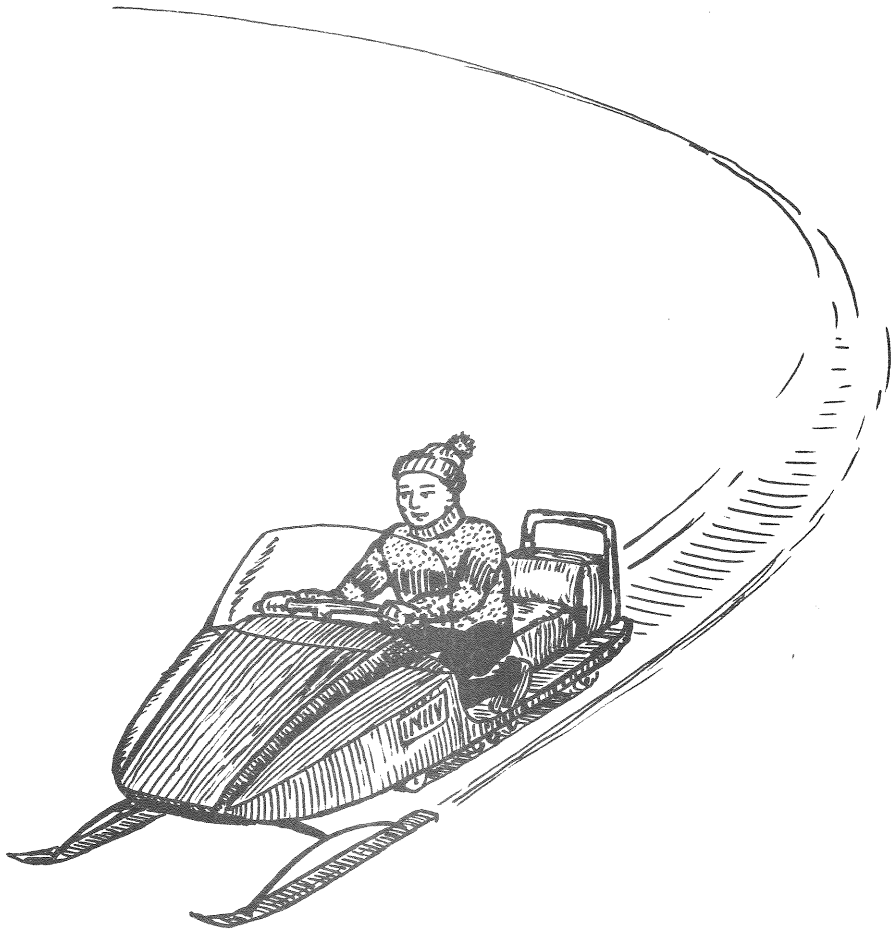
MINNESOTA SNOWMOBILE SURVEY 1970



MINNESOTA DEPARTMENT OF CONSERVATION
BUREAU OF PLANNING

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1970 SNOWMOBILE SURVEY

SUMMARY

In April 1970, a sample of 10,000 registered snowmobile owners was contacted through a mail survey in order to obtain information needed in the administration of a snowmobile program in Minnesota. An unexpectedly high response rate of 39.5% resulted in 3,948 useable returns. The survey yielded data concerning amount and time distribution of snowmobile use; distance traveled; types of areas most used; types of trails used and preferred; attitudes toward certain facilities, maps, signs, and shelters; and the primary use of machines.

Objectives of Survey

1. Determine types of snowmobile facilities actually used and preferred by snowmobile users.
2. Compute existing and projected demands for snowmobile trails based on amount, timing and distribution of use.
3. Determine miles of trails needed by region of the state to meet existing and future demand.
4. Provide administrators with an indication of the attitudes and opinions of snowmobile users which will be helpful in the designing of future snowmobile programs.

Methods

Of approximately 114,000 registered snowmobile owners, 10,000 owners were selected by computer and mailed a two page questionnaire with self-addressed return envelope. The sample was chosen by a computer programmed to select each 10th name until 10,000 names were obtained. Later analysis proved the respondents were distributed throughout the state in proportion to distribution of snowmobile registrations.

Data from 3,948 useable returns was transferred to data processing punch cards. A computer was used to summarize and tabulate the data in a form suitable for analysis.

Earlier inventories of trails available for snowmobile use were available (by regions of the state) as was data from the 1967 recreational demand survey.

To determine demand-supply relationship the data obtained from the respondents in terms of hours of snowmobile use on an average weekend day was used.

Because of unforeseen difficulties, a follow-up survey of nonrespondents could not be completed. Therefore this data reflects those attitudes, needs and opinions of the 40 percent who took the time to return the questionnaire. It was assumed that the immediate priorities of trail development and other phases of providing for the needs of the snowmobile would be at least partially satisfied by this survey.

Results, Conclusions and Recommendations

1. Cross-Country Trails Preference

Results - Of the snowmobilers surveyed, 75 percent indicated a preference for cross-country trails although only 61 percent of the respondents stated that they presently use this type of facility. The majority of these cross-country trail users also prefer a trail that returns via a different route (circle route).

Conclusions - Cross country trails, particularly those that start and return by a different route are in highest demand.

Recommendations - If possible all trails should be the cross-country type and located in such a way as to link up with another trail that can provide a different return route. Second choice would be a trail providing for return on same route to point or origin. New trails should link up with other trail

systems whenever possible. Major loop trails should be 15 to 25 miles in length but should generally have alternative "cut-offs" to permit snowmobiles to return more rapidly to the starting point if they desire a shorter trip or in case of an emergency.

2. Additional trail needs

Results- Most snowmobilers prefer to remain within 50 miles of home for one day trips and most will travel up to 100 miles for weekend trips.

Within 100 mile radius of the metropolitan region there are approximately 400 miles of cross-country snowmobile trails, as indicated by the Department of Conservation inventory. This radius also has 60 percent of state registered snowmobiles.

Based on the use calculated for an average weekend day, there is a need for 1200 additional miles of cross-country trails within a 100 mile radius of the Twin Cities. Recreation Regions 7, 9, 10, and 11 lie within the radius.

Lesser deficiencies were found in the following Recreation Regions: Region I - 77 miles; Region 4 - 205 miles; Region 6-104 miles; Region 8 - 41 miles. The remaining three regions 2, 3, and 5 appear to have an adequate supply of cross-country trails to satisfy current needs,but more will be needed by 1980.

Conclusion - There is presently an inadaquate supply of cross-country snowmobile trails in all but 3 Recreation Regions of the state.

Recommendations - High priority should be given to trail construction to meet the need within the 100 mile radius of the Twin Cities. Recreation Region 7 and 11 have the best combination of public land ownership and snow cover and offer the best potential for trail development. Continued effort should be made to meet the deficiencies in Recreation Regions 1, 4, 6, and 8.

Future demand is difficult to predict, but an estimate of at least 100 percent increase over present needs is predicted for 1980.

3. Inadequate Public Lands

Results - Existing and projected state land holdings appear to be inadequate to fully provide for trail needs, evident in the southern part of the state.

Conclusions - Regional, county, municipal or corporate owned lands suitable for trail development will be needed to complement state trails to meet future needs.

Recommendations - All recreational planning for sizeable recreation areas to be administered by local government or private corporations should include analysis of trail potential.

4. Marked Trails

Results - Of those surveyed, 79.5 percent of the State Park users, 70.5 percent of the State Forest users and 60.4 percent of the Federal land users indicated a preference for marked trails over unmarked trails. Twenty-eight (28) percent of snowmobiling occurred after dark.

Conclusions - The majority of cross-country trail users prefer marked trails. There is a slight difference in preference between park and forest users. Nighttime safety must be considered a significant factor.

Recommendations - All administrating agencies should adequately mark all existing and future cross-country trails. Reflectorized material should be used on all signs, barriers, cables, etc. near trails.

5. Trail Maps

Results - A majority of snowmobilers (by a 2:1 ratio) stated maps were "necessary" rather "than not necessary." A large number of people chose a third alternative that maps would be "nice."

Conclusions - Based on those who chose to give the decisive answer that the maps were necessary-it would appear that trail maps are needed for snowmobiling.

Recommendations - Maps of snowmobile trails should be continued to be made available until such time that a more indepth survey might show otherwise.

6. Trail Shelters

Results - In general, shelters and warming houses were not found to be needed by snowmobilers. On the average statewide, 73 percent indicated shelters were not needed. However, a large portion (41 percent) who use state parks felt shelters are needed while only 25 percent using state forests so indicated.

Conclusions - It would appear that snowmobilers using state parks may require a more "secure" experience.

Recommendations - Shelters should be made available to snowmobilers in state parks. Evaluation of the need for shelters in state forests should be made on the individual state forest basis.

7. Added Parking Needs

Results - In State Forests, for which this question was designed, 21 percent experienced difficulty in parking at the starting points.

Conclusion - Although the majority appeared satisfied, 1 out of 5 forest snowmobilers felt parking was inadequate.

Recommendations - Visual surveys of parking areas on peak days should be made to determine sites needing expansion.

8. Snowmobile Drivers Under 16

Results - An estimated 111,200 snowmobile drivers are below 16 years of age, and of the 114,646 machines registered, 49 percent of the owners claimed at least 1 driver in this age bracket.

Conclusion - A notable number of drivers are below minimum age for automobile drivers license and should have some driver training, especially with a significant number liable to be using public facilities.

Recommendations - Major emphasis should be placed on snowmobile training programs for young drivers. Many of these young drivers will be crossing public roads where a training certificate is required by law.

ACKNOWLEDGEMENTS

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Conservation License Center

Minnesota Department of Economic Development
Michigan State University
Recreation Research and Planning Unit

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CHAPTER I

INTRODUCTION

At the time snowmobiles first "hit" the Minnesota recreation scene, early 1960's, there were no public facilities available for this emerging recreational activity. This form of recreation had not been planned for nor foreseen. The snowmobiler was alone, with no one to look after his immediate interest but himself. He had the freedom of the wind to roam the countryside at will. Public sentiment and pressure had not yet descended upon him.

The snowmobile had a short childhood. Attention of the public was quickly focused upon this mechanical sleigh which possessed the key to open winter recreation opportunity and bring enjoyment to the young and old alike. The snow was there, the snowmobile was there and the desire of the public to want a winter recreation experience was there. The door to winter recreation, which was formerly dominated by the hardiest, was now completely opened to all who had access to a snowmobile.

Minnesota has become one of the leading snowmobile states in the country. Because of the state's geographic location and the abundant amount of snowfall, the snowmobile has prospered in its own backyard.

Snowmobile manufacturers had sprung up in northwestern Minnesota. These entrepreneurs recognized the opportunity they had and sought to provide the potential winter recreationist with a vehicle which would enable him to enjoy the winter season.

Sales of snowmobiles soared throughout the snowbelt and certain mountain states. Demand for both machines and facilities to operate on also grew. This boom was not expected, therefore, no facilities had been provided.

It wasn't until the winter of 1967-1968 that the state (Minn.) agencies provided a formalized policy governing snowmobile use on public lands. It was also the first time that licensing of the vehicles was required. Since that time, snowmobiling has become a major wintertime activity.

Snowmobile registration in Minnesota, since 1967, has been growing rapidly at a rate of 82 percent annually. It is anticipated that snowmobile growth will continue for several more years but at a decreasing rate. The Minnesota Department of Economic Development anticipates a 60 percent increase in snowmobile production in Minnesota by the end of 1970.[1] This would result in employment in this industry in Minnesota of a total of 3,700 people, and (at an estimated average value of $1,200 per snowmobile) would result in $30-40 million in snowmobile retail business in the market area of these manufacturers during 1970.[2]

Outline of the Problems

The rapid phenomenal growth of the number of snowmobiles has forced many public agencies to take a second look at their current recreation programs insofar as they might accomodate this new activity. When snowmobile licensing began in 1967, 19,947 snowmobiles were registered. This has grown to 114,646 snowmobiles registered as of July 1970.[3] It is expected to reach an even higher figure with the increase in fall snowmobile sales. These snowmobiles will be registered for a period of three years as were those snowmobiles presently registered.

It was determined, by a legislative action, that the funds obtained from snowmobile registration would be used, in part, for the promotion and development of snowmobile facilities (such as cross-country trails, shelters and warming house, and also to provide information, in the form of maps and brochures, for the snowmobiler)[4] Such funds would be appropriated from the general fund into which snowmobile license revenue was deposited.

[1] *Minnesota Department of Economic Development "Minnesota's Snowmobile Industry - 1969-70", St. Paul, Minn., n.d. (Mimeograph)*
[2] *Ibid.*
[3] *Records of Minnesota Department of Conservation*
[4] *Minnesota Statutes (1967), I, 84.83.*

Since snowmobiling is a relatively new recreational activity, certain information is needed concerning the snowmobiler's use of his machine, preferences he may have and his attitude towards services and facilities that public agencies can provide to make snowmobiling a more enjoyable recreation activity.

Snowmobiling was not a foreseen activity dealt with in the 1965 Outdoor Recreation Plan. This activity came to light a few years later, in the 1968 Outdoor Recreation Plan, and the needs of this group quickly emerged.

In the late sixties, trails were opened and existing facilities were made available where there was little conflict over other uses. New areas were sought where trails could be built. Old roads, logging trails and abandoned railroad grades were converted to snowmobile trails. But this did not appear adequate in satisfying the demand for operating areas by the present numbers of snowmobiles. At the time, it already was apparent that we were behind in providing facilities for snowmobiling. The 1968 plan pointed this out.

It is believed that the snowmobile growth in Minnesota will continue, but at a decreasing rate than it has in the past. The greatest future demand for snowmobile facilities will probably continue to be within the seven counties of the Twin Cities Metropolitan Recreation Region 11, since approximately 60 percent of all snowmobile owners registered are located in this region. At the present time, 404.5 miles of public snowmobile trails exist within a 100 mile radius of the Twin Cities (all seven counties lie within this distance).

Objectives

To determine how to better administer the snowmobile program, the Minnesota Department of Conservation's Bureau of Planning completed a snowmobile survey designed to help identify the problems and solutions to them. The major objectives of the survey were:

1. Determine the amount of facilities needed to satisfy the needs of the snowmobilers both in the near future and by the year 1980.
2. Compare existing and projected demand with supply of trails.
3. Provide recommendations for the development of those types of snowmobile facilities preferred by snowmobilers.
4. Identify areas where the greatest need for these facilities exists.
5. Provide the resource administrator with information on the attitudes and opinions of snowmobile users which would be useful in future design of future programs dealing with this activity.

Relationship to the 1968 Minnesota Outdoor Recreation Plan

Snowmobiling, as a new sport in Minnesota, was considered in the demand survey conducted as part of the completion of the 1968 State Outdoor Recreation Plan. In this survey, it ranked eighth in popularity for both a weekday and weekend activity.[1] This ranking is rather significant considering that snowmobiling was unheard of a few years before and thusly did not appear in the 1962 ORRRC report. There are very good indications that snowmobiling will move up in the rankings of popular recreation activities at least in the northern states. The phenomenal increase in sales of snowmobiles in Minnesota as mentioned earlier tend to support this assumption.

The total number of miles of snowmobile trails in the state in 1967 was approximately 3,128 miles according to the Minnesota Outdoor Recreation Plan. This figure included both public and private facilities but did not distinguish between marked or unmarked, developed or undeveloped trails. Even so, as pointed out in the plan, there presently exists the need for developing more trails for snowmobiling especially in and nearer to the Metropolitan Recreation Region.[2]

[1] *Bureau of Planning, Minnesota Department of Conservation, Minnesota Outdoor Recreation Plan 1968 (St. Paul: Department of Conservation, June 1969), p. 101.*

[2] *Ibid, p. 102*

It was determined in the 1968 Plan that by 1980 Minnesota could have a deficiency of 1,930 miles of snowmobile trails. This is based upon projected demand for such activity and assuming no new trails were built. The plan indicated that little was then known about snowmobiles in general and particularly about those snowmobilers who operated on lakes, rivers and open farm lands.

The results of the present survey are expected to assist in the planning of new trail areas for snowmobiling, predicting areas of future demand and developing a method by which future information concerning snowmobiling can be obtained.

History of Snowmobiling in State

As mentioned earlier, snowmobilers came on the Minnesota scene in early 1960's. At that time, little was known about the potential of this vehicle and the economic and recreation impact it would have. To date, Minnesota, with over 150,000 snowmobiles owned by residents, ranks first in the nation in per capita ownership [1] and second only to Michigan in total registration of snowmobiles. [2]

One of the key reasons for this high per capita ownership is the fact that several snowmobile manufacturers exist within the state. The first manufacturer of snowmobiles in the United States started in northwestern Minnesota. Early employment figures showed this industry employing some 325 people. Now it employs almost 4,000 people and has contributed over $270 million to Minnesota's economy. [3] Thus the snowmobile industry plays and will undoubtedly continue to play an important role in Minnesota's economic growth and the development of means for greater recreational enjoyment of Minnesota winters.

Snowmobile Regulations

February 17, 1967 saw the first major steps taken towards the regulation of snowmobiling in Minnesota. [4] Prior to this date no provisions governing the activity, licensing or operation of the vehicle existed. It was at this time that Conservation leaders of Minnesota got together to determine snowmobilings place in providing recreational opportunities in Minnesota.

The first major legislation governing the registration of snowmobiles took effect on September 1, 1967, requiring the registration of all snowmobiles in the state. It required an $8.00 registration fee for a three year period. The fees collected were to be deposited to the general revenue fund with $150,000 appropriated for the biennium beginning July 1, 1967 for the promotion and development of recreational facilities for snowmobile uses. [5] This has since been amended by Minnesota Laws 1969 Chapter 695 to read that "fees from registration of snowmobiles shall be deposited with the state treasurer to the credit of the general revenue fund. [6] The 1969 legislative appropriated $825,000 for the 1971 Biennium to be used for the snowmobile facilities. [7]

These regulations also addressed themselves to the required age limitations for operators of the vehicles as well as areas where snowmobiles may and may not operate. In addition, the Commissioner of Conservation, charged with administration of this program, issued more specific rules and regulations relating to the above laws.

[1] *Minnesota Department of Economic Development, 1970 International Snowmobile Congress Proceedings, (St. Paul, Minnesota., 1970), p. 2*
[2] *Ibid., p.28*

[3] *Ibid., p. 2*
[4] *Ibid. p. 19*
[5] *Minnesota Statutes 1967 Vol. I, Section 84.83, p. 983.*
[6] *Laws of Minnesota 1969, Chapter 695 Section 5, p. 1187.*
[7] *Ibid., Chapter 1139, Section 38 p. 2444*

CHAPTER II

APPROACHING THE PROBLEM

A self administered mail questionnaire survey was chosen as the method by which snowmobile information would be obtained. This approach was chosen because:

1. It is relatively inexpensive as compared to the personal interview method, especially when a large sample is required.
2. The survey could be conducted during the off season (non-winter months) and by a relatively small number of staff personnel.
3. A questionnaire survey generally requires fewer skilled staff to administer than do personal interviews.
4. A questionnaire would enable the respondent to give additional thought to those questions which require recall and thus would allow him more time to answer such questions than would other methods.
5. The questionnaire survey can obtain information from people located in scattered geographical areas.
6. A questionnaire will bring in more returns per man hour of staff time than would a personal interview.

The most important disadvantage of using a questionnaire is the problem of low response rates. This could have considerable bearing on the final analysis since a low level of response may result in information not being truly representative of the universe of snowmobile registrants. However, the validity of the information depends on the variance in the data sought and the distribution of the respondents through the sample population. A five (5) per cent response could give representative information if the variance were low and those who did respond were representatives of the sample population.

Methodology

Because of the method by which snowmobile licenses were distributed, it was decided that a systematic sample would best provide a list of snowmobile registrants to be surveyed. This method of selecting the sample provided several advantages over a complete random sample; these are:

1. Drawing a systematic sample is easier and faster than drawing a complete random sample.
2. A systematic sample is easier to execute without mistakes. This allows for savings in time in that it can be done in the field or in the office.
3. A systematic sample is likely to be more precise than simple random sampling.
4. Systematic sample is spread more evenly over the population.[1]

A list of 114,646 snowmobile registrations was obtained from the License Center, Minnesota Department of Conservation. From this list, a sample of 10,000 snowmobile owners was drawn by recording every 10th name and address from the list.

Although the sample was selected by a systematic technique, the sample can be considered as being random because of the method by which the snowmobiles' owners were licensed.[2]

The License Center issues snowmobile licenses by consecutive numbers on a first come-first served basis. The applications are thus processed without any stratification or alphabetical listing of name, county, region, or area. The issuance of licenses are therefore random without a systematic distribution except by consecutive numbers. This, therefore, produces a random listing of snowmobile owners. Therefore, by selection of every 10th name, we maintain random selection. Further evidence of

[1] *Cochran, W. G., Sampling Techniques, (New York: John Wiley & Sons Inc., 1963), p. 206.*

[2] *Support for this assumption is found in the publication of selected papers by M. Jahoda, M. Deutsch, and Stuart W. Cook and others entitled Research Methods in Social Relations, Part 2 (New York: Holt, Rinehart and Winston, 1957, See Chapter by P.J. McCarthy "Sample Design" p. 691).*

this would involve comparing the numbers of survey forms returned to the number of forms distributed by region. Unfortunately, this information was not recorded and is therefore unavailable.

Sample

Of the 10,000 questionnaires sent to snowmobile owners, on April 4, 1970, 3,948 were returned by May 1, 1970 for a 39.5 percent response. These returns represent 3.4 percent of all snowmobiles registered in Minnesota. Approximately 30 percent of snowmobiles registered are in the Metropolitan Area, Recreation Region 11, (Appendix Table B-1). A further breakdown of snowmobile registration by county is illustrated in Figure 1.

There is approximately one (1) snowmobile for every thirty-three (33) people in the State of Minnesota, Appendix Table B-2. Recreation Region 1, (Northwestern Minnesota) has the highest snowmobile-per-population ownership with one (1) snowmobile for every 13.5 people in that region. Recreation Region 3 (Northeastern Minnesota) with one (1) snowmobile for every 14.3 people is second. Recreation Region 10 (Southeastern Minnesota) is the lowest with one (1) snowmobile for every 69.4 people. Availability of open areas and trails together with length of snow cover undoubtedly influence this distribution pattern.

Procedures

The survey questionnaires, returned via stamped and addressed envelopes, were accepted until May 1, 1970. Any questionnaires received after this date were not included in the tabulation of data or the interpretation of results. The primary reason for this short cut off date was the time constraint of coding and programming the questions for computer analysis. Each questionnaire (Appendix A) was reviewed and coded by personnel in the Bureau of Planning, Minnesota Department of Conservation.

Limitations

The survey technique used in this study is not without limitations. As previously mentioned, the selective sample as used in this survey was assumed to have obtained a random sample of all snowmobiles registered. This assumption was supported by the percentage of survey questionnaires returned as compared to the number of snowmobiles registered in each recreation region, Table B-1. The returns per recreation region were within .9 percent of each other. This assumption would have been more valid if the number of questionnaires sent to each county had been recorded. This would have provided a more accurate distribution percentage to determine the randomness of the survey.

Another limitation, and perhaps the most significant is the fact that the results may be biased due to non response. It has been frequently shown that non-respondents tend to differ significantly from those who respond, and as a recent report points out, "The greater the proportion of non-respondents and the greater the extent to which non-respondents differ from those who did respond, the larger will be the bias from non-response."[1] However, it would only be possible to determine if bias actually occurred in this survey by interviewing a sample of non-respondents.

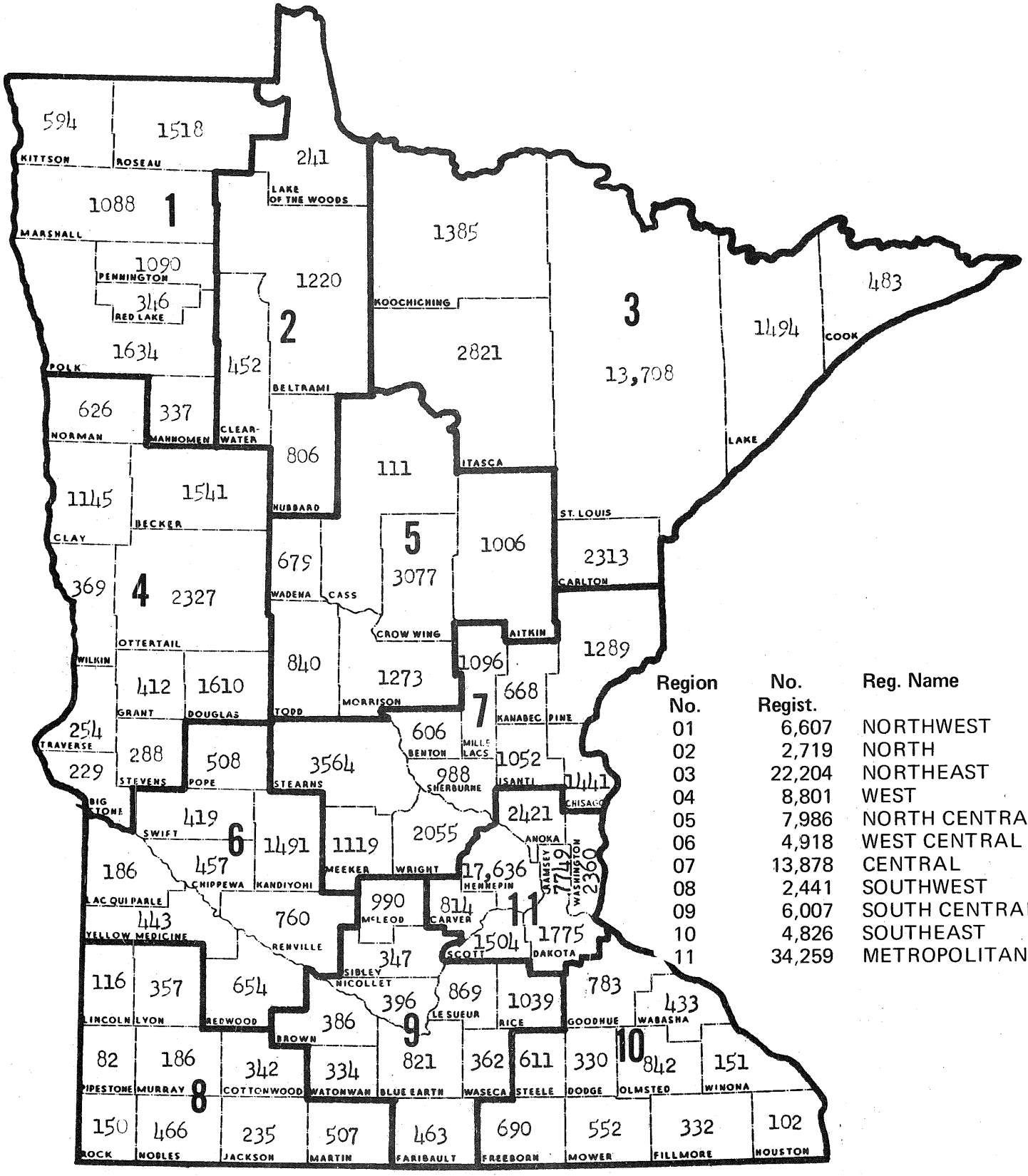
Non-response occurs for various reasons. Individuals may view survey research as an invasion of privacy and therefore will not complete or return a questionnaire.[2]

The problems of non-response can be handled in several ways. The first method is by developing a questionnaire which will motivate the potential respondent to answer the survey questions.

After the questionnaire has been returned and the maximum percentage of initial response is in, efforts must be made to induce the non-respondents to answer. A follow-up, or a series of follow-ups is designed to reduce the percentage of non-response and eliminate bias. However, follow-ups are difficult

[1] *Douglas Crapo and Micheal Chubb, Recreation Area Day - Use Investigation Techniques: Part I A Study of Survey Methodology (East Lansing, Michigan: Recreation Research and Planning Unit, Michigan State University 1969), p. 27.*

[2] *Stanley D. Bachrack and Harry M. Scoble, "Mail Questionnaire Efficiency: Controlled Reduction of Non-Response," Public Opinion Quarterly, Volume 31 (January, 1967), p. 267.*



Region No.	No. Regist.	Reg. Name
01	6,607	NORTHWEST
02	2,719	NORTH
03	22,204	NORTHEAST
04	8,801	WEST
05	7,986	NORTH CENTRAL
06	4,918	WEST CENTRAL
07	13,878	CENTRAL
08	2,441	SOUTHWEST
09	6,007	SOUTH CENTRAL
10	4,826	SOUTHEAST
11	34,259	METROPOLITAN

FIGURE 1

Snowmobile Registrations Per County And Recreation Regions, As of July 1970.

to administer, expensive and time consuming but necessary. Due to the difficulties associated with follow-ups, these were not included as tools for this survey.

Thus, results from this survey, with a 40 percent response, can be said to represent the needs of those snowmobilers who are similar to the respondents who returned the survey forms. The results obtained from this survey should be used as a guide in the planning facilities to accommodate and cater to the needs of these snowmobile respondents until further information becomes available.

Other Studies

Snowmobiling, being relatively new in the recreation picture, is just starting to receive attention by the academic community as well as respective public agencies concerned with recreation planning. Many states are now aware of the possibilities of snowmobiling for winter recreation and the impact this activity is having on the environment. Many states have started, or are planning to start programs to measure this impact.

The State of Michigan, in conjunction with Recreation Research and Planning Unit at Michigan State University, is presently conducting an indepth study of snowmobile use in that state. This is a very detailed study designed to determine the needs of Michigan snowmobilers. The survey is very similar to the Minnesota Study except that indepth information concerning the social and economic characteristics of Michigan snowmobilers are also sought. The results of the Michigan survey should be available in the near future.

The economic impact of snowmobiling is an area being investigated by the Minnesota Department of Economic Development. Predictions of future snowmobile sales and the impact of this will have on Minnesota's economy is a primary concern of this agency.

The impact of snowmobiling on the ecology of northern Minnesota will be the subject of a two year study to be conducted by Bemidji State College. The objectives of this study are to determine if snowmobile usage affects wildlife populations; if snowmobile use changes the structure composition and vegetative cover of plant communities; the effect of the machine on deer activity in yarding areas and other effects on the quality of the physical environment.

The private sectors are also keenly aware of the snowmobile impact. Industries conduct market analysis to determine the acceptance of their products.

Private snowmobile clubs and magazines are also conducting limited surveys to find out the needs and opinions of their supporters. This private sector is very concerned and is very active in citing the needs and opinions in their periodicals.

However, more and better information is continually needed by public agencies to adequately plan for the recreation facilities needed by snowmobilers. This information should be obtained from those institutions most capable of conducting such investigations namely, the academic institutions, the research sections of public agencies, and by private consultants who have demonstrated their capabilities in such investigations.

CHAPTER III

ASSEMBLED DATA

The assembling of snowmobile data began in early June 1970. The following presentation of data will take the form of figures and tables with descriptive analysis of each significant section.

Snowmobile Operation

One of the questions in the survey was concerned with the total number of days and hours snowmobiles were operated during the 1969-70 Season (Appendix A). Table I illustrates the cumulative days and hours of snowmobile operation in the state (for those snowmobilers surveyed). The table shows that 47 percent of snowmobile operations occurs on the two weekend days and the remaining 53 percent is spread over the remaining five weekdays. This indicates that twice as much snowmobiling occurs on any one weekend day than occurs on any one weekday. Therefore, in determining an index coefficient for peak operating time, the days and hours of weekend operation will be used.

Average Weekend Day

The amount of snowmobile use on an average weekend day (Awd) was determined as follows:

1. Total number snowmobile days which took place on Saturdays and Sundays snowmobiled (T), from the survey forms returned. T = 97,142

2. Total number of Saturdays and Sundays in the snowmobile season. (Ts) Ts = 44

3. Coefficient (Ce) used to expand statistics from sample to universe. Total number of snowmobiles registered divided by total number of survey forms returned. Ce = 29

TABLE I

Snowmobile Operation Shown in Terms of Cumulative Days (col. 2, 3, 5), Hours (col. 4 and 6) of Operation and Percent of Operation Occuring During Darkness by Recreation Region 1.

REGION	Sat.	Sun.	Hours of Operation	Number of Weekdays Used	Hours of Operation	Average % of Operation After Dark
1	2	3	4	5	6	7
1	2,968	3,257	22,843	7,392	21,130	28
2	1,341	1,497	11,903	3,055	10,590	26
3	8,657	8,699	73,705	19,980	60,898	22
4	3,938	4,108	28,628	7,942	29,325	21
5	3,266	3,675	27,927	9,204	26,372	24
6	1,965	2,175	15,485	5,437	13,908	31
7	5,225	5,595	42,853	12,779	34,263	29
8	820	961	5,961	2,355	6,424	25
9	2,982	3,067	23,303	5,254	17,809	30
10	2,201	2,347	19,403	5,499	15,895	35
11	13,947	14,451	119,193	28,589	82,530	30
Totals	47,310	49,832	391,202	107,487	319,144	28
%	47			53		

[1] *Figures recorded in table are based on recall of snowmobilers surveyed during the 1969-70 snowmobile season.*

4. Average use on one weekend day for sample equals Awds = $\frac{T}{Ts} = \frac{97,142}{44}$ = 2,208 snowmobile days.

5. Average use on one weekend day for total snowmobiles registered equals:

   Awd = Awds x Ce
   = 2,208 x 29
   = 64,118 snowmobiles per average weekend day divided by 114,646 snowmobiles registered and multiplied by 100.
   = 56% of the snowmobiles registered.

The average weekend day use coefficient (.56) indicates that on average weekend day, during the snowmobile season, there will be approximately 56 percent of all registered snowmobiles out using various facilities throughout the state.

This coefficient will be used later in this report to determine the number of snowmobilers using trail facilities.

Average Hours of Operation

It was calculated that a typical snowmobiler operates his machine an average of 4.02 hours per weekend day outing and an average of 2.96 hours per weekday outing. These values were determined by using the data recorded in Table I as follows:

Average number of hours of snowmobile operation

1. Weekend day
   Total number of hours operated on weekend by all respondents in the sample divided by total number of user days on Saturdays and Sundays snowmobiled during snowmobile season by respondents in the sample.

   $\frac{391,202 \text{ hrs.}}{97,142 \text{ weekend days}}$ = 4.02 hrs./weekend day

2. Weekday
   Total number of hours operated during week by all the respondents in the sample divided by total number of user days on weekdays in snowmobile season by respondents in the sample.

   $\frac{319,144 \text{ hrs.}}{107,487 \text{ weekday}}$ = 2.96 hrs./weekday

Snowmobiling After Dark

Twenty-eight (28) percent of the total amount of time spent snowmobiling occurred after dark (Table I). Region 10 (Southeast) had the highest percentage of evening snowmobiling with 35 percent, while Region 4 (West) had the lowest percentage of evening snowmobiling with 21 percent.

These figures, as are those of total hours of snowmobile operation, are based on estimates made by those snowmobilers surveyed. These must be viewed in such a manner as to recognize that they were based on recall and are subject to human error.

Snowmobile Use

Approximately 86.8 percent of snowmobilers remain in their home county to snowmobile (Table 2). Of the 3,948 snowmobile owners sampled, 13.4 percent indicated they snowmobiled in areas in other counties. Thirty-two (32) percent of the snowmobilers in Region 11 snowmobile in counties other than their home county.

TABLE 2

Destination Areas Used by the Snowmobilers Surveyed
(Weekday and weekend days).

Region	Respondents Home County	Reporting Use of Other Counties	Total Respondents
1	228	16	244
2	120	7	127
3	651	41	692
4	303	14	317
5	278	12	290
6	165	3	168
7	393	34	427
8	70	8	78
9	234	9	243
10	173	9	182
11	803	375	1,180
Totals	3,420	528	3,948
%	86.6	13.4	

Of these 375 snowmobilers in Region 11 who operate their machines in other counties, 292 of these snowmobilers go out of Region 11 to other regions offering facilities for their use. Expanding these figures to include all snowmobiles out on an average weekend day, if can be seen that the majority of snowmobilers, from Recreation Region 11 going out of the region, travel north to operate their machines, see Figure 2 .

It can be seen that five (5) northern counties, St. Louis, Cass, Crow Wing, Aitkin and Pine, receive 46 percent of Region 11 snowmobilers going out of Region 11. These counties are perhaps the most endowed areas of aesthetic resources in the state. It is possible that a large portion of these snowmobilers own seasonal homes in those counties, which may explain their popularity. However, such assumption cannot be supported with present information.

Places of Snowmobile Operation

In order to determine the extent which snowmobiling occured on public lands vs. private lands, lakes, etc., snowmobile owners were asked where they operated their snowmobiles most of the time. (See Question D, Appendix A). It was found that on a statewide average, 49 percent of snowmobilers used their own or other private property, while 20 percent used lakes and rivers. The remaining 27 percent used public lands (Table 3). However, from Appendix Table B-3 it can be noted that these figures vary significantly. In Region 3, over 50 percent of snowmobilers used the public lands while Region 2 has approximately 43 percent of the snowmobilers using public lands. These two regions have very large areas of public lands which accounts for this high percentage of use. The opposite is true for Region 9 which has very little public land. Here only 12 percent of snowmobilers used public lands while 71 percent takes place on snowmobilers own or other private lands. In areas where various other choices are available, snowmobiling tends to decrease on privately owned lands and significantly increase on public lands or on lakes and rivers.

TABLE 3

Areas of Snowmobile Operation, by Percentage of Use.

Property (Own and Private)	Public Lands	Lakes and Rivers	Other
49%	27%	20%	4%

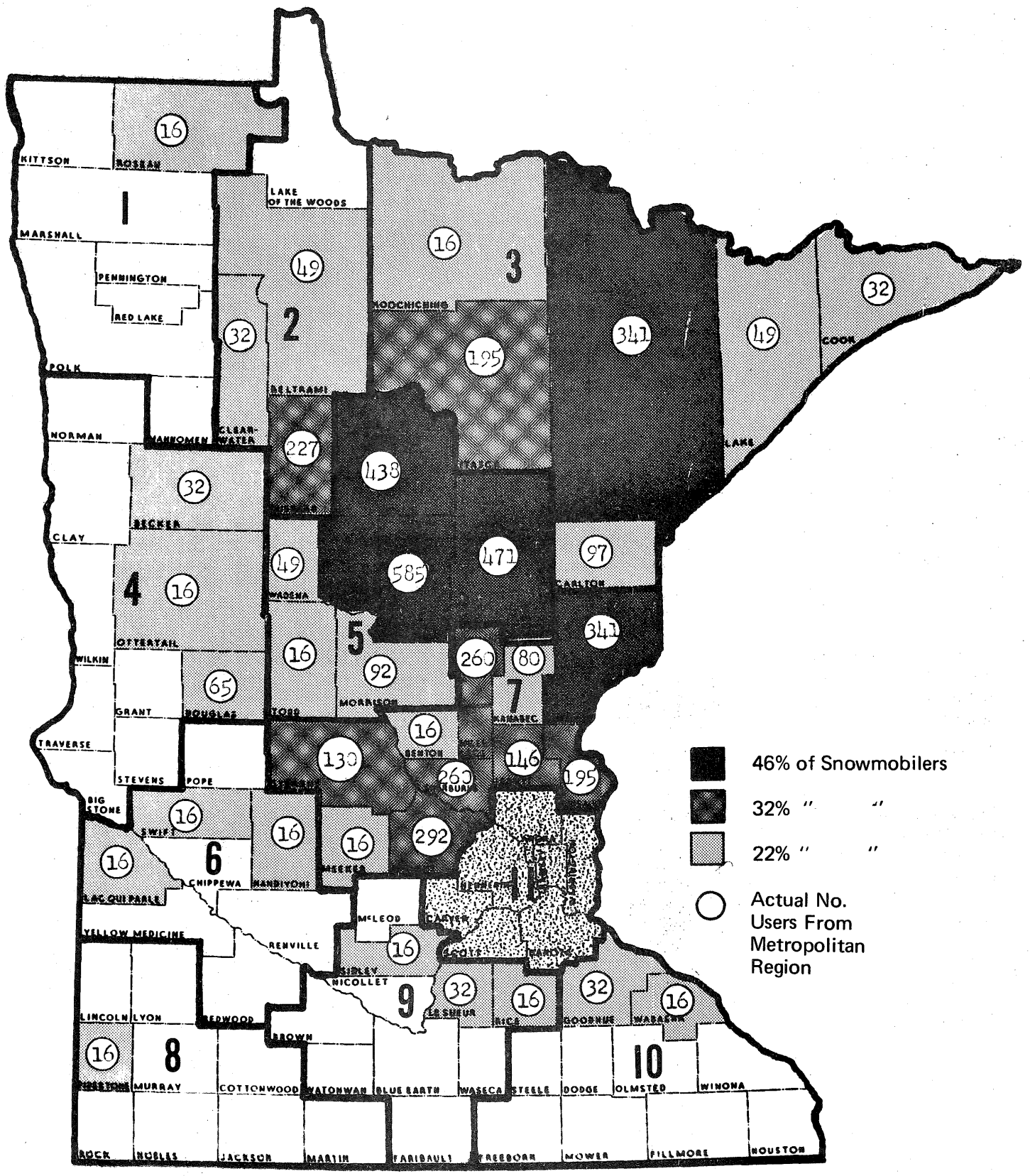


FIGURE 2

Destination Counties of Snowmobilers Originating From Region 11
(Total No. of snowmobilers originating from Recreation Region 11 per avg. weekend day equals 4,742)

Facilities Used and Preferred by Snowmobilers

Snowmobilers were asked the type of facility they most often used as well as what they most preferred. It was found that most snowmobilers, 62 percent, used cross country trails while the remaining 38 percent used large open areas (See Figure 3). However, the respondents preferences for various types of facilities were significantly different as can be seen in Figure 3.

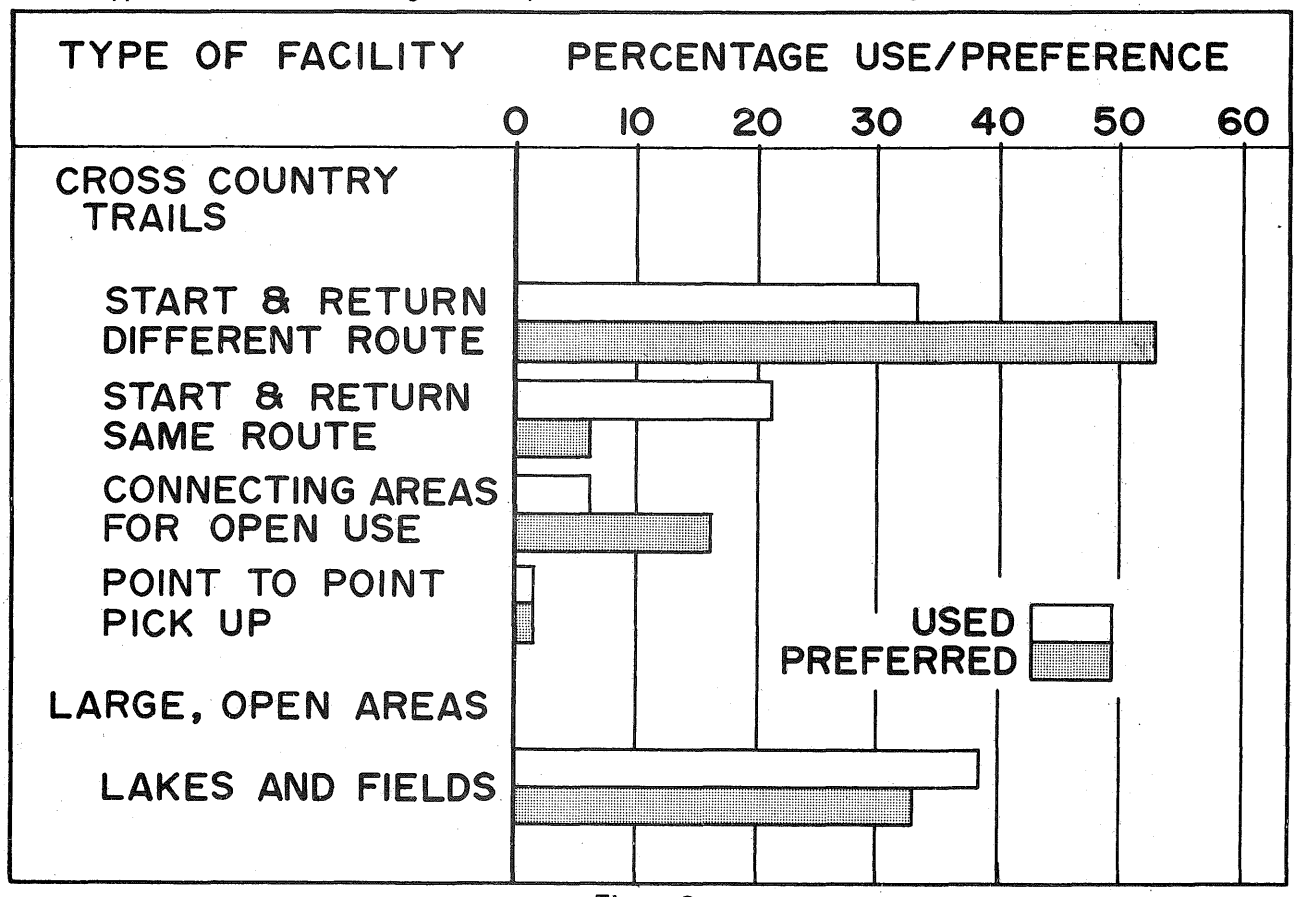


Figure 3
Snowmobile Facilities Used and Preferred By Snowmobilers
Expressed In Percentages of Total 3,948 Snowmobilers

The preference for cross country trails, in general, increased by 13 percent. Specifically, there was a 20 percent rise in the preference of cross country trails returning via a different route and a 10 percent increase in the preference for connected areas for open use.

Since most of the cross country trail facilities are on public lands such as state parks, state forests, and federal lands, more in depth analysis is warranted. First of all, there presently exists approximately 2,528 miles of public snowmobile trails in Minnesota (See Appendix B-4). the greatest number of trails exist within the state forests. Region 3 is endowed with the greatest number of miles of snowmobile trails with 1,185.75 miles, nearly one half of the total for the state. A further breakdown of snowmobile trail mileage by county is seen in Figure 4. St. Louis County has the largest amount of snowmobile trail miles in the state on per county basis.

Public Land Facilities

Responses from snowmobilers who used public land facilities for snowmobiling were separated from the rest of the responses and analysed separately to determine if any significant differences existed between those who used certain facilities. It was found that a difference did occur between facilities used and facilities preferred. These differences also existed between the users of the state parks, forests and federal lands (see Table 4).

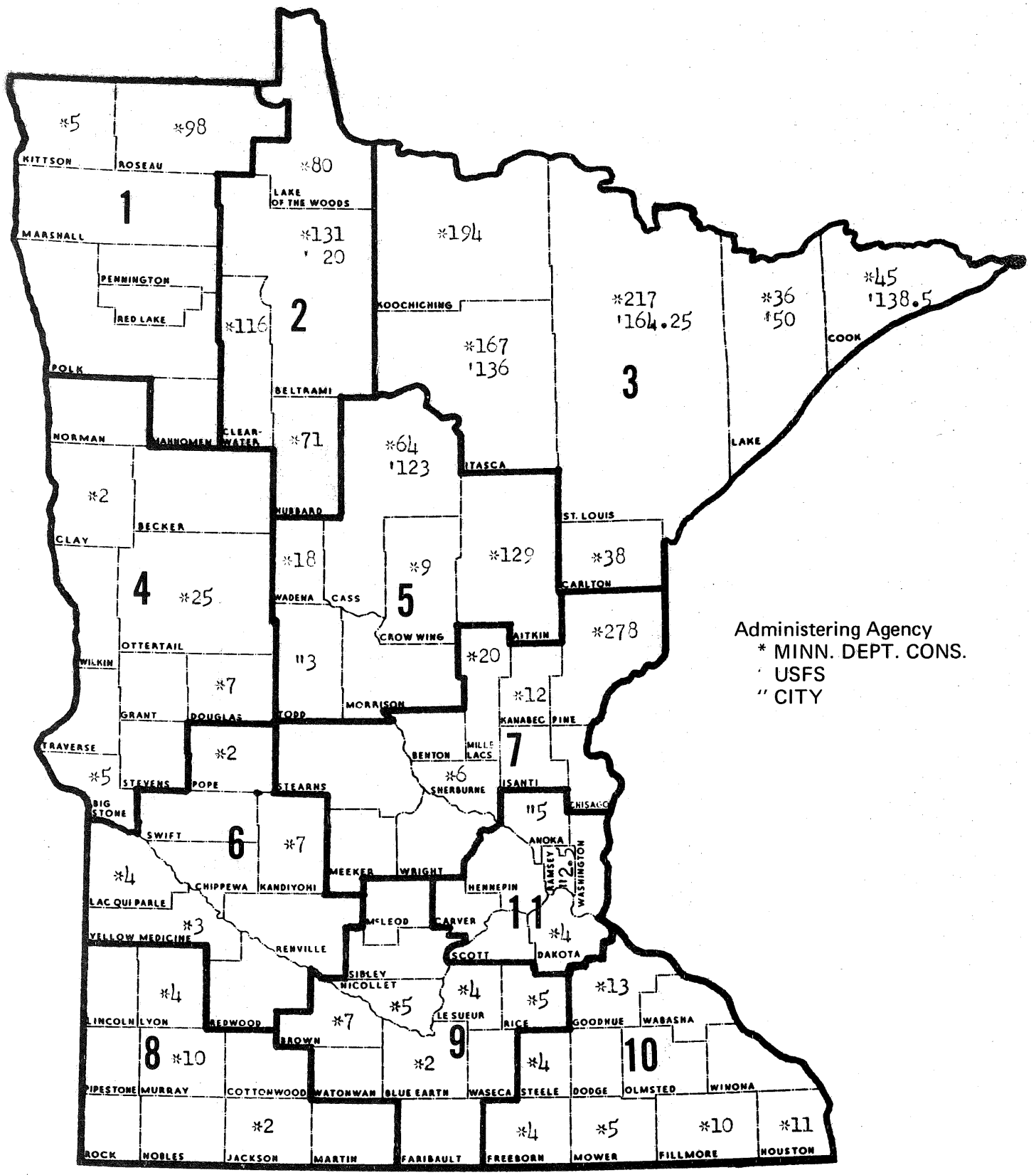


FIGURE 4

Miles Of Public Cross Country Snowmobile Trails By County

TABLE 4

Percentages of
Facilities Used and Preferred by Snowmobilers Who Operate on Public Lands

Facility	Cross Country Trails								Large Open Areas		No Response	
	Start & return via				Point to Point Pick-up		Connecting Areas for Open Use					
	Same Route		Different Route									
	Used	Preferred	Used	Preferred	Used	Preferred	Used	Preferred	Used	Preferred	Used	Preferred
State Parks	23.2%	5.8%	47.8%	68.8%	1.4%	.7%	8.7%	15.2%	17.2%	15.2%	1.4%	2.1%
State Forests	27.0	5.9	47.0	63.7	.6	1.4	10.0	17.3	14.0	11.2	.6	.4
Federal Lands	18.3	3.9	50.0	82.6	.6	2.9	10.6	21.0	20.0	18.1	.6	.6

Percentages are expressed for each area on the basis of answers from 138 snowmobilers using state parks, 490 snowmobilers using state forests and 180 snowmobilers using federal lands.

Most of the increase in preferred facilities was for cross country trails, return via different route (20-30 percent increases noted) and connecting areas for open use (8-10 percent increases noted). Snowmobilers who used large open areas within boundaries of public lands generally preferred these facilities. There was only a 2-3 percent decrease between used and preferred facilities.

Snowmobilers for Recreation Region 11 were analysed separately to determine the cross country trail facilities they preferred. Over 65 percent of the trail users preferred trails that start and return via different routes, (See Table 5).

TABLE 5

No. of Metro Region (11) Snowmobilers (who Snowmobile on Cross Country Trails)
Preferring Various Types of Facilities

	Type of Facility Preferred				
County	Cross country trails start and return		Connecting areas for open use	Large Open Areas (lakes, fields)	Totals
	Same Route	Dif. route			
Anoka	7	64	14	7	92
Carver	2	9	4	2	17
Dakota	5	31	13	2	51
Hennepin	11	74	22	4	111
Ramsey	3	44	13	6	66
Scott	1	10	4	1	16
Washington	4	27	9	3	43
Totals	33	259	79	25	396
%	8.4	65.4	19.9	6.3	

Marked Trails

An analysis was made of those cross country trails snowmobilers using public lands to determine the need for marked trails. It was found, that an average of 70.1 snowmobilers preferred marked trails over unmarked trails (See Table 6).

TABLE 6

Percent of Snowmobilers Preferring Marked and Unmarked Trails by Type of Facility Used

Facility	Marked Trails	Unmarked Trails	No Reponse	No. of Responses
State Parks	79.5%	18.9%	1.6%	122
State Forests	70.5	26.8	2.7	410
Fed. Lands	60.4	38.2	1.4	144
Average	70.1	28.0	1.9	

As can be seen in the table, almost 80 percent of the snowmobilers who use cross country trails in state parks prefer marked trails. The preference for marked trails is somewhat less for users of state forests and federal lands.

Additional Trail Needs

An analysis of the necessity for additional marked trails by cross country trail users within counties they snowmobile in was conducted. More than 67 percent of cross country trail snowmobilers indicated that more marked trails are needed in the counties they snowmobile in (See Table 7). As seen in the table, percentages vary within different regions.

TABLE 7

Percent of Snowmobilers Indicating Marked Trail Needs in Counties They Snowmobile in.

Region	Marked Trails Needed	Not Needed	No Response
1	58.8	39.0	2.2
2	64.8	35.2	
3	76.8	21.3	2.9
4	70.0	28.8	1.2
5	65.1	33.3	1.6
6	66.6	32.2	1.2
7	65.4	31.0	3.6
8	71.7	28.3	
9	67.6	29.4	3.0
10	61.0	36.4	2.6
11	64.2	31.9	3.9
Average	67.4	30.1	2.5

Shelters and Warming Houses

Most snowmobilers, as can be seen in Table 8, using facilities on public lands do not believe that shelters and warming houses are necessary (by approximately a three to one ratio). A higher percentage of state park snowmobilers believe shelters and warming houses are needed than do the state forest or federal lands snowmobilers.

TABLE 8

Percent of Snowmobiles Indicating Whether Shelters and Warming Houses are Needed or Not Needed by Facility.

Facility	Needed	Not Needed	No Response	No. of Responses
State Parks	41.0	57.1	1.8	122
State Forests	23.7	75.1	1.2	410
Federal Lands	18.8	79.9	1.4	144
Average	25.5	73.1	1.5	

These figures seem to indicate that the snowmobilers who use federal lands are more adventurous and do not demand more elaborate facilities as do users of state parks. They appear to be more of an outdoors "roughing it" type sportsman.

Snowmobile Trail Maps

One of the specific areas the Minnesota Conservation Department is concerned with is the need for providing trail maps to snowmobilers. Some of the reasons for supplying maps of snowmobile trails in the past were to:

1. Inform the snowmobiler of the existence of trails.
2. Show the layout of the trail and the county it traverses.
3. Provide for the safety of the snowmobiler by reducing the chances of getting lost or travelling through unsafe areas (spring fed lakes and streams).

To determine the importance of maps for snowmobiling, the snowmobilers surveyed were asked how important maps were to them for new trails (See Question O, Appendix A). Approximately 27 percent indicated they were necessary while only 16 percent said they were unnecessary.

A breakdown by region of the responses concerning the necessity of trail maps, is shown in Table 9. The most significant portion of this table is the 55 percent total average of snowmobilers who

TABLE 9

Percent of Cross Country Trail Users, by Region, Who Feel Maps are Necessary.

Region	Necessary	Nice	Not Necessary	No Response
1	20.5	50.0	25.7	3.8
2	27.4	56.0	16.6	
3	32.0	53.7	13.2	1.1
4	24.7	52.9	17.6	4.7
5	22.3	58.7	16.9	2.1
6	21.8	66.7	10.4	1.1
7	25.1	59.5	13.1	2.3
8	10.3	61.5	28.2	
9	18.7	53.2	24.4	3.7
10	17.0	55.0	26.2	1.8
11	30.6	53.1	14.7	1.6
Average	26.6	55.1	16.4	1.9

answered that maps are nice. This answer, unfortunately, does not allow us to interpret the actual importance of trail maps. If this answer were not considered, we would have a 2.5 to 1 ratio of

snowmobilers believing that maps were more necessary than unnecessary. However, this cannot be done because a statistically sound conclusion cannot be drawn if this answer were disregarded.

Since a majority of snowmobilers who use cross country trails operate on public lands, a correlation was run for this group on how important maps were to them. More than three times as many snowmobilers who use state forests believed that maps were more necessary than not necessary, and for state parks almost four times as many snowmobilers felt they were necessary (See Table 10). However, there was a significant percent of snowmobilers who felt that maps were nice but this does not allow us to make additional assumptions as to whether maps may be more necessary than not necessary for this group.

TABLE 10

Percent of Cross Country Trail Snowmobilers, Using Public Lands, Who Feel Maps are Necessary

Agency	Necessary	Nice	Not Necessary	No Response
State Forest	35.4	52.0	11.5	3.6
State Parks	37.7	52.5	9.9	0
Fed. Lands	22.2	59.7	17.4	.7
Average	32.8	54.8	13.0	1.4

Drivers Under Sixteen Operating Snowmobiles

Snowmobiling has evolved into an activity in which the entire family can participate. Minnesota law requires that persons under 16 years of age must complete a special snowmobile safety program before they can operate snowmobiles over portions of state lands (roads). A significant increase in numbers of youngsters operating snowmobiles has prompted the Conservation Department into investigating the extent to which this occurs.

Question K, Appendix A was designed to obtain information concerning the use of snowmobiles by youngsters under 16. It was found that 49 percent of respondents had drivers under 16 operating their machines (See Table 11). Nearly one-third of these snowmobilers had two or more young drivers operating their machines.

TABLE 11

Percentage of Respondents Sampled That Let Drivers Under 16 Operate Their Snowmobiles

Number of Drivers Under 16	Percent of Respondents
0	51
1	20
2	16
3	8
4	4
5	1

Parking On Public Lands

Concern over the adequacy of parking facilities at snowmobile unloading sites has prompted the Conservation Department to inquire if snowmobilers experience any parking difficulties at areas in which they snowmobile. Primary concern was for those snowmobilers who operate on state forest lands and on federal lands. It was found that approximately 70 percent of the snowmobilers did not experience any difficulty in parking at unloading sites (See Table 12).

TABLE 12

Percent of Snowmobilers, Using Public Lands, Who Experienced Parking Difficulty at Unloading Sites.

Area	Difficulty Experienced	No Difficulty Experienced	No Response
State Forests	21.4%	72.4%	6.1%
Federal Lands	19.4	67.2	13.3
Average	20.4	69.8	9.7

Distance Snowmobilers Travel to Facilities

Snowmobilers were questioned concerning the distances they would travel to their snowmobile areas. The responses were divided into two groups; responses from those who preferred to operate on cross country trails, and responses from those snowmobilers who preferred to operate on large open areas.

Cross Country Trail Snowmobilers

It was found that approximately 79.8 percent of these snowmobilers preferred to remain within 50 miles of home on one day trips. However, on weekend trips, only 28 percent preferred to remain within 50 miles while 58 percent were willing to travel over 50 miles to their snowmobile areas (See Table 13) and also 35 percent were willing to travel over 100 miles.

TABLE 13

Percentage of Snowmobilers, Who Prefer to Use Cross Country Trails, Who are Willing to Travel Given Distance for One Day and Weekend Snowmobiling Opportunities*

Distance	One Day Trip	Weekend Trip
Under 25 miles	41.5%	12.9%
25 to 50 miles	38.3	15.1
50 to 100 miles	14.1	22.9
Over 100 miles	3.6	35.2

**Percentages do not equal 100 due to some non-response.*

Large Open Area Snowmobilers

It was found that approximately 80 percent of these snowmobilers preferred to remain within 50 miles of home for one day trips to snowmobile (See Table 14). This was the same percentage as cross country users.

TABLE 14

Percentage of Snowmobilers Who Prefer to Operate on Large Open Areas Who Are Willing to Travel Given Distances for One Day and Weekend Snowmobiling Opportunities.*

Distance	One Day Trips	Weekend Trips
Under 25 miles	60.1%	32.4%
25 to 50 miles	19.4	10.3
50 to 100 miles	9.5	19.0
Over 100 miles	4.0	28.9

** Total percentages do not equal 100 due to non-response.*

However, for weekend trips, 43 percent preferred to remain within 50 miles of home while 48 percent would go over 50 miles. This is 10 percent less than those who use cross country trails.

This indicates that cross country trail snowmobilers are willing to travel greater distances during the weekends to get to their areas then are large open area snowmobilers.

Recreation Region 11 Snowmobilers

A further breakdown on a regional basis was done for snowmobilers from the Metropolitan Region (11). It was found that individual counties differed significantly in the distances these snowmobilers would go to snowmobile on cross country trails. The following (Table 15) illustrates these differences.

TABLE 15

Percentages of Metropolitan Region Snowmobilers, Who Use Cross Country Trails, Willing to Travel Given Distances to Snowmobile Areas for One Day and Weekend Snowmobiling Opportunities

	One Day		Weekend	
County	Up to 50 miles	Over 50 miles	Up to 50 miles	Over 50 miles
Anoka	81	19	52	48
Carver	91	9	72	28
Dakota	58	42	44	56
Hennepin	77	23	53	47
Ramsey	61	39	73	27
Scott	90	10	84	16
Washington	88	12	66	34

It can be seen that these snowmobilers are also willing to go longer distances on weekends to operate their machines than they are for one day trips. The differences that exist between individual counties may be due to various factors such as amount of snowmobiling opportunities available to these snowmobilers within their own counties, or possibly the differences in socio-economic characteristics. However, this study does not provide enough data to make any further evaluations regarding these differences possible.

Miles of Cross Country Trails

The miles of cross country trail facilities available throughout the state varies significantly. Appendix Table B-5 illustrates the amount of snowmobilers per mile of existing public trails within regions. It can be seen that many regions have trails which are very heavily used.

Table B-5 uses the standard of 16 snowmobilers per mile of trail per day (Appendix C), along with the existing miles of trails per region and amount of cross country trail users operating on an average weekend day to determine overcrowding conditions and trail needs. Deficiencies in miles of trails to meet present demand for four recreation regions are as follows:

Recreation Region 1 - 77 miles.
Recreation Region 4 - 205 miles.
Recreation Region 6 - 104 miles.
Recreation Region 8 - 41 miles.

Recreation Regions 7, 9, 10, and 11 lie mostly within a 100 mile radius of the Twin Cities Metropolitan Area and therefore will be treated separately in this section. The remaining three Recreation Regions 2, 3, and 5 appear to have an adequate supply of cross country trails at this time. This is supported in Appendix Table B-5 in that three regions in comparison to the other eight have less snowmobiles per mile of trail. These regions are well beyond the distances snowmobilers from the Twin Cities metropolitan area are willing to go, Table 13.

The requirements for Region 11 are significantly higher than the other regions. Presently we have an over crowded condition existing in Region 11 where 946.9 snowmobilers per mile of snowmobile trail exists for an average weekend day. The present number of public cross country snowmobile trails within Region 11 totals 11.5 miles. It would require the addition of 670 miles of new trails in Region 11 to bring Region 11 up to the present standards. Due to land prices and amount of open space available, this figure does not appear practical. However, a concentrated effort should be made to satisfy the needs for providing snowmobile trails within 100 miles of the Metro Region (Appendix Table B-6).

A three fold increase in the miles of cross country snowmobile trails is needed within 100 miles of the Twin Cities. This would require an addition of 1,213.5 miles of new trails. Although most of the public land available for this expansion lies in Region 7, the biggest needs are in Regions 6, 9, 10, and 11. Of these four regions, Region 10, in terms of public land available, is perhaps the most desirable region for providing new trails.

However, in providing new trails for the major portion of snowmobilers out on the average weekend day, consideration must be given to areas where the length of snowmobile season will be the longest. In other words, Region 7 has an average of 10-20 more days more snow cover than Region 10.[1] It would, therefore, seem more practical to provide these trails for snowmobiling in Region 7.

Resources Available

At present time we have 20 state parks and 5 major state forests within the 100 mile radius of the Twin Cities. The majority of state parks are of insufficient size to provide adequate lengths of cross country trails to meet the necessary needs.

Many of these parks are south of the Twin Cities and not located in the direction snowmobilers choose to go for their trip nor in areas having reliable snow cover. (Refer to Figure 2 of snowmobile destination counties for Twin Cities snowmobilers).

The St. Croix, Chengwatana, Sand Dunes, Rum River and Nemadji State Forests are the five forests of sufficient size to provide adequate length trails. Solana State Forest is a possibility, but the Minnesota Memorial Hardwood State Forest, because of the lack of fee ownership land within its boundaries, does not yet provide sufficient contiguous lands for snowmobile trails. Other resources include the proposed St. Croix, Minnesota River and Rum River trails.

Primary Use of Snowmobile

Approximately 88 percent of snowmobilers surveyed stated that the primary use of their snowmobile was for pleasure riding. Nine (9) percent used their vehicle primarily in conjunction with other sports (fishing, etc.). Only 2 percent of the snowmobilers use their snowmobile for work and only 1 percent use their snowmobiles for racing.

[1] *John R. Borchert and Donald P. Yaeger, Atlas of Minnesota Resources and Settlement, (Minneapolis: Department of Geography, University of Minnesota 1968), p. 18.*

CHAPTER IV

RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Types of Trails

The majority of snowmobilers surveyed, 75 percent, prefer to use cross country trails even though only 61 percent presently use this type of facility. As seen in Figure 3, two types of cross country trails are the most popular for snowmobiling the cross country return via different route trails and the connecting areas for open use. The former being more popular than the latter. We recommend that the development of future trails be designed to allow the snowmobiler to start at one point on a cross country trail and return to same point via a different route.

Length of Trails

In the planning of future trails, consideration should be given for the development of the type of trails which are the most popular. The length of these trails should also be considered. As mentioned in a previous chapter, the average snowmobiler spends approximately 4 hours snowmobiling per weekend day trip. Therefore, we recommend that most trails be designed so they can be travelled in less than 4 hours.

Marked Trails

The need for more marked cross country trails was expressed by 67 percent of the cross country trail users, Table 7. It can be seen in this table, and Appendix Table B-5 that trail-using snowmobilers in regions with adequate miles of trails believe that more marked trails are needed in their area. This high demand may indicate that the trails in these regions are not adequately marked or users do not know of the existence of marked trails in their region. The State Park snowmobilers who use cross country trails expressed the greatest need for marked trails (See Table 6).

We recommend that all snowmobile registrants be given or sent the Minnesota Snowmobile Guide when applying for a license. This would ensure that all snowmobilers have the opportunity to learn the location of public cross country trails in the state. Secondly, we recommend that all new trails be marked and that those state trails presently unmarked be marked in the near future.

Maps

The majority of snowmobilers using cross country trails, (more than a 2:1 ratio) stated maps were more necessary than not necessary (See Table 9). Unfortunately the survey's multiple choice question offered the choice of "nice" also which was chosen by a large number of respondents. It is regrettable that this choice was included in the question for it does not allow us to draw a decisive conclusion on the need for maps unless this group is disregarded. However, based on those who chose to give the decisive answers that they were either necessary or not necessary, it would appear that trail maps are needed for snowmobiling.

We recommend that maps of snowmobile trails continue to be made available until such time that a more indepth survey might show otherwise.

Shelters and Warming Houses

Shelters and warming houses were found to be not needed by many snowmobilers. Seventy-three (73) percent of the snowmobilers using cross country trails indicated that shelters were not needed. However, a large portion (41 percent) of cross country snowmobilers who use state parks indicated that shelters are needed; see Table 8. These snowmobilers have had these facilities available to them in the past and this is probably why they feel they are necessary. On the other hand, 75 percent of state forest users believe these facilities are not necessary.

We recommend that shelters continue to be made available to snowmobilers who use state parks. We also recommend that some shelters be made available in state forests although not on the scale of those in state parks. Evaluation on the need for shelters in our forests should be made on the individual state forest basis.

Parking Facilities

The Division of Lands and Forests is interested in any difficulty snowmobilers may have had in finding parking space at the unloading sites at trail heads in State Forests. Approximately seventy-two (72) percent who used state forests indicated that they did not experience any difficulty in parking. Twenty-one (21) percent who used state forests did experience difficulty in parking.

We recommend that parking areas continue to be made available to the maximum extent possible without deterioration of the areas or conflict with other management objectives in order that a greater number of snowmobilers will be served satisfactorily.

Location of Facilities

Approximately 88 percent of all snowmobilers surveyed operate their vehicles within 50 miles of home for one day trips while 68 percent stayed within 100 miles for weekend trips. These snowmobilers were asked the distance they would travel for their preferred facilities for one day and weekend trips. It was found that 80 percent of trail using snowmobilers wanted to remain within 50 miles of home for one day trips, and on weekends 65 percent wanted to remain in areas under 100 miles from their home. It is recommended therefore that the majority of new snowmobile facilities be provided within 100 miles of the major population areas of the state.

New Trail Construction Needs

Priority must be given to new trails in the 100 mile radius of the Twin Cities Metropolitan Area. An estimated 1,200 miles is needed to provide for metropolitan as well as adjacent area snowmobile enthusiasts. Preference should be given to Recreation Region 7 immediately north of the metro area and immediate investigation of the St. Croix, Chengwatana, Sand Dunes and Rum River Forests for trail development in the future. Upper St. Croix, Minnesota and Rum River trail systems must get underway.

Incentives must be provided to encourage counties in this region (Recreation Region 7) to develop additional trails in larger county forests. Likewise encouragement must be provided to the private sector for development of trails. However, it is recognized that the private sector, with the exception of the larger land holding companies such as NSP and private forests, will not have sufficient land or capital to provide the cross country trails we need to help satisfy present demand. Private snowmobile clubs can play an important role in providing facilities for snowmobiling. Several clubs have obtained access to mark and maintain trails over private property. This has been done through agreements with land owners. Other snowmobile clubs should be encouraged to investigate this practice and seek areas where they can obtain similar agreements. This would help to complement public agency efforts in providing areas for snowmobiles.

We believe that even with the present amount of resources available it will be difficult for us to provide the necessary facilities to completely satisfy the present demand for snowmobile cross country trails. It is anticipated that the state agencies will have to accept most of the responsibility for providing the facilities for snowmobiling on public lands. The national forests, although large enough to provide adequate facilities, are not geographically located, relative to the demand, to be considered for supplying additional facilities to meet these needs. These federal forests will be able to supplement those areas set aside by the State.

Drivers Under 16

A significant number of snowmobile owners surveyed (49 percent) stated that they had drivers under 16 years of age operating their machines. By applying the percentages in Table 11 to the universe

of 114,646 snowmobiles registered, we found that there are approximately 111,000 drivers under 16 years of age operating snowmobiles. This is an average of one young driver for every machine registered.

This indicates that a significant number of drivers are below the minimum age for automobile drivers license and therefore should have some driver training for snowmobiling to ensure the safety of themselves and others. We recommend that continued emphasis be placed on snowmobile training programs to ensure that these youngsters will have proper training in safe snowmobile operation.

Recommendations for Future Investigations

This survey of snowmobilers was the first of its kind conducted by the Minnesota Department of Conservation. The information obtained should prove to be very useful in assisting the planning of new recreation facilities for snowmobilers. The results of snowmobile studies being conducted by neighboring states will be reviewed and used to supplement the results of Minnesota's survey.

Since snowmobiling is still in its infancy as a sport, additional information on trends will be needed to help predict future demand for facilities. As so often happens, new tastes and needs emerge over time and create new demands. It will therefore be necessary for the Conservation Department to sponsor another survey, similar to the present study, in order to obtain trend information for the 1973 Minnesota Outdoor Recreation Plan.

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APPENDICES

APPENDIX A

MINNESOTA DEPARTMENT OF CONSERVATION

MINNESOTA SNOWMOBILE TRAIL SURVEY

The State of Minnesota would like to know how you as a snowmobile owner feel about the kind and location of trails that are needed for the future. Based on your experience and opinions, we ask that you give ten minutes or so of your time to complete this survey form.

Information from you and others will be used to plan and build future trails and facilities to provide the utmost in outdoor recreation for this winter sport.

A. Hometown: _____ (1-4) County: _____ (5-6)

B. Please fill in estimates of the total number of weekend days and the estimated total number of hours as well as the number of weekdays (including nights) and the estimated total number of hours that your snowmobile was in use during the past season.

1969-70 Snowmobile Season – November-March

NUMBER OF DAYS AND HOURS OF SNOWMOBILING/SEASON

WEEKEND DAYS (Total of 22 Saturdays and 22 Sundays/season)			WEEKDAYS (Total of 107 weekdays/season)	
NUMBER OF DAYS		ESTIMATED TOTAL NUMBER OF HOURS	NUMBER OF WEEKDAYS	ESTIMATED TOTAL NUMBER OF HOURS
SATURDAY	SUNDAY			
(7-8)	(9-10)	(11-13)	(14-15)	(16-19)

C. Approximately what percent of your total snowmobiling time during the 1969-70 season took place after dark? _____ % (20-21)

D. Where do you presently operate your snowmobile most? (Check one) (22)

1. ☐ your own property
2. ☐ other private property
3. ☐ city parks or property
4. ☐ state parks
5. ☐ state forests
6. ☐ federal lands
7. ☐ lakes and rivers
8. ☐ other (describe)

E. What distance do you normally travel to your snowmobiling area? (Check one in each category)

(23) ONE DAY TRIP

1. ☐ neighborhood
2. ☐ up to 25 miles
3. ☐ 26-50 miles
4. ☐ 51-100 miles
5. ☐ 101-150 miles
6. ☐ over 150 miles

(24) WEEKEND

1. ☐ neighborhood
2. ☐ up to 25 miles
3. ☐ 26-50 miles
4. ☐ 51-100 miles
5. ☐ 101-150 miles
6. ☐ over 150 miles

F. Check below the type of facility you most often used and the type you prefer.

(25) USED	(26) PREFERRED	TYPE OF FACILITY
1. ☐	1. ☐	cross country trail (return to start via same route)
2. ☐	2. ☐	cross country trail (return to start via different route)
3. ☐	3. ☐	cross country trail (point to point, pickup service required)
4. ☐	4. ☐	cross country trail (connecting areas for open use)
5. ☐	5. ☐	large open areas (lakes, fields, etc.)

G. What distance would you be willing to travel to the preferred facilities as indicated in question F?

(27) ONE DAY TRIP	(28) WEEKEND
1. ☐ neighborhood	1. ☐ neighborhood
2. ☐ up to 25 miles	2. ☐ up to 25 miles
3. ☐ 26-50 miles	3. ☐ 26-50 miles
4. ☐ 51-100 miles	4. ☐ 51-100 miles
5. ☐ 101-150 miles	5. ☐ 101-150 miles
6. ☐ over 150 miles	6. ☐ over 150 miles

H. Check below the type of trail you prefer.

1. ☐ Marked (29) 2. ☐ Unmarked

I. Where do you do most of your snowmobiling?

Town: _____ (30-33) County: _____ (34-35)

J. Do you think more marked trails are needed in the county named in I above?

1. ☐ Yes (36) 2. ☐ No

K. Number of drivers under 16 years of age that use your snowmobile.

☐ 0 ☐ 1 ☐ 2 (37) ☐ 3 ☐ 4 ☐ 5 or more

L. Please check the type of snowmobiling areas you would prefer:

(38)
1. ☐ Areas where other snowmobiles are unlikely to be seen.
2. ☐ Areas with light to moderate traffic, good spacing.
3. ☐ Heavily used trails with group activity.

M. Are shelters or warming houses necessary along the trail route?

1. ☐ Yes (39) 2. ☐ No

N. If you drive to your snowmobiling area, have you experienced difficulty in parking your car at unloading site?

1. ☐ Yes (40) 2. ☐ No

O. How important are maps to you for new trails? Select one of the following:

(41)
1. ☐ Necessary 2. ☐ Nice 3. ☐ Not Necessary

P. What is the primary use of your snowmobile?

1. ☐ Pleasure 2. ☐ Sports (fishing, etc.) (42) 3. ☐ Work 4. ☐ Racing

Q. Please attach any comments you may have.

THANK YOU FOR YOUR HELP

(Please return completed questionnaire in enclosed envelope)

TABLE B-1.

No. of Returned Snowmobile Survey Forms by Region

RECREATION REGION	Snowmobiles Registered		Survey Forms Returned		Percent of Survey Forms Returned as Percent of Snowmobiles Registered
	No.	%	No.	%	
1	6,607	5.6	244	6.1	3.7
2	2,719	2.4	86	3.2	3.2
3	22,204	19.4	733	17.5	3.3
4	8,801	7.7	317	8.0	3.6
5	7,986	7.0	290	7.3	3.6
6	4,918	4.3	168	4.2	3.4
7	13,875	12.1	427	10.8	3.1
8	2,441	2.1	78	1.9	3.1
9	6,007	5.2	243	6.1	4.0
10	4,826	4.2	182	4.6	3.7
11	34,259	29.9	1,180	29.8	3.7
Totals	114,646		3,948		Ave. 3.5

TABLE B-2.

Snowmobile Ownership Rates by Region.

REGION	State 1970 Population	Snowmobiles Registered	People per Snowmobile Registered
1	88,924	6,607	13.5
2	47,847	2,719	17.6
3	314,248	22,204	14.3
4	189,729	8,801	21.6
5	122,129	7,986	15.3
6	134,313	4,918	27.4
7	265,158	13,878	19.1
8	144,583	2,441	59.3
9	261,289	6,007	43.5
10	335,227	4,826	69.4
11	1,865,312	34,259	54.4
Total	3,768,809	114,646	32.9

TABLE B-3.

Percent of Snowmobilers Using Various Types of Lands

REGION	Private Property			State				
	Own	Other	City Parks	Parks	Forests	Federal Lands	Lakes and Rivers	Other
1	23%	44%	6%	1%	6%	2%	11%	7%
2	20	17		2	37	4	16	4
3	11	14	5	3	29	14	19	4
4	27	30	2	2	5	1	29	4
5	17	22	1	1	20	9	26	4
6	25	30	9	5		2	24	4
7	19	47	1	2	9	1	18	3
8	26	31	3	9		1	27	3
9	27	44	7	5			14	3
10	20	55	9	4	2	1	8	1
11	9	38	9	6	9	3	23	3
Statewide	16	33	6	4	12	5	20	4

TABLE B-4.
Miles of Snowmobile Trails in Existence as of August 1970*

REGION	Department of Conservation		USFS		Local Gov't	Total
	State Parks	State Forests	Chippewa	Superior	City	
1	22	81				103
2	39	359	20			418
3	37	660	136	352.75		1185.75
4	39					39
5	63	157	123		3	346
6	16					16
7	218	100				318
8	16					16
9	23					23
10	29	18				47
11	4				7½	11.5
Totals	506	1,375	279	352.75	10½	2523.3

* *A Guide to Minnesota Snowmobiling, Minnesota Department of Conservation, and Minnesota Division of Lands and Forests 1970 Development Program.*

TABLE B-5.

Cross Country Trail Use per Mile of Trail

REGION	No. of sample respondents snowmobiling in specific region	Expanded No. of snowmobilers using region[1]	No. of snowmobilers operating on an average weekend day[2]	No. of snow-mobilers on an average day preferring x-c trails[3]	Miles of snow-mobile trails on public lands[4]	No. of snowmobilers operating on an average weekend day preferring trails/mi. of existing trails[6]
1	237	6,873	3,849	2,887	103	28.0
2	160	4,640	2,598	1,949	418	4.7
3	741	21,489	12,034	9,026	1185.75	7.6
4	321	9,309	5,213	3,910	39	100.3
5	410	11,890	6,658	4,994	346	14.4
6	172	4,988	2,793	2,095	16	130.9
7	514	14,906	8,378	6,284	318	19.8
8	76	2,204	1,234	926	16	57.9
9	242	7,018	3,930	2,948	23	128.2
10	181	5,249	2,940	2,205	47	46.9
11	894	25,926	14,519	10,889	11.5	946.9
Totals	3,948	114,492[5]	64,146	48,113	2523.3	19.1

1. *The coefficient of 29 was determined by the No. of snowmobiles registered (universe) ÷ by the total number of respondents in survey: 114,646 / 3,948 = 29.02.*
2. *Approximately 56 percent of the snowmobiles registered will be out on an average weekend day.*
3. *Seventy-five percent of snowmobilers out on an average weekend day prefer cross country trails.*
4. *Snowmobile trail miles taken from A Guide to Minnesota Snowmobiling, Minnesota Department of Conservation, 1969-1970; and recent additions made by Division of Lands and Forestry in 1970 (Development).*
5. *Actual Figure is 114,646, however, due to rounding off of coefficient from 29.02 to 29, the figure comes out to 114,492.*
6. *Number of snowmobilers/trail mile was determined by ÷ No. of snowmobilers using the region by the total miles of public snowmobile trails listed in that region; i.e., Region 1: 2887 ÷ 103 = 28.0 snowmobiles/trail mile.*

TABLE B-6.

Cross Country Trail Use per Mile of Trail
(within 100 miles of the Twin Cities).

1	2	3	4	5	6	7
REGION	No. of snowmobilers (surveyed) who snowmobile in this region within 100 miles of Twin Cities	No. of registered snowmobilers who use facilities within 100 miles of Twin Cities[1]	No. of registered snowmobilers who prefer x-c trails[2]	No. of snowmobilers out on average week-end day preferring x-c trails[3]	Miles of x-c trails within 100 miles of Twin Cities	No. of x-c snowmobilers out on average weekend day per mile of trail
11	894	25,926	19,445	10,889	11.5	946.8
10	175	5,075	3,806	2,131	36.0	59.2
9	242	7,018	5,264	2,948	23.0	128.2
7	514	14,906	11,180	6,261	318.0	19.7
6	196	2,784	2,088	1,169	7.0	167.0
5	311	9,019	6,464	3,620	9.0	40.2
Totals	2,332	64,728	48,247	27,018	404.5	66.7

1. *Obtained by multiplying column 2 by the coefficient 29 to expand to include the universe.*
2. *75 percent of snowmobilers surveyed preferred cross country (x-c) trails, thus column 3 multiplied by .75.*
3. *56 percent of column 4 snowmobilers would be out on an average weekend day.*

APPENDIX C

STANDARDS

The 1968 Minnesota Outdoor Recreation Plan recommends that a standard of eight (8) snowmobiles per mile of cross country trail be used to evaluate needs for such facilities.[1] It was found that snowmobilers operate their machines for approximately four (4) hours per weekend day outing. Therefore with a turnover rate of two snowmobiles per day, one mile of snowmobile trail can accommodate 16 snowmobiles per mile of trail per day and still allow the snowmobiler to receive a quality experience.

[1] *Minnesota Department of Conservation, Bureau of Planning, Minnesota Outdoor Recreation Plan 1968 (St. Paul: Minnesota Department of Conservation, 1969), p. 74.*