	807	48.42	676	32,731
Smithfield	18	806	48.36	3860	186,669
Newton	20	804	48.24	327	15,774
Clarkston	22	802	48.12	320	15,398
Hyrum	23	801	48.06	1288	61,901
Logan	30	794	47.64	7455	355,156
Richmond	32	792	47.52	611	29,034
North Logan	35	789	47.34	9	426
Wellsville	42	782	46.92	451	21,160
Lewiston	43	781	46.86	122	5,716
Tremonton	77	747	44.82	95	4,257
Brigham City	79	745	44.70	650	29,055
North Ogden	110	714	42.84	55	2,356
Ogden	115	709	42.54	356	15,144
South Ogden	121	703	42.18	1393	58,756
Roy	128	696	41.76	1140	47,606
Clearfield	133	691	41.46	253	10,489
Bountiful	144	680	40.80	270	9,396
Morgan	170	654	39.24	111	4,355
Salt Lake City	189	635	38.10	1727	42,938
Providence	195	629	37.74	1189	44,872
Murray	198	626	37.56	345	12,958
Kearns	214	610	36.60	276	10,101
Midvale	214	610	36.60	182	6,661
Riverton	216	608	36.48	193	7,040
Hunter	220	604	36.24	79	2,862
Magna	222	602	36.12	430	15,531
Sunset	226	598	35.88	197	7,068
Lehi	247	577	34.62	185	6,404
Tooele	256	568	34.08	122	4,157
Orem	266	558	33.48	63	2,109
Provo	278	546	32.76	63	2,063
Springville	290	524	31.44	77	2,420
Kenilworth	424	400	24.00	122	2,928
Washington	824			55	
Total Economic Rent					1,089,553
Total Number of Trips				25,036	

Table 10. Observed activity and total economic rent value for Carbon County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 470)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Castle Gate	27	443	26.58	6	159
Helper	38	432	25.92	251	6,505
Price	44	426	25.56	1330	33,994
Salt Lake City	285	185	11.10	96	1,065
Bountiful	305	165	9.90	67	663
Richmond	470			63	
Total Economic Rent					42,386
Total Number of Trips				1813	

Table 11. Observed activity and total economic rent value for Davis County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 542)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Woods Cross	15	525	31.50	447	1,408
Kaysville	18	524	31.44	2053	64,546
Clearfield	22	520	31.20	3984	124,300
Bountiful	23	519	31.14	3780	117,709
Farmington	23	519	31.14	5526	172,079
Centerfield	25	517	31.02	356	11,043
Clinton	34	508	30.48	300	9,144
Sunset	35	507	30.42	1576	47,941
Ogden	38	504	30.24	388	11,733
West Bountiful	42	500	30.00	12	360
Salt Lake City	78	464	27.84	3307	92,066
N. Salt Lake City	80	462	27.72	160	4,435
Holladay	85	457	27.42	632	17,329
Murray	87	455	27.30	9	245
Granger	98	444	26.64	160	4,262
Riverton	105	437	26.22	97	2,543
Orem	154	388	23.28	63	1,466
Mapleton	184	358	21.48	27	579
Payson	205	337	20.22	21	424
Kenilworth	312	230	13.80	5243	72,353
Roy	542			1225	
Total Economic Rent					768,636
Total Number of Trips				29,366	

Table 12. Observed activity and total economic rent value for Emery County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 514)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Green River	126	488	29.28	425	12,444
Huntington	87	427	25.62	182	4,662
Price	131	383	22.98	1235	28,380
Helper	145	369	16.14	251	4,051
Castle Gate	153	361	21.66	6	129
Dragerton	179	335	20.10	193	3,879
Sunnyside	183	331	19.86	9	178
Payson	280	234	14.04	78	1,095
Provo	284	230	13.80	189	2,608
Orem	295	210	12.60	63	793
Roosevelt	297	217	13.02	88	1,145
Sandy	348	166	9.96	251	2,899
Murray	360	154	9.24	86	794
Salt Lake City	373	141	8.46	287	2,428
Woods Cross	390	124	7.44	149	1,108
Bountiful	391	123	7.38	135	996
Clearfield	429	85	5.10	63	321
Cedar City	514			440	
Total Economic Rent					67,910
Total Number of Trips				4130	

Table 13. Observed activity and total economic rent value for Iron County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 523)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Paragonah	18	505	30.30	36	1,090
Summit	22	501	30.06	52	1,563
Parawan	43	480	28.80	3084	88,761
Cedar City	48	475	28.50	2862	81,567
Hurricane	128	395	23.70	60	1,422
Price	519	4	.24	190	46
American Fork	523			86	
Total Economic Rent					174,449
Total Number of Trips				6370	

Table 14. Observed activity and total economic rent value for Juab County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 221)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Levan	10	211	12.66	301	3,810
Nephi	21	200	12.00	848	10,176
Payson	73	148	8.88	27	239
Mapleton	95	126	7.56	55	415
Orem	123	98	5.88	380	2,234
American Fork	138	83	4.98	86	428
Salt Lake City	207	14	.84	96	80
Park City	221			340	
Total Economic Rent					17,382
Total Number of Trips				2133	

Table 15. Observed activity and total economic rent value for Millard County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 522)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Holden	10	512	30.72	72	2,211
Hinckley	20	502	30.12	90	2,710
Scipio	25	492	29.52	55	1,623
Delta	49	473	28.38	899	25,513
Sutherland	57	465	27.90	72	2,008
Beaver	62	460	27.60	267	7,369
Oasis	66	456	27.36	36	9,849
Nephi	151	371	22.26	94	2,092
Springville	163	359	21.54	52	1,120
Annabella	213	309	18.54	86	1,594
Monroe	219	303	18.18	304	5,526
Provo	236	286	17.16	190	3,260
Lehi	237	285	17.10	92	1,573
Eureka	251	271	16.26	64	1,040
Dugway	256	266	15.96	80	1,276
Tooele	269	253	15.18	547	8,303
Grantsville	273	249	14.94	246	3,675
Sandy	301	221	13.26	79	1,047
Salt Lake City	325	197	11.82	1295	1,530
West Bountiful	345	177	10.62	6	63
Enterprise	400	122	7.32	109	797
Kenilworth	429	93	5.58	61	340
Lewiston	522				
Total Economic Rent					84,519
Total Number of Trips				4796	

Table 16. Observed activity and total economic rent value for Morgan County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 169)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Morgan	83	86	5.16	222	1,145
Roy	125	44	2.64	82	216
Clearfield	131	38	2.28	63	143
Ogden	148	21	1.26	154	194
Salt Lake City	169			48	
Total Economic Rent					84,644
Total Number of Trips				569	

Table 17. Observed activity and total economic rent value for Salt Lake County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 452)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Riverton	14	438	26.28	1422	37,370
Kearns	19	433	25.98	1288	33,462
Hunter	21	431	25.86	158	4,085
Midvale	21	431	25.86	1578	40,807
Murray	26	426	25.56	2072	52,962
Sandy	26	426	25.56	1506	38,493
Granger	27	425	25.50	428	10,914
Draper	27	425	25.50	2299	58,624
Magna	27	425	25.50	1290	32,895
Bennion	30	422	25.32	27	683
Salt Lake City	34	418	25.08	6714	168,387
Taylorsville	34	418	25.08	64	1,630
Bountiful	54	398	23.28	472	11,271
Clearfield	90	362	21.72	127	2,758
American Fork	96	356	21.36	173	3,695
Ogden	106	346	20.76	78	1,619
Logan	194	258	15.48	125	1,935
Park City	204	248	14.88	632	9,404
Cresent	452			63	
Total Economic Rent					510,994
Total Number of Trips				20,517	

Table 18. Observed activity and total economic rent value for Sevier County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 375)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
American Fork	22	353	21.18	82	1,736
Elsinore	29	346	20.76	350	7,266
Redmond	33	342	20.52	195	4,001
Monroe	36	339	20.34	684	13,912
Richfield	37	338	20.28	2597	52,667
Salina	47	328	19.68	662	13,028
Venice	58	317	19.02	23	437
Joseph	83	292	17.52	219	3,836
Annabella	264	111	6.66	110	732
Orem	281	94	5.64	63	355
Salt Lake City	357	18	1.08	335	361
Tooele	375			61	
Total Economic Rent					98,331
Total Number of Trips				5381	

Table 19. Observed activity and total economic rent value for Uintah County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 641)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Lapoint	16	625	37.50	110	4,125
Vernal	44	597	35.82	2850	102,087
Roosevelt	83	558	33.48	263	8,805
Price	269	372	22.32	95	2,120
Heber City	301	340	20.40	114	2,325
American Fork	363	278	16.68	173	2,885
Coalville	386	255	15.30	62	948
Spanish Fork	387	254	15.24	79	1,203
Salt Lake City	404	237	14.22	96	1,365
Midvale	409	232	13.92	243	3,382
Murray	413	228	13.68	86	1,176
Tooele	461	180	10.80	243	2,624
Green River	641			84	
Total Economic Rent					133,045
Total Number of Trips				4498	

Table 20. Observed activity and total economic rent value for Utah County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 357)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Goshen	16	341	20.46	82	1,677
Lindon	19	338	20.28	36	730
Springville	20	337	20.22	2000	40,440
Genola	20	337	20.22	81	1,637
Benjamin	22	335	20.10	36	723
Salem	23	334	20.04	362	7,254
Payson	26	331	19.86	35	695
Central	29	328	19.68	4166	81,986
Provo	29	328	19.68	78	1,535
Orem	30	327	19.62	3103	60,880
Mapleton	30	327	19.62	911	17,873
American Fork	31	326	19.56	3109	60,812
Pleasant Grove	31	326	19.56	2339	45,750
Spanish Fork	33	324	19.44	2220	43,156
Lehi	36	321	19.26	739	14,233
Santaquin	53	304	18.24	962	17,546
Draper	84	273	16.38	405	6,633
Riverton	86	271	16.26	237	3,853
Hunter	87	270	16.20	79	1,279
South Jordan	90	267	16.02	410	6,568
Heber City	92	285	17.10	456	7,797
Midvale	98	259	15.54	182	2,828
Granger	106	251	15.06	266	4,005
Murray	106	251	15.06	546	8,222
Kearns	116	241	14.46	20	289
Salt Lake City	118	239	14.34	4459	63,942
Hinckley	121	236	14.16	220	3,115
Kamas	129	228	13.68	70	957
N. Salt Lake City	130	227	13.62	40	544
Woods Cross	136	221	13.26	372	4,932
Bountiful	138	219	13.14	202	2,654
Magna	151	206	12.36	86	1,062
Dugway	150	199	11.94	40	477
Clearfield	174	183	10.98	63	691
Price	181	176	10.56	95	1,003
Parawan	212	145	8.70	195	1,696
Annabella	275	82	4.92	500	2,460
Cresent	357			83	
Total Economic Rent					514,028
Total Number of Trips				29,285	

Table 21. Observed activity and total economic rent value for Washington County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 537)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
St. George	10	527	31.62	576	18,213
Enterprise	10	527	31.62	327	10,339
Cedar City	110	427	25.62	142	3,638
Parawan	158	379	22.74	85	1,932
Huntington	537			359	
Total Economic Rent					34,122
Total Number of Trips				1489	

Table 22. Observed activity and total economic rent value for Weber County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 719)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Roy	23	696	41.76	10,015	418,226
Ogden	24	695	41.70	15,943	664,823
Plain City	28	691	41.46	23	953
Clearfield	28	691	41.46	316	13,101
Hooper	33	686	41.16	1,513	62,275
North Ogden	33	686	41.16	355	14,611
South Ogden	36	683	40.98	55	2,253
Harrisville	39	680	40.80	144	5,875
Salt Lake City	84	635	38.10	287	10,934
Granger	105	614	36.84	53	1,952
Garland	106	613	36.78	68	2,501
Coalville	111	608	36.48	410	14,956
Sunset	121	598	35.88	296	10,620
Logan	122	597	35.82	62	2,220
Orem	161	558	33.48	63	2,109
Kenilworth	319	400	24.00	61	1,464
Washington	719			2115	
Total Economic Rent					1,228,875
Total Number of Trips				31,779	

Table 23. Least cost activity and location rent value for Box Elder County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 118)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Honeyville	11	107	6.42	243	1,560
Garland	15	103	6.18	685	4,233
Snowville	16	102	6.12	46	281
Howell	20	98	5.88	175	1,029
Willard	20	98	5.88	820	4,821
Collinston	27	91	5.46	54	294
Perry	28	90	5.40	135	729
Tremonton	35	83	4.98	2758	13,734
Plymouth	45	73	4.38	54	236
Brigham City	65	53	3.18	3654	11,619
Plain City	98	20	1.20	23	27
North Ogden	101	17	1.02	2033	2,073
Ogden	107	11	.66	16,177	10,676
Providence	118			1189	
Total Location Rent					51,312
Total Number of Trips				28,046	

Table 24. Least cost activity and location rent value for Cache County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 144)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Hooper	10	134	8.04	1602	12,880
Millville	16	128	7.68	200	1,536
Hyde Park	17	127	7.62	676	5,151
Smithfield	18	126	7.56	3860	29,181
Newton	20	124	7.44	327	2,432
Clarkston	22	122	7.32	320	2,342
Hyrum	23	121	7.26	1288	9,350
Logan	30	144	8.64	9458	81,717
Richmond	32	112	6.72	611	4,105
Wellsville	42	102	6.12	533	3,261
Lewiston	43	101	6.06	122	739
North Logan	83	61	3.66	9	32
Harrisville	102	42	2.52	180	453
North Ogden	110	34	2.04	219	446
South Ogden	121	23	1.38	165	227
Bountiful	144			5466	
Total Location Rent					153,852
Total Number of Trips				25,036	

Table 25. Least cost activity and location rent value for Carbon County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 94)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Price	44	48	2.88	1620	4,666
Dragerton	94			193	
Total Location Rent					4,666
Total Number of Trips				1813	

Table 26. Least cost activity and location rent value for Davis County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 147)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Woods Cross	15	132	7.92	1043	8,260
Kaysville	18	129	7.74	2177	16,849
Farmington	23	124	7.44	5731	42,638
Centerville	25	122	7.32	415	3,037
Sunset	35	112	6.72	3054	20,522
West Bountiful	42	105	4.14	36	226
Salt Lake City	78	69	4.02	15,384	63,689
North Salt Lake	80	67	2.22	240	964
Cresent	110	37		1040	3,640
Grantsville	147			246	
Total Location Rent					159,825
Total Number of Trips				29,366	

Table 27. Least cost activity and location rent value for Emery County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 153)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Green River	26	127	7.62	509	3,878
Huntington	87	66	3.96	541	2,142
Price	131	22	1.32	759	1,001
Kenilworth	153			2321	
Total Location Rent					7,021
Total Number of Trips				4140	

Table 28. Least cost activity and location rent value for Iron County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 139)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Paragonah	18	121	7.26	36	261
Parawan	43	96	5.76	1053	6,065
Cedar City	48	91	5.46	3588	19,590
Washington	139			1693	
Total Location Rent					25,916
Total Number of Trips				6370	

Table 29. Least cost activity and location rent value for Juab County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 205)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Levan	10	195	11.70	301	3,521
Nephi	21	184	11.04	942	10,399
Eureka	102	103	6.18	64	395
Kenilworth	205			826	
Total Location Rent					14,315
Total Number of Trips				2133	

Table 30. Least cost activity and location rent value for Millard County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 386)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Holden	10	376	22.56	72	1,624
Howell	20	366	21.96	90	1,976
Scipio	25	361	21.66	55	1,191
Delta	49	337	20.22	899	18,177
Hinckley	57	329	19.74	220	4,342
Sutherland	57	329	19.74	72	1,421
Beaver	62	324	19.44	267	5,190
Oasis	66	320	19.20	36	691
Salina	187	188	11.28	235	2,650
Park City	193	193	11.58	225	2,605
Dugway	256	130	7.80	120	936
Tooele	269	117	7.02	82	575
Summit	284	102	6.12	54	330
Parawan	311	75	4.50	2309	10,390
Hurricane	386			60	
Total Location Rent					52,098
Total Number of Trips				4796	

Table 31. Least cost activity and location rent value for Morgan County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 131)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Morgan	83	48	2.88	555	1,598
Coalville	131			14	
Total Location Rent					1,598
Total Number of Trips				569	

Table 32. Least cost activity and total economic rent value for Salt Lake County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 101)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Total Economic Rent
Taylorsville	11	90	5.40	65	351
Clinton	14	87	5.22	1949	10,173
Kearns	19	82	4.92	1860	9,151
Hunter	21	80	4.80	316	1,516
Midvale	21	80	4.80	2246	10,780
Murray	26	75	4.50	3835	17,257
Sandy	26	75	4.50	2073	9,328
Magna	27	74	4.44	1892	8,400
Granger	27	74	4.44	1066	4,733
Salt Lake	34	67	4.02	3462	13,917
Holladay	41	60	3.60	740	2,664
Tooele	101			1013	
Total Economic Rent					88,270
Total Number of Trips				20,517	

Table 33. Least cost activity and location rent value for Sevier County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 83)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Annabella	22	61	4.49	582	2,613
Elsinore	29	54	3.24	350	1,134
Redmond	33	50	3.00	195	585
Monroe	36	47	2.82	988	2,786
Richfield	37	46	2.76	2597	7,167
Salina	47	36	2.16	427	922
Venice	58	25	1.50	23	34
Joseph	83			219	
Total Location Rent					15,241
Total Number of Trips				5381	

Table 34. Least cost activity and location rent value for Uintah County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 83)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Lapoint	16	67	4.02	110	442
Vernal	44	39	2.34	2929	6,853
Roosevelt	83			1459	
Total Location Rent					7,295
Total Number of Trips				4498	

Table 35. Least cost activity and location rent value for Utah County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base=231)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Goshen	16	215	12.90	82	1,057
Lindon	19	212	12.72	36	457
Genola	20	211	12.66	81	1,025
Springville	20	211	12.66	2206	27,927
Benjamin	22	209	12.54	36	451
Salem	23	208	12.48	362	4,517
Payson	26	205	12.30	161	1,980
Central	29	202	12.12	4166	50,491
Provo	29	202	12.12	646	7,829
Orem	30	201	12.06	3798	45,803
Mapleton	30	201	12.06	993	11,975
Pleasant Grove	31	200	12.00	2401	28,812
Spanish Fork	33	198	11.88	2299	27,312
Lehi	36	195	11.70	1016	11,887
Santaquin	53	178	10.68	962	10,274
Draper	84	147	8.82	2704	23,849
Park City	88	143	8.58	747	6,409
South Jordan	90	141	8.46	410	3,468
Heber City	92	139	8.34	684	5,704
Coalville	102	129	7.74	458	4,241
American Fork	104	127	7.62	3713	28,293
Kamas	128	103	6.18	140	865
Castle Gate	162	69	4.14	12	49
Helper	167	64	3.84	502	1,927
Price	181	50	3.00	601	19
Sunnyside	231			9	
Total Location Rent					306,663
Total Number of Trips				29,285	

Table 36. Least cost activity and location rent value for Washington County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 18)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Enterprise	10	8	.48	436	209
St. George	10	8	.48	576	276
Washington	18			477	
Total Location Rent					585
Total Number of Trips				1489	

Table 37. Least cost activity and location rent value for Weber County, Utah, pheasant hunting, 1966

Origin	Adjusted Round Trip Mileage	Location Advantage in Miles (base = 64)	Location Advantage in Dollars (1 mile = $.06)	Number of Trips Taken	Location Rent Per Origin
Roy	23	61	3.66	14,108	51,635
Ogden	24	60	3.60	9751	35,103
Cliton	27	57	3.42	300	1,026
Clearfield	28	56	3.36	5248	17,633
Bennion	65	19	1.14	27	30
Salt Lake City	84			2345	
Total Location Rent					105,427
Total Number of Trips				31,779	