

RECREATIONAL USE OF FARMLAND IN THE DUNCAN
AGRICULTURAL DISTRICT, BRITISH COLUMBIA

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ABSTRACT

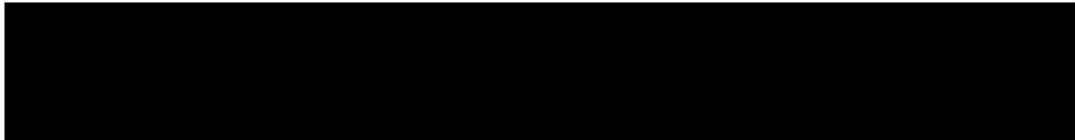
Within the last decade considerable concern has been expressed over the conversion of agricultural land to non-agricultural uses. There has been less of a focus on non-agricultural uses of farmland, such as outdoor recreation, which do not result in conversion. This study investigates the extent of recreational use of farmland in the Duncan Agricultural District, British Columbia, and the preferences of farm operators in allowing recreational activities on their land.

A personal interview questionnaire was designed and completed by thirteen per cent of the population of farm operators in the district. Information collected included: suitability of the respondents' land to accommodate a number of different outdoor recreational uses, willingness of the respondents to allow a number of outdoor recreational uses, preferred outdoor recreational uses, preferred times to allow different recreational uses, preferred access fees for different recreational uses, and preferred access numbers for different recreational uses. Data collected also included information on farm attributes as well as characteristics of the farm operators.

Information obtained from the 100 respondents shows that recreational use of farmland has occurred in the past, and is occurring at present. Results indicate that landowners have allowed a wide range of outdoor activities on their holdings. The preferred activities include birdwatching, farm tours and photography. Farm operators also express different preferred access times, access numbers, and access fees to their land for different recreational activities.

Categorical regression analysis is used to test several hypotheses about willingness of the farm operators to allow recreational activities. The results indicate that there are significant differences in the probability of farm operators allowing different recreational uses of their land depending on: farm type, farm size, area of cultivated land, area of forested land, past recreational use of their land, and whether or not the respondents use any farmland for their own recreational purposes. There are no significant differences in the probability of farm operators allowing different recreational uses of their land based on: location of the farm, whether or not the respondents at present allow recreational use of their land, and whether the respondent had a stated preference for the recreational use.

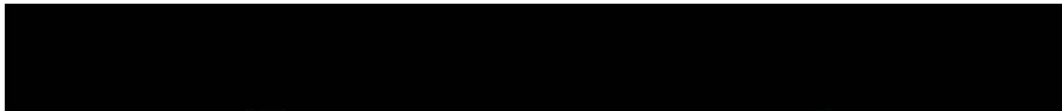
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INTRODUCTION

1.1 Introduction

There is growing concern in both developed and developing nations over the loss of agricultural land to non-agricultural uses (see, for example, Platt, 1977; Plaut, 1980; Briggs and Yurman, 1980; Schneider, 1984). In the United States and Canada, such conversions are recognized as one of the most visible and controversial issues of recent years in land use management (Daniels and Nelson, 1986).

The conversion of farmland to non-agricultural use has been generated both within and outside the agricultural sector and can generally be attributed to population distribution and change, specific types of demand for land by non-farmers, and, alternative employment opportunities for farmers (Bryant, 1976). Some of these same pressures have also created interest in multiple use of farmland. Ironside (1971), for example, suggests that it is inevitable that more attention will be focused on the interface between

agriculture and recreation as the demands for the latter increase.

The use of farmland for many forms of outdoor recreation is also important since it represents a land use which does not necessarily create an irreversible conversion of farmland (Hodge, 1982). Generally, the main impact on agricultural land from recreation is inconvenience to the landowner rather than substantial physical damage to the land, which would interfere with the productivity of the land and, in turn, result in economic impacts (Swinnerton, 1982; Hodge, 1982).

It has also been proposed that multiple use may provide further benefits such as additional farm income, as well as meeting the wider recreational needs of the public. In the United States, for example, recreation on farms was initiated as a legitimate resource use policy of the Department of Agriculture after the passage of the Food and Agriculture Act of 1962. This act created enthusiasm for the conservation of agricultural lands as well as generating additional income to the farm (Twardzik, 1965).

Unfortunately, there has been a paucity of research on the experience of Canadian operators with regard to

farm-based recreation. Little is understood about farmers' preferences and attitudes towards farm-based recreation, and the potential of such activities to raise farm incomes and provide an expanded recreational space (Klippenstein and Ironside, 1973). Before the organized development of recreation can occur more studies of actual and potential cases of recreation on farmland have to be carried out in Canada (Ironside, 1971).

1.2 Purpose of the Study

The purpose of the study reported in this thesis is to investigate the extent to which a sample of Canadian owners of farmland are interested in allowing recreational uses on their property. The study was conducted in the Duncan Agricultural District, Vancouver Island, British Columbia. The specific objectives of this study were as follows:

1. review the literature of multiple use of farmland;
2. develop a questionnaire to record interest in allowing recreational land uses; and,
3. investigate possible relationships between interest in allowing a recreational use and selected socio-economic variables.

1.3 Outline of the Thesis

This thesis is organized into six chapters. Chapter 2 reviews the literature concerning multiple land use theory and its applications to farmland. Chapter 3 outlines the study's conceptual approach. Chapter 4 presents the methodology for investigating preferences of farmers for allowing recreational use of their land. In addition methods of analysis and the analysis plan are discussed in Chapter 5. Results are presented in Chapter 6. Finally, Chapter 7 provides the implications of and conclusions to the research.

MULTIPLE LAND USE

This chapter briefly reviews land use planning theory with specific attention given to planning for multiple land use. The rationale for multiple land use planning is examined together with a review of applications in the agricultural sector, as well as other resource sectors. Finally, some of the impediments to multiple land use planning are identified.

2.1 Land Use Planning

The use of land can be determined in many ways. One important determinant of the use of land is through the economic force of the market. In a free-market economy, with private ownership of land and no restrictions on land use, market forces should allocate land to those uses yielding the highest economic returns (Smit, et al., 1987). Clawson (1975b) argues, however, that our economy is a considerable distance from a wholly free-market in land and is subject to sources of market failures. Market failure is apparent, for example, in planning for open space and environmental amenities since there is little evidence as to how much these amenities are worth

(Gardner, 1984). This has also been the case with multiple use of forest lands (Walter, 1977). Land use planning policies can therefore be used to correct these market imperfections (Frankena and Scheffman, 1980; Gardner, 1984).

In an applied sense, land use planning implies a public policy intervention (Bollman, 1986). Agencies of government are involved in regulating land use for some defined objectives. In Canada, under the British North America Act of 1867 and the Constitution Act of 1982, land use planning has been designated a provincial responsibility (Robinson and Webster, 1985). Provincial governments, therefore, are responsible for writing and implementing planning legislation (referred to as "planning acts") which establish the ground rules for planning, particularly land use planning, by urban and rural municipalities (Robinson and Webster, 1985).

In a theoretical sense, planning is generally viewed as a process of rational allocation or exploitation of resources for the benefit of humans in both the short and long term (Roberts and Roberts, 1984; Bollman, 1986). Implicitly and explicitly, the process of planning places a high value on the rational use of knowledge to manage resources to achieve social good (Bollman, 1986).

Subsequently, land use planning is an effort to systematize decision making affecting land use so as to create the orderly allocation of resources to fit society's demands (Stoddard, 1970). According to Roberts (1979) this process occurs because humans have an inherent need to shape their own destiny. In attempting to manage the natural forces upon which humans are dependent, the process of planning has evolved such that the future is shaped not only by nature but even more by individual and collective decisions (Dubos, 1977).

Much of the land use planning in British Columbia is still overwhelmingly for single purposes rather than for multiple purposes (Pierce, 1986). Given, however, that land possesses certain composite resources (Naysmith, 1976) such as soil, water, vegetation, wildlife, fish, scenery, minerals and recreation potential, it is reasonable to suggest that some form of multiple land use planning is feasible. This feasibility allows for the process of carrying out several uses concurrently on an area of land (Carroll, 1978) and falls under the mechanism of multiple land use planning.

The precise meaning of "multiple use" is rather unclear and depends in part on spatial, economic, and conservationist influences. Evans (1983) suggests that many of the definitions of multiple land use have been derived from three assumptions.

First, multiple land use rejects the assumption of fixed productivity from a piece of land. Thus, the assumption that man can take as outputs only so much as the site can provide, and this quantity is dictated by the ecological mandate of the site in question, is weakened by such technological inputs as irrigation, fertilization, and so forth. The second assumption is that of an overwhelming demand for a number of products. Evans (1983) notes that traditional demands on forest land have been for wood, water, forage, recreation, and wildlife habitat. He cautions that these traditional demands may not remain high and that an overwhelming demand should not be assumed. The final assumption of multiple land use postulates that single use management will be unable to meet anticipated demands. This assumption rests on the notion of fixed productivity and overwhelming demand (Evans, 1983). Society often seeks multiplicity simply for the sake of multiplicity with the assumption that the best use is the most varied use.

These assumptions provide a basis for many of the proposed definitions of multiple land use. Generally, in reference to forest land, multiple use implies that the same area can serve forestry, wildlife, and recreation needs simultaneously with the purpose of safeguarding the rights of the people and the value of the resources for the present, and wherever possible on a permanent basis (O'Gorman, 1978). Logically, however, as Clawson (1977: 302) suggests "...severe conflicts among users would occur if an effort were made to apply multiple use management to every acre at every point in time."

Clawson, therefore, presents a similar view with an areal difference suggesting that multiple land use is:

...the degree or extent to which the output of one product or service is intentionally restricted in order to increase the output of another good or service or combination of goods and services; it does not necessarily require that all kinds of goods and services be produced from the same area (1977: 304).

Furthermore, Clawson raises the issue of conflicting interests in the multiple use of forest area:

The usual discussion of multiple-use management concerns the reconciliation of conflicting or at least partially incompatible uses on the same tract of forest during the same relatively short period of time...But a far more important form of multiple-use management consists of the intermixture of relatively specialized forest uses on particular tracts of land within a larger territorial framework (as well as) on a national basis (1975a: 66).

Multiple land use besides having an areal component has an economic component. There is some disagreement amongst land use analysts over whether or not multiple use is a mechanism that should maximize economic output from land. According to the Multiple Land Use Sustained Yield Act of the United States Forest Service, multiple use means management of all resources so that they are used in the combination that will best meet the needs of the American people with consideration being given to the relative values of the various resources, but not necessarily to the combination of uses that will give the greatest dollar return or the greatest unit output (United States Forest Service, 1958). Millar (1971) suggests that multiple land use, while being an integrated system which produces the greatest array and amount of benefits from a particular area, is usually also biased towards resource development and a growth economy view.

Finally, along with an areal and an economic component, there is a conservation component to multiple land use planning. Behan (1976) suggests that the practice of multiple land use planning tries to minimize conflict through the harmonious integration of uses, and to maintain or protect, or at least not impair, the productivity of the land. From this perspective, the

purpose of multiple land use planning is as follows:

...to optimize the provision of goods and uses while ensuring, by managerial restrictions on permitted uses, that one does not diminish the land's ability to support other uses in perpetuity (Culhane, 1981: 327).

For the purposes of this thesis, multiple land use has been given a broad definition. It is conceptualized as being varying use per farm. This thesis is concerned with recreational and agricultural land uses. Given the variation in the nature of both recreation and agriculture, it is difficult to select one particular definition from the definitions given above which applies to all cases of recreation on farmland. As recreation type and farm type changes, the extent and nature of multiple use will most likely vary. Therefore, spatially there may be some recreational uses which can occur on the same acre of land that farm production is occurring on. On the other hand, there are recreational uses, which may be occurring on the farm, but not on the same acreage as the actual production. Additionally, there may be some instances where recreation and agriculture are combined to give a maximum economic output. Maximization of economic returns may, however, not be important to the farmer. Thus, no single definition is appropriate.

The need to adopt multiple land use planning has been promoted by many researchers. First, Carroll (1978) argues that an increase in social accountability in both the public and private sectors has led to more emphasis on the need to obtain, for the benefit of society as a whole, secondary benefits. Multiple land use planning may be increasing in part due to a scarcity of resources, relative to an increasing degree of planning for integration. This reflects an increasing range of activities demanded by society from non-urban land.

Second, many kinds of land use which are geared toward one major purpose after development may serve other purposes. Vink (1975) notes that the essential purpose of agricultural land is not always for food production alone. Bryant et al. (1982) support Vink's argument by suggesting that farmland has played an important role in providing outdoor recreational opportunities. In Alberta, for example, Pattison (1974) discovered that respondents in a provincial survey acknowledged difficulties in finding land near their home for particular outdoor recreational activities such as camping, hiking, fishing, and hunting. In addition, a number of the provincial respondents suggested that they would use agricultural land for recreation if it was made

available. This demand may be related to growth of urban concentrations, increasing leisure time, and an apparent urge to go 'back to the land' (Pattison, 1974). There are a number of reasons why the farm environment provides a suitable environment for leisure-seekers (Ironside, 1971). These reasons include, for example, first, that urban space is not sufficiently large or varied enough to provide all types of recreation demanded by people. Second, in Canada, although wilderness areas are large, their relative inaccessibility for recreation in different parts of the country and for different time periods means that not all people can use these areas. In addition, because of pressures on parks it is inevitable that other areas will be required to take the overspill of visitors, among these will be agricultural lands. Third, people will always wish to visit the countryside because of the aesthetic qualities for both physical and mental health. Finally, many believe that farms have a particular educational value for children.

Furthermore, contact between farmers and leisure seekers may help to establish a better understanding of the farm environment. Drew points out the following:

A guest farm or ranch is like the public relations office of the agricultural community and a great many people learn from their visits that a farmer often has to look at things differently from someone with a city background... (1987, M2)

Third, and again in relation to agricultural land, multiple land use offers an alternative to other types of development which often remove the land from production. Concern has been generated over the loss of agricultural land to non-agricultural uses (see for example, Bryant, 1976; Bryant and Russwurm, 1979). There has, however, been little effort in North America to promote multiple use of agricultural land which would not remove the land from agricultural production through activities such as horseback riding and farm vacations (Bryant et al. 1982). An additional potential benefit to farmers from private and public participation in recreational enterprises is added income (Ironsides, 1971). He notes that farmers in the agricultural areas of Europe and the United States have recognised the potential for increasing income by providing accommodations and services for tourists. The leasing of land or water for sporting activities, and sale of fresh produce to visitors or local resorts also generates income (Ironsides, 1971). Indeed, the rationale for a policy of encouraging expansion of private recreation enterprises by the United States Department of Agriculture was to provide additional sources of income for the farmer, to reduce the number of acres in agricultural production, thereby controlling surplus crop production and finally, to help meet the national demand for outdoor recreation (Twardzik, 1965).

Multiple land use of public and private land has occurred in Europe as well as North America. In Britain, multiple land use has been practiced ever since the Bronze Age (Anderson, 1967). During this time, man cleared the forest and used the space for crops. The surrounding forest provided shelter, a hunting area, and a source of firewood (Anderson, 1967). Medieval times saw the development of the Royal Forests which provided space for hunting and grazing as well as a source of firewood. The great estates of the seventeenth and eighteenth centuries also supported multiple land use. During this time, open land was subject to common rights (Johnson, 1971). Considerable areas of land were enclosed, and areas of woodland and hedgerows were planted. Edlin (1968) estimates that 2 million of 3.5 million acres of woodland existing in 1947 were created during the enclosure movements and that approximately 180,000 miles of hedgerow were formed during that period. The effect was to create a landscape which provided, along with vigorous agriculture, shelter, amenity, and biological diversity.

Generally, forest recreation has been encouraged in all Forestry Commission forests in Britain since the Countryside Act of 1968 which gave added powers to the

Commission to open up its forests for recreation (Glig, 1978). Recreation has also been encouraged since 1972 when a government white paper established recreation as one of the main justifications for new planting.

In North America, there is also a legacy of multiple land use. This legacy of multiple use has been developed especially in water resource management and forestry management in the United States and Canada. Chang and Buongiorno (1981) indicate that in the United States, The Multiple-Use Sustained Yield Act of 1960, The Wilderness Act of 1964, The National Environmental Policy Act of 1969, The Resources Planning Act of 1974, and The National Forest Management Act of 1976 have directed the Forest Service to give a balanced consideration to all resources. The Forest Service has established the precedent for national forests so that they are used in the combination that makes the most judicious use of the land for some or all of the resources (United States Forest Service, 1980). The potential multiple uses include watershed maintenance, forage or rangeland use, fish and wildlife habitats, recreational areas, and timber areas. To arrive at a choice of the most suitable multiple uses, factors such as regional and national economic development, social well being, and environmental quality are considered (United States

Forest Service, 1980). In addition to these criteria, Clawson (1975a) considers the degree of compatibility between different potential multiple uses to be significant planning information.

In Canada, the success of multiple land use planning for forest lands is open to debate. Hackman (1982) suggests that Ontario is a hypocritical adopter of multiple use planning for forestry. He suggests that the presumption remains that forestry products and other uses are inherently conflicting. The forest industry retains the notion that if they cannot make a profit, then the forest is worthless. The Provincial government has taken an expansionist approach while adopting, in Hackman's opinion, a smokescreen of multiple use.

In British Columbia, the Planning Guidelines for Coast Logging in 1972 recognised the multiplicity of forest services in stating that protection of the quality of water and the maintenance of a managed forest suitable for preservation, protection, and regulation of other users of the forest habitat was a concern (British Columbia Forest Service, 1972). The degree to which these concerns have been dealt with through multiple land use planning can be debated.

Multiple use has also been adopted within water resources management. White (1971) suggests, for example, that two out of six possible river basin development strategies in the past included multiple purpose construction. Tate (1981) provides several examples of multiple use planning, including The Tennessee Valley Authority which in 1933 established a system of dams and reservoirs to harness the power potential of the Tennessee River, to control floods, to provide navigation, and to supply water to municipalities and industries. He also points to the South Saskatchewan River Project as a good example of a multiple purpose land use plan with the main intention of assisting in diversifying the agricultural economy of the region.

Multiple use public projects in Canada have also been pioneered through Ontario's Conservation Authorities. Tate (1981) suggests that the Authorities anticipated the need for comprehensive river basin planning. The impetus for their formation was a need to alleviate flood and soil erosion problems through coordinated basin management (Department of Regional and Economic Expansion, 1969). Subsequently, they have become involved in providing outdoor recreation opportunities.

Finally, Tate (1981) examines water problems in the

Okanagan Valley. Here a planning task force was organized with four concerns: water quantity, water quality, fisheries, and water based recreation. For each of these concerns, alternative development plans were prepared to help formulate a multiple land use plan because land use impinged on water use.

Other researchers have recognised the importance of multiple use of water resources. Arnett (1983) suggests that there is a broad range of user groups placing demands on marine environments which serve such multiple functions as fishing, gas and oil extraction, recreation, and wildlife habitat. Raphael and Jaworski (1979) also acknowledge the value of multiple land use planning of Michigan's coastal wetlands. These areas provide breeding habitats for many fish species as well as other wildlife. They also support recreation environments. Some potential recreational activities include nature study, boating, sightseeing, hiking, picnicking, and snowmobiling. As Raphael and Jaworski (1979) suggest, these recreational activities can be accommodated in wetlands by virtue of their unique ecological character which attracts wildlife concentrations and provides a high viewing quality. Finally, a study by the Environmental Protection Agency (1980) of the Coquille River Estuary indicates that wetlands in farmland areas,

are for the most part, compatible with existing agricultural practices. In addition, agricultural practices are compatible with the wetland conditions and winter water fowl habitat.

Most of the examples and studies cited so far focus on multiple use of land which is publically owned or which is a common property resource. Multiple use of privately owned land can also be observed.

Sweden and Norway are countries where the use of private land for recreation is accepted, but only if no damage occurs and the personal space of the landowner is not infringed upon (Cullington, 1980). In the Netherlands, it has been suggested that a remaining source of land for open space recreation is an area of 2.5 million hectares of highly productive agricultural land. The intention is to bring a substantial part of this agricultural land under multiple use by conserving and developing the natural and recreational resources of such areas. In 1979 the Government stated that part of the multiple use plan for agricultural land would include a 200,000 hectare conservation program. This program began in 1980 as a long range scheme where some of the integrated uses such as a system of recreational trails would be developed including provisions and regulations

to protect farming interests (Held and Visser, 1984).

The benefit of such multiple use planning has, however, been debated in Britain. Gilg (1978) suggests that with the growth in a demand for recreation coupled with a demand for more intensive farming that the scope for multiple land use planning to deal with the demands is being reduced.

Perhaps one of the best examples of multiple use of privately owned farmland in North America has been the development of dude ranches. While Bourne (1983) suggests that dude ranching did not begin at a specific time, there is evidence that it developed slowly from several divergent sources in different locals starting in the 1800's. He indicates that only in 1937 did Wyoming officials define a dude ranch as "a ranch offering accommodations, entertainment, and participation in ranch...activities to guests for a monetary consideration" (Bourne, 1983: 4).

The Department of Agriculture in British Columbia has provided information for different regions of the province concerning farm and ranch accommodations. Furthermore, Ontario has been one of the most active provinces in promoting farm vacations and dude ranches

(Ironsides, 1971). The Ontario Federation of Agriculture, for example, had a Farm Vacation program for two years which promoted farm vacations (Ironsides, 1971).

Alberta has also established land use systems that attempt to accommodate both recreational and agricultural land uses. Pattison (1974) found that Albertans use agricultural land for non-agricultural purposes, primarily outdoor recreation. Recreation in this study involved activities such as small group picnics, overnight camping, hiking, bicycle or motorbike riding, hunting, fishing, cross-country skiing, snowmobiling, and boating. Supporting evidence for Pattison's work was provided by Swinnerton (1982), once again in Alberta, and his main conclusions are summarized in Appendix A. The results clearly indicate that both consumptive and non-consumptive forms of recreation can be accommodated on farmland without conflict.

In British Columbia in the Duncan Agricultural District, evidence of recreation on farmland already exists. Fairburn Farm is a sheep farm in the Cowichan Valley that offers year-round guest accommodations. Darrel and Athena Archer, the owners and operators, maintain that:

Many urban people have misconceptions about what farm life is really like. We provide an opportunity to change those ideas, because they can visit Fairburn Farm and get involved in the business of food production...all types of people are drawn to the farm experience...Some people want to get involved with the haying or farm chores, some want to hike and they even have riders who bring their own horses to enjoy travelling through the hills on old logging roads. There are sleigh rides in the winter and hay rides in the summer.... .(Drew, 1987: M2)

There is also evidence of farmland being used for horseback riding (Litwin, 1987) and farm tours (Times Colonist, 1987). Wolff (1987: 29) reports, for example, that "One of the most prestigious sheep dog trials is held here (Saltspring Island)...(where) A trial is set up like a real working farm situation." As a final example of recreational use of farmland in the Duncan Agricultural District, Cleverley (1987), reports that the National Retrievers Club of Canada Championship Stake was held at Woodwin Farm on West Saanich Road.

While a number of studies focus on the nature of the activities occurring on farmland, a limited research effort has examined the issue from the farmers' perspective of attitudes and preferences. It may be that the attitudes and preferences of the landowner towards accepting alternative uses other than the primary use have a higher influence than physical or economic aspects (Carroll, 1978).

Klippenstein and Ironside (1973) address the importance of farmers' attitudes towards farm based recreation. Attitudes were measured by asking respondents to indicate an interest or non-interest in accommodating five different types of recreational activities. Results reveal that interest was highest in snowmobiling, camping, horseback riding, guest accommodation, and hunting. The authors concluded that there were significant statistical associations between interest in accommodating one or more recreational activities and farm type, farm size, cultivated acreage, and census division.

2.5 Issues of Multiple Land Use Planning

Clearly, multiple land use planning is an accepted idea in resource management in both the public and private sectors. In the area of privately owned land as well as publically owned land there are, however, certain on-going unresolved issues. While there are numerous rationales for developing multiple land use plans, there are several obstacles to or problems associated with this type of planning. Successful applications of multiple land use plans depend as much upon overcoming problems of attitude and communications as on resolving an often formidable array of legal and technical impediments

(Harville, 1983). Additionally, there are considerable spatial, temporal, economic and public constraints on recreational development on farmland (Ironside, 1971). A number of these impediments are reviewed.

2.5.1 Legal Impediments

Ownership of land is really a collection of rights and duties (McDonnell, 1977). In Canada, the Crown is the absolute owner of the land, everyone else has an estate in the land, that is, each person has an interest in land for a certain length of time. The "fee simple" estate is most like absolute ownership where "fee" denotes that the estate might continue forever, and "simple" denotes that there is no qualification on the type of heir who can inherit the land (McDonnell, 1977). The theoretical interpretation has been that the fee simple title would facilitate pursuing one's own best interests which would automatically fulfil any responsibilities which that individual might owe society (Boylan, 1975). It can be postulated, however, that only personal interests have been fulfilled without much attention being paid to the needs of society. This may help to explain why public access to private land has not been a strong part of our heritage. The Public Trust Doctrine serves as an example which establishes the

principle that property rights in certain lands can never be alienated from the general public (Nixon, 1978). One rationale for the doctrine is that certain resources, for example, shorelines, are so important that their protection is essential in a free society. The benefits of these resources to society as a whole outweigh any private property interests (Nixon, 1978).

Ultimately, in the modern state, the full title to the land does not lie with the owner because of eminent domain. The owner has, however, a number of rights. Land rights include, those rights which enable the owner to enjoy the land itself, and those rights which place restrictions on someone else's land in favor of the public (Esau, 1974).

Property rights in land help to settle the land use and are one of the powers by which man can execute positive plans for the use of land (Denman, 1969). Knetsch notes, however, that property rights have been a neglected area of serious analysis.

Rights are often not well understood, divergent preferences are often contrived sources of awkward accommodation, and remedies are sometimes at variance with one another. A more deliberate accounting of the assertions of entitlements associated with resource management actions might well improve matters (1978: 87-88).

Logically, one could suppose that the proprietary structure of land and the motives of landowners as well

as land tenure and property rights are matters which might be expected to affect the implementation of multiple use of land.

Conflicts which occur with recreational use of farmland arise out of land tenure and property rights. These include conflicts of access and trespass which often require the negotiation of public rights of way across farmland to scenic attractions (Ironside, 1971). Bryant et al. (1982) suggest, that the major restrictions to multiple use in North America are trespass and liability laws. Trespass and liability laws suggest that there are property rights of the owner as well as property rights of the user of private property. What an owner does on their property resulting in damage to the public is handled as nuisance or negligence. When the public directly comes onto or interferes with an owner's property, the action is one of trespass. Unless a person has a legal justification for entering on the property of another, they will be liable for trespass even if they do not cause damage (Lennon, 1974). Actual specific damage need not be proven, merely 'bruising the grass' is enough (Lennon, 1974). Reasonable force may be used to evict trespassers or to prevent them from entering.

Negligence may also be of concern to farmers who

consider allowing recreational use of their land. Negligence is the part of tort law which attempts to define for what careless acts a person will be held responsible (Lennon, 1974). Landowners have duties of care towards the public when they enter onto the land. The owner of land is under obligation to demonstrate that he/she has not acted towards the public in a manner which breaches that duty of care. This assumes that the owner of the land can foresee where any of his/her actions or omissions might cause damage to the public (Lennon, 1974). The fear of negligence may, therefore, act as a deterrent to allowing multiple land use of private property.

2.5.2 Technical Impediments

First, in the case of multiple use of farmland for recreation, there may be the technical impediment of unsuitable land. Ironside indicates that

A major constraint is the physical resource base required for the establishment of vacation farms. Wooded, lake, and hill land, from the view-point of general location or site, are prerequisites for the operation of such farms and other recreational facilities (1971: 9).

McCurdy (1965) concurs and suggests that land which is

suitable for recreation should have several natural attractions as well as a scenic setting.

Second, location may act as an impediment to multiple use of land. A major constraint can be the accessibility of the recreational facility to its market with the potential for different types of recreational development varying with the distance and travel time from a city (Ironside, 1971). The development of recreational facilities also depends to a large extent on the availability of provincial and national parks and Crown wilderness lands. If these are easily accessible, the development of private facilities may have severe competition.

Third, there are environmental impacts arising from increased erosion by overuse of paths, waterside areas, and vegetation cover when allowing multiple use of land. Burden and Randerson (1972) suggest that there has been little study of the precise effects of recreation on the vegetation and soils of seminatural areas. They found, however, that vegetational changes are rather sensitive indicators of the intensity of recreational use. It is important, therefore, for environmental impact information to be used as a prerequisite for land use planning (de Vos and Bailey, 1970).

Cole and Fichtler (1983) in a study of the impact of camping in forest areas found that tree injury, vegetation loss, and soil compaction on campsites occur after only a few nights of use. Newmann and Mernam (1972) have measured the ecological effects of snowmobiles. Impacts include those directly to small mammals, as well as snow compaction which significantly reduces the ability of snow to runoff slowly. In addition, there were direct mechanical impacts to vegetation at and above the snow surface. It appears, therefore, that although a multiple land use plan might suggest that recreational and agricultural land uses may be compatible, microscale studies in some cases have suggested that human recreation has a negative impact on the environment.

Fourth, there exist more general impediments to multiple land use planning such as a lack of technical planning information within the forestry industry (Chang and Buongiorne, 1981). They suggest that current knowledge about the complicated relationships among uses is limited and that management programs rely mostly upon the judgement and experience of a select group of forest managers rather than a systematic analysis of management alternatives or with public input.

2.5.3 Economic and Social Impediments

First, in the forest industry, Walter (1977) suggests that the market place which traditionally is relied upon to resolve conflicts in needs through pricing has failed to provide the multiple use services demanded of the forest. This failure occurs because of historical precedence, common property problems, joint products which may be in conflict, and lack of clear liability rules. Historically, forest lands have been managed as large, essentially single use holdings (timber harvest), so that road access and other planning have centred on cost minimization of timber extraction. Forests are treated as a common property resource and harvest firms have not, until recently, been liable for their actions affecting the environment and recreational access. As a result, there has been market failure (costs imposed without compensation). There generally have been no mechanisms in existence to compensate the forest service for undertaking measures trading off wood production for other goods, either within or outside the government. These mechanisms of compensation can, however, be observed particularly within wilderness preservation. Instances have arisen where compensation to timber companies for lost production as a result of preservation have been attempted.

If the market failure in multiple use forestry is to be resolved, then two possible alternatives arise (Walter, 1977). These alternatives include 1) the use of annual permits or tolls to levy users' charges, and to estimate willingness to pay for forest land recreation, and 2) the establishment of government management whereby the various government agencies with different interests in the forest land are willing to compensate other government agencies for accommodating their interest.

Second, multiple land use may be inhibited because of the cost of development. In the case of farm vacations, for example, renovations to a farmhouse may be required which the farmer may not be able to afford (Ironside, 1971).

Third, impediments to multiple use may be a result of planning controls (Ironside, 1971). Hodge (1982) suggests that there are two possible alternatives for planning for multiple use. First, "In the case of frictional competition, the objective of management is to encourage the dual use of agricultural land, while minimizing the various externalities involved" (Hodge, 1982: 372). Minimizing the externalities would include recreationalists preventing their dogs from worrying farm

animals, closing gates, and keeping to paths. Landowners could also maintain walls and paths. As well, a landowner might involve a third party who could act as a supervisor and organizer of activities by providing information and signposts or notices (Hodge, 1982).

"This would help to reduce the casual damage resulting from recreationalist straying into crops or not realizing the significance of agricultural activities" (Hodge, 1982: 373). Second, "The management of fundamental competition requires a more formal transfer of property rights from the occupier of the land to some public body" (Hodge, 1982: 373). Such a process would transfer various combinations of rights to a public authority who would undertake management of the land in a specified manner to achieve a particular public objective. Hodge (1982: 373) concludes by suggesting that "The costs of arranging and policing the arrangements are likely to be high...However, a population looking to rural areas for the provision of recreation and conservation may expect to bear the burden of these facilities".

Fourth, with regard to farmland, Pattison (1974) suggests that the majority of recreational activity takes place on land owned by someone other than the recreationalist. Landowner cooperation is essential if

the land is to remain accessible. While the situation presents the potential for conflict, only about 25 per cent of approximately 2,240 landowners surveyed by Pattison reported any inconvenience. There still remains, however, the potential for harassment, damage, or destruction of farm buildings, crops, and livestock by irresponsible recreationalists (Ironside, 1971). Fire, excessive noise, illegal and careless hunting, litter, and persistent trespass can be the means by which these conflicts occur. The notion of inconvenience is controlled to some degree by the attitudes of an individual landowner which result from his or her personal beliefs, preferences, and experiences taken together with the implications of the legal, economic, social, and ecological concerns (Swinnerton, 1982). Preferences represent the willingness of a person to accept or reject an idea (Swinnerton, 1982) and affect the type and extent of benefits which the owner, and society as a whole will obtain from the farmland (Carroll, 1978).

More specifically, a social impediment to multiple land use on privately owned land may be the characteristics of the landowners themselves. Many farmers enter the commercial recreation business unaware

of the need for special skills and experience in recreation operations (Twardzik, 1965). Ironside (1971) concurs. He suggests that not every farmer can operate a successful farm vacation because of the need to like all kinds of people and to be personable. Results of a study by Klippenstein and Ironside (1973) show, for example, that farmers indicated no interest in accommodating recreation on their land because they had a preference for privacy. McCurdy (1965) as well has shown that the forest recreation provider is one who has an avid interest in outdoor recreation.

Assuming that multiple land use of agricultural land is desirable, Pattison (1974) suggests a number of courses of action to encourage landowners to allow multiple use of their private property. First, a system should be developed where landowners receive economic benefits from making their land available for recreation, not only for hunting, but also for such activities as snowmobiling and fishing. Second, landowners should be encouraged to take the initiative in providing and advertising attractive areas for recreation. Third, purchase and development of parcels of land throughout the settled areas for specific recreational uses should occur. Fourth, law enforcement to assist in the

protection of private property rights should be strengthened. Fifth, rural-urban youth exchanges should be sponsored with the view to increasing good will and understanding. Sixth, landowners should be educated to their rights. Finally, the general public should be educated with respect to the use of private property and the impact their actions may have on the economic well-being of farmers.

2.6 Summary

Rural land can serve a variety of human needs. Planning for the servicing of these human needs may be accomplished through either single or multiple land use plans. Multiple land use plans recognize the composite nature of land and the ability of an area of land to sustain a number of uses. Farmland may be able to accommodate food production and recreational activity concurrently. Multiple use of farmland does, however, have a number of restrictions. One of the most important restrictions is the preferences of farm operators' toward recreational use of their land.

Although the preferences of a farm operator will influence the decision whether or not to allow multiple use of land, few studies have been conducted to determine if farm operators will allow multiple uses and, if so, which of the uses are preferred. The following chapter develops a framework for investigating these issues.

Chapter 3

CONCEPTUAL FRAMEWORK

This chapter presents the conceptual framework adopted to investigate farm operator preferences in allowing outdoor recreational use of their land.

3.1 Conceptual Basis of the Study: Geography and Behavior

In the broadest sense, the universe of geographical study can be divided into three realms: the first being the nature of the environment; the second, what humans think and feel about the environment; the third, how humans behave in the environment and alter it (Lowenthal, 1967). Until the early 1960's geographers were content to explore only the first realm. Others (see, for example, Golledge, 1981; Bunting and Guelke, 1979) argue that a major departure from geography's conventional position occurred in the early 1960's when researchers began to realize that in order to exist in and understand an environment, people select and organize information from their mass of experience.

By the twentieth-century, geographers had achieved a certain facility for describing the spatial properties of inanimate phenomena such as physical and economic landscapes, locations, distributions, and interactions (Cox and Golledge, 1969). Research, therefore, turned to analysing the reasons for the spatial existence of phenomena. The analysis included ideas such as the logic of individual decision making, as well as the maximization of preferences and became concerned with the outside world of the behaving organism as well as with the elements of the behaving organism itself (Golledge, 1981; 1982).

Behavioral geographers, therefore, adopted a cognitive philosophy where the mind was seen as a crucial variable in the explanation of spatial behavior (Harman and Betak, 1976). Geographers also began to require theories of the mind to guide research on spatial behavior. These included theories on how the mind selects, codes, and manipulates information about environmental stimuli for the purposes of spatial decision making (Harman and Betak, 1976). Three mental processes were focused on, namely, cognition, evaluation of spatial opportunities, and learning. These mental processes and their measurement were based according to Burnett (1976) on a number of beliefs about the mind, and

how the mind relates behavior to the environment (Harman and Betak, 1976). Burnett suggests these points, for example:

1. Minds observe, select, and structure information (sense data) about the external world. They thus have processes corresponding to spatial learning and remembering... .
2. Minds are the seat of emotions and sensations, such as environmental stress and satisfactions and dissatisfactions. They are also the seat of attitudes, needs, desires, and motives... .
3. The mental states, events, and processes of different persons, such as preferences and perceptions, are comparable, recoverable, and verifiable (1976: 25-26).

The notion that behavioral geography is evaluative has been clearly acknowledged. Rushton (1979), for example, indicates that behavioral geographers began taking the position that individuals evaluate their environments from their given state of attitudes, beliefs, perceptions, and preferences. These are then used to formulate goals and actions within certain environmental constraints (Rushton, 1979). Thus, if humans are continually reacting to new and novel environments, then it is only by knowing how alternatives are evaluated and choices made that researchers can expect to anticipate the decisions which humans will make in any new situation (Rushton, 1979).

Others still feel, however, (see for example, Bunting and Guelke, 1979) that overt behavior is the primary concern of geographers, not the cognitive

process. Geographers deal with the real world. A thorough description of human geographical activity is seen as a logical starting point of geographical analysis.

3.2 A Framework for the Study

This study focuses on the individual landowner as a decision maker who exercises choices. These choices represent revealed preferences. It is argued that through a survey of a suitable sample of individuals, a systematic description, evaluation, and prediction of preferences is attainable. Consequently, it is necessary to review what preferences are and the method for measuring preferences.

Preference is the selection of one person, idea, or other phenomena over others. Preference for some object is directly related to the attitude that one has towards that particular object with agreement that attitude connotes preference regarding outcomes involving the object (Summers, 1970). Attitudes can be described as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object (Fishbein and Ajzen, 1975). Generally then, attitudes are "the evaluative dimension of a concept"

(Fishbein, 1963: 233) and they are described as mediating evaluative responses. An individual's attitude towards any object is a function of his/her beliefs about the object and the evaluative aspect of those beliefs (Fishbein, 1963). When an individual's attitude is positive, it is likely that a preference for that object can or will be stated.

Banerjee, et al. (1982) suggest that there are two broad views concerning the nature of preferences. The first suggests that preferences are expressed in terms of activity or behavior. The second suggests that preferences are expressed in terms of attitudes or opinions. The basic assumption of the first point of view is that the real-world choices are the best indicator of preferences. Therefore, it is argued, the only reliable and objective way to find out about preferences is to study actual behavior and to observe choices that have been selected (Banerjee, et al., 1982).

The major weakness of the revealed preference approach is that it does not provide information about unfulfilled preferences, preferences that might emerge in possible future environments with characteristics and attributes outside the range of current observations. For land use planners this is a serious limitation since

existing behavior patterns may oversimplify or provide misleading views of preferences. One alternative to revealed preferences has been the use of preference surveys. Banerjee, et al. suggest, "Such questionnaires will often reveal valuable information about the preference orderings of respondents, that is, the basic ranking of desired environmental attributes..." (1982: 79).

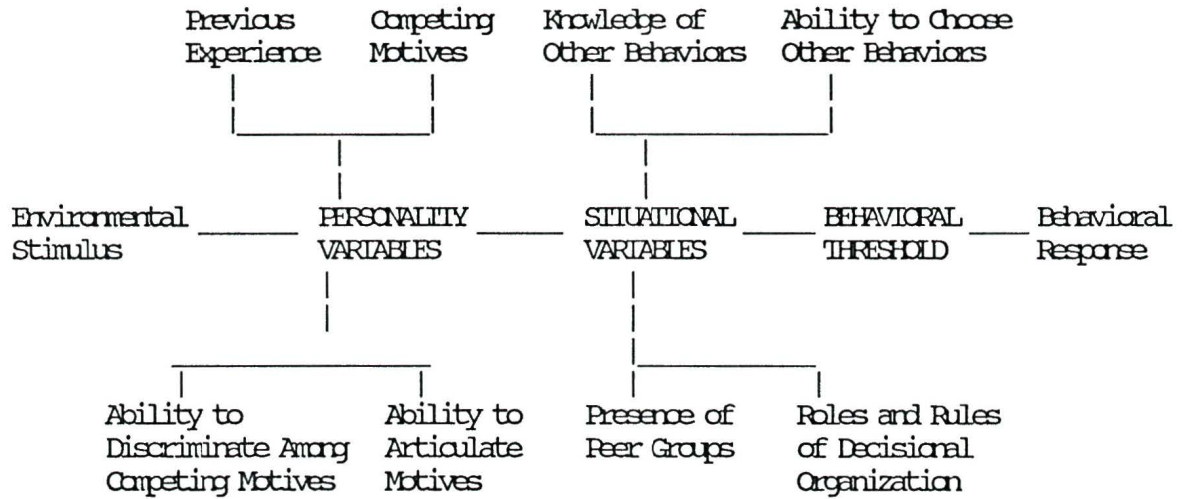
This theoretical approach is not without its drawbacks in using preferences as means of predicting human behavior. First, Bunting and Guelke (1979) have raised the issue of whether or not it is possible to obtain subjects who are prepared and able to reveal their actual thoughts to investigators. Second, preferences relate to attitudes which, in turn, relate to beliefs and values. Preferences may influence behavior, but they may also be derived from behaviors. Although a type of behavior may have a consistent impact, any given behavior may also have quite different impacts. Third, Bunting and Guelke (1979) as well as Banerjee, et al. (1982) also suggest that findings associated with the study of preferences for environmental phenomena show no direct or self-evident relationship to overt, ongoing behavior. Expressed preferences and actual behaviors do not necessarily coincide, especially if behavior is defined

as real world action directed to or having impact on some element or feature of the environment. Expressed preferences from a limited set of alternatives are not adequate for predicting the behaviors of the individuals being tested, were they to be faced with responding to the real world equivalent test stimuli. Discrepancies have resulted when preferences have been measured towards inappropriate stimulus objects (Porteous, 1977). Additionally, verbal behavior has fewer consequences than overt behavior so that the individual is free to express any reasonable preference unless that person perceives immediate commitment to a behavior.

The assumption of a strong relationship between expressed preferences and actual behavior does not always follow because of the many other factors such as personality and situation which may come into play (O'Riordan, 1976). These can be considered to be latent process variables (Figure 3.1). Personal variables include the preferences of individuals, competing motives, and verbal and intellectual aptitude to conceptualize and describe preferences (O'Riordan, 1976). These personal variables characterize discrete bundles of closely connected beliefs and feelings that relate to various facets of an object or situation.

Figure 3.1

Environmental Stimulus and Other
Variables Leading
to a Behavioral Response



After: O'Riordan (1976)

Situational variables refer to the sanctions relating to the social or organizational environment which relies upon the presence or absence of peer groups and authority roles (O'Riordan, 1976). Situational variables will, therefore, help to determine what alternative behaviors will be considered. Behavior is influenced by the situational threshold beyond which there is a search for alternative thresholds. These alternative thresholds suggest that there are certain behavioral thresholds. These behavioral thresholds are influenced by experience, new information, and social peers (O'Riordan, 1976).

This framework enables one to consider what the relationship is between preferences and behavior with respect to allowing recreational use of farmland. For the purposes of this study, the behavioral response is the respondent allowing a recreational use. This model accounts for not only stated preferences for certain recreational uses but also the following: 1. the effect of previous experiences; for example, have the respondents allowed recreational use of their land in the past?; 2. the effects of competing motives, for example, does remuneration from off farm work present a competing motive as compared with the remuneration from recreation?; 3. the ability to discriminate among

competing motives, for example, is the respondent's land suitable for certain recreational uses?; 4. the ability to articulate motives, for example, are the respondents at present allowing recreational use of their land?; 5. presence of peer groups, for example, have the respondents used farmland for recreation themselves where their peer groups have provided the recreational opportunity?; 6. roles and rules of decisional organization, for example, do respondents express concern over the problems of trespass and liability?; 7. knowledge of other behaviors, for example, do respondents perceive that there is a demand for the recreational use of their land?; and 8. the ability to choose other behaviors, for example, do the respondents have a farm type, farm size, or farm terrain which may restrict their ability to choose a behavior favouring recreational use? Information on these personal and situational variables are collected in the study (see section 4.4.1).

3.3 Preference Measurement

One of the most obvious methods of measuring preferences is the checklist method. In this method, respondents are presented with a list of objects and asked to check or indicate those which they approve of

and/or those of which they disapprove (Lemon, 1973).

Checklists represent an absolute judgement on the basis of some attribute according to Lemon (1973). In this case, objects are judged independently of each other. The checklist method in the case of this study has each respondent indicate whether or not they are willing to allow certain recreational uses on their farmland. As Lemon (1973) indicates, however, while this method of attitude measurement is simple it has several drawbacks. He (1973: 84) goes on to suggest that "Respondents are asked to check an object for which they have a preference, but they cannot indicate whether this preference is a strong desire or just a mild fancy."

In response to this criticism of the checklist method, the second scaling technique to be employed for this study is an ordinal technique of rank ordering. Garner and Creelman (1970) indicate that the simplest of all scaling techniques is simple rank ordering. In this technique, a subject is shown a set of stimuli to judge, for preference. The subject is simply required to place the objects in rank order, or to assign a numerical rank to each object.

An effective way of making relative judgements with reference to some ideal is to rank order a set of statements or objects, for example, how much a person prefers each object (Lemon, 1973). The most typically used ideal against which respondents are asked to judge stimulus items is their own preference for an object.

For the purposes of this study, respondents are asked to judge each recreational land use that they would allow in terms of preference for allowing the recreational use. A respondent will not only indicate whether they will allow a use but will also indicate the strength of their willingness to allow with a stated preference rank.

3.4 Summary

The conceptual approach of this study falls within behavioral geography. In part, the foundations of behavioral geography are in decision making and preference measurement.

Preferences of landowners are an important factor in recreational use of farmland. Since preferences are important to recreational use of farmland, then a

behavioral theoretical approach to the study is suitable. This theoretical approach uses stated preferences to analyse the reasons for why the patterns of recreational use occur as well as providing a description of the pattern.

The behavioral approach taken in this study measures farmers' preferences for a number of recreational activities. This is done in two methods. The first method is an evaluative method which focuses on farmers preferences for certain recreational uses and willingness to allow certain recreational uses. This is accomplished by using a checklist and ranking exercise. The second method is a description of the overt behavior of farmers with regard to recreational use of their property. The descriptive approach also attempts to collect information on the personal and situational variables that O'Riordan (1976) has indicated as important in determining what sort of behavioral response might occur. The following chapter develops a methodology for investigating these preferences.

METHODOLOGY

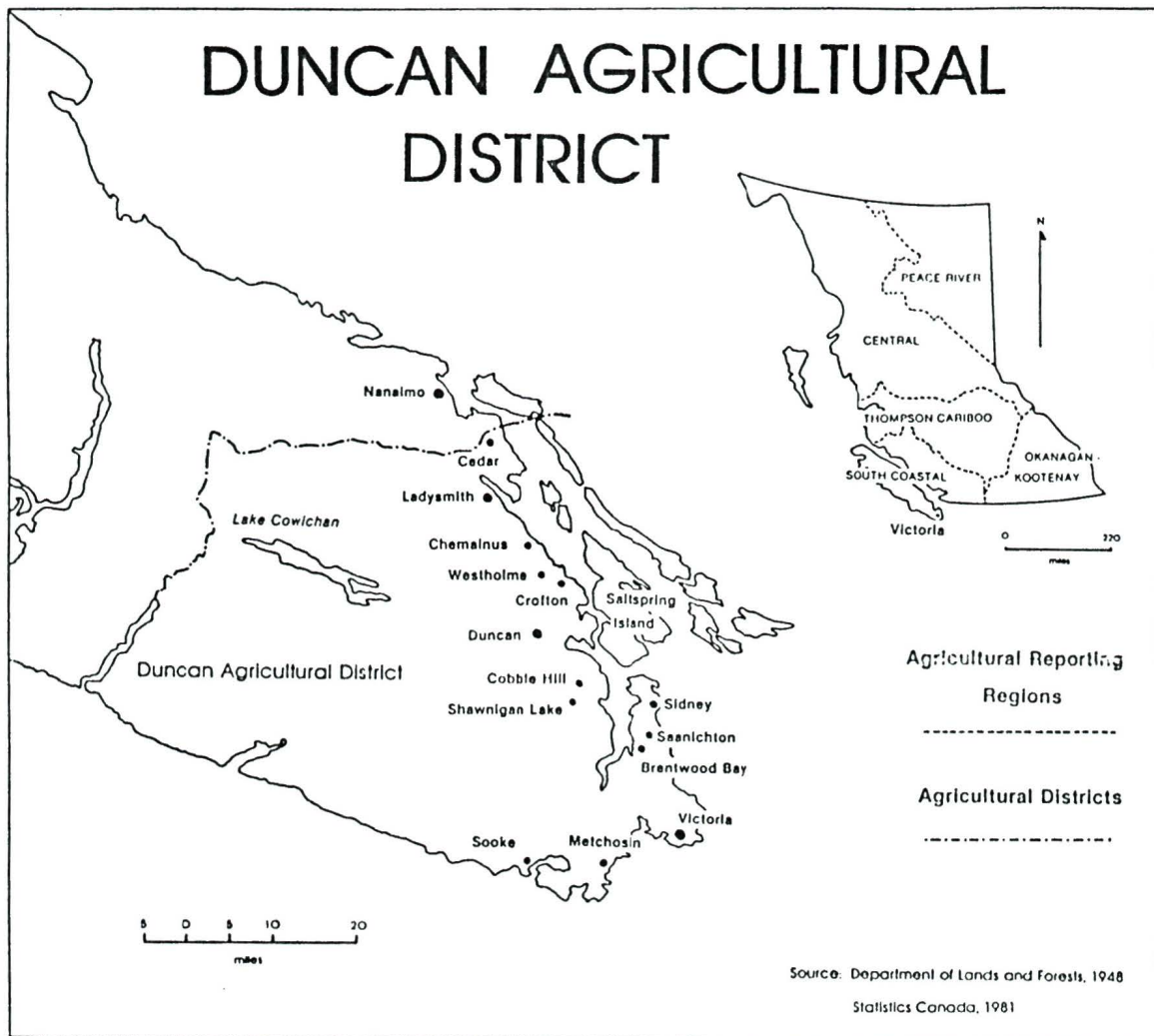
This chapter presents the rationale for the selection of the study area. It then describes the procedures used in selecting the sample and outlines the development of the questionnaire.

4.1 Study Area

Southeast Vancouver Island is an area of mixed land uses. This area supports forestry, mining, and agriculture; it also houses a growing urban population. The Duncan Agricultural District falls within this area of Vancouver Island (Figure 4.1). It has been chosen for this study for three reasons. First, the area is near Victoria, Duncan, and Nanaimo where the greatest demands for recreation on agricultural land are likely to be generated. In 1981, urban population made up 80 per cent of the total population in this district (Province of British Columbia, 1984). More specifically, the rural population experienced a 45 per cent increase in Central Saanich, a 25 per cent increase in North Saanich, a 31 per cent increase in the Langford-Metchosin area and a

Figure 4.1

STUDY AREA



130 per cent increase in the Cobble Hill area between 1976 and 1981 (Environment Canada, 1985). Agriculture is a dominant land use in all these areas of increased rural population (Environment Canada, 1985).

Second, agricultural activity in the district is on a small scale often as a subsidiary activity to other employment. Multiple land use may provide a means of supplementing income from agricultural production. Third, a reliable set of background data is available since the study area corresponds with Canadian Census Divisions 17 and 19.

Agricultural activity in this district is quite varied, involving both hobby and commercial operations. The definition of farm is any holding with sales of agricultural products during the past twelve months of \$250.00 or greater (Statistics Canada, 1981). Agricultural products include: livestock, poultry, dairy products, eggs, field crops, fruits, vegetables, mushrooms, greenhouse produce, nursery produce, fur bearing animals, honey, beeswax, and maple products. In 1971 there were 1106 farm operators. This represented 6.0 per cent of total provincial farm operators. By 1986, the farm population in this district was 1408 or 7.4 per cent of the provincial farm population.

The nature of farming in this agricultural district displays a number of trends between 1971 and 1986 (Statistics Canada, 1971; 1976; 1981; 1986). Dominant production types have included dairy, livestock, poultry, fruit, vegetable, and miscellaneous speciality products. Table 4.1 shows, for example, that in 1981, 9.8 per cent of all dairy farmers in the province with produce sales of \$2500 or more were in the Duncan Agricultural District. The district has also contributed substantially to miscellaneous speciality production. In 1976, 11.3 per cent of all provincial operators with returns of \$2500 were in the district. This percentage increased to 22.9 per cent by 1981.

4.2 Questionnaire Development

Measurement of preferences of the sample respondents was made through personal interviews. Personal interviews have several advantages over telephone and mail questionnaires (Backstrom and Hursh-Cesar, 1981). First, they allow for a more complex and lengthy survey as well as development of a better rapport with the respondents. Second, personal interviews allow for probing which may lead to information about recreational use of farmland which was not anticipated. Finally,

Table 4.1

Number of Farms With Sales of Produce
of \$2500 or More,
1971-1986

PRODUCT	1971		1976		1981		1986	
	Pro- vince	Duncan Agricultural District	Pro- vince	Duncan Agricultural District	Pro- vince	Duncan Agricultural District	Pro- vince	Duncan Agric- ultural District
Dairy	1633	101	1437	87	826	81	1150	92
Cattle/ Hogs/ Sheep	2501	68	3252	95	1277	228	4556	225
Poultry	644	57	564	60	488	78	752	91
Wheat	166	0	206	0	3	3	151	1
Small Grains	390	1	870	2	13	1	663	1
Field Crops	387	16	220	13	124	28	356	10
Fruits/ Vege- tables	1948	56	2153	46	608	72	2920	106
Miscel- laneous	571	13	813	92	742	170	1893	231
Mixed Farms	223	8	495	39	175	72	1258	108

After: Statistics Canada (1971, 1976, 1981, 1986)

since the study area was within a small geographic area, personal interviews were an economical means of collecting the data.

When designing a questionnaire the first task was to establish the variables to be measured. The multiple land use variables chosen for this study reflect those which Pattison (1974) Swinnerton (1982) and Bryant et al. (1982) have identified as important recreational uses of agricultural land. Some modifications were made due to climatic differences of the study area. For example, cross country skiing has been suggested as an appropriate multiple land use. Given the climate of the study area this use was not appropriate. As well, there were combinations of uses provided to account for the notion that people may recreate on farmland for many different reasons. For example, recreationalists may wish to hike and camp during the same visit.

The other variables including number of users, times of the year that land is open to use, and remuneration for use to be measured in the study were left as open ended questions since the literature has not made reference to measuring these variables specifically. Finally, a number of personal profile questions were designed in order to obtain information about the socio-

economic characteristics of the respondents. A copy of the pretest can be found in Appendix B. The questionnaire proper can be found in Appendix C.

4.3 Sample Selection

When considering sampling methods, one must select a sampling frame, a sampling option, and a sample size. Hammond and McCullagh (1980) suggest that often the true population is not amenable to sampling in the time available, and a substitute has to be found. This requires that a choice of a suitable sampling frame or statistical population from which to take a sample is made. In order to answer the research questions, a sample was taken of the agricultural landowners of the Duncan Agricultural District. Agricultural landowners refer to farm operators. Farm operators are the people responsible for the day to day decisions made in the operation of the farm. By census definition only one operator is listed for each farm, therefore, the number of operators is the same as the number of census farms. In 1984 there were 748 farms.

A simple random sample with replacement was drawn from a mailing list provided by the District

Agriculturalist for the study region (Personal communication, Peter Fofonoff, January 14, 1987). A list of farm operators compiled by the District Agriculturalist was used since it was probably a better representative of farming in this area and more unbiased, rather than selecting a sample from some other non-spatial source such as members of the farmers institutes, or from a spatial source such as air photographs or topographic maps. Sampling with replacement guaranteed independence of selection of respondents. As Willams suggests (1984), the only time independence without replacement can be insured is when the population is infinitely large.

A simple random sample has been defined as one in which any one individual measurement or count in the population is as likely to be included as any other and therefore unbiased (Hammond and McCullagh, 1980). As Stoddard suggests (1982) a random sample is one that satisfies the conditions required for using probability theory, which in turn makes it possible to evaluate the likelihood that the sample is truly representative.

Hammond and McCullagh (1980) suggest that stratification of a random sample may be useful. This option was rejected for this study for two reasons.

First, it is possible that the population could be stratified on the basis of production type of the farm. There is one hazard with this stratification. If the population is to be stratified then the strata must be mutually exclusive (Williams, 1984). It could be expected that in certain situations that there would be farms not fitting into only one production type. Second, the method of data analysis which has been chosen will perform analyses on particular strata (subpopulations) within the sample population without conducting a stratified random sample (SAS, 1985). This is based on the assumption that each possible strata considered in the analysis does represent a stratified random sample from some hypothetical population (SAS, 1985).

The purpose of sampling is to enable one to generalize or make reasonably reliable statements about a population without examining the whole population. While there is no particular rule of what size of sample is acceptable (Clark and Hosking, 1986; Austin, 1983), there are a number of guidelines. For the interested reader these guidelines can be found reviewed in Shaw and Wheeler (1985), Clark and Hosking (1986) and Ebdon (1985). For the purposes of this study, sample size was dictated in part by the requirements of the statistical analysis (Chapter 5) as well as by financial and time

constraints. Information on the size, and proportion of the sample for this study can be found in section 4.5.

4.4 The Pretest Study

A pretest (Appendix B) of the questionnaire was conducted from 05/25/87 to 06/05/87. Twenty-five farm operators were randomly selected from the sampling frame. Out of the twenty-five the total number of respondents was 16.

Data were collected by two methods. In the first method, the person selected was visited by the interviewer without prior contact. The second method of data collection consisted of a telephone call prior to the visit to arrange an appropriate meeting time. Non response in both methods was accounted for by two farmers which could not be located, one of whom was on vacation, three who were no longer farming, and three who were unwilling to participate.

The pretest served one purpose. Results were used to indicate weaknesses in the questionnaire where changes could be made, and it aided in establishing categories of variables. For example, in the pretest, open-ended responses were used for collecting information on

preferred number of users, preferred times of the year, and preferred remuneration for each recreational use. These open ended responses were then used to form categories for response in the questionnaire proper. Finally, the pretest helped to determine if some recreational activities were absent from the list.

4.4.1 Form of the Modified Questionnaire for the Survey Proper

First, the questionnaire (Appendix C) contained some general open-ended questions. These were designed with the aim of introducing the respondents to the idea of recreation on farmland. In addition, the introductory questions served as a link to the theoretical framework of the thesis. Questions probed aspects of the framework such as the following: previous experience (questions A1 and A2), the effects of competing motives (questions C10 and B5), the ability to discriminate among competing motives (question B1), the ability to articulate motives (questions A3 and A4), presence of peer groups (questions A7 and A8), roles and rules of decisional organizations (questions A5 and A6), knowledge of other behaviors (question A9), and the ability to choose other behaviors (questions C8, C4, C6 and C7). The pretest also helped

to establish a more complete set of introductory questions. Introductory questions were expanded to include questions of past as well as present recreational habits.

From the pretest, modification of types of recreational uses included the addition of farm tours, and "u-picking" to the original list of activities. Changes were also made to the combined uses so that the uses which appeared on the questionnaire proper included activities such as: horseback riding and camping, hiking and birdwatching, horseback riding and farm vacations, hiking and camping, farm vacations and hiking, and farm vacations and fishing.

Following the introductory questions, each respondent was asked if his/her land was suitable for the recreational land uses and if they were willing to allow those uses which the land could support. After this, respondents were asked to state a ranked preference for each of the additional land uses that they were willing to allow on their property. Respondents ranked from 1 to n the additional land uses that they would allow, with 1 being the most preferred additional use and n being the least preferred additional use.

Each respondent was then asked to indicate for each use that he/she would allow, a preferred category of numbers of visitors per day, remuneration for daily use, and times of the year that the land is open to use. These categories were formed on the basis of the pretest. Finally, the respondents were asked a number of personal profile questions. These provide a general description of the personal profiles of those who stated preferences for allowing recreational uses of their land. The selected variables included location of the farm, type of agricultural production as defined by the Province of British Columbia, size of holding, length of residency of the farm operator, the nature of the terrain that the farm was on, farm income, number of days of off farm work, and the age of the farm operator. It can be noted that Peterson's (1984) study about asking the age question does not provide unequivocal evidence as to the preferability of one age question format over another. An attempt was made, however, to order the profile questions so that the most objectionable questions about age and income were asked last as Dillman (1977) recommends. Results of the pretest also helped to modify the personal profile questions. Land type categories were expanded to include orchard land and rock outcrop. Farm production types were expanded to include poultry production. In addition, a number of income categories

were added along with the categorization of estimated proportion of income from farming. Finally, if the respondent indicated that he/she engaged in off farm work, the nature of that work was recorded in the questionnaire proper.

4.5 Survey Proper

The survey proper was conducted between 06/17/87 and 07/21/87. Of 180 randomly selected respondents, 100 (13 per cent of the total population) agreed to complete the questionnaire. This represented a response rate of 55 per cent.

The personal interviews for the survey proper were scheduled by a telephone call which was placed on weekdays as well as weekends and during both the day and evening. If the respondent could not be reached at home by telephone to establish an interview time two return telephone calls were made to that respondent. Following the third unsuccessful telephone call another name on the list provided by the District Agriculturalist was randomly selected.

The Duncan Agricultural District, British Columbia, is well suited to the study of outdoor recreation on farmland. In order to investigate the objectives of the study, a questionnaire was developed and tested through a pretest. Through the aid of the pretest, the format of the questionnaire proper for this study was determined. Following modification of the questionnaire, the survey proper was conducted. Information from this questionnaire was then used in a statistical analysis. The nature of this analysis is described in Chapter 5.

DATA ANALYSIS

Data analysis was conducted using categorical data modelling techniques. This chapter reviews categorical data modelling techniques and identifies aspects relevant to the investigation of the preferences of farmers in allowing recreational use of their farmland.

5.1 Categorical Data Modeling

Wrigley (1985) suggests that given the characteristic low level of measurement in much of social science, the unified approach to categorical data analysis has proved to be particularly appropriate to the needs of social scientists. This method of data analysis is appropriate since it links the analysis of categorical data to the general linear model. Many geographers use regression models which are employed in cells (a) to (c) of Table 5.1. Only recently have they begun to use the methods involved in analysis of cells (d) to (g). Categorical modelling fits linear models to functions of data which consist of counts of the number of individuals, households, etc. in particular categories.

Table 5.1

**Conventional Regression Models
and
Their Extensions**

		Explanatory Variables		
		Continuous	Mixed	Categorical
Response Variables	Continuous	(a)	(b)	(c)
	Categorical	(d)	(e)	(f)	(g)

After: Wrigley (1985)

This facilitates analyses such as regression, analysis of variance, linear modelling, log linear modelling, logistic regression, and repeated measurement analysis in cells (d) to (g). These analyses are used to establish a predictive model based on the regression equation, test a model or a hypothesis, and describe a relationship between variables (Shaw and Wheeler, 1985).

Analysts are confronted by a vast array of choices regarding which approach to use. Kritzer (1979) suggests that the relevant factors are the availability of computer programs, intelligibility of the discussions of the various techniques, and the ability of any one program to perform different types of analyses (flexibility).

5.2 The General Linear Model

The general linear model allows for predictions of the significance and direction of relationships between variables of a population without empirical observations or each member of that population (Taylor, 1977). The dependent variable (y) is the variable whose values are to be predicted, or explained, given values of the independent variable or variables (x) (Ebdon, 1985). Regression is a technique for fitting a curve to any

scatter of points by producing an algebraic solution for estimating the parameters (Taylor, 1977).

Modifications of the simple linear regression model are needed for the analysis of the questionnaire data since a number of assumptions of the general linear model are violated when categorical data are used in place of continuous data.

5.3 Extensions of The General Linear Model

Two problems are encountered when trying to employ a conventional regression model using categorical response data Wrigley (1985, 1979). First, the conventional regression model may generate predictions that are seriously deficient where predicted values of the response variable in such a model would best be interpreted as predicted probabilities. If, for example, a categorical response variable had two levels, 1= in favor, and 0= against, the probability that an individual would select the 1 given information about the level of some explanatory variable would range from 0 to 1. Predicted values generated from the regression model are, however, unbounded (values from negative to positive infinity), and, as a result, predicted values could fall

outside the meaningful range of probability. In an attempt to reconcile probability and prediction, the conventional regression model has been replaced with either the logistic regression model or the linear logit regression model in some cases, or the log linear regression model in other cases. In these models probability ranges from 0 to 1 as the estimated parameter goes from negative to positive infinity.

There are several different forms for the three models depending on the number of variables used in the analysis. These equations for three models have been reviewed elsewhere. The interested reader should consult Wrigley (1981), Fingleton (1984), Feinberg (1977), and Plackett (1981).

The second problem with the application of categorical data is that the error term in the logistic/logit, and log linear models is heteroscedastic. This means that the error variance is not constant, but depends upon the probabilities of occurrence of each response and on sample size. Since Ordinary Least Squares (OLS), the method used to fit a line of best fit to a scatter of data points, assumes constant error variance in its parameter estimation, it cannot be used in estimation of the parameters of a categorical

regression. In place of OLS, Weighted Least Squares (WLS) or Maximum Likelihood Estimation (MLE) can be used.

Weighted Least Squares is an extension of Ordinary Least Squares. In the OLS procedure, parameter estimates are obtained by minimizing the sum of the squared residuals, whereas in the WLS procedure, parameter estimates are obtained by minimizing the weighted sum of squared residuals (Wrigley, 1985). Weights imply that more weight is given to sub-populations which have larger sizes.

Maximum Likelihood Estimation consists of three stages. First, an expression for the likelihood of observing the pattern of response category choices is derived (Wrigley, 1985). Second, the value of this expression depends upon a number of unknown parameters which need to be estimated (Wrigley, 1985). Third, the estimates which are accepted, are those values of the parameters that maximize the likelihood of the observed pattern of responses (Wrigley, 1985). The likelihood of obtaining the particular observed responses is simply the joint probability of occurrence of the observed choices (Wrigley, 1985). The derivation of the equations for WLS and MLE can be found reviewed in Wrigley (1985; 1981), Fingleton (1984), Feinberg (1977) and Plackett (1981).

5.4 Method Selection

Given the modifications to the conventional general linear model it is necessary to select an appropriate combination of methods for a particular problem. Several authors (see, for example, Wrigley, 1979, 1985; Koch et al., 1977; Fringleton, 1984; Fienberg, 1977; Kemper, 1984; Kritzer, 1979) present specific guidelines concerning the choice of methods.

A review of method selections is presented in Table 5.2. Generally, the choice between logistic/linear logit models and log linear models is based on their ability to distinguish between independent and dependent variables. Logistic/linear logit models are employed when such distinctions are important for analysis, while log linear models are employed when no distinction is made. The choice between maximum likelihood estimation and weighted least squares is related to sample size (n values of Table 5.3) and whether or not there are repeated observations for each combination of values of the explanatory variables. If there are no repeated observations, MLE can be used.

Table 5.2 Categorical Data Modeling Choices

	<u>Logistic/Linear Logit</u>	<u>Log Linear</u>
1) Fingleton (1984)		When distinction between response and explanatory variables isn't important the log linear model approach may yield better estimates.
2) Fienberg (1977)	If ones interest lies only in the effects of the explanatory variables on the response variable then an analysis based on logits for the response variable is appropriate.	Analysis of multidimensional contingency tables via log linear models aims to make inferences about a set of parameters describing the structural relationship among the underlying variables.
3) Wrigley (1985)		When no distinction is made between response and explanatory variables the aim is not to assess the effects of explanatory variables on a response variable but rather to describe the structural relationships among the response variables. When distinction is made between response and explanatory variables the model is used to assess the effects of explanatory variables on response variables rather than describing the structural relationship among response variables.
4) SAS (1985)	There is a clear distinction between independent and dependent variables. There is an emphasis on estimation and hypothesis testing of the model parameters. It is easy to test for differences among probabilities, perform repeated measurement analyses and test for marginal homogeneity. It is difficult to test independence.	There is no a priori distinction between independent and dependent variables although model specifications can allow distinction. Emphasis is on model building, goodness-of-fit, estimation of cell frequencies or probabilities. It's easy to test independence. It is difficult to test for differences among probabilities, do repeated measurement analysis, and test for marginal homogeneity.
	<u>Maximum Likelihood</u>	<u>Weighted Least Squares</u>
1) Wrigley (1979)	Method doesn't require repeated observations for each combination of values of explanatory variables. The method can be adapted to a variety of problems. Advantages include that estimates are consistent and are the best possible estimates in very large samples, while being satisfactory estimators in small samples.	When numbers of repeated observations for each value of explanatory variable are sufficiently large, the WLS procedure can be adapted.

Table 5.2 Continued

	<u>Maximum Likelihood</u>	<u>Weighted Least Squares</u>
2)Wrigley (1985)		Procedure is for moderate and large samples. What represents large is a controversial issue, but it may not be as large as some critics of the procedure might suggest. It is advisable that for each response level that there be a sample of 5 or greater. Must also be able to argue that the data could have arisen from an underlying product multinomial sampling design. Most simple random samples can be assumed to meet this condition.
3)Domencich and McFadden (1975)	Provided that explanatory variables are not multicollinear, the existence of the maximum is almost certain in subpopulation samples of 10 or 20 observations.	In asymptotically large samples this procedure yields the best estimates possible. In small samples, weight is placed on extreme observations leading to variable estimates.
4)Koch et al. (1977)		WLS methods may provide more effective analyses than MLE oriented methods for repeated measurement experiments, particularly for those those involving large underlying contingency tables with sparsely distributed samples.
5)Veldhuisen (1984)	Sample size not as critical since model maximizes the fit of the model in regard to the data directly on the basis of the MLE function and the relevant distribution.	Quality of the resulting model depends on the sample size and cell frequencies of combinations of categories.
6)Kritzer (1979)	Parameter estimator is best asymptotically normal. In addition, cells with no responses raise less problems. MLE greatly limits the class of models which may be fitted to the data.	WLS is best asymptotically normal. With small samples appears to be more efficient. Have to make adjustments for 0 cells. Finally, there are few limits to the class of models which may be fitted.
7)SAS (1985)	Maximum likelihood estimation of parameters is available for log linear models and for logit models.	WLS is available for all types of response functions.

Agreement over sample size does not exist. Kritzer (1979) suggests that with small samples WLS is slightly more efficient, while Domencich and McFadden (1975) suggest that using WLS with small sample sizes places excessive weight on extreme observations leading to variable estimates (Table 5.2).

In addition to the above mentioned considerations, Wrigley (1985, 1979) gives some general guidelines. For problems of cell (d) where the response variables are categorical and the explanatory variables are continuous, the most convenient and most widely used models are the logistic regression model or the linear logit regression model. Generally, maximum likelihood estimation is used to estimate the unknown parameters with weighted least squares rarely used for logistic or linear logit regression when all the explanatory variables are continuous. For problems of cell (e) where the response variable is categorical and the explanatory variables are mixed, logistic and linear logit models are appropriate. In practice, maximum likelihood parameter estimation is generally employed. Problems of cell (f), where both the response and explanatory variables are categorical, lie in a zone of transition. Either logistic/linear logit models can be employed, or log linear models. Parameter estimation for the logistic/linear logit models is

achieved through weighted least squares, while log linear models employ maximum likelihood estimation methods. For problems in cell (g) there is no distinction between response and explanatory variables. In these cases, log linear models are employed along with maximum likelihood estimation procedures.

5.5 Computer Program

Statistical Analysis Systems (SAS) (1985) with its Categorical Data Modelling (CATMOD) procedure performs a number of different analyses. If more than two categorical variables are used, the data are represented by a multidimensional contingency table (Table 5.3). Generally, the variables are divided into two sets. One set contains the independent variables, while the second set contains the dependent variables. From this division profiles are based on independent variables, and called population profiles, while profiles based on dependent variables are called response profiles.

CATMOD uses maximum likelihood estimation of parameters for log linear and logistic regression models. It is important to note, however, that CATMOD was not designed specifically for logistic regression, and is

Table 5.3

Generalized Form of the Contingency Table

Response Categories

	r=	1	2	3	...	R	Total
subpopulations							
g = 1		$n_{1 \cdot 1}$	$n_{2 \cdot 1}$	$n_{3 \cdot 1}$	...	$n_{R \cdot 1}$	$n_{+ \cdot 1}$
g = 2		$n_{1 \cdot 2}$	$n_{2 \cdot 2}$	$n_{3 \cdot 2}$	...	$n_{R \cdot 2}$	$n_{+ \cdot 2}$
g = 3		$n_{1 \cdot 3}$	$n_{2 \cdot 3}$	$n_{3 \cdot 3}$	...	$n_{R \cdot 3}$	$n_{+ \cdot 3}$
.	
.	
.	
g = G		$n_{1 \cdot G}$	$n_{2 \cdot G}$	$n_{3 \cdot G}$	...	$n_{R \cdot G}$	$n_{+ \cdot G}$
							<hr style="width: 100%; border: 0.5px solid black;"/>
							$n_{+ \cdot +} = N$

**Example of Generalized Form
of the Contingency Table**

Explanatory Variables (subpopulations)		Variable A = Response Variable			
B	C	In Favour	Against	Undecided	TOTAL
Female	Rural	265	334	143	742
Male	Rural	350	307	86	743
Female	Urban	325	322	96	743
Male	Urban	411	258	73	742
					<hr style="width: 100%; border: 0.5px solid black;"/>
					$2,970$

After: Wrigley (1985)

less efficient than more specialized procedures. Nevertheless, one advantage of CATMOD is that it works for nominally scaled responses with more than two levels. CATMOD also provides analyses using weighted least squares estimates for all types of response functions. With this flexibility CATMOD can test homogeneity which indicates if the response probabilities are the same for each population profile. If the response probabilities are different, then CATMOD accounts for several possible explanations (interactions of the explanatory variables). Interaction effects can be specified as crossed, nested, direct, nested by value, or crossed direct effects between explanatory variables. Significance of the interactions of the independent variables is reported in an analysis of variance table and analysis of contrasts. A chi square test can be used to test the hypothesis that the true response probabilities are the same for two populations.

CATMOD can examine the independence of two independent variables using a chi square test. CATMOD also provides parameter estimation where prediction of the value of the dependent variable is made, based on knowledge of the independent variables. CATMOD provides output that contains for each population (cross classifications of independent variables) the observed

and predicted values of the response variable, their standard errors and their residuals. With the linear logit model, the output also includes observed and predicted values of the cell frequencies, together with their standard errors and residuals.

Finally, CATMOD allows for repeated measures analysis. Such an analysis involves subjects selected from various subpopulations being exposed to a series of different measurement conditions or stimuli and being classified in terms of a response variable with a given and constant number of levels (Wrigley, 1985).

As noted in Table 5.2, the selection of methods within CATMOD depend on the focus of the data analysis. For example, linear logit models emphasize parameter estimation and hypothesis testing. With these models it is easy to test for differences among probabilities, perform repeated measurement analysis, and test for marginal homogeneity. However, it is difficult to test independence. With log linear models the emphasis is on model building, goodness of fit, estimation of cell frequencies or probabilities. It is easy to test independence, but it is difficult to test for differences among probabilities, do repeated measures and test for homogeneity.

The restrictions of CATMOD as well as the review in Table 5.2 helped to derive a suitable analysis plan.

5.6 Categorical Data Analysis Plan

Since there may be no definitive best way of analysing the data that has been collected, the analysis plan was developed as a result of the sample size. Categorical data modelling techniques were used for the following purposes:

1. to establish predictive models based on the regression equation,
2. to test a model or a hypotheses, and
3. to describe a relationship between variables.

First, a number of hypotheses were tested to develop a number of models. Second, each individual parameter (slope estimates of each level of the independent categorical variables) were considered to determine the direction of the relationships. The significance of the direction of the relationships were tested using the chi square statistic. Finally, having tested hypotheses about the values of the parameters of the models, it is normal practice in conventional regression modelling to consider the overall fit of the model using the likelihood ratio statistic as an appropriate goodness-of-fit measure.

Problems from the data collected fit into cell (f)

of Table 5.1. First, for analysis of cell (f) there was an a priori division of variables into response and explanatory. Explanatory variables included farm type, location, land type, past land use, present land use, and past respondent use of farmland for recreation. The response variable to be modelled was willingness to allow a number of recreational activities on farmland. This was measured as whether or not the respondent would allow a particular recreational activity on his/her land. Only those uses which 20 per cent or more of the respondents suggested that they would allow were included in the models (Appendix H).

Second, analysis was done for cell (d). In this case there was an a priori division of variables as in the first problem with the response variable being categorical and the explanatory variables being continuous, for example, size of the respondent's farm.

The final research question examined was how the hypothesized relationships varied across different locations, by gender of the respondents and by different percentages of farm income.

Results from the categorical data modelling were derived using logistic regression methods and logit

analysis. Logistic regression was used when the explanatory variables were continuous, and logit analysis was used when the explanatory variables were categorical. In both cases parameter estimates were calculated through a maximum likelihood method because the sample sizes were too small to successfully employ the weighted least squares method. It was also necessary to combine categories of location and production type for the purposes of the data modelling. In this case, location consisted of three categories, namely, Nanaimo, Duncan, and Victoria (Appendix E). Categories of production types included dairy production, sheep production, fruit/vegetable/greenhouse production, and others.

5.7 Summary

The method of analysis selected for this study was an extension of the general linear model. This extension allowed for categorical data modelling which in turn allowed for the testing of hypotheses about willingness of a farmer to allow recreational uses and socioeconomic characteristics of that farmer. The data analysis also estimated the direction of significant relationships between the recreational activities and the socioeconomic variables. Results of this analysis are in Chapter 6.

RESULTS

Results are reported in two manners. First, a number of descriptive results are given to provide an overview of recreational land use patterns in the study area as well as the social and economic characteristics of the respondents. Second, results are reported from the categorical data modeling.

6.1 Overview of Respondent's Social and Economic Attributes

Selected social characteristics of the respondents are presented in Appendix D. Of the 100 respondents, 99 per cent indicated that they helped to operate the farm. Ninety-eight per cent indicated that they owned the property. These findings substantiate the assumption that respondents were farm decision makers and that they were in a position to make any stated recreational changes to the use of their land.

Response to the total household income question was poor. Sixty-seven of the respondents refused to answer the question on estimated household income. All respondents, however, were willing to estimate percentage

of family income obtained from farm sources (Appendix D). Off farm work also appeared to have an important role in this agricultural district (Appendix D) with a reported average of 132.4 days of work off the farm.

Characteristics of the farms including location were also collected (Appendix E). For the purposes of analysis, individual locations were collapsed into three categories, namely, the Victoria Area, the Duncan Area and the Nanaimo Area. Additionally, the results suggest that farms in the study region have rather varied sizes, production capabilities, and landscapes (Appendix F).

6.2 Descriptive Recreational Land Use Aspects

Recreational use of farmland has been occurring for several years in the Duncan Agricultural District (Appendix G) as suggested by 80 per cent of the respondents who have allowed recreational use of their land in the past. Recreational uses have included birdwatching, farm tours, photography, painting, horseback riding, hunting, mushroom picking, dog trials, 4-H activities, farm vacations, camping, hiking, u-pick, swimming, saddle clubs, dirt biking, fishing, model airplane flying, orienteering, and so forth.

Furthermore, 25 per cent of the respondents indicated that they or their family used other peoples' farmland for recreation. Activities that they participated in can be found in Appendix G.

Respondents were asked first, if their land could be used for certain recreational activities, and second, if they would allow those activities that their property could accommodate. Results have been summarized in Appendix H. It can be noted that for all of the activities there is a distinction between uses for which landowners feel their land is suitable and these uses which landowners permit.

6.3 Access Fees, Access Times and Access Numbers

Respondents were also asked to indicate a preferred level of access fee, access time, and access number for each activity that they were willing to allow. Results for each recreational use are in Appendix I. It is interesting to note, that for most recreational activities, the majority of respondents preferred not to charge an access fee. This may be reflective of the idea that charging for access places an obligation on the

owner to provide a service. This may be more of a commitment than farmers in the district will make.

6.4 Overall Preference

Overall preference for an activity was measured by having the respondents rank their 5 or 6 most preferred activities. A rank of 1 indicated that the activity was most preferred, a rank of 2 indicated that the activity was second most preferred, and so on. Preference measures for each activity are presented in Table 6.1. Clearly, the most preferred activities were farm tours and birdwatching. The most unpreferred activities were off road vehicles and hunting.

6.5 Reasons for Non-Interest

Respondents were asked to express if they had any concerns about allowing the public on their land for recreational purposes. Sixteen per cent indicated that they have no concerns, while 84 per cent indicated that they are concerned. These aspects which concerned the respondents the most are liability, gates left open, crop damage, fire, vandalism, control, litter, loss of

Table 6.1 Preferred Recreational Activities

ACTIVITY	RANKING	PERCENTAGE SELECTING RANK N = 100
Off Road Vehicles	not ranked	100
Hiking	1 or 2	13
	3 or 4	18
	5 or 6	1
	not ranked	68
Camping	1 or 2	5
	3 or 4	14
	5 or 6	2
	not ranked	79
Horseback Riding	1 or 2	15
	3 or 4	3
	5 or 6	3
	not ranked	79
Birdwatching	1 or 2	41
	3 or 4	12
	5 or 6	4
	not ranked	43
Photography	1 or 2	27
	3 or 4	32
	5 or 6	11
	not ranked	30
Hunting	3 or 4	1
	5 or 6	1
	not ranked	98
Fishing	1 or 2	4
	3 or 4	2
	5 or 6	1
	not ranked	93
Farm Vacations	1 or 2	13
	5 or 6	3
	not ranked	84
Farm Tours	1 or 2	46
	3 or 4	18
	5 or 6	1
	not ranked	35
U-Pick	1 or 2	9
	not ranked	91

privacy, overall impact to the land, lack of respect shown by the people using the land, imposed restrictions on lifestyle, damage to livestock, damage to wildlife, and the use of valuable farm resources such as water.

6.6 Categorical Data Modeling

The hypotheses tested in this thesis were similar to the ones investigated by Klippenstein and Ironside (1973). The hypotheses for this thesis included:

1. there is a positive relationship between interest in allowing the activities and the percentage of forested land on the respondents' farms;
2. there is a negative relationship between interest in allowing the activities and the percentage of field on the respondents' farms;
3. interest in allowing the activities varies with the farm type;
4. interest in allowing the activities varies with farm size with the operators of smaller farms indicating a greater interest;
5. interest in allowing the activities varies with location, reflecting the spatial patterns of farm types;

6. interest in allowing the activities varies with whether or not in the past the respondent allowed use of the land for recreation;
7. interest in allowing activities varies with whether or not the respondents were presently allowing recreational activities on their farms;
8. interest in allowing the activities varies with the respondents own use of farmland for recreation; and,
9. interest in allowing the activities varies with the stated preference of the respondent for a particular activity.

Tests of homogeneity, were used to investigate the above stated hypotheses (that the true response probabilities are the same for all respondents) using one independent variable and one dependent variable at a time. The results for each of the nine hypotheses are presented in Table 6.2.

6.6.1 Parameter Estimation and Significance

Modelling of the effects of an independent variable on a dependent variable was not only used for hypothesis testing but also to describe a relationship between the

Table 6.2

**Tests of Homogeneity and Direction of
Significant Relationships**

VARIABLES	CHI SQUARE VALUE	PARAMETER ESTIMATES	PROBA- BILITY
HYPOTHESIS ONE			
forested land effect on allowing birdwatching	7.85	.029938	.0051
forested land effect on allowing horseback riding	5.50	.024125	.0191
forested land effect on allowing farm vacations	4.42	.021496	.0355
HYPOTHESIS TWO			
field effect on allowing birdwatching	3.77	-.0138466	.0523
field effect on allowing farm tours	5.68	-.0194977	.0172
HYPOTHESIS THREE			
farm type effect on allowing farm vacations	6.62	1.05341	.0101
HYPOTHESIS FOUR			
farm size effect on allowing horseback riding	4.37	.005651	.0365
HYPOTHESIS FIVE			
no significant effects	—	—	—
HYPOTHESIS SIX			
not allowing use in the past effect on allowing camping	3.95	-1.04857	.0467
not allowing use in the past effect on allowing photography	5.02	-.592812	.0251
HYPOTHESIS SEVEN			
No significant effects	—	—	—
HYPOTHESIS EIGHT			
respondents not using farmland for recreation effect on allowing photography	4.36	-.813299	.0367
HYPOTHESIS NINE			
No significant effects	—	—	—

dependent and independent variables based on the slope parameter estimates for each level of the independent, categorical variables and the significance of these parameters in the relationship.

With regard to hypothesis one at a significance level of .05, results from CATMOD indicated that there was a significant difference in the response probabilities of allowing horseback riding, birdwatching and farm vacations between different respondent populations based on percentage of forested land on their property. The direction of these relationships are described by considering the parameter estimates as modeled by the main effects of the independent variables which are presented in Table 6.2. In all cases the direction of the relationships were positive. The direction of these results were expected. Past research (see for example, Ironside, 1971) has indicated that the presence of forested areas is an important aesthetic aspect of an attractive landscape and contributes to the quality of the recreational resource.

When considering hypothesis two, a significant difference existed in the response probabilities of allowing birdwatching and farm tours between different populations of respondents based on the percentage of

their property in field. The direction of the relationship between allowing birdwatching and allowing farm tours and the percentage of field were both negative. Thus, as the percentage of field increased the probability of allowing birdwatching and farm tours decreased. The direction of these results were expected. This is based on the assumption that cultivated land is less suitable for recreation with a larger number of potential conflicts between agriculture and recreation.

For hypothesis three, there were significant differences in the response probabilities of allowing farm vacations between populations of respondents based on farm type (Table 6.2). More specifically, with the incidence of sheep production, the probability of allowing farm vacations increased. The direction of this relationship was expected. The variation is related in part to the resource potential of the different types of farms. Farms having few or no animals might hold little attraction for recreationalists, while sheep farms, for example, might be perceived by the respondents to provide an attraction of animals.

With regard to hypothesis four, there was a significant difference in the response probabilities of allowing horseback riding between different populations

of respondents based on the size of their property. The direction of this relationship was positive (Table 6.2) and opposite to the direction hypothesized by Klippenstein and Ironside (1977). This is related to their assumption that the operator of a smaller farm has a greater need to supplement farm income and would therefore be more interested in allowing recreational use.

Results from hypothesis six indicated that there was a significant difference in the response probabilities of allowing photography and camping between different populations of respondents based on whether or not in the past they have allowed their land to be used for recreation. These relationships are summarized in Table 6.2. The directions of these two relationships were negative. Therefore, as the incidence of respondents not allowing use of their farmland in the past occurred, the probability of allowing the activities decreased. The direction of these relationships were expected under the assumption that respondents with no past experience would be less willing to consider allowing use of their land.

When reviewing hypothesis eight there were also significant differences in the response probability of allowing photography between different populations of

respondents based on whether or not they use farmland for recreation. This relationship is summarized in Table 6.2. The direction of the relationship was negative. With the incidence of the respondents not using farmland for recreation, the probability of allowing photography decreased. The direction of this relationship was expected again under the assumption that respondents with no past experience with using farmland for recreation have missed an opportunity which may, for example, generate an interest to carry out the activities on their own land.

All other hypothesized relationships (hypotheses five, seven and nine) were not significant at the adopted significance level. Chi square values, parameter estimates, and probability levels for these relationships are presented in Appendix J.

6.6.2 Goodness of Fit Measures

Having tested hypotheses about the values of the parameters of the models, it is normal practice in conventional regression modeling to consider the overall fit of the model. In other words, which of the fitted models was an acceptable representation of the structural

Table 6.3

Goodness of Fit Measures

MODELED RELATIONSHIP	LIKELIHOOD RATIO	PROBABILITY
percentage of field and birdwatching	79.65	.0021
percentage of field and farm tours	71.88	.0112
percentage of forested land and horseback riding	52.52	.0191
percentage of forested land and birdwatching	56.09	.0295
percentage of forested land and farm vacations	50.75	.0803
property size and horseback riding	72.06	.0277
respondents not using farm land for recreation and photography	0.00	1.000
not allowing use in the past and camping	0.00	1.000
not allowing use in the past and photography	-0.00	1.000
production type and farm vacations	0.00	1.000

relationships between the variables (Wrigley, 1985). In both the logistic and logit models, the maximum likelihood parameter estimation method calculated the likelihood ratio statistic as an appropriate goodness-of-fit test for the model. The likelihood ratios and their significance levels for the modeled relationships are presented in Table 6.3.

The only models with a non-significant likelihood ratio were as follow:

1. the models of the main effects of respondents not using farmland for recreation on photography;
2. the main effects of no past use of the respondent's land on camping and photography;
3. the main effects of production type on farm vacations; and,
4. the main effects of the percentage of forested land on farm vacations.

These models, according to CATMOD, were the only models with an acceptable fit to the data. They implied, that:

1. there was no evidence for rejecting the hypothesis that respondents not using farmland for recreation was a main effect in predicting the probability of allowing photography;

2. there was no evidence for rejecting the hypothesis that no past use of the respondents land was a main effect in predicting the probability of allowing camping, and photography;
3. there was no evidence for rejecting the hypothesis that the farm type was a main effect in predicting the probability of allowing farm vacations; and,
4. there was no evidence for rejecting the hypothesis that the percentage of forested land was a main effect in predicting the probability of allowing farm vacations.

It is important to note that with main effects modelling the explanatory variables entered into the models in the most simple way with none of the interactions which might exist among the variables considered.

6.6.3 Association of Interest by Location, Gender and Farm Generated Income

Given that measurable variations existed in the data, the question remaining was how the hypothesized relationships varied across different locations, by different genders of the respondents and by different percentages of farm generated income.

6.6.3.1 By Location

For each subpopulation of respondents based on location of their farms, there were varying numbers of significant differences in the probability of recreational activities occurring. The greatest number of significant relationships occurred in the Victoria Area. This result may be reflective of patterns of perceived demand for the use of farmland for recreation. These results may also reflect locational differences in patterns of farm types and terrain types of farms.

In the Duncan Area, there was a significant difference in the probability of allowing horseback riding and hiking between farms with different percentages of forested land (Table 6.4). The directions of these relationships were positive and were expected under the assumption that forested land offers an attractive recreational environment.

In the Victoria Area several significant relationships existed including a significant relationship between the percentage of forested land and the probability of allowing hiking and horseback riding. The direction of these relationships was positive and, again, expected. There was also a significant difference

Table 6.4

**Tests of Homogeneity and Parameter Estimates
by
Location**

RELATIONSHIP	CHI SQUARE	PARAMETER ESTIMATE	PROBABILITY
Duncan Area			
forested land effect on allowing horseback riding	3.91	.04285	.0481
forested land effect on allowing hiking	5.86	.05975	.0155
Victoria Area			
forested land effect on allowing hiking	6.53	.05021	.0106
forested land effect on allowing horseback riding	5.72	.04126	.0168
dairy farming effect on allowing farm vacations	10.38	1.98626	.0340
fruit/vegetable/ greenhouse production effect on allowing farm vacations	10.38	-1.36365	.0508
dairy farming effect on allowing photography	4.55	-1.77562	.0552
Nanaimo Area			
	—	—	—

in response probabilities between farm type and allowing farm vacations, as well as allowing photography. More specifically, the direction of the relationship between dairy farming and allowing farm vacations was positive, while the direction of the relationship between fruit/vegetable/greenhouse production and allowing farm vacations was negative. The direction of the relationship between dairy farms and the probability of allowing photography was negative. The direction of this relationship was unexpected. Presence of animals was expected to provide an attraction and, therefore, result in an increased probability in allowing photography. The directions of the remaining relationships were expected in part due to the resource potential of the different farm types. Fruit, vegetable or greenhouse producers having few or no animals might hold little attraction for recreationalists. Moreover, farms producing specialized crops might require considerable labour inputs at the time of the year when people wish to recreate. This would leave the operator with little time to devote to recreational facilities.

Finally, there were no significant differences in any response probabilities for different populations of respondents in the Nanaimo area.

6.6.3.2 By Gender

For different subpopulations of respondents based on gender there were a number of differences in the probability of recreational activities occurring. The subpopulation of female respondents had the largest number of significant relationships. There is a possibility that in some instances female respondents are not active participants in the operation of the farm. They may, therefore, in some cases have more time to allocate, or more desire, to accommodate recreation on their farm.

There was a significant difference in male respondents allowing farm vacations and the effect of those respondents not using farmland for recreation (Table 6.5). The direction of the relationship was negative. Therefore, as the incidence of male respondents not using farmland for recreation increased, the probability of allowing farm vacations decreased. The direction of this relationship was expected for the same reasons discussed in section 6.6.1. In addition, there was a significant difference in the response probabilities of male respondents allowing birdwatching based on the percentage of their land in field. The direction of this relationship was negative and expected.

Table 6.5

**Tests of Homogeneity and Parameter Estimates
by Gender**

RELATIONSHIP	CHI SQUARE	PARAMETER ESTIMATE	PROBABILITY
Male Respondents			
Respondents not using farmland for recreation effect on allowing farm vacations	4.66	-1.09861	.0310
Field effect on allowing birdwatching	4.41	-.03303	.0358
Female Respondents			
Respondents not using farmland for recreation effect on allowing photography	3.78	-1.07329	.0517
Respondents not allowing use in the past effect on allowing photography	5.93	-.90140	.0149
Forested land effect on allowing horseback riding	3.81	.03178	.0509
Forested land effect on allowing birdwatching	4.17	.02851	.0412
Farm size effect on allowing horseback riding	4.45	.01337	.0350
Field effect on allowing farm tours	4.41	.02448	.0358
Male and Female Respondent			
Respondent not allowing use in the past effect on allowing photography	4.87	-1.52226	.0274
Forested land effect on allowing farm vacations	4.17	.08746	.0411

When considering female respondents there was a significant difference in the response probabilities of allowing photography and not using farmland for recreation. The direction of the relationship was negative and expected under the assumption that without past experience with recreation on farmland there will be less motivation to accommodate recreation. There was also a significant difference in the response probabilities of female respondents allowing photography based on not allowing recreational use of their land in the past. The direction of the relationship was negative. Additionally, a significant difference in the response probabilities of allowing horseback riding and birdwatching based on the percentage of forested land occurred. The direction of the relationships were positive and expected. Furthermore, a significant difference in the response probabilities of allowing horseback riding between different populations of female respondents based on the size of their farms also existed. The direction of the relationship was positive. Finally, a significant difference in the response probabilities of allowing farm tours and the percentage of field was observed. The direction of the relationship was positive and unexpected under the assumption that farms with a larger percentage of field provide a less attractive recreational environment.

When considering responses from both a male and female at the same time, the results revealed significant differences. First, as the incidence of not allowing recreational use in the past occurred, the willingness to allow photography decreased (Table 6.5). Additionally, there were significant differences in the response probabilities of allowing farm vacations between different populations of respondents based on the percentage of forest land on their property. The direction of the relationship was positive and expected.

6.6.3.3 By Farm Generated Income

For different subpopulations of respondents based on farm generated income there were a number of differences in the frequency of significant relationships. Respondents in the subpopulation with the smallest proportion of their total income generated from farm income had the greatest number of significant relationships. The relationships that had a positive direction may reflect the expectation that farm operators for whom farm income forms the smallest percentage of the total household income are more willing to allow recreational activities as a supplement to their farm income.

More specifically, when considering those respondents with a farm generated income of 0 to 39 per cent, there was a significant difference between the respondents not using farmland for recreation and the probability of them allowing farm vacations. Again, and as expected, the direction of the relationship was negative. There was also a significant difference in the probability of allowing photography as the incidence of not allowing use in the past occurred. The direction of the relationship was negative. Significant differences in the response probabilities of allowing birdwatching and allowing hiking occurred between respondents with different percentages of forested land. The direction of the relationships were positive and expected. A significant difference in the response probabilities of a respondent in farm generated income class 0 to 39 per cent allowing farm tours and percentage of field existed. The direction of the relationship was positive and opposite to the direction expected. It has been assumed that as the percentage of field increases the potential for conflict between agriculture and recreation increases. It may be suggested, however, that for activities controlled by the landowner such as farm tours, that this assumption does not apply. Finally, there was evidence indicating a significant relationship between farm size and the probability of a respondent in

the farm generated income class of 0 to 39 per cent allowing horseback riding. The direction of the relationship was positive and expected under the assumption that larger farms probably have better resources for accommodating horseback riding.

Results of the tests of homogeneity for respondents in a farm generated income class of 40 to 79 per cent are presented in Table 6.6. There was a significant difference between the percentage of forested land and the probability of a respondent allowing farm vacations. The direction of the relationship was positive and was expected.

Finally, results for respondents in farm generated income class of 80 to 100 per cent indicated a significant relationship between the incidence of the respondent not allowing use in the past and the probability of allowing farm vacations. The direction of the relationship was negative as expected. Additionally, there was a significant relationship between the percentage of field on the respondent's land and the probability of the respondent allowing birdwatching. The direction of the relationship was negative and expected under the assumption that farms with a large amount of cultivated land would not provide a suitable setting.

Table 6.6

**Tests of Homogeneity and Parameter Estimates
by Farm Generated Income**

RELATIONSHIP	CHI SQUARE	PARAMETER ESTIMATE	PROBABILITY
0-39%			
Respondents not using farmland for recreation effect on allowing farm vacations	4.10	-.74894	.0429
Respondents not allowing use in the past effect on allowing photography	6.94	-1.06412	.0084
Forested land effect on allowing birdwatching	3.80	.02985	.0513
Forested land effect on allowing hiking	7.78	.04644	.0053
Field effect on allowing farm tours	6.90	-.03135	.0086
Farm size effect on allowing horseback riding	6.08	.05194	.0137
40-79%			
Forested land effect on allowing farm vacations	3.89	.04542	.0486
80-100%			
Respondents not allowing use in the past effect on allowing farm vacations	3.58	-1.07003	.0585
Field effect on allowing birdwatching	4.32	-.03228	.0377

6.6.4 Goodness of Fit Measures

Having tested hypotheses, the overall fit of the models were considered. The likelihood ratio statistics for the modeled relationships are presented in Table 6.7. The models with a non-significant likelihood ratio were the models with an acceptable fit to the data. This implied, that, in the Duncan Area, there was no evidence for rejecting the hypothesis that percentage of forested land was a main effect in predicting the probability of allowing horseback riding and hiking.

The models with non-significant likelihood ratios in the Victoria Area included the main effects of production type on photography, the main effects of farm type on farm vacations, and the main effects of forested land on hiking. These models were the models with an acceptable fit to the data. They implied that there was no evidence for rejecting the hypothesis that production type was a main effect in predicting the probability of allowing photography, that farm type was a main effect in predicting the probability of allowing farm vacations, and that the percentage of forested land was a main effect in predicting the probability of allowing hiking.

The only model with a non-significant likelihood

ratio for male respondents was the model of the main effects of not using farmland for recreation on allowing farm vacations. This model was the only model with an acceptable fit to the data. It implied, that there was no evidence for rejecting the hypothesis that male respondents not using farmland for recreation was a main effect in predicting probability of allowing farm vacations.

The models with a non-significant likelihood ratio for the female respondents were as follow:

1. the model of the main effect of not using farmland for recreation on allowing photography;
2. the models of the main effects of not allowing use in the past on allowing photography;
3. the model of the main effect of farm size on allowing horseback riding; and,
4. the model of the main effect of forested land on allowing birdwatching.

These findings implied the following:

1. there was no evidence for rejecting the hypothesis that not using farmland for recreation was a main effect in predicting the probability of allowing photography;

Table 6.7

**Goodness of Fit For Models By Location,
Gender and Farm Generated Income**

RELATIONSHIP	LIKELIHOOD RATIO	PROBABILITY
Duncan Area		
forested land effect on allowing horseback riding	22.89	.1949
forested land effect on allowing hiking	23.00	.1906
Victoria Area		
forested land effect on allowing hiking	19.11	.0858
forested land effect on allowing horseback riding	20.54	.0575
farm type effect on allowing farm vacations	0.00	1.0000
production type effect on allowing photography	0.00	1.0000
Male Respondents		
respondents not using farmland for recreation effect on allowing farm vacations	0.00	1.0000
field effect on allowing birdwatching	29.08	.0475
Female Respondents		
respondent not using farmland for recreation effect on allowing photography	0.00	1.0000
respondent not allowing use in the past effect on allowing photography	0.00	1.0000

Table 6.7 Continued

RELATIONSHIP	LIKELIHOOD RATIO	PROBABILITY
forested land effect on allowing horseback riding	32.02	.0583
forested land effect on birdwatching	30.19	.0882
farm size effect on allowing horseback riding	28.85	.4202
field effect on allowing farm tours	36.20	.0525
Male and Female Respondent		
respondent not allowing use in the past effect on allowing photography	0.00	1.0000
forested land effect on allowing farm vacations	12.57	.1831
Farm Generated Income 0-39%		
respondent not using farmland for recreation effect on allowing farm vacations	0.00	1.0000
respondent not allowing use in the past effect on allowing photography	0.00	1.0000
forested land effect on allowing birdwatching	21.09	.1339
forested land effect on allowing hiking	18.41	.2418
field effect on allowing farm tours	29.93	.1111
farm size effect on allowing horseback riding	28.26	.2493

Table 6.7 Continued

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RELATIONSHIP	LIKELIHOOD RATIO	PROBABILITY
<hr/>		
Farm Generated Income 40-79%		
forested land effect on allowing farm vacations	9.37	.0526
Farm Generated Income 80-100%		
respondents not using farmland for recreation effect on allowing farm vacations	0.00	1.0000
field effect on allowing birdwatching	39.98	.0154

2. there was no evidence for rejecting the hypothesis that not allowing use in the past was a main effect in predicting the probability of allowing photography;
3. there was no evidence for rejecting the hypothesis that farm size was a main effect in predicting the probability of allowing horseback riding; and,
4. there was no evidence for rejecting the hypothesis that the percentage of forested land was a main effect in predicting the probability of allowing birdwatching.

The likelihood ratios revealed, first, that for male and female respondents there was no evidence for rejecting the hypothesis that not allowing use in the past is a main effect in predicting the probability of allowing photography; second, there was no evidence for rejecting the hypothesis that percentage of forested land was a main effect in predicting the probability of allowing farm vacations.

All of the models for the respondents in farm generated income class 0 to 39 per cent were not significant. This implied that there was no evidence for rejecting the hypotheses that the independent variables were the main effects in predicting the probability of

allowing the recreational uses. Additionally, none of the models for the respondents in farm generated income class 40 to 79 per cent were not significant.

The only model for the respondents in farm generated income class 80 to 100 per cent that was not significant was the model of the main effects of respondents not using farmland for recreation on allowing farm vacations. This implied that there was no evidence for rejecting the hypothesis that respondents not using farmland for recreation was a main effect in predicting the probability of allowing farm vacations.

Chapter 7

IMPLICATIONS AND CONCLUSIONS

Conversion of farmland to non-agricultural uses has been in the past, and still is at present, a concern in both developed and developing nations. The pressures which have resulted in conversion of farmland have also, in part, created an interest in the use of farmland for multiple purposes. This thesis has measured farmers' preferences in allowing multiple use of their land. This objective has been accomplished with the use of a case study in the Duncan Agricultural District which describes recreational use of farmland and investigates possible relationships between interest in allowing recreational uses and a number of socio-economic variables.

7.1 Implications

Recreational use of farmland in the Duncan Agricultural District has occurred in the past, and it is occurring at present. In the past, 80 per cent of the farm operators allowed use, while at present, 75 per cent are allowing use. Farmland in this district appears to be most suitable for accommodating hiking, camping, birdwatching, photography, and farm tours.

It appears, however, that even if farmland is suitable for recreation that recreation as a future generator of economic income to farm operators is unlikely. This may be true for a number of reasons. Recreational activities which farm operators feel are most suitable uses are those that are generally low investment activities that provide simple outdoor recreational activities. Results indicate that for most activities, with the exception of farm vacations and camping, farm operators prefer no access fee. It may be suggested that if access fees are charged then the farm operator has a duty to maintain the recreational resource. This may involve more commitment to recreational use than farmers in this district wish to make. In addition, the findings indicate that as farm size increases, the probability of allowing certain recreational uses increases. If it can be assumed that larger farms are more financially stable than smaller farms, then the farm operator who may be in need of recreation as a source of income is less disposed to allowing use.

Prediction of future recreational use of farmland may have little to do with stated preferences for recreational activities by farm operators. Rather, the probability of recreational use of farmland occurring in

the future is better estimated by variables such as farm size, percentage of field on the farm, percentage of forest land on the farm, whether or not the farm operator has allowed use in the past, whether or not the farm operator uses farmland for recreation, and farm type. It has also been revealed that the relationships between allowing certain recreational uses and the above mentioned variables vary by location of the farm, gender of the operator, and percentage of income which is derived from the operation of the farm.

It can be suggested, therefore, that preference and behavior in this study have a weak link, and that latent process variables influence behavior. Other observations which are suggestive, but not statistically significant, indicate that latent process variables such as concerns of the farm operators about allowing people on their property will influence future behavior. These concerns include legal (for example, liability problems), economic (for example, property destruction leading to an economic loss), and social (for example, loss of privacy) concerns.

Results of this study are influenced to a certain extent by the limitations of the research design. First, the study has taken a narrow focus because it has

attempted only to measure the possible supply of recreational land. It has yet to be established if there is actually a demand within the study area for use of farmland for outdoor recreation. In addition, if recreation is to serve as an alternative activity which does not remove farmland from productivity then measures of the biological impacts of different forms of recreation should be made.

Second, there may be a question of how accurate the data are when respondents have the opportunity to falsify their responses as well as a limited time to consider the subject of recreation on their farmland. It may be fair to assume that since the topic of the study was not a contentious issue, and questions were unobtrusive that responses were accurate. In addition, respondents were contacted approximately twenty-four hours in advance of the interview and were told about the subject matter of the questionnaire. It is possible that this gave the respondent an opportunity to consider the subject before responding to the questionnaire.

Finally, a number of the variables were measured in a simple fashion. Access fees for different recreational activities, for example, might be better estimated through an experiment of user's willingness to pay. In

addition, further information might be gained through a trade off exercise. A trade off exercise would help not only to establish if there are preferred recreational uses, but also the levels of use where a farm operator no longer prefers that activity.

7.2 Conclusions

This thesis has demonstrated that farmland can and does provide recreational opportunities. It also demonstrates that recreational use while stimulated by the same pressures that lead to conversion of farmland to non-agricultural uses is not resulting in the same conversions. Recreation on farmland in the Duncan Agricultural District is occurring for the most part in a low intensity and non-conflicting fashion. If the goal of protecting farmland must be considered in light of other non-agricultural demands placed on the same land, then it seems feasible that low intensity recreation can occur on farmland while production continues. If demands exist, however, for higher intensity recreation activities, then it is most likely that production of the land would cease.

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Appendix A

Swinnerton's Conclusions Concerning
Recreation on Farmland

1. The conversion of agricultural land to many forms of recreational use is not an entirely irreversible land use change.
2. As a land use type, outdoor recreation retains many of the basic characteristics of the countryside and the change that takes place is frequently one of function rather than form. Intensive forms of recreation development do, nevertheless introduce a distinctly urban element into rural areas.
3. The conversion of agricultural land to recreation at present is not seen as a major threat to the maintenance of the agricultural land base. Competition for agricultural land from recreation is considered insignificant when compared with the land being taken for urban development.
4. Recreation on agricultural land is a multiple use issue. Despite the apparent compatibility between recreation and agriculture, the necessary compromise to ensure this relationship is becoming increasingly difficult to establish and maintain. Agriculture is becoming more intensive in its use of land, and increasing levels of participation in a variety of recreational activities mean that conflicts will undoubtedly occur in the future.
5. The attribute of the agricultural landscape which largely determines the recreational capability of farmland in the extent and quality of the natural environment occurring within an otherwise modified environment for agricultural production. As a result, in many instances people are having to cross farmland in order to reach the non-agriculturally productive areas of the rural landscape.
6. Reference to three groupings of outdoor recreation activities (off road vehicles, non-consumptive forms of outdoor recreation, and consumptive forms of outdoor recreation) illustrates the different perspectives that recreationalists have to the recreational use of agricultural land.
7. Use of off road vehicles for recreation is a contentious issue. However, productive agricultural land offers relatively little attraction for most of these user groups.

Appendix A Continued

8. Non-consumptive forms of outdoor recreation engender relatively little hostility from the farming community as compared with mechanized forms of outdoor recreation. However, access to preferred recreation areas such as lakes and rivers is seen as a growing problem. In the case of environmental groups, increasing concern is being expressed about the environmental implications of modern farming methods.

9. Consumptive forms of outdoor recreation are traditional uses of rural land, whether they are hunting or fishing. In the case of fishermen, access to water bodies is perceived as a particular problem. Access is an issue with hunters, particularly with the increasing tendency for land owners to post their land. There is also tension over modern agricultural practices and removal of natural habitat for wildlife. Nevertheless, for the most part there continues to be an amicable relationship between hunters and landowners.

10. The promotion of farm based recreation and tourism by government has been based on the prospect of increasing farm income, particularly of marginal farms. However, it is evident that not every farmer should or could become involved in the operation of recreation or tourism enterprises. This farm based recreation and tourism can however provide a useful source of income if the operation is kept within operating capabilities of the host family.

After: Swinnerton (1982: 171-175)

Appendix B Pretest Questionnaire

RECREATIONAL USE OF AGRICULTURAL LAND
in the
DUNCAN AGRICULTURAL DISTRICT

This study is interested in whether you currently allow the public use of your property for recreation and which activities if any, that you would or would not be willing to allow in the future. If you were to allow people on all or a portion of your land for recreation there might be some activities that you would prefer to allow more than others. As well, you might prefer some amount of money in return for use by the public. You might also prefer certain times of the year to have people using your land as well as a certain number of days. Finally, you might prefer a certain number of people on your land at one time. Your participation is voluntary and your responses will remain confidential.

Location _____

Gender _____

A. Introduction

1. At present do you allow the public onto your land for recreational purposes?

YES _____
NO _____

2. If you allow people onto your land for recreation now:

a) What types of activities do you allow?

b) Do you charge a fee? YES _____
NO _____

If yes, how much is that fee? _____

3. Do you have any concerns about allowing the public access to your property for recreational purposes?

YES _____
NO _____

If you answered yes, what are those concerns?

4. Do you post your land against trespassing?

YES _____
NO _____

5. Do you or your immediate family participate in any recreational activities on your farm or other peoples farms?

YES _____
NO _____

If yes, what are some of the activities that you participate in?

6. If you or your family have used farmland for recreational purposes:

a) was the farmland owned by you, people that you know or are related to?

b) did you pay to use the land?

YES _____

NO _____

If yes, how much was that fee?

7. Do you think that there are people in the area who would like to have access to your property for recreational purposes?

YES _____

NO _____

B. Recreational Land Use Preferences

Could your property be used for the recreational uses listed? I don't mean which uses you'd allow, but rather the uses for which your land is suited.

Would you allow each of the recreational uses listed on your land? I don't mean which uses for which your land is suited, but rather which of the uses you would allow.

From the list of activities that you would allow on your property choose the activity that you would prefer the most to allow on your property. Rank it one (1). Rank the use that you would prefer second most 2 and so on.

OFF ROAD VEHICLES	YES ___	NO ___	YES ___	NO ___	___
HIKING	YES ___	NO ___	YES ___	NO ___	___
OVERNIGHT CAMPING	YES ___	NO ___	YES ___	NO ___	___
HORSEBACK RIDING	YES ___	NO ___	YES ___	NO ___	___
BIRDWATCHING	YES ___	NO ___	YES ___	NO ___	___
PHOTOGRAPHY	YES ___	NO ___	YES ___	NO ___	___
HUNTING	YES ___	NO ___	YES ___	NO ___	___
FISHING	YES ___	NO ___	YES ___	NO ___	___
FARM VACATIONS	YES ___	NO ___	YES ___	NO ___	___
OFF ROAD VEHICLES AND CAMPING	YES ___	NO ___	YES ___	NO ___	___
OFF ROAD VEHICLES AND HUNTING	YES ___	NO ___	YES ___	NO ___	___
OFF ROAD VEHICLES AND FISHING	YES ___	NO ___	YES ___	NO ___	___
HIKING AND CAMPING	YES ___	NO ___	YES ___	NO ___	___
FARM VACATIONS AND HUNTING	YES ___	NO ___	YES ___	NO ___	___
FARM VACATIONS AND FISHING	YES ___	NO ___	YES ___	NO ___	___
OTHER (SPECIFY)	YES ___	NO ___	YES ___	NO ___	___

For each recreational use please indicate the number of people that you would allow on your land. You may answer zero for some of the recreational uses.

For each recreational use please indicate the fee that you would charge per person for the use of your land. You may answer free for some of the recreational uses.

<u>RECREATIONAL USES</u>	Number of people per day	Charge per person	Free
OFF ROAD VEHICLES	_____	_____	_____
HIKING	_____	_____	_____
OVERNIGHT CAMPING	_____	_____	_____
HORSEBACK RIDING	_____	_____	_____
BIRD WATCHING	_____	_____	_____
PHOTOGRAPHY	_____	_____	_____
HUNTING	_____	_____	_____
FISHING	_____	_____	_____
FARM VACATIONS	_____	_____	_____
OFF ROAD VEHICLES AND CAMPING	_____	_____	_____
OFF ROAD VEHICLES AND HUNTING	_____	_____	_____
OFF ROAD VEHICLES AND FISHING	_____	_____	_____
HIKING AND CAMPING	_____	_____	_____
FARM VACATIONS AND HUNTING	_____	_____	_____
FARM VACATIONS AND FISHING	_____	_____	_____
OTHER (SPECIFY)	_____	_____	_____

For each recreational use please indicate the number of days that you would allow your land to be used. There may be some recreational uses for which you will answer zero days of use of your land.

For each recreational use please indicate the times of the year that you would allow your land to be used. There may be some recreational uses for which there are no times of the year that you will open your land to use.

<u>RECREATIONAL USES</u>	Number of days land open to use	Times of the year
OFF ROAD VEHICLES	_____	_____
HIKING	_____	_____
OVERNIGHT CAMPING	_____	_____
HORSEBACK RIDING	_____	_____
BIRD WATCHING	_____	_____
PHOTOGRAPHY	_____	_____
HUNTING	_____	_____
FISHING	_____	_____
FARM VACATIONS	_____	_____
OFF ROAD VEHICLES AND CAMPING	_____	_____
OFF ROAD VEHICLES AND HUNTING	_____	_____
OFF ROAD VEHICLES AND FISHING	_____	_____
HIKING AND CAMPING	_____	_____
FARM VACATIONS AND HUNTING	_____	_____
FARM VACATIONS AND FISHING	_____	_____
OTHER (SPECIFY)	_____	_____

C. Finally, I would like to ask you some questions about your property and a few demographic questions.

1. Please tell me how old you were on your last birthday?

2. How many years have you lived on this property?

3. Do you own or lease this property?

OWN _____
LEASE _____

4. What is the size of this property, that is, how many acres or hectares?

5. Approximately what proportion of your property is:

STANDING WOODLOT _____
BRUSH _____
SWAMP _____
FIELD _____

6. Approximately what proportion of your property is:

STEEP _____
FLAT _____
ROLLING _____

7. What is the main type of production on this farm?

LIVESTOCK _____
CROP _____
FRUIT OR VEGETABLE _____
GREENHOUSE _____
DAIRY _____
SHEEP _____
OTHER (SPECIFY) _____

8. What is the estimated household income from all sources in 1986?

\$ 5,000 - \$9,999	_____
\$10,000 - \$14,999	_____
\$15,000 - \$24,999	_____
\$25,000 - \$34,999	_____
\$35,000 - \$44,999	_____
\$45,000 or more	_____

9. Approximately what proportion of this household's income in 1986 was from farming?

10. Approximately how many days did the farm operator(s) work off the farm in 1986?

RECREATIONAL USE OF AGRICULTURAL LAND
in the
DUNCAN AGRICULTURAL DISTRICT

This study is interested in whether you currently allow the public use of your property for recreation and which activities if any, that you would or would not be willing to allow in the future. If you were to allow people on all or a portion of your land for recreation there might be some activities that you would prefer to allow more than others. As well, you might prefer some amount of money in return for use by the public. You might also prefer certain times of the year to have people using your land. Finally, you might prefer a certain number of people on your land at one time. Your participation is voluntary and your responses will remain confidential.

Location _____

Gender _____

5. Do you have any concerns about allowing the public access to your property for recreational purposes?
 YES _____ NO _____

If you answered yes, what are those concerns? Rank them in order from the thing that concerns you the most to the thing that concerns you the least.

1. _____ 2. _____
 3. _____ 4. _____

6. Do you post your land against trespassing?
 YES _____ NO _____

7. Do you or your immediate family participate in any recreational activities on your farm or other peoples farms?
 YES _____ NO _____

If yes, what are some of the activities that you participate in?

1. _____ 2. _____ 3. _____

8. If you or your family have used farmland for recreational purposes:

a) What was your relationship to the people that own the land?

- a) family _____
 b) friends _____
 c) neighbours _____
 d) people that you know _____
 e) strangers _____

b) Did you pay to use the land?

- YES _____ NO _____

If yes, how much was that fee?

9. Do you think that there are people in the area who would like to have access to your property for recreational purposes?

- YES _____ NO _____

B. Recreational Land Use Preferences

Could your property be used for the recreational uses listed? I don't mean which uses you'd allow, but rather the uses for which your land is suited.

Would you allow each of the recreational uses listed on your land? I don't mean which uses for which your land is suited, but rather which of the uses you would allow.

From the list of activities that you would allow choose the one that you would prefer the to allow on your property. Rank it one (1). Rank the use that you would prefer the second most 2, and so on.

OFF ROAD VEHICLES	YES ___	NO ___	YES ___	NO ___	___
HIKING	YES ___	NO ___	YES ___	NO ___	___
OVERNIGHT CAMPING	YES ___	NO ___	YES ___	NO ___	___
HORSEBACK RIDING	YES ___	NO ___	YES ___	NO ___	___
BIRDWATCHING	YES ___	NO ___	YES ___	NO ___	___
PHOTOGRAPHY	YES ___	NO ___	YES ___	NO ___	___
HUNTING	YES ___	NO ___	YES ___	NO ___	___
FISHING	YES ___	NO ___	YES ___	NO ___	___
FARM VACATIONS	YES ___	NO ___	YES ___	NO ___	___
HORSEBACK RIDING AND CAMPING	YES ___	NO ___	YES ___	NO ___	___
HIKING AND BIRDWATCHING	YES ___	NO ___	YES ___	NO ___	___
HORSEBACK RIDING AND FARM VACATIONS	YES ___	NO ___	YES ___	NO ___	___
HIKING AND CAMPING	YES ___	NO ___	YES ___	NO ___	___
FARM VACATIONS AND HIKING	YES ___	NO ___	YES ___	NO ___	___
FARM VACATIONS AND FISHING	YES ___	NO ___	YES ___	NO ___	___
FARM TOURS	YES ___	NO ___	YES ___	NO ___	___
U-PICK	YES ___	NO ___	YES ___	NO ___	___
OTHER (SPECIFY)	YES ___	NO ___	YES ___	NO ___	___

For each recreational use that you would allow on your land please indicate the times of the year that you would allow your land to be used.

<u>RECREATIONAL USES</u>	Times of the year						
	during summer	during spring and summer	during fall and winter	during winter	during spring to fall	anytime except during important farming events	anytime
OFF ROAD VEHICLES	—	—	—	—	—	—	—
HIKING	—	—	—	—	—	—	—
OVERNIGHT CAMPING	—	—	—	—	—	—	—
HORSEBACK RIDING	—	—	—	—	—	—	—
BIRD WATCHING	—	—	—	—	—	—	—
PHOTOGRAPHY	—	—	—	—	—	—	—
HUNTING	—	—	—	—	—	—	—
FISHING	—	—	—	—	—	—	—
FARM VACATIONS	—	—	—	—	—	—	—
HORSEBACK RIDING AND CAMPING	—	—	—	—	—	—	—
HIKING AND BIRDWATCHING	—	—	—	—	—	—	—
HORSEBACK RIDING AND FARM VACATIONS	—	—	—	—	—	—	—
HIKING AND CAMPING	—	—	—	—	—	—	—
FARM VACATIONS AND HIKING	—	—	—	—	—	—	—
FARM VACATIONS AND FISHING	—	—	—	—	—	—	—
FARM TOURS	—	—	—	—	—	—	—
U-PICK	—	—	—	—	—	—	—
OTHER (SPECIFY)	—	—	—	—	—	—	—

C. Finally, I would like to ask you some questions about your property and a few demographic questions.

1. Please tell me how old you were on your last birthday?

2. How many years have you lived on this property?

3. Do you own or lease this property?

OWN _____
LEASE _____

4. What is the size of this property, that is, how many acres or hectares?

5. Do you help operate this farm?

YES _____
NO _____

6. Approximately how many acres of your property is :

STANDING WOODLOT	_____	FIELD	_____
BRUSH	_____	ORCHARD	_____
SWAMP	_____	ROCK OUTCROP	_____

7. Approximately how many acres of your property is:

STEEP _____
FLAT _____
ROLLING _____

8. What is the main type of production on this farm?

LIVESTOCK	_____	DAIRY	_____
CROP	_____	SHEEP	_____
FRUIT OR VEGETABLE	_____	POULTRY	_____
GREENHOUSE	_____	OTHER (SPECIFY)	_____

9. What is the estimated household income from all sources in 1986?

\$ 5,000 - \$9,999	_____
\$10,000 - \$14,999	_____
\$15,000 - \$24,999	_____
\$25,000 - \$34,999	_____
\$35,000 - \$44,999	_____
\$45,000 - \$54,999	_____
\$55,000 - \$64,999	_____
\$65,000 or more	_____

10. Approximately what proportion of this household's income in 1986 was from farming?

a) 0 - 39%	_____
b) 40 - 79%	_____
c) 80 - 100%	_____

11. Approximately how many days did the farm operator(s) work off the farm in 1986?

If the farm operator(s) worked off the farm what kind of work did he/she do?

Appendix D

Descriptive Social and Economic
Characteristics of the Respondents

Total Number	100
Percentage of Interviews With Male Respondents	36
Percentage of Interviews With Female Respondents	44
Percentage of Interviews With Male and Female Respondents Together	20
Average Age	48.7
Minimum Age	26.0
Maximum Age	78.0
Average Length of Residency	17.5
Total Number of Respondents Willing to Reveal Percentage of Income From Farm Sources	100
Percentage of Respondents Deriving 0-39% of Income From Farming	43
Percentage of Respondents Deriving 40-79% of Income From Farming	15
Percentage of Respondents Deriving 80-100% of Income From Farming	42
Average Number of Days of Off Farm Work	132.4

**Locations of the Respondent's
Farms**

	<u>LOCATIONS</u>	<u>PERCENTAGE OF FARMS</u>
		N = 100
VICTORIA AREA		
	Sooke	3.0
	Brentwood Bay	3.0
	Metchosin	4.0
	Saltspring Island	4.0
	Sidney	8.0
	Victoria	11.0
	Saanichton	14.0
DUNCAN AREA		
	Duncan	20.0
	Cobble Hill	11.0
	Shawingan Lake	1.0
NANAIMO AREA		
	Chemanius	2.0
	Westholme	2.0
	Ladysmith	6.0
	Nanaimo	10.0
	Crofton	1.0

Farm Characteristics

Average Farm Size	56.2 acres
Minimum Farm Size	0.3 acres
Maximum Farm Size	500.0 acres

N = 100

Per Cent

Farms Producing Livestock	11.0
Farms Producing Crops	2.0
Farms Producing Fruits/Vegetables	18.0
Farms Producing Greenhouse Produce	10.0
Farms Producing Dairy	24.0
Farms Producing Sheep	20.0
Farms Producing Poultry	3.0
Farms Producing Some Other Type Of Produce (Mainly Mixed Farming)	12.0
Farms Reporting 50% or Less of Flat Terrain	55.0
Farms Reporting 50% or More of Flat Terrain	45.0
Farms Reporting 50% or Less of Rolling Terrain	55.0
Farms Reporting 50% or More of Rolling Terrain	45.0
Farms Reporting 50% or Less of Steep Terrain	97.0
Farms Reporting 50% or More of Steep Terrain	3.0

Appendix G

Recreational Land Use

	N = 100
Respondents Allowing Recreational Use in the Past	Per Cent 80.0
Respondents Allowing Recreational Use at Present	75.0
Respondents Using Farmland For Recreation	25.0

Recreational Activities That Respondents Participated in On Farmland

ACTIVITY	PERCENTAGE PARTICIPATING
picnicking	3.0
horseback riding	9.0
hiking	6.0
hunting	3.0
watching wildlife	2.0
camping	1.0
painting	1.0
birdwatching	2.0
fishing	1.0
livestock shows	1.0
4-H activities	1.0

Appendix H

Recreational Activities on
Farmland

	N = 100	
Activity	Percentage Suitable	Percentage Allow
Off Road Vehicles	25	5
Hiking	51	33
Camping	56	25
Horseback Riding	36	30
Birdwatching	68	60
Photography	84	75
Hunting	12	5
Fishing	21	11
Farm Vacations	35	23
Farm Tours	74	63
U-Pick	11	9

Appendix I Access Fees, Access Times and Access Numbers

(A) Activity	(B) Percentage Allowing the Activity	(C) Level of Fee, Times, Numbers for Access	(D) Percentage of (B) Choosing Level as Most Preferred Level
Off Road Vehicles	5	FEE - no access fee	100
		TIME - during summer	40
		- anytime	60
		NUMBER - 1-3 people/day	100
Hiking	33	FEE - no access fee	100
		TIME - during winter	6
		- anytime except important farming events	24
		- anytime	69
		NUMBER - 1-3 people/day	18
		- 4-6 people/day	33
		- 7-12 people/day	9
		- 13-25 people/day	6
		- no limit	33
Camping	25	FEE - no charge	68
		- \$1-4/person	20
		- \$5-10/person	12
		TIME - during summer	12
		- during fall and winter	4
		- anytime except important farming events	24
		- anytime	24
		NUMBER - 1-3 people/day	32
		- 4-6 people/day	4
		- 7-12 people/day	20
- 13-25 people/day	20		
- no limit	24		
Horseback Riding	30	FEE - no access fee	76
		TIME - anytime except important farming events	3
		- anytime	73
		NUMBER - 1-3 people/day	33
		- 4-6 people/day	6
		- 7-12 people/day	3
		- 13-25 people/day	6
		- no limit	26

Appendix I Continued

(A) Activity	(B) Percentage Allowing the Activity	(C) Level of Fees, Times Numbers for Access	(D) Percentage of (B) Choosing Level as Most Preferred Level	
Birdwatching	60	FEE - no access fee	100	
		TIME - during spring and summer	1.6	
			- during winter	5
		- during spring to fall	1.6	
			- anytime except important farming events	15
		- anytime	76	
		NUMBER - 1-3 people/day	26	
			- no limit	40
			- 4-6 people/day	18
			- 7-12 people/day	8
			- 13-25 people/day	6
		Photography	75	FEE - no access fee	98
- \$1-4/person	1.3			
TIME - anytime	66			
	- anytime except important farming events			16
- during summer	2.6			
- during spring and summer	5			
	- during fall and winter			5
- during winter	2.6			
- during spring to fall	1.3			
NUMBER - 1-3 people/day	52			
	- no limit			28
	- 4-6 people/day			14
	- 7-12 people/day	2.6		
	- 13-25 people/day	2.6		
Hunting	5	FEE - no access fee	100	
		TIME - anytime	60	
			- anytime except during important farming events	20
		- during winter	20	
		NUMBER - 1-3 people/day	80	
- no limit	20			

Appendix I Continued				
(A) Activity	(B) Percentage Allowing the Activity	(C) Level of Fees, Times Numbers for Access	(D) Percentage of (B) Choosing Level as Most Preferred Level	
Fishing	11	FEE - no access fee	100	
		TIME - anytime	81	
			- during summer	18
		NUMBER - 1-3 people/day	54	
			- no limit	27
- 4-6 people/day	18			
Farm Vacations	23	FEE - no access charge	47	
			- \$5-10/person	4
			- \$11-15/person	4
			- \$16-20/person	21
			- more than \$20/person	21
		TIME - during summer	47	
			- anytime	39
			- during spring to fall	8
		- during spring and summer	4	
		NUMBER - 1-3 people/day	43	
			- 4-6 people/day	39
			- 13-25 people/day	13
			- 7-12 people/day	4
Farm Tours	69	FEE - no access fee	92	
			- \$1-4/person	7
		TIME - anytime	37	
			- during spring and summer	33
			- anytime except during important farming events	8
			- during winter	7
			- during fall and winter	5
			- during summer	4
		- during spring to fall	2	
		NUMBER - no limit	46	
			- 13-25 people/day	37
			- 7-12 people/day	15
U-Pick	9	FEE - \$11-15/person	77	
			- \$16-20/person	11
			- more than \$20	11
		TIME - during summer	88	
			- during spring to fall	11
		NUMBER - 13-25 people/day	44	
			- no limit	33
- 7-12 people/day	22			

Appendix J

Non-Significant Relationships

RELATIONSHIP	CHI SQUARE	PROBA- BILITY
1. There are no significant effects of location on the probability of a respondent allowing any recreational use.	—	—
2. There are no significant effects of the respondent's preference for a recreational activity on the probability of the respondent allowing any of the recreational uses.	—	—
3. There are no significant effects of the respondents not allowing recreational use of their land at present on the probability of the respondent allowing any of the recreational uses.	—	—
4. The effect of respondents not using farmland for recreation on the probability of the respondent allowing farm vacations	3.07	.0796
5. The effect of respondents not using farmland for recreation on the probability of the respondent allowing hiking	0.73	.3916
6. The effect of respondents not using farmland for recreation on the probability of the respondent allowing camping	0.02	.8939
7. The effect of the respondents not using farmland for recreation on the probability of the respondent allowing horseback riding	0.47	.4941
8. The effect of the respondents not using farmland for recreation on the probability of the respondent allowing birdwatching	0.22	.6377

RELATIONSHIP	CHI SQUARE	PROBA- BILITY
9.The effect of the respondents not using farmland for recreation on the probability of the respondent allowing farm tours	0.76	.3846
10.The effect of the respondents not allowing use of their land in the past on the probability of the respondent allowing hiking	3.36	.0667
11.The effect of the respondents not allowing use of their land in the past on the probability of the respondent allowing horseback riding	0.00	.9887
12.The effect of the respondents not allowing use of their land in the past on the probability of the respondent allowing birdwatching	2.29	.1305
13.The effect of respondents not allowing use of their land in the past on the probability of the respondent allowing farm vacations	2.19	.1393
14.The effect of respondents not allowing use of their land in the past on the probability of the respondent allowing farm tours	0.19	.6658
15.The effect of production type on the probability of the respondent allowing hiking	2.67	.4446
16.The effect of production type on the probability of the respondent allowing camping	1.36	.7152
17.The effect of production type on the probability of the respondent allowing horseback riding	5.49	.1392
18.The effect of production type on the probability of the respondent allowing birdwatching	1.09	.0873

Appendix J Continued

RELATIONSHIP	CHI SQUARE	PROBA- BILITY
19.The effect of production type on the probability of the respondent allowing farm tours	3.01	.3894
20.The effect of percentage of field on the probability of the respondent allowing horseback riding	0.15	.6976
21.The effect of percentage of field on the probability of the respondent allowing photography	1.09	.2968
22.The effect of percentage of field on the probability of the respondent allowing farm vacations	0.38	.5358
23.The effect of percentage of field on the probability of the respondent allowing camping	0.71	.4011
24.The effect of percentage of field on the probability of the respondent allowing hiking	0.99	.3194
25.The effect of percentage of forest land on the probability of the respondent allowing hiking	2.86	.0907
26.The effect of percentage of forest land on the probability of the respondent allowing camping	1.30	.2551
27.The effect of percentage of forest land on the probability of the respondent allowing photography	0.26	.6098
28.The effect of percentage of forest land on the probability of the respondent allowing farm tours	0.70	.4030
29.The effect of farm size on the probability of the respondent allowing hiking	0.60	.4370

RELATIONSHIP	CHI SQUARE	PROBA- BILITY
30.The effect of farm size on the probability of the respondent allowing camping	0.80	.3702
31.The effect of farm size on the probability of the respondent allowing birdwatching	0.01	.9204
32.The effect of farm size on the probability of the respondent allowing photography	1.45	.2284
33.The effect of farm size on the probability of the respondent allowing farm vacations	0.01	.9320
34.The effect of farm size on the probability of the respondent allowing farm tours	0.98	.3224

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RECREATIONAL USE OF FARMLAND IN THE DUNCAN AGRICULTURAL DISTRICT, BRITISH COLUMBIA

Author


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LYNDA LOU PATTERSON
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Sept 30, 1988
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