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OFF-ROAD VEHICLE USE IN MINNESOTA

(pursuant to Laws of Minnesota, 1983, Ch. ~~344~~, Sec. 56)

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Department of Natural Resources

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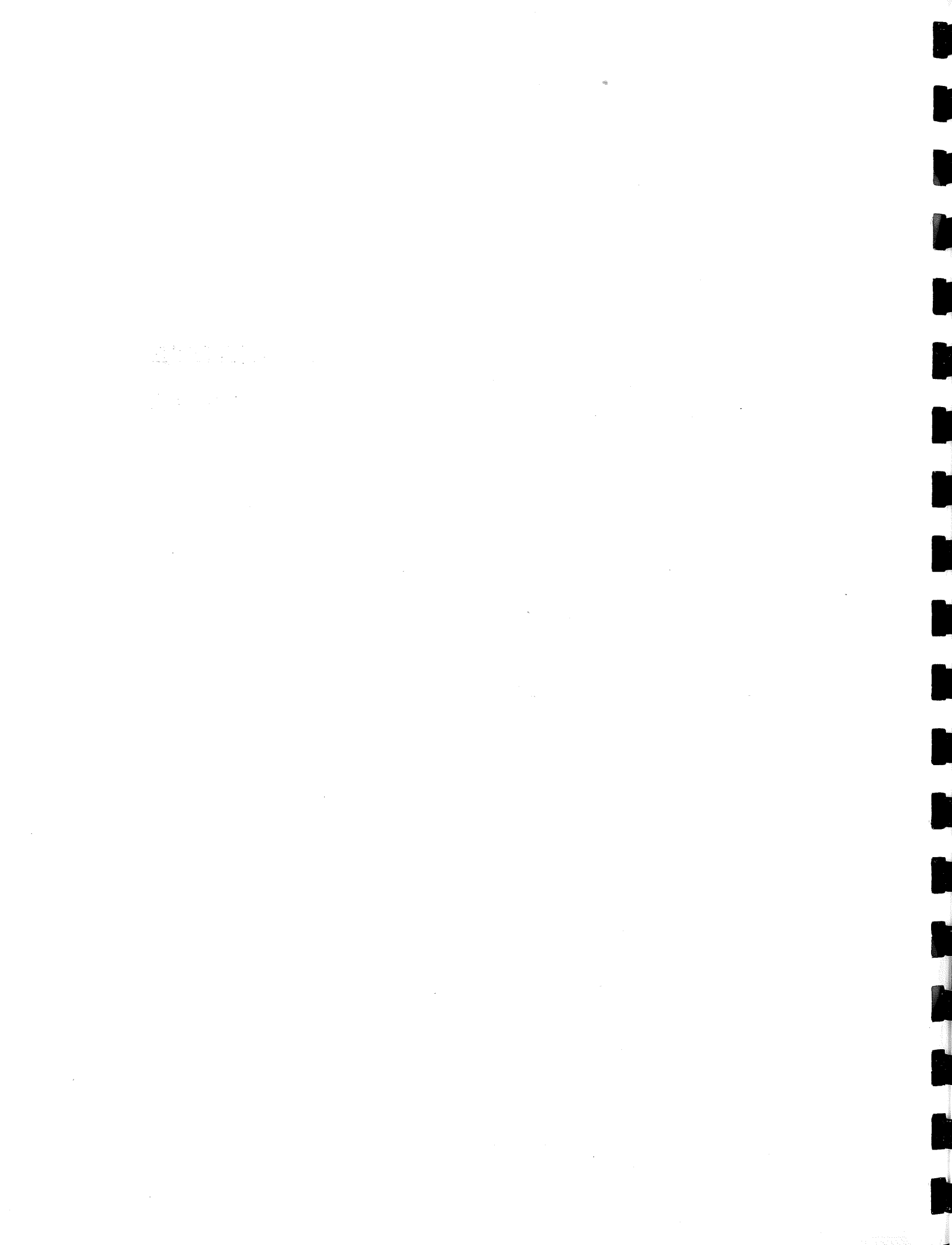


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PREFACE

In the spring of 1983, the Minnesota Legislature called for a study of off-road recreational motor vehicles pursuant to Laws of MN, Ch. 344, Sec. 56. As called for in this law, the consideration of off-road recreational motor vehicles is one which extends beyond any jurisdictional boundaries. Off-road vehicle (ORV) recreation takes place on private as well as public lands. Because the Department of Natural Resources (DNR) administers a significant portion of public land and has dealt with a similar issue, snowmobiling, it was mandated to become involved. The issue was not a new one for the Department of Natural Resources (DNR). In 1972 the DNR contributed to an ORV study by the Upper Great Lakes Regional Commission. This effort resulted in a 71-page document outlining model ORV legislation. Additionally, the DNR has had some experience with attempting to establish a recreational state park open to off-road vehicle use. In the mid-1970's, the DNR received a tract of land near Moose Lake in Carlton County. One of the proposals for allocation of this property was to designate it as a recreational state park and develop it to accommodate off-road vehicle riding. As the proposal progressed, information was released indicating that the area might be developed as an off-road vehicle state park. Public input during review of this idea was heavily negative. The proposal died and the Moose Lake property was designated, and is being managed, as a state non-motorized recreation area.

Since the 1970's, the nature of ORV use in Minnesota has changed somewhat. The principal change has been the wide-spread sale of three-wheel vehicles. Three-wheel-vehicle use, which began with perhaps 50 vehicles statewide in 1970, has now increased to about 30,000 in use as of December 1983. In

addition to this, approximately 90,000 two-wheelers and 50,000 four-wheel-drive vehicles are involved in off-road recreation in the state. The two-and four-wheel figures represent a stabilization in their growth.

Much ORV use takes place on private lands. This use is primarily individuals recreating on their own land or friends' land. Additionally, groups of users or formal clubs will purchase or lease land for the group's use. This use can be on a regular basis or often only for a single activity or event.

Within DNR-managed lands, ORV use currently takes place on Division of Forestry administered lands. Within Minnesota, the multiple-use concept, as clarified in Laws of Minnesota, 1982, Ch. 511, Sec. 3, provides a substantial amount of land within state forests for off-road use. Because none of these lands are presently managed specifically for ORV use, the DNR has not widely publicized their availability. As a result, awareness of ORV opportunity on DNR-managed lands comes from Departmental response to public inquiries and from "word of mouth" among ORV users.

The current policy of the Division of Forestry of the DNR is to allow off-road vehicle use on all public forest lands except those specifically closed to ORV traffic. Closings are based on damage to the environment or safety considerations. Additionally, some areas such as forest campgrounds and snowmobile trails (during the winter season) are closed to ORV's. Based on this policy, nearly 1800 miles of forest roads remain open to off-road vehicle use as well as most of the 3,000,000 acres of state forest land.

In addition, the policies of the U.S. Forest Service in the Superior and Chippewa National Forests open forest roads on an additional 3,000,000 acres

of federal forest land. The Superior Forest policy is to, "allow the use of two- three- and four-wheeled off-road vehicles on old roads during the season of no snow cover where vegetation is not harmed and if roads are not closed to public access".

On the other hand, a number of restrictions presently effect ORV use in this state. Nearly all snowmobile trails, for example, are restricted to no other motorized uses under Laws of Minnesota, 1981, Ch. 215. Other DNR regulations prohibit ORV use of state trails, posted state forest roads or trails, and state park and wildlife management area lands.

Additionally, ORV use along roadside rights-of-way is illegal. The only exception to this is the carefully defined conditions in Statutes of Minnesota 84.87 for snowmobiling. Despite these restrictions, much two-wheeler and three-wheeler recreation takes place along roadside ditches in the state.

In the 1983 legislative session a bill was presented at the urging of the Minnesota Three Wheelers Association that called for the registration of 3-wheel vehicles and a program of facility development. Because of the perception that any three-wheel legislation would eventually impact other ORV users, the Legislature called for a study of all ORV use. Furthermore, representatives of all ORV groups, to a greater or lesser degree, have at various times voiced their desires to improve conditions for their own recreation.

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INTRODUCTION

During the summer and fall of 1983, the DNR with cooperation from the University of Minnesota conducted a study of off-road recreational vehicle use in Minnesota. This study was in response to the legislative mandate set forth in Laws of Minnesota 1983 Chapter 344, Sec. 56. The term "recreational motor vehicle" as defined here is synonymous with the term "off-road vehicle (ORV)" found throughout this study.

[RECREATIONAL MOTOR VEHICLE STUDY.]

By January 1, 1984, the commissioner of natural resources shall study the use and effects of recreational motor vehicles on the environment, including soils, vegetation, and wildlife; the demand now and future need for recreational motor vehicle recreational opportunities in the state; the appropriate legal and social implications of recreational motor vehicle use on public and private lands; the potential for recreational motor vehicle use on existing recreational trails; and the impact of increased recreational motor vehicle use on tourism opportunities statewide. For the purposes of this section, "recreational motor vehicle" has the same meaning as defined in Minnesota Statutes, section 84.90 except that snowmobiles are not included in the study. The commissioner shall work with and solicit the comments and advice of, the departments of public safety, transportation, and any interested party or group in the study. The study shall be presented to the governor and the appropriate standing committees in the house of representatives and the senate.

Responsibility for the study was assigned to the Office of Planning within the Department, as it was determined that an interdisciplinary approach best suited this assignment. A task group was formed with representation from the Forestry, Wildlife, Parks, Enforcement and Trails and Waterways disciplines, including both field and central office personnel.

It was important to the Department that the impacts of ORV use be judged in an objective manner. Therefore, the Department solicited the assistance of the University of Minnesota, both its Center for Urban and Regional Affairs (CURA)

and the Division of Recreation, Park and Leisure Studies in the College of Education.

The Department organized the study in a manner that would facilitate response to all aspects of the legislation. The legislation calls for addressing five separate areas. These areas are the first five chapters (PART ONE) in the study. The last three chapters (PART TWO) address those additional areas of necessary background on the issue.

PART ONE - LEGISLATIVE ISSUES

I. Use and Effects of Recreational Motor Vehicles on the Environment

The University of Minnesota Center for Urban and Regional Affairs (CURA) conducted a review of past studies and articles on off-road vehicle impacts and management from across the nation. In addition, the University of Minnesota College of Education, Division of Parks and Leisure Studies conducted three Minnesota case studies addressing ORV use. An additional case study was conducted by the DNR Office of Planning.

II. Present and Future Demand for Recreational Motor Vehicles

Calculations on present and future use of two-wheel, three-wheel, and four-wheel-drive off-road vehicles (ORVs) were made by DNR Office of Planning.

III. Legal and Social Implications of Recreational Motor Vehicles on Public and Private Land

The legal implications have been addressed in an interpretation of state liability law by the legal staff of DNR.

The social implications of recreational motor vehicles have been addressed in the literature review by the University of Minnesota-CURA.

IV. Potential For Recreational Motor Vehicle Use on Existing Trails

Potential use of existing trails requires a definition of present ORV policy. This definition was obtained through a memo of agreement between DNR Trails and Waterways Unit and DNR Forestry Division.

Potential use of snowmobile trails by the three-wheel segment of the ORV group was the focus of a DNR-supported consultant survey conducted in April and May of 1983.

V. Impact of Increased Use of Recreational Motor Vehicles Upon Tourism

Estimates of the present economic impact of ORVs, combined with estimates of the future use of ORVs, have been computed by DNR-Office of Planning.

PART TWO - BACKGROUND ISSUES

VI. Solicited Response From ORV Spokesperson

To obtain a measure of public attitude toward ORVs, the written responses of a variety of ORV groups, government officials and environmental groups was received by the DNR. A number of these representatives also attended a public meeting.

VII. Off-Road Vehicle Programs In Other States

A sampling of other states' ORV programs was conducted by DNR-Trails and Waterways Unit, DNR-Office of Planning, and University of Minnesota-CURA.

VIII. Management Considerations and Estimated Administrative Costs for an ORV Program in Minnesota

Certain management concerns were addressed by University of Minnesota-CURA, and potential management costs were estimated by DNR-License Bureau and DNR-Trails and Waterways Unit.

CONCLUSIONS

As the DNR reviewed the various components of the study a number of key findings surfaced. These include:

1. ORV's are widely used in Minnesota and will continue to grow in numbers.
2. Minnesota currently has approximately 90,000 two-wheeled, 30,000 three-wheeled and 50,000 four-wheeled vehicles used for off-road recreating.
3. Three-wheeled vehicles are only one segment and even with their projected growth rates will only represent approximately 1/3 of the ORV market in 1990.
4. ORV operators span a wide age range, from 5 years to 90 years, with most being in their mid teens to late 20's.
5. Use patterns show that ORV use is normally within 50 miles of the operator's home base. (This distance also represents the desired distance, 0-50 miles, to travel for ORV day use.)
6. Vehicle use is currently spread throughout the state on all types of lands-private, city, township, county, state and federal.
7. All ORVs cause impact, both environmental and social. The amount of impact, however, varies substantially and is related to:

- a. where the use occurs
 - b. what type of use occurs
 - c. how much use (the amount of use) occurs
 - d. when the use occurs (e.g., wet vs. dry or frozen conditions, and seasonal considerations, hunting seasons)
8. ORV use can be managed through site design and development, signing, enforcement and user education.
 9. Some of the impact currently seen is vandalism.
 10. All user groups, as represented by their state associations, indicated that they are willing to pay their own way. It should be noted, however, that the user groups felt that program costs would be low and thus so also would their fee structure. Specifically, the 3 wheelers' association (current membership 100) has developed and is lobbying for passage of a 3-wheel registration bill. The 4-wheel association (membership 600) is requesting dedicated use-areas. The 2-wheel association (membership 2,000) is specifically requesting either the continuation of areas currently available or expansion of opportunities.
 11. Because a large number of both 2- and 4- wheeled vehicles are not used for off-road recreation, blanket registration of ORVs for purposes of funding ORV programs may create concern.
 12. Users expressed and showed a desire for mud, sand and hills. This desire was reinforced by a DNR survey which indicated that ORV users

generally desire rugged terrain most highly. Mud and sand was ranked just below forest and rolling terrain in desirability. Managers, in contrast, feel the need for dry or frozen conditions, stable soils and minimal slopes to minimize resource impact.

13. Desirable sites concentrate ORV use but do not totally eliminate use at other surrounding areas.
14. Many ORV users (specifically 2-wheel and 3-wheel recreators) ride in roadside ditches.
15. Although the snowmobile user groups wish to assist the 3-wheel recreationist, they currently do not want to share trails.
16. Although between 50 and 60% of the private landowners who currently allow snowmobile grants-in-aid trails on their property indicated that they would discuss 3 wheel use of those trails, 25% of the landowners said that they would drop out of the current program if it included 3-wheeling.
17. A number of resource managers from state agencies and local units of government and citizens are unclear about the laws and rules regulating ORV use. (The Department lacks rules for recreation management on Forestry-administered lands with the exception of day-use areas).

In light of these findings, the DNR formulated a basic philosophy:

The need for ORV management is a issue deserving Department attention. At this time, however, ORV use is not a prevalent problem across state-administered land, but instead is more of a localized concern with a number of problematic use areas scattered throughout the state. This use is taking place on lands administered by a variety of entities: DNR, DoT, local units of government and private land owners. As a localized issue, other levels of government should become involved in formulating a response to ORV use in Minnesota. The DNR, however, should take a lead role.

In reacting to the information gathered, the DNR has developed an approach (i.e., a series of recommendations) which allows for different solutions to varied local situations. The Department's recommendations follow.

1. The Department should use the Forestry unit planning process to decide what areas of Forestry administered lands could be used for ORV activities. The Forestry unit-planning process provides an excellent vehicle for the Department to take a lead in a localized issue. Forestry has divided the state into twenty management units and is planning for multiple use in each of them. Furthermore, the planning process is designed to include opportunities for public input and coordination with local units of government.

The first unit to be planned, Forestry's Moose Lake Area, works out quite well because of its proximity to the Twin Cities area. In this area, sites could be planned, developed and used as pilots for other DNR administered areas that may eventually accommodate ORV use. It should be noted that it may be necessary to limit use at these pilot sites and to control the publicity on them until a number of sites are available.

To ensure that the Department process best accommodates the ORV issue, it is recommended that the ORV situation particular to each management unit be assessed, and be used as a criterion in prioritizing the order in which the twenty forestry units will be planned. Additionally, as units are planned to contain ORV trails or use areas, methods for monitoring the environmental effects of that use must be built into the operating plans. This environmental monitoring must also include assessments of the social impact on other users. Planning decisions on ORV trails must follow the Department's unit trails policy and must include local users in planning and educating.

2. A sub-group of the Department's ORV task group should be convened to produce ORV development and management guidelines to provide direction to the forest planning effort. Membership on this group should be expanded to include other appropriate personnel. Additionally, the DNR SCORP activity should do further intensified research for ORV planning.
3. The Department should continue to prohibit the use of ORV's in state parks, designated state trails (unless specified differently in the management plan), wildlife management areas and scientific and natural areas. This is in keeping with the Departments current policy to prohibit ORV use in these units of the Outdoor Recreation System.
4. At this time, the Department as a general rule should continue to prohibit use of ORV's on all DNR administered snowmobile trails during winter. This seems appropriate since more than half of the

state's snowmobile trails are grants-in-aid trails and 25% of private landowners participating in the grant program indicated that they would drop from the program if vehicles other than snowmobiles were allowed on the trails.

Furthermore, allowing ORV use on snowmobile trails (or portions thereof) that are on public lands also seems impractical. The grants-in-aid system is interlaced with both the state and unit trails. Without extensive signing it would be impossible for ORV users to know if they were on unit, state or grants-in-aid trails. Thus, it appears impracticable to open parts of the trail system while leaving the grants-in-aid units closed. Finally, the state's snowmobile user groups are currently requesting that their trails remain off-limits to other ORV user groups.

There could, however, be some consideration given to special channeling of ORV funds and use to limited experimental areas of the present snowmobile grants-in-aid program. Before any consideration should be given, there must be agreement from the local sponsors (local snowmobile club and unit of government), the adjacent landowners and the DNR. ORV financial support would be a necessary factor to this agreement.

5. The Department should adopt the following interim policy pertaining to ORV activities on Department administered lands. This interim policy would be superceded in each forestry management unit as each unit plan is completed.

- a. Maintain the status quo management of Forestry's multi-purpose administered lands. These lands would thus remain open for ORV use unless marked otherwise. This seems appropriate because at this time the negative environmental and social impacts are localized and in most cases minimal. This leaves open to ORV users millions of acres of land and thousands of miles of roadways and trails which have historically been available for multiple uses.

It must be made clear for the interim policy, however, that certain areas may be closed and that the responsibility to recommend closing rests with the area forester. The Area Forester must work closely with the Regional Trails and Waterways Coordinator and the Area Wildlife Manager in any recommendations on this issue.

- b. Recommendation for closure should be made if one or more of the following conditions are present to the degree that user safety and enjoyment are jeopardized or the natural resource is subject to significant damage. Significant damage to the natural resource should be defined as resource damage which will require rehabilitation (i.e., grading which exceeds normal maintenance before other uses can take place). Closures might be entire trails/roads or segments thereof. Recommended criteria for determining whether an area should be closed are as follows:

- i. Soft soil conditions resulting from spring frost breakup or unseasonably wet conditions exist.

- ii. Hazardous fire conditions exist.
- iii. Excessive erosion and significant damage is occurring.
- iv. Conflict between motorized and non-motorized recreators or adjacent landowners cannot be resolved. (This condition is particularly difficult to assess and as such requires clear delineation and documentation.)
- v. Wildlife is being displaced or habitat destroyed.
- vi. Over-use or misuse is taking place. Use has reached a level that is creating significant resource damage or safety hazards. (It must be remembered that when dealing with heavy use, intensified management may be a more appropriate alternative than closure.)

Note: The above criteria could also be used by other agencies who manage ORV recreation on their lands.

- 6. During the interim period Department personnel should respond to inquiries "Where can I go to off-road" in the following manner:
 - a. The law allows use on Forestry administered lands unless posted otherwise.
 - b. Changing conditions as well as scattered public forest ownership makes contacting the area forester a necessity. Therefore, each

request should be clarified for the geographic area of interest and the inquiries referred to the appropriate area forester.

This allows the Department to continue to respond to inquiries, provide for use and minimize conflicts.

7. The Metropolitan Council and other Twin Cities area local units of government should take the lead in working with the Department to gain an understanding of the ORV issue within the Twin Cities metropolitan area. This could be done in a manner similar to the coordination and provision of Metropolitan Public Water Access. It is further suggested that an inventory of potential public and private sites in the metropolitan area, including waste sites and gravel areas, be done to assess these as possible areas for ORV activities. This recommendation is in keeping with the findings that users want to stay close to home, many users are young and a large number of ORV users live in the Twin Cities area. It should be noted that, currently, the metropolitan trespass law prohibits use of any lands without expressed permission from the landowners.
8. The Department should perform an inventory of abandoned mining areas around the state as potential area for intense use. This allows the Department to pinpoint areas that might be developed as possible ORV sites.
9. The Department should support MN/DOT's position prohibiting ORV use in state road ditches. Additionally, such a prohibition should be uniformly applied to county and township road ditches. Use in

ditches creates extremely unsafe situations, particularly considering the young age of many ORV operators. Additionally, prohibiting such use compliments the Department's wildlife management program. If use was to occur in the ditches, the ditches would have to be maintained and DNR's wildlife program would be jeopardized. Even without ditch maintenance, the ORV use itself would damage that program.

10. The Department opposes legislation that would allow the registration of 3-wheel vehicles as snowmobiles.¹ Such a bill was proposed in the Senate in 1983 (S.F. 1051). Further, if industry were to make a ski for the front wheel of its 3-wheeled vehicles it would fit within the legal definition of "snowmobile." The problem here is the fact that the 3 wheel vehicles are not self-regulated by season, as are snowmobiles, which are seldom used when there is no snow. Therefore, 3-wheelers could become unmanageable if treated and regulated as snowmobiles because of their year-around use capabilities. The Department should work with the legislature to more distinctly define what will legally be considered a snowmobile.

11. The Department wishes to communicate the following observations on the separate three-wheel registration (H.F. 820 and 991).

- a. Passage of a three-wheel vehicle registration law and a grants-in-aid program for trail riding opportunities would only provide for one segment of the ORV community.

¹(NOTE: Two separate 3-wheel bills were introduced in the 1983 session: S.F. 1051 which would register 3-wheelers as snowmobiles and H.F. 820/S.F. 991 which would establish a separate registration program for 3-wheel vehicles.)

- b. ORV use on public lands must be managed. That management requires funding. Currently, the Department is spending dollars (both from its general fund appropriation and its dedicated funds) to maintain and rehabilitate roads and trails that are used by the off-road motorized recreators.
- c. Registration is only one alternative for funding ORV programs others include a share of the gas tax, user fees and appropriations from the general fund.
- d. Funds obtained using any of or a combination of the above sources should be designated for the maintenance and rehabilitation of roads, trails and recreation areas where use of the off-road vehicles are allowed, a limited grants-in-aid program (trails or scramble areas) and the administration of the program including safety training, enforcement and environmental monitoring. (The model legislation developed by the Upper Great Lakes Regional Commission in 1972 could prove useful.)
- e. Any ORV bill passed should contain language regarding additional staff (complement) and funding needed for program administration.
- f. In all segments of the ORV community (2, 3 and 4 wheel) there are numbers of individuals who do not use their vehicles for off-road recreating.

In a 1980 survey of ORV owners conducted by the DNR, sixty-one percent of the ORV owners said that they did not use their

vehicle for recreation. (This included 80% of 4-wheelers and 32% of two wheelers who do not use their vehicle for off-road recreating). To illustrate the non-recreational interests of this subgroup, 96% of these non-recreators said that lack of areas was not a reason for their lack of ORV recreational use (Survey and Analysis of Minnesota ORV-Owners, Sersland et al., Minnesota Department of Natural Resources, Trails and Waterways Unit, May 1981, page 7).

In contemplating a registration system it will be important to get adequate public feedback as to their willingness to pay. The willingness to pay has thus far been expressed only by the user associations which are a tiny percentage (1%-2%) of the owners.

- g. If a program is established to expand recreational opportunities for ORV use, the DNR could be the administrator of a grants program for ORV facilities. As in the case of the snowmobile trail program there would be a need for a statewide "umbrella" for funding ORV management at local levels. As a localized issue, the DNR should not be the sole supplier of sites. Patterns of use (i.e., within 50 miles of home base and often in roadside ditches) as well as age of users (i.e., a significant number in their teens) show this to be a localized issue. Funds should be distributed based on present use patterns and areas of known demand.
- h. ORV users will have to take a visible role in any management

actions.. Siting and developing ORV trails or use areas will be controversial whether on public or private lands. It should be the users who take a visible lead in negotiating these sitings.

12. The Department concludes that it is currently not advisable to initiate a registration program for ORVs, particularly not for a single vehicle type (i.e., 3-wheelers). It must be remembered that only a percentage of the vehicles currently used for off-road recreating would register. It is the Department's conclusion that the funding generated from registration would not provide an adequate program for the users at present. Additionally, it should be noted that present use is quite dispersed and the study team found only a couple of significant problem areas on DNR-administered land.

Still, however, of major concern to the Department is the illegal use of ORVs (principally 3-wheelers) in the state, county and township road ditches. This use in combination with the young age of many operators creates an unsafe situation in many areas. Again, it is the DNR's conclusion that at this time the net proceeds from a registration program (even if simply distributed through a grant program) would not provide adequate alternatives to truly mitigate this problem.

There are 1800 miles of state forest roads and trails informally open for use by these recreators. It is the Department's recommendation that it continue to monitor the ORV issue and report to the legislature as appropriate.

PART ONE - LEGISLATIVE ISSUES

I. USE AND EFFECTS OF RECREATIONAL MOTOR VEHICLES ON THE ENVIRONMENT

A. Literature Review

As an initial step in the study, a literature review was conducted by the University of Minnesota Center for Urban and Regional Affairs (CURA) to provide an information base regarding the impacts of off-road vehicles on natural resources. This was done to take advantage of research that had already been done, and because the time frame for the current study was too limited for much original research.

The literature review was carried out by Julie Stephens and Susan Blachman, graduate students at CURA. They first compiled an extensive bibliography from available and pertinent sources. Then, with the aid of DNR, the graduate students selected those studies which seemed most applicable to Minnesota. They read and summarized these articles and presented the findings to DNR.

The literature review identified environmental effects of four major types: soils and vegetation, wildlife, water and noise. In this chapter, soils and vegetation are discussed together, since most impacts to vegetation, other than direct mechanical damage and uprooting, are the result of changes in soil characteristics. Additionally, the literature review examined reported ORV social

implications (Chapter III) and a program in another state (Chapter VII) and some management considerations (Chapter VIII). This review, including the references cited, is included in the appendix and is available upon request.

1. Soils and Vegetation Impacts

a. Compaction

Compaction is the predominant effect on soils resulting from the operation of ORV's, based on the studies cited in the literature review. Compaction, in turn, results in many other changes in soil characteristics and leads indirectly to effects on the vegetation which the affected soils support. Changes occur not only in the soil structure but also in the chemical characteristics of the soil. Specifically, compaction can result in changes in the bulk density, strength, temperature, air supply, organic matter, and nutrient levels of soils. Increases in bulk density and soil strength result in decreased permeability, which reduces the soil's water-holding capability. This reduced capability can result in an increase in runoff and soil erosion.

It was noted that soil texture and water content interact to affect soil susceptibility to compaction. The same vehicle tire pressure will produce more compaction on moist soil than on dry soil. Soil compaction will also vary

according to soil aggregate size, particle size distribution, and organic matter content.

Vegetation is indirectly impacted by physical and biological changes in the soil. Soil compaction may result in restriction of root growth, reduced seed germination, changes in plant growth rates, and reduced plant yields. One study cited the reduction of plant growth rates of between 15 and 50 percent as a result of vehicle effects. These influences of soil compaction result from decreasing the permeability, trapping of nutrients, washing away of nutrients by rainwater on denuded soils, and increasing soil temperature as the soil becomes more dense. These factors slow down the ability of roots to absorb moisture and nutrients for continued physiologic activity.

Several approaches for preventing or minimizing soil compaction were presented in the literature. Most researchers advocate restricting ORV use to non-fragile soils, keeping in mind the seasonal variation in soil sensitivity to compaction. Some suggested that ORV use should be limited to prepared trails. Other suggestions include avoiding repeated use of the same track, avoiding wheel-spin, making only large-radius turns, and maintaining tire pressures at recommended levels. Proper water management of use-areas is also recommended because of the relationship between soil water content and undesirable

effects on soils. Implementation of these suggestions would require effective education and instruction in vehicle operation.

b. Sheer Damage

Sheer damage is an effect on soils closely related to compaction but can be even more damaging. Sheering is a slippage between the strata or soil particles in planes parallel to the soil surface. It is caused by tire spinning, and is greater with wider and lower pressure tires. The indirect effects on vegetation are much the same as for compaction. The recommended approaches for minimizing it are similar to those for minimizing compaction.

c. Quarrying

Quarrying is the actual displacement of soil and underlying rock caused by spinning tires, especially the "paddle" tires used in hill climbing. The effects are particularly adverse in soft soils and can cause rapid denudation of ORV use areas.

d. Erosion, gullyng and sedimentation

Several authors noted the increased potential for soil erosion associated with ORV use. One of the major causes

of accelerated erosion is the soil property change resulting from compaction, as noted earlier. Three types of erosion were identified: 1) Direct mechanical erosion by the ORV vehicle; 2) water erosion of disturbed or denuded soil; and 3) wind erosion of destabilized surfaces.

Water runoff, as a prime contributor to accelerated erosion, was found in one study reviewed to increase from 8 to 50 times as a result of ORV use. Increased runoff and erosion eventually results in gullies, and the soils carried away in the process of erosion eventually are redeposited on top of other soils, or into lakes or streams.

In addition to erosion on the ORV site, ORV use may affect adjacent areas as well. Impacts include sedimentation, gullying, lowered water tables, impaired water quality, and increased wind effect.

Various measures for preventing or minimizing erosion were cited in the literature. A technique called the Universal Soil Loss Equation (USLE) has been developed by the U.S. Soil Conservation Service to aid in predicting soil erosion rates. This equation could be used to select sites as ORV areas that would be least susceptible to erosion.

Other management techniques mentioned include maintaining a vegetative cover, use of soil mulches, and application of chemical soil stabilizers. Water diversion or retention

structures such as catchment dams, conduits, open channels, dikes, grade stabilizers (check dams), debris basins and sediment traps, and other water energy dissipation techniques were noted. In the event that erosion measures are not adequate, sediment control measures should be developed to intercept and remove sediment from the watercourse as close as possible to the source. Good planning and management of ORV areas were cited as important for minimizing erosion and other negative environmental effects. In some cases, ORV trail or use areas must be closed for rehabilitation and recovery of the soil. In other cases, the application of soil fertilizer compensated for the loss of plant nutrients found in the upper layers of soil, which may have been removed by ORV activity.

2. Wildlife Impacts

Virtually all of the applicable literature addressing the effects of ORV use on wildlife has focused on snowmobiles. Many of the effects cited, however, could also result, in varying degrees, from other types of ORV use.

Snowmobiles created little effect upon larger animals, moderate effects upon medium-sized animals yet drastically affected small animals overwintering under snow cover in specific instances.

Development of a stressed condition in response to ORV noise or proximity is a matter of much concern, but it has not been proven. The consequences of stress have been physically documented, but the fact of stress being routinely caused by ORVs has yet to be demonstrated by research.

White-tailed deer in Minnesota appear to be relatively tolerant to snowmobiles. For example, one study indicated that the deer would not move away from the noise of a snowmobile until it was within sight. Elk in the Rocky Mountains appear to be more sensitive than deer to the sight and sound of snowmobiles.

Medium-size animals exhibited no general responses to snowmobiles. For example, snowshoe hares were observed avoiding snowmobile trails, but red fox, along with deer, were more active near and in these trails.

Increased snow density and changes in temperature caused by compaction were two effects noted. They can result in increased mortality of small mammals beneath the snow. In heavy snowmobile use areas, snow densities were found to be so high that it was doubted that any animal movement could occur at the snow-ground surface. Snow compaction also creates an icy crust which prevents snow-roosting by birds in areas heavily criss-crossed with tracks. This would probably become a factor primarily in those areas lacking in vegetative cover in winter, such as in agricultural settings.

The insulative quality of the snow cover[®] is reduced due to the decrease in snow depth caused by packing. Thermal conductivity is thereby increased. This is the major cause of destruction of the mild climate beneath packed snow; it subjects undersnow organisms to greater winter temperature stress and may increase their mortality.

3. Water Impacts

Intensive use of recreation vehicles over and near small water bodies will quite probably increase lead content in the spring meltwater. Another impact of ORVs upon water resources was noted in a study which indicated that water storage was considerably greater in compacted snow, and soil moisture was greater after snowmelt on snowmobile trails than in adjacent areas. Compaction, however, also delays snowmelt and may reduce erosion by protecting the unvegetated trail until after maximum runoff has occurred.

4. Noise Impacts

Studies cited indicated that ORV noise is primarily an annoyance as far as humans are concerned. Many of the studies do not clarify whether the machines being observed are well muffled, or even whether they are legally muffled. Such annoyances lead to the perceptions which heighten the discontent of non-motorized recreators within the vicinity of ORV recreation. Annoyance may also disturb the non-recreating adjacent landowners.

One study demonstrated the maximum range of distance over which ORV noise can travel. On level ground, a 4x4 vehicle could be heard for a distance of 4,500 feet. This distance increased to 7,500 feet for 4x4s and motorcycles which were used at the higher power levels required for hill climbing. Findings such as these can be useful when determining the size of ORV noise-buffer areas.

In Minnesota, the impact of ORV noise is effected by seasonality. The greatest negative impact would be expected in summer, when more people are seeking outdoor solitude, and when more people have doors and windows open.

Health effects of noise as noted in the cited studies included both auditory (hearing loss), primarily to the user, and non-auditory (cardiovascular, digestive and neurohumeral disturbances). Both operators and bystanders can be affected.

Methods for minimizing the impacts of ORV noise suggested in the literature include proper selection of track location, use of buffers, and vehicle inspection. Providing buffer strips around ORV use areas is one important way to minimize noise disturbance.

B. Case Studies of ORV Use In Minnesota

As is evident from the review of literature, existing studies can only be applied at a very general level. Often the studies do not differentiate between vehicle types and they may have only scattered

application to Minnesota. During the study design phase, this potential problem was anticipated. To enhance the information base with actual data about the Minnesota situation, a set of case studies of ORV problem areas in Minnesota was undertaken. The case study approach was selected because they cost less, provide a more complete overview of efforts, provide richer detail and can be accomplished more quickly than other experimental research approaches.

The initial problem for the case studies was finding the sites. The objective was to select a variety of areas representing geographic dispersion over the state, different types of ORV use and different levels of management. With the exception of the Sand Dunes State Forest and the Whitewater Wildlife Management Area, no commonly known public areas where ORVs were heavily used or causing environmental or social problems were found.

DNR area personnel from forestry and wildlife were surveyed for information on known problem areas across the state. After contacting forty-nine area personnel and regional offices, returns were reviewed. Many areas noted ORV use but few identified problems significant enough to warrant nomination of the area as a potential site for a case study.

The inventory and selection process itself provided valuable information. It demonstrated that while ORV use is taking place throughout the state, it is quite dispersed. Based on the judgement of forestry area personnel, few sites were receiving enough use to be considered problem areas worthy of study. Further, some areas were receiving use without negative impact.

Based on the information returned in the survey, however, four areas finally were selected for in-depth examination:

Minnesota Valley National Wildlife Refuge is located near the Minneapolis St. Paul Metro Area and provides easy access for day, evening, and weekend use. It has received heavy ORV use in the past and shows extensive visible impact. Many areas within the refuge have been closed with gates to prevent any vehicle use. Land ownership and boundaries are complex and the entire valley area is managed cooperatively by the U.S. Fish and Wildlife Service and the Minnesota DNR. A national wildlife refuge generally excludes motorized recreation as a policy.

Whitewater Wildlife Management Area and the Trout Valley Area within the Richard J. Dorner State Forest (between Rochester and Winona) were chosen for their location in the southern part of the state. They serve a variety of recreationists, including ORV users. Portions have received heavy ORV use, reported heavy impact, and suffer adverse effects of this use. In addition, the Wildlife Management Area has specific wildlife management objectives which are different than those of state forests, and as such, it was important to include an area in the research that was managed by the Wildlife Section of the DNR.

Pillsbury State Forest near Brainerd was chosen for its northern location. It is situated near a major resort and recreation region. The area has a high recreational tourist orientation. The site has a history of ORV and other trail use. Annually, there is an enduro dirtbike race which uses a designated trail in the forest.

Sand Dunes State Forest was chosen because, in mid-1983, it was experiencing high levels of ORV use, it was relatively near the major population center of the Twin Cities, and it was a site with high suitability for a number of uses ranging from timber and wildlife production to urban development.

The research on the first three sites was conducted by students under the direction of Leo McAvoy of the College of Education, Division of Recreation, Park and Leisure Studies at the University of Minnesota. The fourth case study was conducted by DNR's Office of Planning. The general methodological approach for the case studies was to review related documents and literature, conduct on-site observations, and selectively interview principal people involved with the ORV issue at each of the case study sites selected.

A summary of the findings in each of the case studies follows. The complete analysis for each of the sites studied can be found in the appendix. The complete analysis for each case study includes: (1) the data gathering techniques used; (2) a description of the physical characteristics of the site and the use and administration of the management unit; (3) impacts, public benefits, and problems; and (4) conclusions reached. In addition, the case study from the University of Minnesota included photo documentation.

Minnesota River Valley

Two different areas in the Minnesota River Valley Refuge were studied: the Long Meadow Lake Unit and the Upgrala Unit. Presently, both sites are managed by the U.S. Fish and Wildlife Service and

private landowners. The Upgrala site is destined to be bordered on its southern edge by a non-motorized riverbank trail. The Long Meadow Lake site is destined to be bordered on the south boundary by the Minnesota Valley State Trail along the riverbank. At the Long Meadow Lake site, the soil type is vulnerable to compaction, and at Upgrala the two predominant soil types are less subject to compaction than to erosion because of the steep slopes in much of the unit. Wildlife is abundant because both units are managed for wildlife habitat. The vegetation at the Long Meadow Lake unit is floodplain forest and emergent; portions of the area are presently farmed. The Upgrala site is dry grassland, containing some of the last native prairie grasses in the valley region. Much of the vicinity is either prime farmland or is contained within a private hunting grounds.

Information about the ORV users of the units and the types of vehicles was obtained from local residents, landowners and city officials. ORV users were not observed at the site during the research, and so were not interviewed themselves. At Long Meadow Lake, ORV users are primarily males aged 16-25; vehicles sighted include passenger cars, raised pickups, jeeps, and many other 4-wheel-drive types. Extensive tracks of trailbikes were also noted in the area. ORV use appears to be concentrated on weekends and Friday and Saturday evenings. ORV use has increased over the past three years, mostly as a result of the completion of the Cedar Avenue bridge in 1982. The site is also only one mile away from a densely populated residential area and is easily accessible by the road approaching the site of old Cedar Avenue bridge. The site is well signed denoting boundaries of the Minnesota Valley National Wildlife Refuge, but not with signs denoting acceptable or unacceptable uses.

At the Upgrala site, ORV users are also males, aged slightly older--from 18 to 40 years. Vehicles sighted include four-wheel-drives, pickup trucks and a few autos. Again, ORV use has occurred most frequently on weekends and evenings. ORV use at the site has declined recently due to the installation of a cement-based steel gate, replacing two others removed by vandalism during summer 1983. The Upgrala site is very poorly signed.

Resource impacts from ORV use are apparent on both sites. At Long Meadow Lake much of the ORV damage was on privately owned and maintained farmland and farm sites. The areas included the Minnesota River Road, adjacent farmland, open space beneath the new Cedar Avenue bridge, and the property of Bituminous Roadways. At the Upgrala site, the slopes on private land have eroded and gulleys have formed from ORV activity. Native prairie grasses which stabilize these slopes have been destroyed. Gates were removed at Upgrala, but in general, use at this site has declined recently as a result of these gates. Most of the impacts, and the majority of severe impacts in these areas are a result of 4 wheel-drive vehicles. Overall, the ORV use is clearly incompatible with the uses planned for the units: wildlife management and the development of trails for hiking, biking and skiing. Enforcement has been difficult due to the limitations of police vehicles and the ambiguity of signs and jurisdictions.

Whitewater Wildlife Management Unit/Trout Valley

The two sites and their circumstances reviewed in this case study differ from each other, but they were examined together because of their geographical proximity. The results of the study provide an

opportunity to compare the impacts of 2-and 3-wheel ORV's with those of 4-wheel ORV's.

The Whitewater Wildlife Management Area (WWMA), located on the North Branch of the Whitewater River, and the Trout Valley Unit of the Richard J. Dorer State Forest, are administered by the Commissioner of Natural Resources. These two sites have been either purchased by the state from private landowners, or were areas previously owned for state management. They are managed for wildlife habitat, timber harvesting, share-crop farming, environmental education, hunting, trapping, fishing, and recreational activities such as bird-watching, walking, cross-country skiing, and nature study. ORV use also occurs. The areas are floodplain and have predominantly very fertile soil. Because of the steepness of the watershed, the floodplain may also flood after heavy rains. Due to the irregular topography and the different slope aspects in the two management units, both units support a wide variety of vegetation. A total of 237 species of birds is regularly found in the units; the endangered peregrine falcon appears, although rarely, at the WWMA. As many as 49 different species of mammals have been noted in the units.

Information about ORV users in the units came from a variety of sources: DNR wildlife, forestry and enforcement personnel, local sheriffs, ORV users and local residents. At WWMA, ORV use is not restricted to any age or socio-economic group. Family use is common. The WWMA is heavily used by 4-wheel-drive vehicles, usually in organized groups of between 6-10 vehicles. The area is used year-round except during heavy snowfall, and use increases following

heavy rains. ORV use is most intense on holidays such as the Fourth of July when neighbors have spotted as many as 100 vehicles on the site. The site is easily accessible from neighboring towns, and ORV users from Rochester, Winona and even the Twin Cities have visited the area. The site remains accessible to ORV users in part because the Quincy Town Board has refused to abandon a 6.2 mile stretch of road along the river in the west-central portion of the WWMA, although the town has not maintained the road since 1936. This portion of the road crosses the river 3 times, yet all bridges have been removed. The Elba Town Board did abandon a 2.1 mile stretch of road parallel to the river at the eastern end of the site, thus access is gained primarily though the road in the northwestern portion of the WWMA. A parking lot at that access point, intended to limit the area to pedestrians, is poorly marked and difficult to find.

Resource impacts at the WWMA are readily apparent. In certain areas, the ruts are five vehicles wide and deeper than 3 feet below normal ground level. Because ORV users frequently drive through and down the river, its banks are damaged and excessive siltation occurs. Because of the deep ruts in the access road, the DNR has not stocked trout in this area since 1979. Enforcement has been difficult at the site. Local residents have complained about noise well into the night by ORV users. Liability along the Quincy Township Road is a question for area managers. ORV users of the site maintain that they have a right to travel the Quincy Township Road because their vehicles are licensed, that organized 4-wheel groups do not abuse any area except the township road, that this is the only area available to them in the southeastern part of the state, and that the floods along the river are so devastating each year that the damage caused by their vehicles is insignificant by comparison.

At the Trout Valley unit, ORV use is completely different. ORV users are mostly youths from the local area who ride 2-and 3-wheelers. Adult ORV users in the area use their vehicles for hunting, fishing and nature study as well as for farm maintenance. 4-wheel-drive vehicles are prohibited. Use is year-round except when the area is inaccessible due to snowfall; use at this site also increases following heavy rains. A gate at the western end of the Trout Valley Trail limits access to 2-and 3-wheelers; the eastern end is left open to provide access to vehicles having fuelwood permits.

The visible resource impacts by 2-and 3-wheel vehicles at the Trout Valley site are negligible. At current levels of use they cause about as much damage as horseback riders using the same trail. Ruts are apparent at the eastern end of the trail, but it is not clear that they are caused by ORV users. Those trails remain negotiable by vehicles other than the 4-wheel-drive. Complaints from other trail users, horseback riders and hunters, have been few and mild. The installation of gates at the two ends of the trail has greatly reduced, although not entirely eliminated, damage to adjacent cropland.

It is clear from this case study that a distinction must be made between types of ORV's used. The power of the 4-wheeled ORV is much greater than that of the 2-and 3-wheeled ORV's, and this power of the 4-wheeled vehicle is magnified when the object of its driver is to challenge the machine in difficult terrain. The intent of the ORV driver becomes a very important factor in the impacts caused by ORV use.

Pillsbury State Forest

The Pillsbury State Forest, located near Brainerd, is managed by the Division of Forestry for the purpose of maintaining the maximum sustainable yield of various forest products while using the resources to benefit as many people as possible. The predominant soil in the forest is a sandy loam with a base of rocky glacial moraine, and the area has many lakes and marshlands with good water quality. Vegetation includes jackpines, aspen, oak and birch on the upland islands and ridges of the forest, with willows, black ash and swamp grasses in the lowland areas. Wildlife abounds in the forest.

Some information about ORV users at the site was obtained through interviews with DNR forestry, wildlife, enforcement and planning personnel. ORV users were not very willing to be interviewed, although the president of the local Enduro Motorbike Club did speak with researchers. Other than the Enduro trailbike race held annually in May, there is actually very little ORV use of the area, although there is some evidence of light traffic on forest trails and roads. Most of the ORV use in the forest appears to be from 4-wheeled vehicles, with only occasional 2-or 3-wheeled tracks. Much of the 3-wheeled vehicle traffic in the forest is from local farmers or their children.

The Enduro Motorbike Club held their second annual rally in the forest in May 1983. Club members cleared the proposed trail of brush, posted signs along the route, supervised riders and spectators, and repaired the trail after the event under the

direction of the forestry staff. Organization of the Enduro bike race has been praised by forest managers who are willing to continue the event annually.

Even with the annual motorcycle event, resource impacts from ORV use are very limited. During the first year of the race, however, it was held in September and the event conflicted with grouse hunters and bow hunters. Some forest access and logging roads as well as the hiking and riding trail show ruts from 4-wheel drive vehicles, but little impact from 2- or 3-wheeled vehicles. There is no soil compaction; erosion is a potential problem on the sandy soils, but little was observed. Wildlife impact was unobservable. Both the Enduro Motorbike Club president and horseback riders interviewed cited the potential conflict if horses and ORV's used the same area, but such occurrences are very rare. ORV use is infrequent except for the annual event. One reason for little ORV use in the area may be the fact that confusion exists regarding when use is permitted.

On the basis of interviews with local people, it was determined that while ORV use in Pillsbury State Forest itself is modest, problems with the use do exist in the immediate vicinity of the forest, and many interviewees in this case study felt there was a statewide problem with inadequate supervision of ORV use.

Sand Dunes State Forest

Approximately one half of the Sand Dunes State Forest is state-owned land and is administered by the DNR. The other half is either owned by private landowners or is part of the Sherburne National Wildlife

Refuge. The private holdings are residential and are of two types, a large block in the middle between the state-owned western and southeastern sections and several small "islands". Both patterns inhibit comprehensive forest management. Nonetheless, the forest is managed under the multiple-use concept, with timber production, maintaining wildlife habitat, and recreational use as objectives.

All of the forest's soils are varieties of sandy types, with the topography of the area varying from flat to gently rolling to sloping. Drainage is excessive, with erosion by water or wind a serious hazard, and potholes and marshy areas can be found in many areas. Water quality is generally good. Since the droughty days of the 1930's, the area has been the focus of serious conservation and reclamation efforts, and has been planted with pine seedlings. Other vegetation includes native cover types, grasslands, and marsh vegetation. There are good populations of terrestrial birds, mammals and aquatic species. Along with the residential development, the area contains recreational facilities such as campgrounds, picnic sites and trails. ORV riding has been a regular use of the forest - along with waterfowl and game hunting, fishing, camping, horseback riding and winter trail sports - since 1973.

Information about the ORV users came from interviews with the area forester, the district forester, the local conservation officer, non-ORV recreationists in the forest and an ORV user survey which was conducted during summer 1983. From the standpoint of local forest officials, ORV use in the forest has been problematic for about 10 years, since the upsurge in all terrain vehicle (ATV) use in 1973.

By 1978, complaints about ORV use in the forest were also coming from local township officials and hunters. Forest officials have felt enforcement to be a major problem because verbal warnings have become increasingly ineffective over time due to the increased volume of ORV traffic. By late 1982 it was apparent that ORV users were the dominant recreational group in the forest. A plan was instituted to legally separate the campground by signing it so that the NR 1 rules for recreational sub-areas would be usable for enforcement purposes. In spring 1983 trails were signed and limited to snowmobile use. District foresters were delegated authority to enforce NR 1 and began enforcement in this sub-area. In August 1983 a further restriction prohibited ORV use in the southeastern portion of the forest altogether. ORV's were permitted only on the 840 acres in the western part of the forest to permit closer monitoring of types of users and vehicle impacts. At the end of October 1983 the entire forest was closed to ORV use and a report on the overall problem in the forest was submitted by the area forester to the DNR Forestry Division.

The information about ORV users in the forest, obtained directly from them, using a structured questionnaire, yielded valuable insights into user motivation and use patterns. The survey was limited by lack of representativeness of user types, self-selection rather than randomness, short-time frame and small sample size. However, little information of this type has been gathered directly from Minnesota ORV users, particularly from an on-site survey. It should be kept in mind, however, that the results are more indicative than conclusive.

The following were the findings regarding use patterns among the 44 ORV recreators interviewed at Sand Dunes State Forest:

- * Nearly all of the 44 ORV users surveyed rode frequently, from 1-4 times per month. Many used the Sand Dunes State Forest repeatedly, the average return use rate being 13 times.
- * Two-thirds of the users surveyed lived within 50 miles of the forest and felt 40-50 miles was a reasonable distance to travel to use their vehicles. Two-thirds of the users came from the Twin Cities metropolitan area.
- * Nearly all of the ORV use was summer use. Half the users regularly used private land, but a substantial number (42%) regularly used public land. Very few users (7%) regularly used both public and private lands.
- * ORV users at the forest averaged 25 years of age. Almost two-thirds of those surveyed were between 14 and 25 years old.
- * Three-wheeled ORV users made up 60% of the users; 2-wheelers made up the remaining portion of the survey.
- * Few 3-wheelers (25%) or 2-wheelers (19%) belong to organized riding clubs. Sixty-four percent use their ORV's with friends, 11% with families. Three-wheelers are more family-oriented, while 2-wheelers prefer to ride with friends.

The following were the major findings regarding user motivation patterns:

- * Highest on the motivation scale for surveyed ORV users were: desire to explore (68%); need to achieve (77%); being with family, friends or new acquaintances (52%); and "action" (50%).
- * Lowest on the motivation scale for surveyed ORV users were: escape from every-day pressures (32%); and rest and relaxation (11%).

Resource impacts of the ORV's in the Sand Dunes State Forest are readily apparent. Since spring 1981 roadsides have been stripped of vegetation, a marsh was destroyed and numerous hillsides were gullied. Most forest roads are rutted to the point where they are impassible by a standard pickup truck, which impairs potential fire protection efforts and hinders timber removal and other management and recreation activities. Some trail corners are so steeply banked that the only alternative is to go off the trails and around the corners. Random new trails are continually being created. Snowmobile trails could not be repaired using a medium-sized grader, and a bulldozer had to be contracted to prepare the trails for the 1983-84 season. Wildlife impacts are unknown. Other area recreationists have complained of noise and fear of being hit by ORV users. Ninety local residents have been disturbed to the point where they signed a petition to the DNR complaining of resource destruction, fire hazards, noise pollution and litter. Area township officers are worried about spillover use on township roads.

Generalizations From the Case Studies

As noted in the introduction to this section, the survey conducted to select these case study sites revealed that current ORV use is quite dispersed throughout the state, few sites have received enough use to be considered problematic enough to study, and some areas are used by ORV riders without negative impact. The survey showed that ORV use is not a prevalent problem on DNR administered public land in Minnesota. Yet, based on the case studies, it is possible to discover the characteristics of ORV use at a particular site that transforms that use into a resource management problem at the local level.

- * The degree of impact on the natural resources in an ORV use area is dependent on many factors: the natural vulnerability of the resource (e.g., soil or slope conditions); the number of ORV users and the types of vehicles they use; the frequency and intensity of the use; and the conditions of use (sunny afternoon vs. after-rain rides).
- * ORV users prefer to ride in areas that are relatively near where they live, i.e., close to population centers.
- * ORV riding is a very social activity for ORV riders. 2-, 3- and 4-wheelers enjoy riding with groups. Some family activity occurs with 4-wheelers. However, many of those riding ORV's are young, ranging from 16-40 years of age, and they enjoy riding with peers or peer groups.

- * ORV users, especially 4-wheelers, like to challenge their vehicles in mud, as was apparent in the Whitewater Wildlife Management Area and Trout-Valley study where ORV use reportedly increased after heavy rains.
- * The use of ORV's is not just an issue on public lands administered by MNDNR. Local township officials and sheriffs from local governments near the Pillsbury State Forest and the Sand Dunes State Forest complained of unauthorized use on road right-of-ways, neighboring lands, and less-traveled township roads.
- * Supervision of ORV use in those areas having joint management has been hampered by insufficient enforcement tools, both on public and private lands. For the most part, existing signs are confusing, and ORV use occurs in jointly managed areas, thus creating jurisdictional enforcement questions.

The impact of ORV use from a statewide perspective may appear limited and localized, but in the local setting the problems of intensity of use, types and intentions of users, private property damage, and insufficient enforcement capabilities are very real.

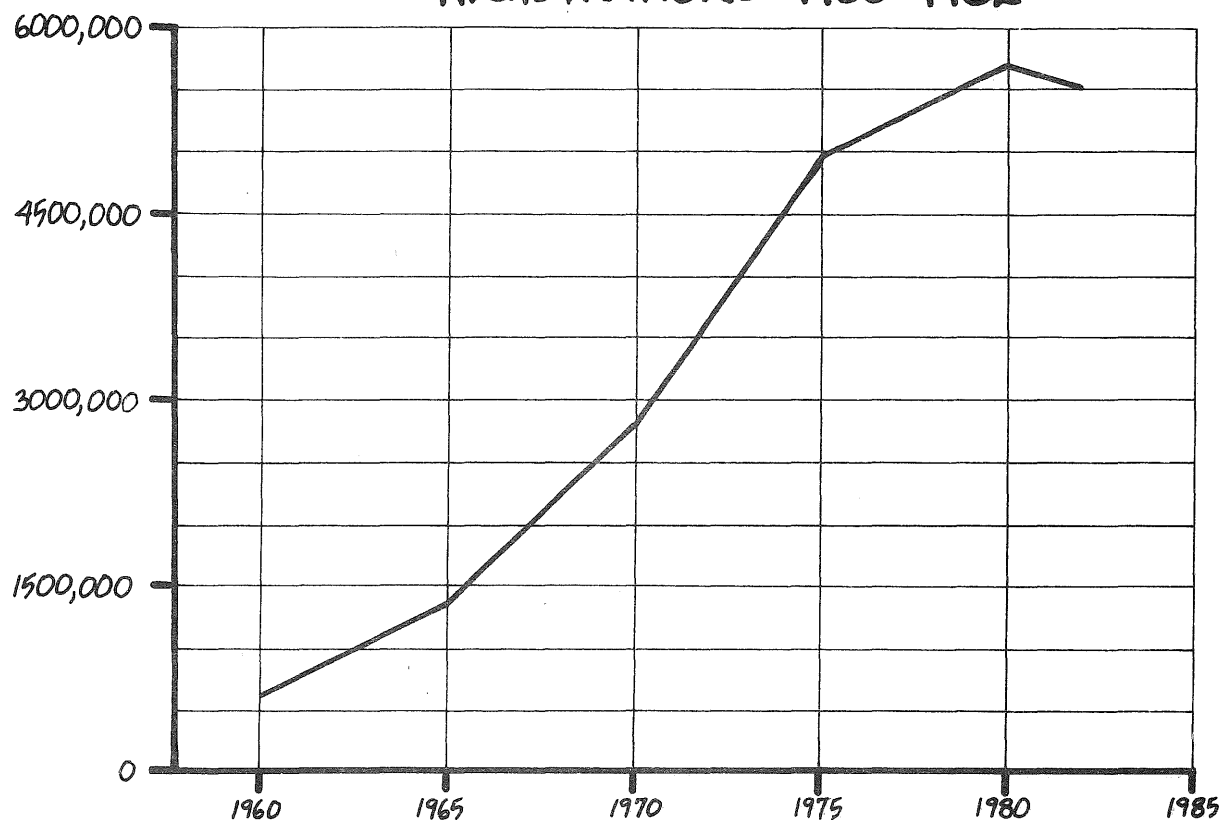
II. PRESENT AND FUTURE DEMAND FOR RECREATIONAL MOTOR VEHICLES

The history of off-road vehicle driving as an important recreation activity in the United States began in the late 1960's and early 1970's. Despite the fact that ORVs were used by a few hunters, other recreators and many western prospectors prior to the mid 1960's, it was not until the Japanese-made motorcycle entered the U.S. market that ORV use accelerated. As the post World War II baby boom left high school and entered college or the job market, sales of mass-marketed imported motorcycles boomed. This explosion in sales between 1965 and 1975 is reflected in Figure 1, which is a display of annual motorcycle registrations nationwide. In 1960, just over 600,000 motorcycles were registered in the U.S., and by 1965 that figure had more than doubled to about 1.4 million. After 1965, motorcycle registration grew at an exponential rate to 4.9 million registrations in 1975. As the baby boom matured, the rate of increase in motorcycle registrations lessened, and after 1980 registrations actually declined. The late 1970's is also the period when three-wheel sales began a growth pattern similar to that which motorcycles experienced beginning in the 1960's.

At about the same time that motorcycle registration began a decline, (1980) the sales of four-wheel drive light trucks also took a downward turn. These sales declined by a third between 1978 and 1982 (see Table 1). While part of this leveling of growth may possibly be attributed to economic conditions, the general aging of the population may better define the underlying shift in the market for off-road vehicles and the decline in their enormous growth in use of 2- and 3-wheel vehicles for recreation. These trends can best be seen in State Comprehensive Outdoor Recreation Plan (SCORP) projections of off-road vehicle use based on age

FIGURE 1

TOTAL UNITED STATES MOTORCYCLE
REGISTRATIONS 1960-1982



(SOURCE: U.S. DEPT. OF TRANSPORTATION AND THE MOTORCYCLE SAFETY COUNCIL)

and sex of vehicle users. These projections are based on a large random sample of Minnesotans, and include the use of vehicles off-road by both occasional and frequent users.

TABLE 1: Annual United States Light Truck Market Share Owned By 4X4 Trucks

	Year				
	1978	1979	1980	1981	1982
Total Annual 4X4 Truck Sales	990,000	810,000	443,000	315,000	390,000
Total Truck Sales Under 10,000 Lbs GW*	3,475,000	2,845,000	1,960,000	1,745,000	2,060,000
Percent of Total Annual Truck Sales Attributable to 4X4 Trucks	28%	28%	23%	18%	19%

*Gross Vehicle Weight

Source: Motor Vehicle Manufacturers Association

SCORP concentrates its estimates on two types of vehicles: two-wheel vehicles and four-wheel-drive vehicles. Of these, the two-wheel vehicle is predominant. Projected trailbike occasions for Minnesota residents will fall steadily from the base year (1978) until 1985, when they bottom out. Over the 1978 to 1985 period, trailbiking will decline by seven percent, from 1,151,000 occasions annually to 1,051,000 occasions. At that time, trailbiking projections show a steady increase until 1995, when use will again be at its 1978 level. The cause of this projected dip is the aging of the post-war baby boom through 1985. By 1985, the population distribution will have begun to return to normal in the heavy trailbiking age groups (youth) and then will commence a positive rate of growth.

Because four-wheel driving is most often a pursuit of slightly older people with more discretionary income, SCORP shows this activity peaking at a later date, in 1985. From that time, the impact of four-wheeling is projected to decline through 1995.

Of all the off-road vehicle activities, three-wheeling is the most difficult to predict. Unlike the other activities, very little data has been collected on the three-wheel activity. No comprehensive studies have been conducted. In fact, the only reliable data on three-wheel off-road vehicle growth have come through state ORV registration programs. Of the upper midwestern states, only Michigan has a comprehensive ORV registration program with a comparatively long history. The Michigan data, beginning in 1978, show the take-off stage of a classic product life cycle. In 1978, only two percent of Michigan's registered ORVs were three-wheel vehicles; by 1981 the number had grown to four percent. In 1982 the figure had reached twelve percent and just a year later it was eighteen percent (See Table 2).

TABLE 2: Total Michigan Registered Off-Road Vehicles by Type and Year 1978
-- 1983* (Percent)

Type of Vehicle	Year					
	1978	1979	1980	1981	1982	1983
Two-Wheel	65%	63%	58%	58%	55%	49%
Three-Wheel	2%	2%	3%	4%	12%	18%
Four-Wheel	32%	34%	38%	38%	33%	32%
Other	1%	1%	1%	0%	0%	1%

*Source: Michigan Department of State

The Michigan data show declines in the off-road vehicle market share for two- and four-wheel, while the three-wheel share increases. Standard forecasting techniques can provide a great deal of information about the likely share of the market that each of these types of vehicles will have in the future. Figure 2 presents these forecasts. Based on Michigan registrations, forecasts show the two-wheel share declining substantially through 1995 as three-wheel share increases. Near 1990 each of these vehicles is predicted to have about one-third of the market for vehicles actually used off-road. The four-wheel drive market share will decline slightly, but for planning purposes can be considered to have a stable market.

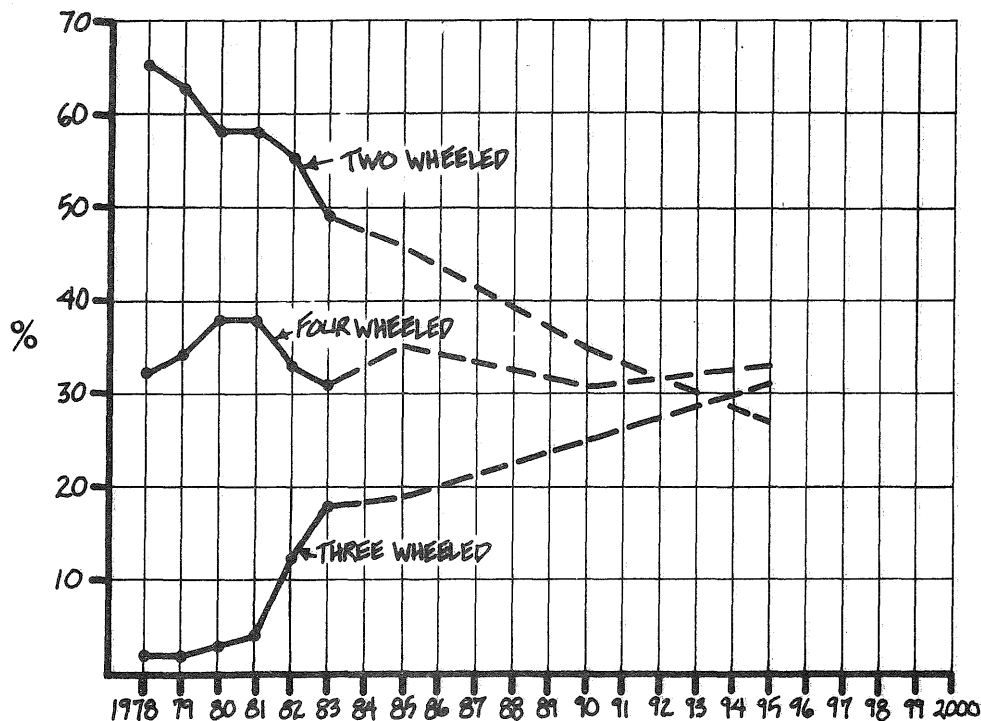
The approach for gauging the future size and mix of the ORV market assumes that the rates of change in the two- and three- wheel market share will slow progressively, as compared with a linear extrapolation of their 1978-83 Michigan market shares (Table 2). That is, it assumes the later stage in the normal product life cycle of slowing growth (and decline) will be reached over the period of the forecast to 1990. A linear growth projection through 1990 assumes that the later stage of the product life cycle will not be reached over the period of the forecast and that more rapid changes will be experienced.

Using linear assumptions produces different future size and mix projections (Figure 3). The effects of the linear assumption are footnoted in each table where appropriate.

The assumption of linear change is neither more nor less credible than the nonlinear approach that led to Table 2. It does, however, demonstrate the short and long range differences in the market forecast based on minor changes in the shape of the growth curves.

FIGURE 2

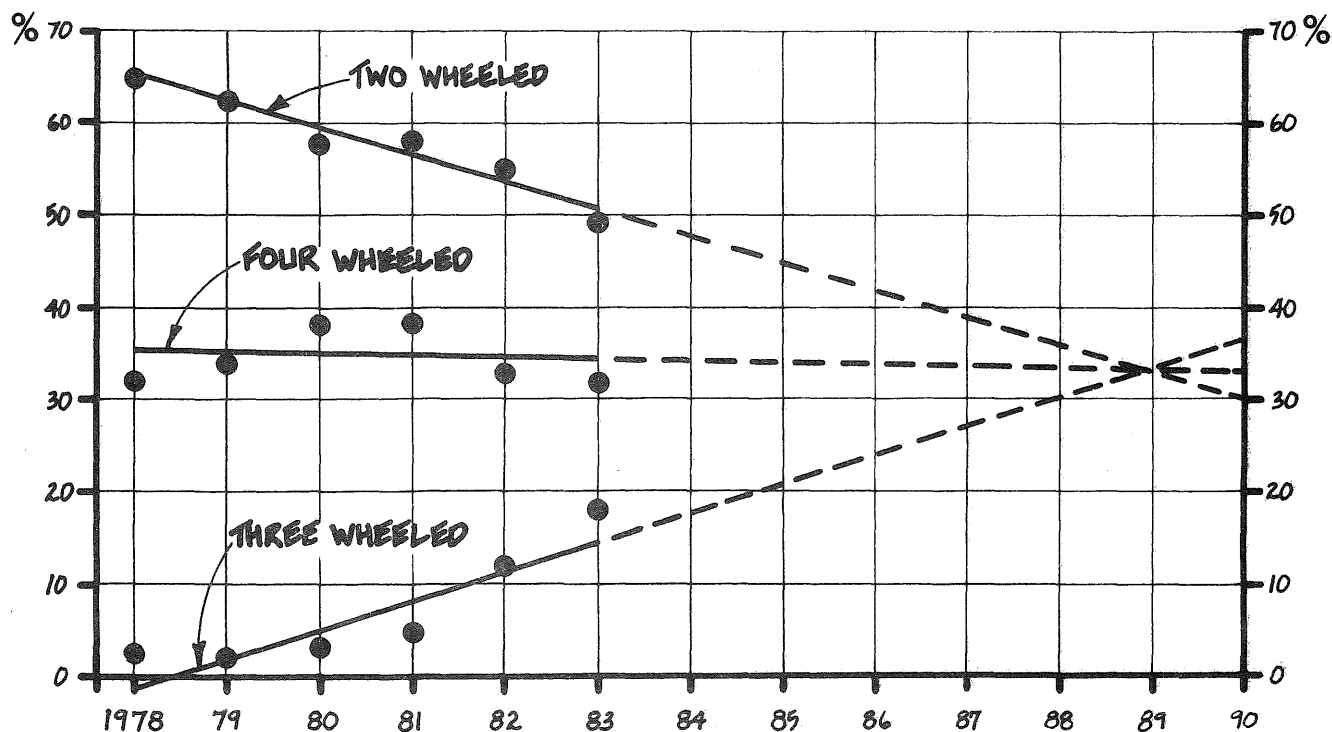
ESTIMATED NONLINEAR TRENDS IN MARKET SHARE FOR TWO, THREE AND FOUR WHEELED OFF-ROAD VEHICLES



(SOURCE: MICHIGAN ORV REGISTRATION SYSTEM)

FIGURE 3

ESTIMATED LINEAR TRENDS IN MARKET SHARES FOR TWO, THREE AND FOUR WHEELED OFF-ROAD VEHICLES



(SOURCE: MICHIGAN ORV REGISTRATION SYSTEM)

Overall, the total size of the market (all ORVs) is increasing slightly. Combining the market share data with known off-road vehicle occasions per vehicle yields an estimate of ORVs used off-road in Minnesota through 1990 (Table 3). (The footnotes in Table 3 and subsequent tables show the impact of a linear forecast.) The total number of vehicles are projected to increase from 157,000 in 1978 to 227,000 in 1990.

TABLE 3: Nonlinear Estimates of the Number of Two-Wheeled, Three-Wheeled and Four-Wheeled Vehicles Used Off-Road in Minnesota In 1978, 1985, and 1990

(figures rounded to nearest thousand)

Type of Vehicle	1978	Year 1985	1990
Two-Wheeled	102,000	93,000	97,000
Three-Wheeled	3,000	34,000 ¹	57,000 ²
Four-Wheeled	<u>50,000</u>	<u>54,000</u>	<u>53,000</u>
Total	157,000*	181,000	227,000**

* Total does not add up due to the 'other' ORV category of 1 percent in Table 2.

** Total does not add up because the 3 ORV classes add up to 91 percent of the total market in Figure 2.

¹ The higher linear forecast of market share would increase 1985 figures by 5,000 three-wheeled vehicles

² The higher linear forecast of market share would increase 1990 figures by 30,000 three-wheeled vehicles

Source: 1978 SCORP per vehicle participation rates, SCORP participation occasions and projected Michigan registration proportions (Table 2)

During the period from 1978 to 1990, trends in Michigan would suggest that two-wheeled vehicles would lose a little ground. The 1978 total was 102,000, while the projection for 1990 shows 97,000. That loss in two-wheel vehicles is made up by an increase in four-wheel vehicles used

off-road, from 50,000 in 1978 to 53,000 in 1990. The most impressive increase comes in three-wheeled vehicles. In 1978, it was estimated there were 3,000 three-wheel vehicles in Minnesota; by 1990 it is projected there may be 57,000 to 87,000 three-wheel vehicles used off-road.

TABLE 4: Nonlinear Estimates of the Number of Two-Wheel, Three-Wheel and Four-Wheel Off-Road Driving Occasions in Minnesota -- 1978, 1985 and 1990

(figures rounded to nearest thousand)

Activity	Year		
	1978	1985	1990
Two-Wheel Driving	1,151,000	1,051,000	1,093,000
Three Wheel Driving ¹	33,000	374,000	616,000
Four-Wheel Driving	<u>384,000</u>	<u>415,000</u>	<u>406,000</u>
Total	1,568,000	1,840,000	2,115,000

¹ Three-wheel driving occasions are based on an assumed annual average of 11 occasions per vehicle used off-road. The assumption follows from use patterns for similar types of vehicles found in the SCORP survey:

Median snowmobiling occasions per vehicle = 8
 Mode of snowmobiling occasions per vehicle = 10
 Mean two-wheel driving occasions per vehicle = 11.3
 Mean four-wheel driving occasions per vehicle = 7.7

The higher linear forecast of market share would increase 1985 figures by 55,000 occasions and 1990 figures by 330,000 occasions.

Based on the information about the likely numbers of vehicles used off-road and known use patterns for these types of vehicles, estimates can be made of off-road vehicle participation (occasions) by vehicle type and total participation. These estimates of current use and projected future use are found in Table 4 and Figure 3. By 1990, off-road vehicle driving occasions in Minnesota are expected to total just over two million. As

Figure 3 illustrates, growth is expected to come solely as a result of the increased use of three-wheel vehicles. Participation in three-wheel driving will increase from 33,000 occasions in 1978 to over 600,000 occasions twelve years later. This growth will roughly parallel the historic growth of motorcycles and other new products. (For a detailed description of the preceding forecast methodology, see the 'Technical Note' in the appendix).

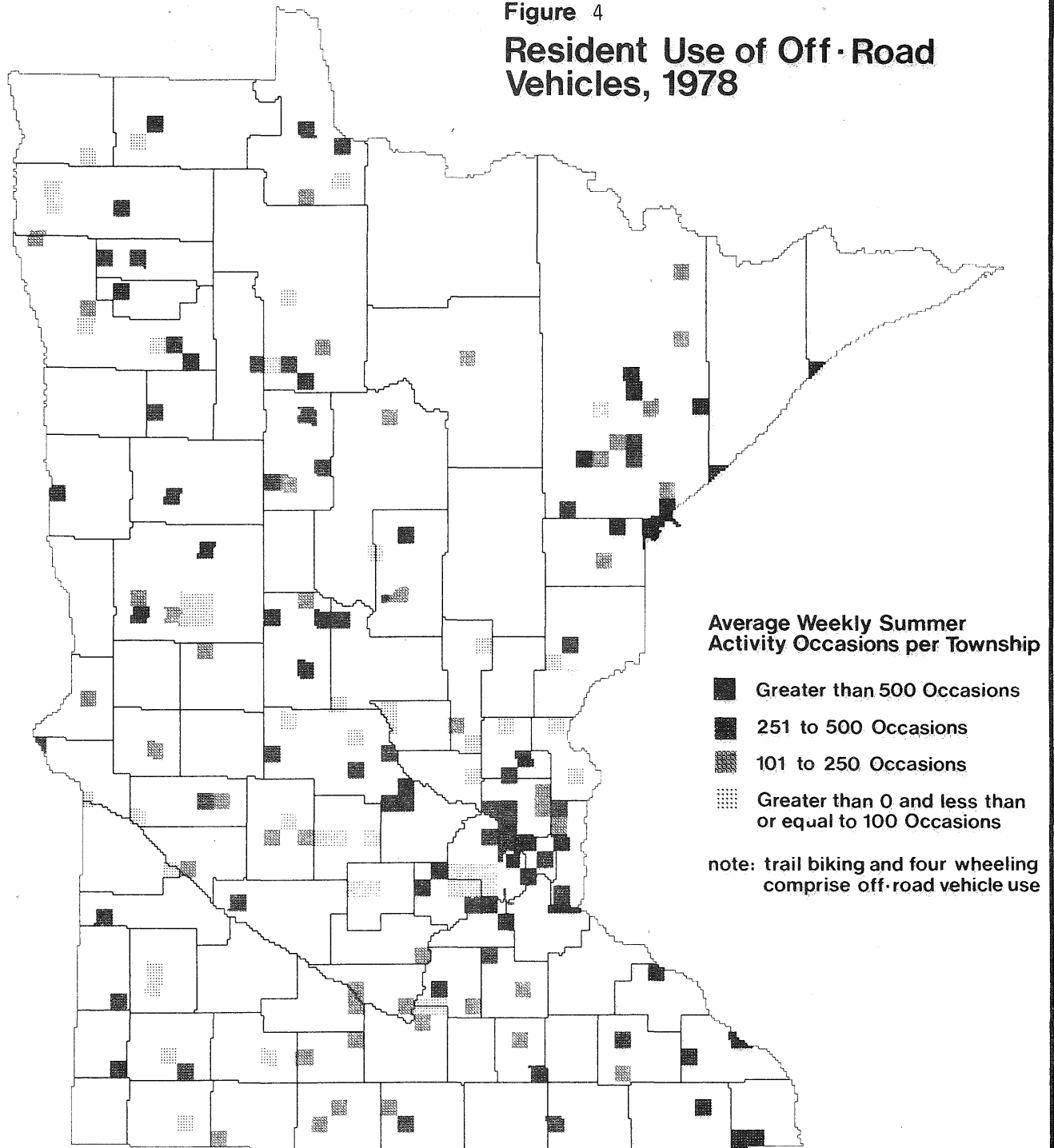
The substantial difference in the 1990 linear and nonlinear forecasts of the number of three-wheel vehicles indicates that the seven-year projection period is a 'long' forecast for this dynamic new product. Thus prudence must be exercised when using the 1990 ORV numbers. In other words, shorter forecasts coupled with activity occasion monitoring are a reasonable approach for looking at the rapidly changing ORV market. Selecting a single estimate for 1990 is an overextension of the limited-quality data that are presently available for making forecasts that far ahead. It is more appropriate to estimate the number of three-wheel vehicles in 1990 to be within the range of 60,000 to 90,000, projected by the two different methods.

Distribution of ORV Use in Minnesota

The spatial distribution of resident off-road vehicle use in Minnesota is shown in Figure 4. Major concentrations of use are closely related to areas of high population. Even the townships with higher ORV use in outstate Minnesota have significant populations. The data suggest that off-road vehicle driving is a close-to-home activity. Data collected by Burke Marketing Research for the Motorcycle Industry Council substantiate this conclusion. In 1980 Burke found the average motorcyclist traveling

Figure 4

Resident Use of Off-Road Vehicles, 1978



Source: Minnesota Department of Natural Resources. 1978 SCORP Resident Outdoor Recreation Use Survey

0 20 40 miles
0 20 40 60 km.

just under 17 miles to the place they most often ride off-highway (See Table 5). The 1979 Minnesota SCORP survey asked a similar question. Respondents were asked what they felt was a reasonable distance to travel for trailbiking and four-wheel driving. The response was 24 miles of travel for trailbiking and 36 miles for four-wheeling. Interestingly, this exceeds the actual distance traveled by 80 percent of the nation's trailbikers as found in the Burke research. Finally, it should be noted that a substantial number of Minnesotans who own ORV's do not use them for recreation and do not seem to care about the availability of facilities.

TABLE 5: Actual Miles Traveled One Way to Where Midwesterners Most Often Ride Off-Highway, 1980 (n=273)

Miles Traveled	Percent of Respondents
None	8%
1	27
2 to 5	24
6 to 19	22
20 to 49	8
50 and Over	10
No Answer	2
Total	101 (due to rounding)

MEAN = 16.7 miles (1978 Minnesota SCORP Mean = 24 miles for estimated reasonable travel distance.)

Source: Off-Highway Motorcycle Usage: Burke Marketing Research, Inc.

III. LEGAL AND SOCIAL IMPLICATIONS OF RECREATIONAL MOTOR VEHICLE USE ON PRIVATE AND PUBLIC LANDS

A. Legal Implications

A matter of considerable interest to both private and public landowners is the liability which landowners may be subject to when outdoor recreational vehicles are used on their lands. This is a legal area involving complex questions and in which there has been much litigation. Many of the laws in this area are recent, and the courts are only beginning to interpret them. Local government immunity from tort claims was dropped in 1963 and state sovereign immunity ended by a tort claims act in 1976.

Many parallels may be drawn between snowmobiles and other off-road vehicles in regard to legal implications arising from their use on private and public land. For example, Minnesota Statutes section 100.273 prohibits snowmobile or other motor vehicle use on privately owned agricultural lands without the permission of the landowner, occupant, or lessee. Another example is the general authority of the Commissioner of Natural Resources, found in Minnesota Statutes section 84.029, to establish trails on public land and to acquire, within the limitations specified, private lands for public recreational trails for snowmobiles or other recreational vehicles.

In regard to public use of privately owned lands, Minnesota Statutes Chapter 87 directly applies to both recreational snowmobiling and the use of any other motorized vehicle (Minnesota Statutes section

87.021, subd. 4). Chapter 87 is intended to encourage private landowners to offer to the public the free recreational use of their land directly, or by means of a license, lease, or other interest in land, conveyed to a private individual, the State or a political subdivision. This law is intended to limit the private landowner's liability for injuries to people or property arising from the permitted free recreational use of the private landowner's land.

A recent decision of the Minnesota Supreme Court indicates that the scope of protection provided by Chapter 87 depends, in part, upon the openness of the offer of their land for private recreational use Hughes v. Quarve & Anderson Company, N.W.2d (Minn. Sept. 23, 1983). One way a landowner can make clear that he is offering his private land for free recreational use is by posting signs such as "recreational use welcome", "snowmobile trail", or "hunting allowed".

It is important to remember that Chapter 87 does not protect the landowner who, in general terms, "willfully causes" injury to the recreational user. For example, if there is a man-made condition on the land open for use that obviously could cause serious injury to any user who might not see it quickly enough to avoid it then the landowner should take reasonable care to warn people of the condition. This would be especially true where after-dark snowmobile or other outdoor recreational vehicle use is popular, and headlights are inadequate for the speeds obtained.

In regard to public use of state-owned land, the State Tort Claims Act (Minnesota Statutes section 3.736) rather than Chapter 87 applies

to lands open for recreational use by snowmobiles and other outdoor recreational vehicle uses. The State is not liable to persons for injury caused by conditions on unimproved property. On units of the outdoor recreation system, the State's duty of care is limited, generally, to giving reasonable warning of hidden artificial dangerous conditions.

Counties, cities, towns, school districts, special districts, and other non-state-level public authorities are subject to the Municipal Tort Claims Act, Minnesota Statutes Chapter 466. In general terms, this act provides no special immunities from claims by injured recreational users of this category of public land, whether developed or undeveloped. It does provide immunity from liability if the government's employees were exercising due care in the execution of a law, or were performing a discretionary function.

B. Social Implications

The literature review undertaken for this report identified studies showing significant conflicts exist between traditional, non-mechanized outdoor recreational activities (hiking, backpacking, camping, bicycling, canoeing, ski touring, horseback riding, fishing, swimming) and mechanized activities. These conflicts often lead to the displacement of the traditional activities by ORVs. The literature review indicates negative, often intense, feelings toward ORV activities by other outdoor recreationists. None of the studies show positive reactions. Those who object to ORVs may view them as undesirable and unnecessary from both a societal and an environmental

point of view. In addition to disturbing soil, vegetation and wildlife, the non-ORV users may fault the mechanized users for increases in theft, property damage and vandalism often associated with ORVs. However, noise is one of the most often named sources of discontent and emotion. Most of the studies note adverse psychological effects of ORV noise upon the other recreationists who seek quiet and solitude in the outdoors.

Mechanized recreationists, on the other hand, see ORVs as fun and desirable, as having beneficial aspects such as promoting social interaction and providing opportunities for people of all ages to utilize the outdoors, and as encouraging a positive economic impact through vehicular sales and use. They also see the ORV as a way to more easily view nature.

Throughout the literature review, documentation of hostility on the part of non-mechanized users toward mechanized recreationists is found; however, the reverse is not true. This has been labeled the "one-way effect." While non-ORV users contend that their satisfactions are directly impaired by the presence of mechanized uses, ORV users felt few or no impacts from other recreationists upon their activities. Thus, it is a one-way conflict; the mechanized users do not dislike the non-mechanized users. Quite often they are even oblivious of the person on foot. The literature suggests that the one-way nature of the conflict probably helps to explain the lack of understanding between conflicting groups.

Most studies found that much of the hostility between the groups stems from spatial conflicts. Traditional recreationists who seek solitude, freedom and serenity often require vast amounts of undisturbed space to satisfy these values. It is these values, however, that are most vulnerable to crowding. Mechanized users need large areas just to carry on their activity and to provide varied terrain in which to enjoy their machines. In addition, evidence shows that ORV users value the sense of freedom gained from their vehicles and the ability to explore, unhampered, large remote areas. One study concludes that "groups causing the greatest amount of conflict seem to be those that require fairly large land or water area for their activity, make use of private land, and do not have designated areas for their sport."

The ability of ORVs to readily access remote areas, and especially the year-around capabilities of three-wheeled vehicles, creates another problem which concerns DNR. Many recreationists, such as hunters, hikers and cross-country skiers, derive considerable satisfaction from penetrating comparatively long distances (for on-foot travel) into remote areas. Their satisfaction can be diminished when a three-wheeler, which covered the same distance in half an hour that it took them several hours to cover on foot, comes buzzing by. Combined with the noise disturbance which may interfere with hunting success or destroy the solitude for the hiker or skier, the ORV can be an intrusion into what were previously tranquil natural sanctuaries.

IV. POTENTIAL FOR RECREATIONAL MOTOR VEHICLE USE ON EXISTING TRAILS

A. Existing Rules, Regulations, Laws and Statutes Relating to Recreational Motor Vehicles

An important aspect of assessing the status of ORVs is identifying existing laws and policies. A significant portion of the ORV recreational opportunities in the state is provided by DNR-managed lands or DNR programs. The regulatory policy which guides the management of these lands and programs is varied and complex. Following is a summary of laws, policies and rules which apply to ORV use on state, state park, state forest and grant-in-aid trails. (This information is also combined in a Memorandum of Understanding between the Division of Forestry and the Trails and Waterways Unit; See Appendix).

1. NR 1, State park and forest campground and day-use area rules - Provides that: "Only motor vehicles which are licensed and which may be driven on Minnesota Highways may be operated within parks, campgrounds and day-use areas." The operator must have a valid drivers license and the motor vehicle may be operated only on designated roads and parking areas."

"No person shall operate a snowmobile in a state park unless on trails and areas posted and designated for such use under conditions of snow cover considered adequate for protection of the park by the park manager."

Snowmobiles are permitted on roads or trails in forest campgrounds and day-use areas during the winter unless the area is signed to prohibit them.

2. NR 20, State Trail rules - Provides that: "No motor vehicle other than a snowmobile shall be operated within a trail except upon a legal road or highway."
3. Laws of Minnesota 1981, Chapter 215 - Prohibits ORV's on trails, from December 1 to April 1 of any year, which are sponsored by a local unit of government and in whole or in part funded by grants-in-aid funds. (It has been determined by the Attorney General's Office that this law does not apply to state forest or park trails).
4. Laws of Minnesota 1982, Chapter 580, Section 1 through 6, (Dedicated Snowmobile Account) - States that monies appropriated from this account are dedicated for snowmobile purposes. (Since all DNR snowmobile trails are groomed using this funding source, the legislation implies that these trails are for snowmobiling only in the winter. Therefore, the intent of the law would be to prohibit ORV's from all snowmobile trails funded from this source).
5. DNR Unit Trail Policy (page 8, article 6) - States that: "Use of off-road motor vehicles will be addressed in each unit's management plan and permitted only when such use:

- a. is consistent with the units policy and purposes for which the unit was established;
- b. will not cause significant environmental damage; and
- c. will not conflict with other trail or unit activities or uses."

6. Minnesota Statute 84.90 - Provides that: "Outside the seven county metro area, no one shall enter another's land while operating a recreational motor vehicle after being notified not to do so, either orally or by written notice." Notices must be posted at corners and at ordinary entrance and exit points with signs such as DNR sign number NR8-403, "No motorized vehicles permitted except snowmobiles" (for snowmobile trails), or NR8-417, "No motorized vehicles permitted" (for ski trails). This statute provides the only legal authority DNR has to prohibit ORVs on state forest trails. In lieu of such posting, there is no authority to prohibit ORVs unless it can be proven that they are causing damage.

In Summary:

- a. ORVs are prohibited on snowmobile and ski grants-in-aid trails (December 1 through April 1). ORV use during the rest of the year is also prohibited, unless a special use permit is obtained.
- b. ORVs are prohibited on designated state trails and state park trails (all seasons).

- c. ORVs are permitted on state forest trails, unless they have been properly posted.

During the non-snow months, control of off-road vehicle use of state forests is based upon the recommendation of the area forest supervisor until such time as a unit plan is completed or legislation is changed. If ORVs are to be prohibited during the non-snow months, signs as outlined in number 6 above must be posted.

B. Landowner Survey of Compatability Between Three-Wheeling and Snowmobiling.

The issue of using ORVs on existing trails was addressed in a DNR survey conducted in April and May of 1983. This survey attempted to measure landowner reaction to a variety of questions relating to the use of three-wheel vehicles on existing grants-in-aid trails. The sampled landowners were already participating in agreements to allow DNR grants-in-aid snowmobile trails across their property. The findings of this survey demonstrate the complexities of combining snowmobiles and three-wheelers on the same trail system. It identifies both problems and areas of agreement, which will be useful in future discussions on this subject. The survey was conducted as a response to increasing public interest and concern expressed to DNR about the compatibility of three-wheelers and snowmobiles.

The survey consisted of a sample of 400 participants. It addressed only the use of three-wheel vehicles on snowmobile trails during winter months, and recognized that, at the time, snowmobile trails were restricted only to snowmobile use.

A key finding of the study was that 25 percent of the landowners would cancel their trail agreements if three-wheelers were allowed on grants-in-aid trails, although 55 percent of the survey population either "agreed" or "strongly agreed" that "the time has come to develop trails for three-wheelers in Minnesota."

Despite the fact that it is not conclusive, the survey gives an indication of landowner opinion as of April and May of 1983. It suggests several alternatives for accommodating both snowmobiles and three-wheelers:

1. Identify experimental trails for combined three-wheel and snowmobile use (winter only). 57% of the landowners would agree to this.
2. Permit licensed three-wheelers on snowmobile trails (winter only). 62% of the landowners would agree to this.
3. Permit three-wheelers on snowmobile trails as a part of a snowmobile club arrangement (winter only). 69% of the landowners would agree to this.
4. Permit a separate three-wheeler trail on the same land as the snowmobile trails. 32% of the landowners would agree to this.

A remaining challenge, however, is in knowing how to respond to the needs of the 25 percent of landowners who opposed any three-wheel use. Clearly, a carefully developed policy for off-road three-wheel recreational vehicles is needed which addresses the concerns of all.

V. IMPACT OF INCREASED USE OF RECREATIONAL MOTOR VEHICLES ON TOURISM

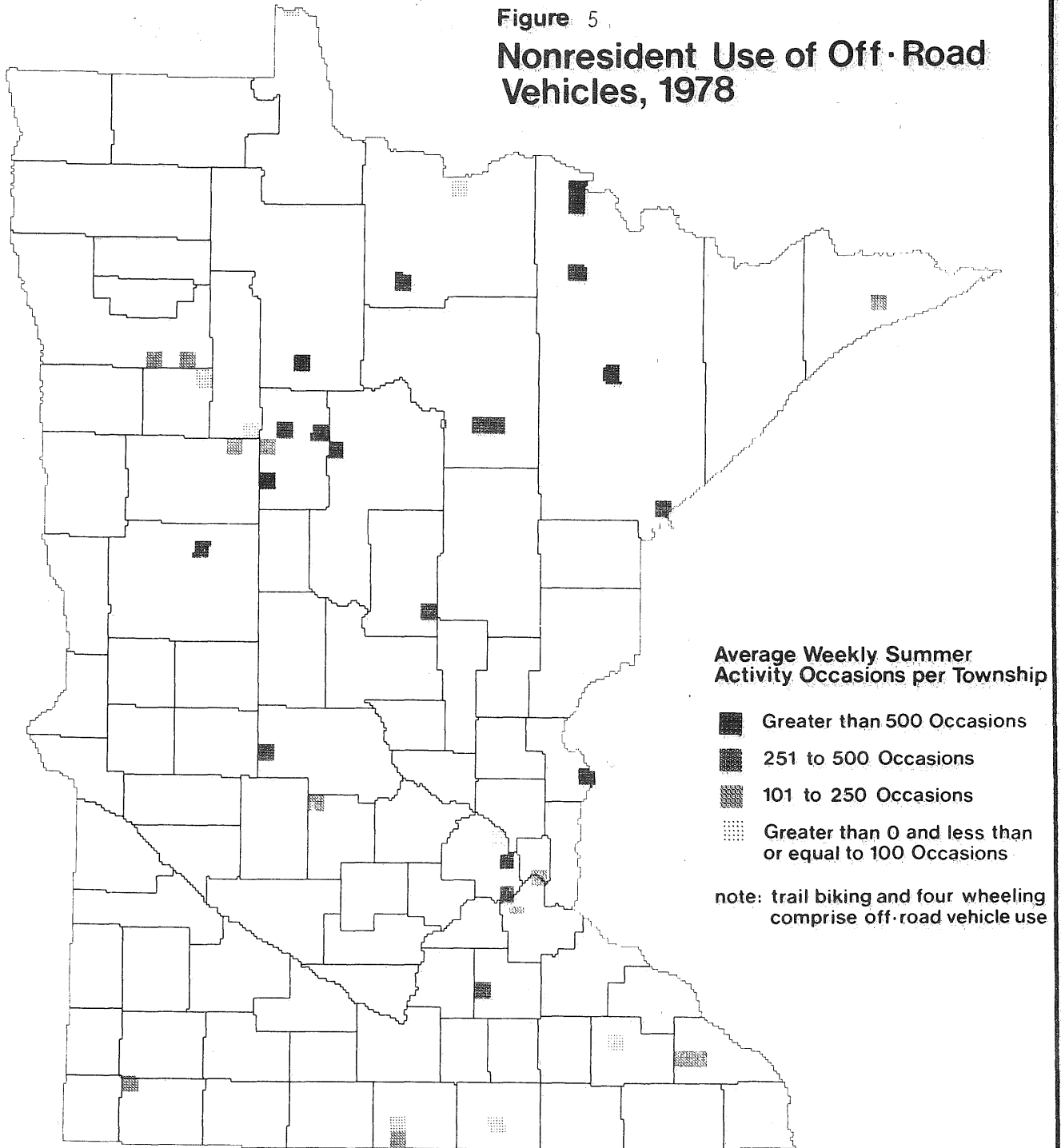
Little research has been conducted on the total economic impact of off-road vehicle use. Nevertheless, enough data have been collected in Minnesota and other states to roughly gauge the value of off-road vehicle recreation to the state's tourism economy.

Any discussion of tourists or tourism value must begin with a definition of a tourist. While a generally accepted definition is "any one traveling 50 or more miles from home for purposes of business or pleasure," this study uses two definitions, one for resident recreation tourists and another for nonresident summer motor vehicle tourists. A resident recreation tourist is anyone who travels outside their development region to recreate. A nonresident summer motor vehicle tourist is anyone visiting Minnesota from another state or country for recreation purposes during the 17-week summer season. Because these definitions exclude both nonresidents visiting Minnesota in seasons other than summer and residents recreating in their own region but more than fifty miles from home, the numbers presented here will be somewhat conservative.

The distribution of the 9900 weekly nonresident off-road vehicle occasions, estimated from the summer 1978 SCORP motor vehicle visitor survey, is shown in Figure 5. Expanded to the 17-week season, the total number of nonresident occasions equals 168,300. Using the 1978 interregional resident recreation flow tables from the 1979 SCORP, it is found that residents use off-road vehicles 158,000 times per year outside their home region.

Figure 5

Nonresident Use of Off-Road Vehicles, 1978



Source: Minnesota Department of Natural Resources. 1978 SCORP Nonresident Outdoor Recreation Use Survey

0 20 40 miles
0 20 40 60 km

The dollar impact of both resident and nonresident recreation can be estimated using a Pennsylvania study of expenditures associated with outdoor recreation. In Pennsylvania, each off-road vehicle occasion generated \$4.66 in expenditures. While this figure may seem low at first, it appears to be more reasonable when the exact meaning is understood. The figure cited represents expenditures per occasion; occasions differ substantially from trips. Many occasions can occur during one trip. For example, two people on an ORV trip who each operate their ORVs once will generate two occasions. On the average, it would be estimated that this trip would generate \$9.32 in expenditures. If the people also picnicked they would generate even more economic impact. The advantage of this method is that is based on occasions rather than trips and thus allows analysis of the estimated added impact of a specific activity.

Using the Pennsylvania method, the gross 1978 off-road vehicle tourism product in Minnesota was calculated to be 1.5 million dollars (see Table 6). Similiar methodology shows the Minnesota gross tourism product from fishing to be 152 million dollars annually. (The gross tourism product is significantly less than the total annual value of any tourism revenue-generating resource and is quite different from the value of the resource).

TABLE 6: Estimated Annual Gross Minnesota Tourism Product For Five Recreation Activities (1982 dollars)¹

Activity	Estimated Annual Gross Tourism Product
Fishing	\$155,000,000
Camping	39,000,000
Picnicking	9,000,000
Driving Off-Road Vehicles	1,500,000
Bicycling	500,000

¹ Gross Tourism Product = Annual tourism occasions in the recreation activity multiplied by Estimated expenditure per activity occasion.

Sources: Annual tourist occasions in each activity were calculated from the Minnesota SCORP Data Base. Estimates of expenditure per activity occasion taken from The Economic Significance of Recreation in Pennsylvania: Pennsylvania Department of Environmental Resources, November, 1982, page 7.

Future revenue can be projected for the target years of 1985 and 1990, based on the earlier projections of off-road vehicle occasions (Table 4, Chapter II), and is shown in Table 7. Simply stated, gross tourism income from off-road vehicle users will rise one-half million dollars over the twelve years from 1978 to 1990 based on the projections of occasions. All of this increase will result from the projected increase in three-wheel vehicle driving. This projection is based on current off-road vehicle programs which do not consider effects of increased development, greater information availability, or better promotion.

TABLE 7: Estimated and Projected Annual Gross Tourism Income From to Off-Road Vehicle Use In Minnesota, 1978, 1985 and 1990 (1982 dollars)

Type of Vehicle	Year		
	1978	1985	1990
Two-Wheeled	\$1,100,000	\$1,000,000	\$1,000,000
Three-Wheeled	Negligible	400,000 ¹	600,000 ²
Four-Wheeled	<u>400,000</u>	<u>400,000</u>	<u>400,000</u>
Total	\$1,500,000	\$1,800,000 ¹	\$2,000,000 ²

¹ The higher linear based estimate of occasions would increase 1985 figures by \$50,000

² The higher linear based estimate of occasions would increase 1990 figures by \$330,000.

Potential Revenue from Off-Road Vehicle Registration Program

The information in Table 3 (Chapter III) provides a foundation for projecting annual revenues from an off-road vehicle registration program similar to the current Minnesota snowmobile registration program. Snowmobiles are registered for three years for a fee of eighteen dollars, or an annual rate of six dollars per year. Assuming the same annual fee for off-road vehicles and full compliance with registration requirements, a comprehensive off-road vehicle registration program would generate just over 1,000,000 dollars in 1985 (See Table 8). A program covering two- and three-wheel vehicles will generate approximately 750,000 dollars in 1985 and a registration program limited to three-wheeled vehicles would bring in 200,000 dollars. The current snowmobile registration program provides 1,500,000 dollars a year.

TABLE 8: Projected Annual Revenue From A Six Dollar Annual Off-Road Vehicle Registration Fee By Type of Vehicle For 1985 and 1990

Type of Vehicle	Year	
	1985	1990
Two-Wheeled	\$558,000	\$582,000
Three-Wheeled	204,000 ¹	336,000 ²
Four-Wheeled	324,000	318,000
Total Two and Three Wheeled	\$762,000 ¹	\$918,000 ²
Total Two, Three and Four Wheeled	\$1,086,000 ¹	\$1,236,000 ²

¹ The higher linear forecast of market share would increase 1985 figures by \$30,000.

² The higher linear forecast of market share would increase 1990 figures by \$180,000.

PART TWO - BACKGROUND ISSUES

VI. SOLICITED RESPONSE FROM ORV SPOKESPERSONS

Input was received from ORV user organizations as representative of the views of the three different basic ORV user groups: off-road motorcycles, 3-wheel ATVs, and 4-wheel-drive vehicles. It should be noted that these ORV user groups were statewide associations. The memberships of these organizations represent only a small proportion of the total recreators in the various ORV activities. For example, District 23 of the American Motorcycle Association has a membership of approximately 2,000 drawn from approximately 90,000 off-road motorcyclists in the state. The Minnesota Three Wheelers Association has a membership of approximately 100 out of a total of about 30,000 recreating/non recreating 3-wheelers in the state. The Midwest 4 Wheel Drive Association has a membership of approximately 600 out of a total of about 50,000 4x4 off-road enthusiasts in the state. In addition, the environmental perspective of a number of environmental groups (i.e., North Star Chapter Sierra Club, MN Audobon Council, Izaak Walton League) was represented by the Sierra Club (as well as DNR), while the Minnesota Department of Transportation (Mn/DOT) and Department of Public Safety (DPS) presented information on the use of highway right-of-ways and public safety aspects.

Representatives of the various organizations and agencies were invited to provide comments both in writing and at a meeting held in St. Paul on December 13, 1983. Written responses were received from five state ORV organizations; eight national or out-of-state organizations; and seven state, regional and county governmental bodies; plus one environmental

group and one individual. At the public meeting, the state-wide organizations of all three ORV groups were represented, along with several district chapters of these organizations and member clubs. The Sierra Club, representing a variety of similar organizations, Mn/DOT and DNR were also represented. Attendance at the meeting totalled about 22 representatives.

Issues which were discussed included the need for trails and intensive-use areas, the type of trails and areas desired, how these facilities should be funded (such as through registration or user fees), and environmental protection concerns in relation to ORV use of public and private lands.

Need for Trails and Use Areas and Type of Facilities Desired

All three user groups (off-road motorcycles, 3-wheelers and 4-wheel drives) expressed an interest in both extensive trail systems or roads and intensive-use areas. For example, users from each group often want the experience of an extended trip over a period of several hours or an entire day, encompassing anywhere from 15 to 60 miles of trail or road over a four-hour time period. At other times, however, they enjoy participating in competitive type events such as motocross or enduros, or hill climbing and mud-slogging which can be accommodated in relatively small areas of 100 to 400 acres.

The three-wheel ATV users expressed the greatest desire for an extensive system of trails. They compare their sport with snowmobiling, and would like to see a system of trails similar to that which is available to snowmobiles. This system would include trails on state lands and grants-in-aid trails. These representatives do not want to use snowmobile

trails, however; they want their own system. (It should be noted that while currently the state snowmobile association, the Minnesota United Snowmobilers Association, supports the 3-wheel community in their request for registration, they do not want to share trails).

The off-road motorcyclists appear to have found sufficient areas to satisfy many of their needs by utilizing existing opportunities on public and private lands, especially for special events such as enduros. They do feel, however, that trail opportunities for individual users are quite limited. The 4-wheel representatives do not really want a system of developed trails, but expressed a desire to have available more abandoned or primitive roads which would provide both a challenge for their machines and an opportunity to see different areas of the state.

The 2-wheelers and 4-wheelers would also like to have more areas for special events. For the motorcyclist, this would primarily include areas for competitive events such as enduros and motocross, although some are interested in other activities such as hill climbing. Four-wheelers like "hills, sand and mud". For them, relatively small areas of a few acres that offered enough challenge, could provide an entire day's enjoyment.

All user groups expressed an interest in having a variety of areas available to accommodate different skill levels and to provide different types of experiences. The three-wheeler association specifically ask for rider safety instruction similar to the snowmobile program. All groups indicated they would accept machine requirements (i.e., mufflers, spark arrestors).

All the groups also indicated they would prefer to have their own areas rather than share trails with snowmobiles or other types of ORV's other than their own. (A May 1981 DNR survey of ORV owners, primarily 4- and 2-wheel recreators, found that nearly 60% of them willing to share an ORV facility). While motorcyclists and 3-wheelers seemed to be the most compatible, there is a significant difference in the speed at which the two types of vehicles are operated. It was felt that this speed differential would cause safety problems if these vehicles were inter-mixed on the same trails. The groups also felt that 4-wheel-drive vehicles were not at all compatible with the other two types, due to major differences in size and operating characteristics, type of facilities preferred, and the effects which these vehicles have on the natural resource. All groups mentioned that the need for vehicle separation was directly related to density of use. If ORV use is intense, the need for separation becomes more acute. If ORV use is dispersed, the need for separation becomes less important.

To summarize, the off-road motorcyclists desire both an extensive system of trails and areas for intensive-use special events and feel that additional trail opportunities for independent use are the biggest need. The 3-wheelers primarily want an extensive trail system similar to that available for snowmobiles. Lastly, the 4-wheelers would like more abandoned or primitive roads made available, but also would like some challenging special event areas.

All groups indicated they would like trails and use areas located as close to population centers as possible, preferably within 50 to 100 miles for day use. (This is a bit contrary to research information which show

willingness to travel under 50 miles). However, for special events or to gain access to particularly challenging or attractive areas, they would be willing to travel 250 miles, or even up to 500 miles in the case of the 4-wheelers, for weekend or longer trips.

Funding/Registration

If trails, special road systems, or special use areas are to be provided for ORV's, users should contribute to the cost of developing and maintaining these facilities. Funds could be generated either through a vehicle registration system or a user fee system.

Under a registration system, all new vehicles would be most effectively registered at time-of-sale. For 4-wheel-drive vehicles, most of which are already registered as street-legal vehicles, an additional user fee (surcharge) could be added to provide funds for a 4-wheel-drive road system. Three-wheel vehicles are currently not registered at all, and a new registration program could be set up similar to the one for snowmobiles. A large percentage of motorcycles are registered and used both on- and off- road, but many are not registered and are trailered to off-road use sites. A registration system for off-road motorcyclists would have to take into account the fact that many motorcycles, even if manufactured for off-road use, are never used for that purpose.

The user-fee system might better accommodate the dual use which is characteristic of motorcycles. The fee would pay for a sticker that would be required only for use of the vehicle on developed trails or areas. During the December 13 meeting held in St. Paul, the motorcycle group

representatives initially were split between favoring user fees over blanket registration, but eventually agreed to a registration system for purposes of solidarity.

The three-wheelers said they definitely favor a blanket registration system, and the 4-wheel-drive owners prefer a registration system over a user-fee system. The 4-wheel-drive owners, however, were also concerned about the large number of 4-wheel vehicles that are not used off-road that would be taxed under an off-road vehicle registration system.

It was noted that for those vehicles currently not registered (3-wheelers and some motorcycles), registration would have the added advantages of aiding enforcement regarding ORV use, and of benefiting the planning for ORV facilities by providing better information on user numbers and demographics.

The 3-wheelers seem to be the most desirous of instituting a registration system so that funds could be generated to establish a trail system for them. This group seems to feel the greatest concern over the availability of areas to use their vehicles. The motorcyclists, on the other hand, would accept a user fee system only if they were assured that it would produce significantly improved opportunities and not result in closure of currently available areas. But motorcyclists are generally not so concerned with a lack of available areas that they wish to push for institution of a fee system. The 4-wheelers, likewise, have considerable opportunities available (although maybe not all they would like), but would accept a fee system to pay for new special use areas, identification of existing abandoned and primitive roads, and for the maintenance these

facilities would require. (Willingness to pay by ORV owners is also addressed in a May 1981 DNR, SCORP-based survey).

The user groups also indicated they felt that a portion of the unrefunded gas tax (collected on sales of gasoline which is used for non-highway purposes) should be made available for ORV roads, trails and use areas, just as a portion is made available for snowmobiles. It would be apportioned on the basis of the amount of off-road use by each of the three user groups. It is uncertain whether user fees (alone, in contrast to blanket registration) would generate enough revenue to support a very large trail or use-area system. The amount of revenue would depend on how many users would use developed areas or trails in preference to other areas which would be available free or through other arrangements. Also, the start-up of a user fee system might be slow since few users would be willing to pay the fee until significant facilities were available, and in turn the resulting small revenues would mean slow development of facilities.

Public Land Use/Environmental Concerns

Presently, state lands are open to use by ORV's unless posted otherwise, except for state parks, state trails, wildlife management areas, and scientific and natural areas. The Sierra Club, representing a number of similar organizations, stated they would like to see all state lands closed to ORV use until lands can be inventoried and classified, and areas determined to have the capability to support ORV use would then be designated. The group proposed three classes of land: 1) Reasonable ORV use for certain seasons; 2) Restricted use permitted during specified

times of the day or week; and 3) Non-use areas. The ORV organizations, on the other hand, felt that public lands should be open to ORV use on a controlled basis, and only sensitive or problem areas should be closed on a case-by-case basis.

The Sierra Club's position stems from its belief that ORV use results in various detrimental environmental impacts, including noise, streambank and hillside erosion, littering, damage to vegetation, and harassment of wildlife. The Club's spokesman also cited conflicts with non-ORV recreationists and with landowners as reasons for limiting ORV use.

The Sierra Club also supported educational programs aimed at reducing the effects of ORV use on natural resources, which the user organizations also agreed were necessary. The Sierra Club also suggested that any potential licensing or user fee systems pay not only for enforcement and development of facilities, but also be used for the monitoring of environmental impact. The user associations responded favorably to fees and their use in development, maintenance, enforcement, and education. They had no comment on the use of fee dollars for environmental impact.

Other State Agencies

MN DPS and the MN DOT both indicated that there is currently a problem with illegal off-road vehicle use in public road rights-of-way. The use is taking place in the road side ditches and is creating a public safety hazard with vehicles illegally crossing roadways and from the bouncing ORV headlights which can blind and confuse oncoming motorists. Additionally, this use often creates erosion problems and other environmental damage. This use is illegal and both agencies are interested in seeing that the use is placed elsewhere, in more appropriate areas.

VII. ORV PROGRAMS IN OTHER STATES

To gauge where Minnesota fits in the spectrum of state efforts regarding ORV use, DNR researched those efforts on two levels. On the first level, written materials supplied primarily by the Motorcycle Industry Council and the American Motorcycle Association were reviewed and, in some cases, confirmed or supplemented by written correspondence.

Based on this information, an assessment was made of the degree to which programs were developed and the existence of interesting program management features. Certain states were then chosen for a more thorough phone survey. States contiguous to Minnesota were also included in this second survey. The questions asked in this survey fell into the following categories: the state's definition of an "ORV" and numbers of vehicles in the state; acreage and type of land available for ORV use; origin, budget and length of the program; specific program management features; appraisal of the program; and existence of an ORV statute.

A. Findings From Across the United States

A compilation of the information on ORV use in all fifty states gathered from the private sector can be found in the table "ORV Status in the United States" in the appendix. In general, states have few institutional arrangements for ORV use. Even though 40% of the states have some legislation regarding ORV's, only 15 of them require ORV's to be registered.

Further, only eight of them have any type of developed ORV program.

In the industry's view, the most available lands for ORV use are U.S. Forest Service lands, available in 82% of the states. Almost half the states also have other federal lands available, owned by either the Corps of Engineers or the Bureau of Land Management.

Much less state and local land is available. Only 24% of the states have any local areas available for ORV use and about 46% have state lands available. The reliability of this data, however, is open to question since the industry reports Minnesota as having state land expressly available for ORV use although it is available only under the state forest lands multiple-use principle. The situation is similar in New York State. Industry sources say that New York has state land available, but staff at the New York Department of Environmental Conservation did not confirm this availability, and actually insisted the contrary: that no land was available and there was no plan to make any available. The industry materials do not make evident the basis on which public or private land was determined to be "available".

Fifteen states required registration of ORV's with fees ranging from a low of \$2.50 for 3 years in New Mexico to a high of \$13.00 annually for residents of New Hampshire (non-resident annual registration is \$17.00). The average of the registration fees charged was \$5.72 per year.

Findings From a Selective Phone Survey

Eleven states were surveyed directly through phone calls. California, Michigan and Washington were selected because they were

among those states having apparent leadership in ORV management. Iowa, North Dakota, South Dakota and Wisconsin were selected because of their proximity to Minnesota. Florida, Maine, New Hampshire, and Ohio were selected because of their apparent innovations in ORV management. The complete summary of information gathered can be found in the chart titled, "Partial Survey of State ORV Programs, December 1983" in the appendix.

In the states of California, Michigan, and Washington, where ORV programs are well-established and well-developed, the programs share a number of similar components. The programs have been in existence for a comparatively long period of time - from 8-11 years - and make available for ORV use a considerable amount of state-owned land (e.g., 37,800 acres in California; 10,000 miles of state forest roads in Michigan; and 1,000 acres of sand dunes in Washington). The programs have large budgets compared to other states, ranging from \$450,000 per year in Michigan to \$10 million per year in California. All three states require registration of ORV's and have developed user education programs. All 3 states also have grant programs for ORV trail and facility development, although California and Washington will only contract with federal or local agencies for those services and make no payments to individuals, while Michigan will contract both with local clubs and with other governmental units. The only ORV use of private land in these states occurs in Washington where the U.S. Forest Service enters agreements with private landowners when their trails cross private lands. In general it can be said that these states have tried to manage ORV use on public land positively by responding to rather than ignoring public demand for trails, by attempting to provide opportunities - either

trails or areas - for all types of ORV's, and by locating ORV opportunities relatively close to population centers. Each of these three states have also developed their own processes for effectively drawing user groups into a joint problem-solving effort with government. User initiative ranges from legislative sponsorship to formulation of development plans and reviewal of proposals. This process draws opposing views into a framework for discussion and compromise.

In the states neighboring Minnesota - Iowa, Wisconsin and the Dakotas - two different general approaches to ORV's have been taken. Neither North Dakota nor South Dakota have statutes or programs for ORV use, although both have snowmobile trail programs. Both states experience 3-wheeled ORV use on snowmobile trails; in North Dakota the use is a problem but it is not a problem in South Dakota. Land freely made available for ORV use is along the Missouri River in both states and is owned by the U.S. Army Corps of Engineers, but the Corps has no particular ORV program on its lands in either state.

By contrast, in both Iowa and Wisconsin, fledgling ORV programs are developing out of the state snowmobile programs. Although thus similar in origin, these programs are very different except for the prominent role played by county governments. In Iowa, ORV's of a certain size (the 3 wheel vehicles) since 1977 have been included in a broad statutory definition of "snowmobile". Because less than 1% of Iowa's land base is publicly owned, the state gives grants to County Conservation Boards which contract with snowmobile clubs to create trails primarily on private lands. Thousands of miles of

snowmobile trails thus became available to ORV's with the limitation of winter-use only. The co-existence of these ORV's with snowmobiles has been relatively peaceful because they started the program together and pay the same registration fees, but there is some potential for difficulty due to ORV users' interest in a summer program.

While the State of Wisconsin owns about one million acres of forest land, the forest roads are available for use only by licensed vehicles. Because ORV's need not be licensed or registered, these lands are unavailable to them, although a total of about 20 miles of state-owned trails are available to 2- and 3-wheelers in the summer time. In comparison, counties own another one-million acres of tax-forfeited forest lands. Counties receive grants from the state to develop both motorcycle and snowmobile trails and have the authority to permit ORV's to use these county trails also. Two counties have elected to make the trails available to ORV's in the winter time and one has extended permission for summer use by ORV's also. This use has been contested by the state snowmobile association which interprets the law to allow only snowmobile use on snowmobile trails. A bill governing ORV's is currently pending in the Wisconsin Legislature.

Of the four remaining states surveyed, Florida and Ohio were contacted because they required registration, and from the nationwide survey it appeared the response to ORV use was somewhat advanced. In actuality, the Ohio program is very modest, with a total of only 36 miles on the state's forest lands available for ORV use. The

registration fees collected from ORV's are not earmarked for the ORV program, but become part of a pool of state money which is then allocated among all recreational uses. Because Florida is a southern state, the hypothesis was that an ORV program may have developed that was not contingent upon or even related to a previous snowmobile program which might have components of value for consideration in Minnesota. The hypothesis was not borne out. While Florida has many acres available for ORV use - 4.5 million - it is mostly water, which limits comparison between type of ORV and type of use with the situation in Minnesota. Further, the \$10.00 registration fee does not signal a developed program, but rather provides just enough annual income to pay for administration of the permit program.

Lastly the states of Maine and New Hampshire were surveyed because they required registration, had a statute governing ORV use, and were northern states like Minnesota. The Maine Legislature actually just passed the ORV statute in early 1983 and registration of vehicles will not begin until July 1, 1984. The reason for passage was the desire to find out the number and type of vehicles and services their users would like. In New Hampshire, the state makes available 180 pieces of tax-forfeited property for multiple recreational uses. This includes 30 miles of trail specifically designated for ORV use.

ORV's are prohibited on other portions of these areas, and all other state land is similarly off limits to any ORV's except snowmobiles. There is no specific program at the present for 3-wheelers because the registrations have not yet been sufficient to warrant one.

Non-State ORV Programs of Interest

As the survey of states progressed, the names of other ORV programs of interest surfaced and were pursued: the Turkey Bay ORV Area in Kentucky, the Ramparts Range in Colorado, and the Wenatchee National Forest in Washington.

Turkey Bay is a 2,500 acre area which is part of a 170,000 acre Tennessee Valley Authority project at Land Between the Lakes (LBTL), Golden Pond, Kentucky. It is a national ORV demonstration project which was officially established in 1972, although the area had extensive ORV use as early as 1969. Trails in the area are 2-way and are open year round because of the mild climate. The facility is well-used by vacationers from as far away as Chicago and St. Louis.

From the literature reviewed by CURA (University of Minnesota), the approach to unit design at Turkey Bay appears well planned. This approach used a number of site design criteria, including:

1. A single ORV entrance near a major LBTL entrance and the park's administrative complex.
2. A square boundary rather than long, narrow area with adequate acreage to allow for a variety of riding experiences (2,000 to 5,000 acres deemed appropriate for the LBTL landscape).
3. A campground developed within the ORV area since many ORV users come to camp as well as to ride.

4. Preference for cherty soils (highly resistant to erosion), poorer quality vegetation (a second-generation, cut-over forest) and habitats with no special wildlife significance.
5. Designation of an area with a history of ORV user familiarity, designation of an area of known ORVer preferences for terrain, and designation of a previously disturbed area.

A relatively simple set of policies and regulations were established to manage Turkey Bay. Although originally planned for motorcyclists, President Nixon's 1972 Executive Order caused the area to be open to all ORV's, as well as to non-riding recreationists. Normal forestry and wildlife management practices have been continued in the area. Boundaries, marked with inward facing signs, were established to buffer from other noise problems along the highways adjacent to the northern and western boundaries. Spark arrestors are required, and riding is allowed only during daylight hours. Although safety considerations were given major ranking, the staff avoided the urge to overly protect the cyclist and, consequently, avoided some potential management problems. The regulations have proven to be very effective; there have been few major violators. There has been no campground vandalism, no significant littering of the backwoods, and few reports of game harrassment.

In keeping with the 1972 Executive Order, an environmental monitoring system was established. Results of the five-year program show an increase in total area receiving direct ORV impact from 0.7 percent in 1973 to 2.1 percent in 1977. The 2.1 percent figure is much lower

than anyone had anticipated. Although some hills of 15 percent or greater slope had serious erosion problems, overall erosion was not great. Average trail width increased about 31 percent. While vegetation on trails was heavily impacted, plants not actually driven over showed no significant deterioration. Although measurement is difficult, impacts on wildlife appear negligible.

The Ramparts Range Park in Colorado is part of the Pike National Forest, consists of 100 miles of 40-inch wide trail, and is primarily used by motorcycles. The entire park has been used by motorcycles since the 1940's due mainly to the proximity of Denver - an hour's drive north. Trail loops, mountainous terrain and beautiful scenery are the appealing features for motorcyclists, but use of the area by motorcyclists has precluded use by other recreationists, including other ORV users, which require a trail width greater than 40 inches.

The Wenatchee National Forest in Washington state has 900 miles of trail for motorcycles, another 2,400 miles of trail for other non-motorized recreational users, and thousands of old logging and administrative roads available for ORV use within the 2 1/2 million acres of the forest. The forest is managed primarily for family recreationists and an effort is made to keep vehicle speeds relatively slow.

VIII. MANAGEMENT CONSIDERATIONS AND ESTIMATED ADMINISTRATIVE COSTS FOR AN ORV PROGRAM IN MINNESOTA

A. Management Considerations

Preceding discussions would suggest that management of ORV recreation is a necessary consideration in Minnesota. Most of the studies reviewed by University of Minnesota-CURA concluded that "management controls involving some form of segregation or zoning are necessary to minimize conflicts and maintain satisfactions of all outdoor recreationists." Spacing -- separate trails, separate areas -- is needed. Public acceptance of such actions is evident given the overwhelming support of President Nixon's Executive Order of 1972 which set forth guidelines for ORV use on federal lands by prescribing that trails and areas be located so as to minimize conflicts between ORV use and other existing or proposed recreational uses.

Education is a major component of effective management. As discussed in one of the articles, the question is "not whether the trail bike has an environmental impact, but where and what kind." Trailbikes, 3-wheeled, and 4-wheeled vehicles all have impact. The degree of that impact, however, is dependent on how and where that vehicle is used. Impacts can be minimized by either riding in an appropriate place or by riding in an appropriate way. If ORV users stick to designated trails and avoid wet soils, loose soils, steep slopes and needless wheel spinning, impacts can be greatly lessened. The key here is to educate the user.

Education requires viable channels of communication. Essential to these channels is a strong network of user clubs and associations. Additionally, the educator must be certain that information and education efforts correctly target the audience and utilize the proper media to reach that audience. ORV users need to understand not only that there are regulations but also why there are regulations.

The final point in the management section of the literature review dealt with enforcement. The conclusion was that while management of ORV sites has become somewhat sophisticated, enforcement is not so clear-cut and is approached differently across the country. Effective enforcement requires good levels of user information, intensive signing and action against violations. One action which seems to be successful is the ejection of the violator from the use area for a day or for the season, depending on the violation. Some areas use local club members as educators and enforcement personnel, thus allowing for increased person power and the use of peer pressure to create conformance.

B. ORV Trail Development and Maintenance Costs

A phone survey of trail development and maintenance costs in those states with relatively "advanced" ORV programs was undertaken by DNR to provide a perspective for possible program development in Minnesota. It should be noted that it became impossible to generalize about costs as costs are very specific to the area, e.g.

mountainous and wet terrain in California and Washington; flat to gently rolling areas in Michigan. In California, ORV trail development can run from \$3,500 to \$8,000 per mile; maintenance costs were unavailable. In Washington the costs per mile are:

Planning, design and development	\$5,000 - 10,000
Trail maintenance (annual)	\$140 - 500

In Michigan, the state contracts with local clubs to develop trails at a cost of \$120/mile; maintenance figures were unavailable.

C. Estimated Administrative Costs for an ORV Program in Minnesota.

The management and administration of an ORV program in Minnesota will require additional funding. The amount of funding needed will vary depending on the size and type of program legislatively mandated.

A number of funding approaches can be considered for any new program. In a January 1983 DNR study, eleven approaches were examined and ranked for possible use in a non-motorized trail program. This study can provide perspective on the following program, which is based in part upon registration. Funding sources other than those in the 1983 study may include bonding and unrefunded gasoline tax.

Management and administration of an ORV program basically fall into three categories of expenditures:

- Administration of a registration program - providing staff to work with deputy registrars issuing registrations and accounting for revenues.
- Planning and operations - providing staff to plan ORV areas and to actually develop and maintain those areas.
- Administration of a grants program - providing staff to work with local clubs and units of government to develop locally initiated trails or use areas.

1. Administrative costs associated with a registration program for off-road vehicles are the easiest to assess. The DNR's License Bureau has had extensive experience with similar programs and can extrapolate from that. This bureau has the responsibility for all DNR licensing and registration programs, including the state's snowmobile program. Their projections of costs assume a program similar to the state snowmobile program. This projection incorporates the snowmobile system's use of the state network of deputy registrars and vehicle decals.

The addition of an ORV program to the current license center would necessitate additional staff. The salaries of that staff as well as their office equipment (a one time expense) have been calculated in the initial biennium program costs. Additionally, the development of computer software for program management have been added to the first biennium costs. These equipment and software costs are a one-time cost and should therefore more

appropriately be apportioned over a longer period of program operation. They have been included here in full to show the complete program start-up costs.

The supplies used in the program (envelopes, decals applications) are variable costs which depend on the numbers of potential and actual registrants. For the purpose of this calculation it was assumed that 40,000 vehicle owners would register in the first biennium.

As calculated the initial BIENNIAL capital expenses would total an estimated \$63,275.00. The recurring biennial expenses would total an estimated \$185,651.00. The total cost for operating the License Bureau through the first BIENNIUM is thus \$248,926.00.

2. Planning and operation costs are the most difficult to assess. As seen in the survey of other states, these figures can vary greatly depending on the program, the types of facilities offered, their size and where they are located. Providing recreation opportunity for 40,000 registered ORV users would require an estimated 13,600 acres. The reason the level of 40,000 ORV users was chosen is because it represents a reasonable maximum registration level during the early years of an ORV program. This figure was also used for estimates of DNR License Bureau registration costs.

Of the 40,000 hypothesized ORV registrations, projections would indicate that 18,000 would be two-wheelers, 14,000 would be four-wheelers, and 8,000 would be three-wheelers. The necessary

13,600 acres would assume three-wheeler and four-wheeler use both winter and summer, and two-wheeler use only in summer. The 13,600-acres need also assumes a peak use of about 95 ORVs on a 500 acre site which is provided with directional trail and/or scramble area signs.

Twenty-seven sites each consisting of 500 acres would be necessary to provide for the 13,600 acres serving 40,000 users. If these sites were to be separated by user-type, they would be allotted as follows:

Two wheelers: 1 sites

Three wheelers: 6 sites

Four wheelers: 10 sites

Two options are presented to address the first stage of development necessary to provide for 40,000 registered ORV users. The first option represents the costs of purchasing land, developing and maintaining the first of a potential 27 sites. The second option represents developing and maintaining the first of a potential 27 sites on existing state land. Both options would require staff time in St. Paul to administer the program.

BIENNIUM COSTS TO THE STATE FOR THE FIRST COMPONENT(S) OF A STATEWIDE ORV PROGRAM

	<u>OPTION ONE</u> <u>(one facility)</u>	<u>OPTION TWO</u> <u>(one facility)</u>
FIRST YEAR		
acquisition:	\$500,000.00	state land only
administration:	\$ 26,232.00	\$ 26,232.00
<hr/>		
SECOND YEAR		
planning and development	\$159,500.00	\$159,500.00
maintenance	\$ 16,000.00	\$ 16,000.00
administration: (salary)	\$ 26,232.00	\$ 26,232.00
<hr/>		
FIRST BIENNIUM TOTAL COSTS:	\$727,964.00	\$227,964.00

It must be remembered that in both options only a single site of the twenty-seven needed is funded. The costs of program planning and operations added to the costs of registration administration make both options currently infeasible.

3. Finally, a third approach is a grants program. Managing that program will take staff. The number of staff will vary with program size. It is safe to assume, though, that at least one person would be needed to administer the program. It is anticipated that the grants position would be classed as an Natural Resources Specialist II with a biennial salary of approximately \$52,500 including benefits. This cost would then

be added to the cost of a registration program (approximately \$250,000) for the first biennium for a total of approximately \$300,000 for the first biennium. The remaining funds would then be available as grants.

If 40,000 vehicles registered at \$18 for a three year period, the gross proceeds would be \$720,000. Subtracting the approximate \$300,000 needed for registration and grants administration leaves approximately \$400,000. While the figure of \$400,000 might establish a program satisfactory to one user group, it would not adequately address the needs of all three. At this time if only one group (i.e., 3-wheelers) registered, the dollars generated would not even cover the cost of the registration program. If a portion of the gas tax was added, it would still not allow the Department to develop a satisfactory program for the users. The result is that whether ORVs are registered as group, each with somewhat different needs, or only one segment is registered, the current number of vehicles makes the creation of an adequate program inadvisable. This result may change, however, if the number of 3-wheelers increases dramatically and as such should be regularly monitored.

APPENDIX

APPENDIX

Because of its size the appendix has not been included with each report. Instead it is available upon request. The appendix contains the following:

- I. The complete literature review done by the University of Minnesota-CURA including the bibliography.
- II. The complete case studies done by the University of Minnesota, Division of Recreation, Park and Leisure Studies and DNR's Office of Planning.
- III. A synopsis of letters received from the ORV user and industry representatives, environmental organizations, other state agencies and local units of government. (Letters available on request)
- IV. The "Technical Note" associated with vehicle forecasts.
- V. A chart detailing ORV programs in other states.

Requests for the Appendix should be referred to:

Department of Natural Resources
Unit of Trails and Waterways
St. Paul, Minnesota

4057F

