

# Managing the Environment for Diverse Recreation: Cross- Country Skiing in Minnesota

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Station Bulletin 544—1981  
Forestry Series 39

AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF MINNESOTA  
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**Cover photo:** The Thistledeew Trail in the George Washington State Forest.

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The University of Minnesota, including the Agricultural Experiment Station, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap.

# Managing the Environment for Diverse Recreation: Cross-Country Skiing in Minnesota

## Preface

This study was funded by McIntire-Stennis Cooperative Forestry funds, which supported the doctoral work of G. E. Ballman. Aid was also received from Dean R. A. Skok and the Forest Resources Department Head, Dr. G. N. Brown, and staff of the College of Forestry as well as from the Agricultural Experiment Station, the University of Minnesota Computer Center, and the Minnesota Department of Natural Resources (Bureau of Comprehensive Planning and Programming). To all these people and units we extend our thanks as well as to the citizens of Minnesota who responded to our inquiries and questionnaire.

## Abstract

The participants in any given form of recreation consist of individuals with a diversity of motivations and environmental preferences. This publication describes a method of identifying subgroups and their needs.

A sample of Minnesota cross-country skiers surveyed in 1978 provided basic information on motivations, use patterns, demographic characteristics, and environmental preferences. This data was used to identify eight types of skiers on the basis of their expressed desire for exercise, experiencing nature, achievement, social contact, escape, and family solidarity. Each type was further distinguished by describing its use patterns, characteristics, and preferences for specific environmental attributes.

The results of this study, and subsequent studies utilizing this approach, can contribute to the completion of the major tasks con-

fronting land use planners, managers and administrators, in the public and private sectors. These tasks include: assessing and predicting need; allocating resources; mixing uses; design and implementation; and developing an information system. The publication concludes with a discussion of the practical application of this material.

## What's The Problem?

The Minnesota Department of Natural Resources is typical of public agencies which are making a concerted effort to ascertain the needs of various recreational user groups. These efforts generally take the form of public meetings, surveys, advisory committees, and the solicitation of written statements. Recreationists are usually categorized according to the activity they engage in.

Quite expectedly, the agency finds considerable differences, competition, and conflict among groups such as hikers, horseback riders, canoeists, motorboaters, ski tourers, and snowmobilers. As if this weren't enough to deal with, they also discover a good deal of disagreement *within* each activity group. Cross-country skiers are a case in point.

Some skiers express a decided

preference for carefully manicured, well groomed tracks close to the comfort of a lodge. Others would rather break their own trail through relatively unaltered, remote terrain. There is a wide range of opinion on how difficult a trail should be. Experienced skiers may have no difficulty coping with a steep, twisting, downhill run; for others, this type of trail would impose an insurmountable barrier. Skiers also differ in their desire for small, closed loop trail systems as opposed to longer, point-to-point trails connecting resorts, communities, and recreation sites.

So, what is the agency to do? Lacking a consensus, administrators can respond in several ways. Some administrators may look upon the situation as an opportunity to avoid any meaningful response. They will simply throw up their hands and say, in effect, "If they (the skiers) can't agree on what they want, then we can't do a thing for them."

Another kind of response is more likely, and more difficult to evaluate. An agency may, consciously or subconsciously, select from the numerous statements of preference those items which best fit the agency's preconceived notion of what they ought to be doing. The latter can be the result of older, well established programs and alliances, or it may be a simple tendency to take the easiest course. This response can result in ignoring or giving token attention to large segments of the public.

What is the ideal response? How can an agency resolve the dilemma? First they must acknowledge a legitimate diversity of preferences within the activity group. Next, they should attempt a fair allocation of resources among competing preferences.

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This is easier said than done. Our initial task is to define the problem in more specific terms. The first step is to develop a classification scheme or a meaningful way of dividing participants into subgroups. This should serve to identify individuals and at the same time provide an indication of relative numbers. The next step is to determine the environmental preferences of each of the subgroups. Some knowledge of use patterns in time and space will help to quantify the actual demand pressure exerted by each subgroup. Finally, we will have to "package" these preferences into reasonable management alternatives.

Private or commercial providers have an altogether different problem; yet, dividing participants into subgroups is still a logical first step. The major decision for private entrepreneurs is selecting the subgroup or subgroups they wish to cater to. Next, they need to know the environmental preferences and behavioral patterns for that market.

Ultimately, the public and private sectors must communicate and cooperate in order to provide the full range of opportunities in demand. The approach we are suggesting is a systematic way of identifying the tasks, assigning responsibilities, and determining the potential for conflicts and complements.

The remainder of this publication will describe how this process was carried out in a (Ballman 1978) study of Minnesota cross-country skiers. The results will present a suggested typology of skiers and their preferences, and will identify areas of consensus. Also included is a brief consideration of "participation dynamics," i.e., the mechanisms of change and probable trends. The bulletin concludes with a discussion of how the data can be used for land use planning and management.

## Description of Study

Cross-country skiers, or ski tourers, were identified by a random telephone survey of Minne-

sota households conducted by the Minnesota Department of Natural Resources in 1978 (MN DNR 1979). During each interview the respondent was asked, "Have you or any member of your household ever cross-country skied?" A positive answer was followed by a request for the names of each cross-country skier. A technique designed to avoid selection bias developed by Kish (1967) was used to select one skier over 14 years of age from each household, a total sample of 944.

A four-page questionnaire was sent to each individual in the sample on August 31, 1978. After correcting for undeliverable questionnaires and misidentified "non-skiers," a return rate of 74.6 percent (597 usable responses) was calculated.

The questionnaire (Appendix A) consisted of four parts. Part one solicited information on use patterns or actual participation. Specifically, it asked when the skier first took up the sport and the relative level of participation over the past several seasons. Some indication of skill level and the distances skied was also obtained.

Part two, "Reasons for cross-country skiing," provided the data used to develop the skier typology. It seemed logical to group skiers according to motivations or the kind of experience they were seeking. This process is similar to a marketing strategy which targets groups according to the benefits they seek from consuming a given product.

Part three consisted of a list of 52 specific items representing attributes or characteristics of the environment. A five-scale measure was provided for the respondents to indicate their level of preference for each item. This section translated the skiers' motivations into clearly identified management objectives.

Part four requested demographic information which could be used to further describe each of the subgroups. Two additional questions provided information on participation in other outdoor winter activities.

A three-stage procedure was used to arrive at eight skier types or subgroups from the individual respondents:

1. An R-type cluster analysis was applied to the 25 most important reasons for cross-country skiing (as determined by responses) to create six major scales of motivation.

2. Each respondent was given a score for each of the scales based on mean scores for each item within a given scale.

3. A Q-type cluster analysis utilizing the individuals' scale scores resulted in the formation of eight skier types and their "benefit profiles."

A more detailed discussion of the statistical procedures is contained in Appendix B.

Once the skiers had been categorized, each group was described according to demographic characteristics, use patterns, and environmental preferences. It was particularly important to look for significant differences among the subgroups.

Additional analysis consisted of a rank ordering of the preference items and a comparison of skiers on the basis of the number of years they had skied.

## The Results: A Closer Look at Minnesota Cross-Country Skiers

Few need to be told that cross-country skiing, or ski touring, has become a popular activity in Minnesota. A statewide telephone survey conducted by the Minnesota Department of Natural Resources in 1978 provided an estimate of 500,000 cross-country skiers in the state (Dalton 1979). There is little need to dwell on the general nature of this form of recreation; numerous popular publications, both books and magazine articles, can provide the reader with a good description of the activity. Our research revealed some of the detail, the nature of subgroups, specific motivations, and the mechanisms of change.

## The "average" cross-country skier

A brief description of the average cross-country skier, or more accurately the "averaged cross-country skier characteristics," will help to create a base for our discussion. This description will help to identify the broad class of participants; it will also make it easier for us to discuss deviations which distinguish the various sub-groups.

Three-fourths of our sample were under 40 years of age, although some were over 65. The averaged age was 31 years old. Fifty-six percent were female and 44 percent male. Nearly 28 percent indicated they had a rural residence. This category probably included many skiers living on the fringe of the metro area. Two-thirds of the sample had some college education; more than one-fifth had more than four years.

Professional/technical occupations accounted for 30 percent of the respondents and students nearly 25 percent. Managers/administrators and house-persons made up nearly 12 percent each. About two-thirds of the skier households had an average annual income greater than \$15,000.

These figures are more meaningful when compared to the statewide population. Cross-country skiers tend to have more formal education, slightly higher household incomes, and a larger representation in the professional/technical occupations than the statewide averages.



Overnight lodging is an important complement to the ski trails.

When examining motivations, exercise rated the highest and experiencing nature next highest. Achievement, social contact, escaping pressures, and family solidarity followed in that order. The meanings of these motivations will be examined in more detail in the following section.

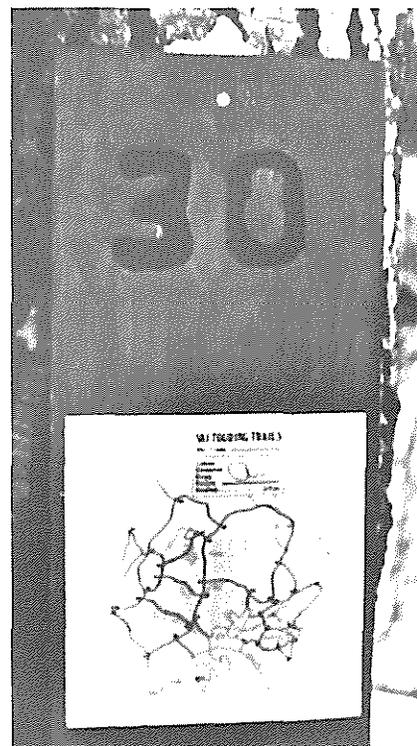
The overall responses to the preference items are shown in Table 2. Here it is important to note the relative ranking and the degree of consensus. Those items which show a significant difference among subgroups or types are identified. There appears to be a general agreement that natural features, such as wildlife, wooded terrain, lakes and streams, are desirable. At the other end of the spectrum, the three items dealing with snowmobiles rank the lowest, although large numbers of skiers are viewed as being almost as undesirable. Lack of agreement is

most prevalent on those items which describe facilities and developments designed especially for ski tourers. These are the same items for which planners and managers have the most discretion and responsibility.

Table 2 will prove very useful when planners and managers are confronted with decisions on specific management objectives.

## Cross-country skier types

First, a word about the motivational scales which form the basis



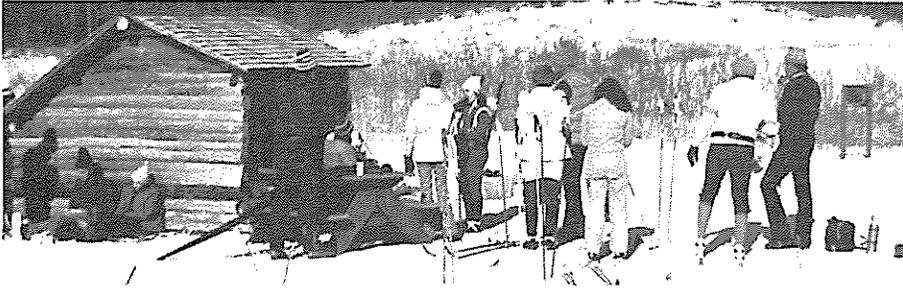
A location sign; most cross-country skiers like to know where they are.

**Table 1. Some averaged characteristics of a random sample of Minnesota cross-country skiers collected in 1978. Equivalent characteristics for the total population of Minnesota are not available.**

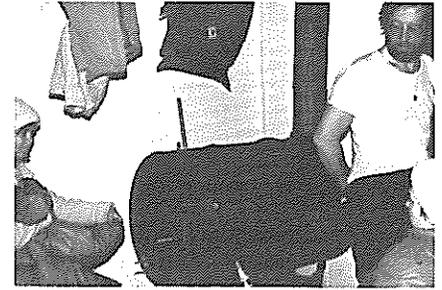
	Cross-country skiers	State of Minnesota <sup>b</sup>
Age <sup>a</sup>	31 years	
Female	56%	
Male	44%	
Some college	66%	
Over 4 Years of college	21%	
Professional/technical occupation	30%	
Students	23%	
Management/administration occupation	12%	
Housepersons	12%	
Over \$20,000 household income	40%	

<sup>a</sup> Only persons over 14 years of age were included in sample

<sup>b</sup> At the time of this printing, 1980 census data were unavailable. The reader will be able to make a more meaningful interpretation of the skier characteristics when equivalent state data can be used for comparison.



A simple shelter provides protection and a place for lunch.



Simple accommodations—bunk beds and a wood burning stove—satisfy many cross-country skiers.

Table 2. Rank-ordering of preference items by mean desirability score.

Rank	Item No.	Mean <sup>a</sup>	Item
1	30	4.39	Wildlife and signs of wildlife
2	6	4.17	*Skiing through mostly wooded areas
3	16	4.14	Skiing along lakes and streams
4	49	4.01	Areas within a short distance from home
5	40	3.92	Pocket trail maps
6	41	3.86	*Warning signs before steep hills and junctions
7	14	3.84	Trails wide enough for two skiers
8	20	3.82	Signs showing trail route and length
9	22	3.78	Gentle slopes (less than 10 percent slope)
10	1	3.76	Well groomed trails
11	19	3.72	*Trails that have been tracked only by other skiers
12	47	3.71	Signs indicating difficulty of trail
13	27	3.70	Trails about 5 miles in length
14	21	3.69	Warming house with restroom at trail head
15	8	3.64	Distance markers at regular intervals
16	48	3.61	*Primitive winter camping facilities
17	43	3.58	Areas without trails where I can ski anywhere I want
18	44	3.56	Skiing on abandoned logging roads
19	12	3.54	Trails connecting different recreational areas
20	17	3.50	Rest stops with tables and benches
21	34	3.49	*Moderately steep hills (about 15 percent slope)
22	3	3.48	Nature interpretation signs along trail
23	18	3.39	*No man-made developments at all
24	10	3.39	*Developed overnight facilities (cabins or lodge) nearby
25	23	3.38	Encountering a few other skiers (5-10 per hour)
26	35	3.36	Moderately steep hills (about 15 percent slope)
27	33	3.34	Trails connecting different communities
28	15	3.28	*Breaking my own trail through unbroken snow
29	42	3.26	*Ski patrol on trails
30	4	3.23	*Encountering nobody else while skiing
31	52	3.19	Skiing across lakes
32	2	3.17	Steep hills (at least 20 percent slope)
33	45	3.16	One-way single lane trails
34	32	3.14	Developed parking area
35	46	3.07	Skiing across flat terrain
36	26	2.86	*Remote, hard to reach areas
37	5	2.84	Encountering hikers and snowmobilers on the trail
38	7	2.79	*Trails at least 25 miles long
39	51	2.77	*Trails requiring a high degree of skill
40	13	2.73	Trails through active logging areas
41	11	2.73	Areas that have been logged over within the last 5 years
42	9	2.69	Sharply curved downhill runs
43	24	2.58	Skiing through mostly open areas
44	25	2.43	*Downhill runs with sharp curves at the bottom
45	37	2.13	Encountering large groups of skiers (more than 10 people together)
46	38	2.06	*Seeing powerlines and similar man-made structures
47	28	1.92	Residential development
48	29	1.71	Sound of autos
49	31	1.70	Encountering a lot of other skiers (more than 40 per hour)
50	50	1.68	Hearing or seeing snowmobiles
51	36	1.60	Snowmobiles on parallel trails within 50 feet
52	39	1.39	Snowmobiles on the same trail as I

\*Indicates significant difference among cross-country skier types.

<sup>a</sup>Mean calculated on the basis of a five-point scale. A score of 1.0 was given to the response "very undesirable" and a score of 5.0 to "very desirable." A "neutral" position was given a score of three.

for our groupings. The six scales or measures, their labels, and the items which define them are as follows:

**Exercise/fitness**

- To help keep me physically fit.
- For the exercise.

**Experiencing nature**

- To enjoy the winter scenery.
- To learn things about an area.
- To learn about nature.
- To be close to nature.
- To explore things.

**Achievement**

- To develop my skills and abilities.
- Because it is stimulating and exciting.
- To feel better about myself.
- To gain a better sense of self-pride.

**Social contact**

- To be with others who enjoy the same things I do.
- So I could do things with my companions.

**Escape social/physical pressure**

- To get away from other people.
- To get away from crowded situations for awhile.
- To get away from the demands of other people.
- For a chance to be on my own.
- To think about personal values.
- Because it gives my mind a rest.
- To help release or reduce some built up tensions.

**Family solidarity**

- So the family could do something together.
- To help bring the family together more.

An examination of the questionnaire (Appendix A) will help the reader to appreciate the context of these response items.

Eight skier types were derived from the scores skiers had for the six motivational scales. The types were given labels which are crude, simplified descriptions of their motivational profiles. The eight types are:

Type 1—the moderate skier.



A comfortable chalet with a Scandinavian motif.

Type 2—the family nature skier.

Type 3—the social exerciser.

Type 4—the family social skier.

Type 5—the older family skier.

Type 6—the gung-ho wilderness skier.

Type 7—the naturalist skier.

Type 8—the indifferent, occasional skier.

Figure 1 summarizes the profiles of each of the eight types. It is im-

portant to note that 17 percent of the skiers sampled could not be classified, i.e., their motivation scores did not place them in any of the eight groups, nor were there a significant number which could form an additional cluster or type.

Once the skiers had been classified, we could look for differences among the types on the preference items. Fifteen of the 52 items showed significant differences. Table 3 summarizes the

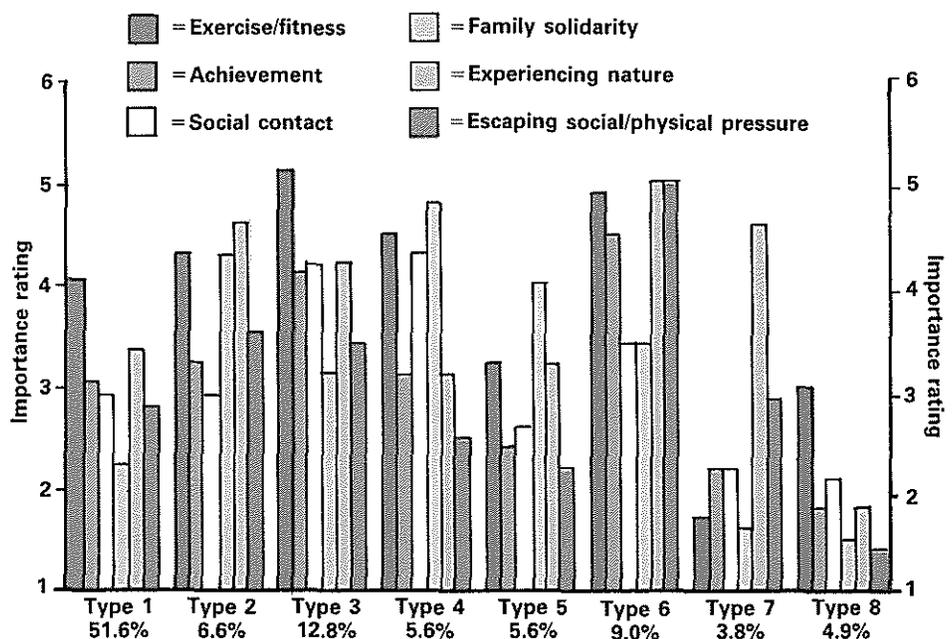


Figure 1. Importance ratings of six benefits derived from cross-country skiing for eight types of cross-country skiers.

mean scores of each skier type for each of the 15 items as well as their rank relative to the other types.

Part one of the questionnaire dealt with use patterns or participation characteristics. We have selected several items which provide indices of the intensity of involvement, space requirements, and the effect of experience. These

characteristics are summarized in Table 4. Because of the season-to-season variation resulting from snow conditions, these figures are of little value as absolute measures. However, they do enable us to make comparisons among skier types.

Demographic characteristics for each of the types is summa-

rized in Table 5. This table will help us to describe the skiers in terms that can be related to standard population data.

The four major descriptors (motivations, preferences, use patterns, and demographics) can be utilized to provide a capsule description of each skier type:

**Type 1—The Moderate Skier**

**Table 3. Meanscores (/xx) and rank relative to other types (xx/) for 15 preference items which showed a significant difference among the eight cross-country skier types.**

Preference item	Cross-country skier type								All
	1	2	3	4	5	6	7	8	
Trails at least 25 miles long	4/2.72	6/2.84	5/2.83	2/2.38	3/2.58	8/3.31	7/3.18	1/2.09	2.8
Moderately steep hills-about 25 percent slope	4/3.30	8/3.77	5/3.43	7/3.69	3/2.96	6/3.57	2/2.88	1/2.76	3.7
Trails requiring a high degree of skill	4/2.75	3/2.64	5/2.77	6/2.81	1/2.29	8/3.26	7/2.94	2/2.50	2.8
Downhill runs with sharp curves at the bottom	5/2.50	1/2.03	4/2.37	6/2.54	2/2.16	8/2.74	7/2.70	3/2.17	2.4
Breaking my own trail through unbroken snow	5/3.26	4/3.13	6/3.33	2/2.92	1/2.88	8/4.00	7/3.56	3/3.00	3.3
Trails that have been tracked only by other skiers	4/3.72	5/3.74	6/3.81	2/3.50	3/3.56	8/4.15	7/3.82	1/3.18	3.7
Encountering nobody else while skiing	3/3.18	7/3.58	4/3.27	2/3.08	5/3.44	8/3.76	6/3.47	1/2.74	3.2
Warning signs before steep hills and junctions	4/3.83	6/3.97	7/4.03	8/4.12	5/3.96	2/3.76	1/3.12	3/3.73	3.8
Primitive winter camping facilities	5/3.55	8/3.97	6/3.60	3/3.38	4/3.43	7/3.86	2/3.29	1/3.27	3.6
Developed overnight facilities nearby	5/3.30	8/3.81	7/3.61	3/3.28	1/3.00	6/3.50	4/3.29	2/3.23	3.4
Ski patrol on trails	4/3.23	3/3.22	7/3.45	8/3.65	6/3.33	2/3.00	1/2.82	5/3.33	3.2
No man-made developments visible at all	5/3.34	2/3.10	6/3.52	4/3.27	3/3.16	7/3.98	8/4.06	1/3.10	3.4
Seeing powerlines and similar man-made structures	5/2.08	7/2.32	6/2.12	2/1.85	4/2.04	1/1.66	3/1.88	8/2.50	2.0
Skiing through mostly wooded areas	3/4.07	6/4.42	5/4.22	4/4.08	2/3.96	7/4.45	8/4.53	1/3.91	4.2
Remote, hard to reach areas	5/2.92	6/3.10	4/2.73	2/2.54	3/2.54	7/3.21	8/3.41	1/2.23	2.8

Mean scores were calculated on the basis of a five-point scale. A low score or rank indicates that an item was less desirable and a high score or rank indicates that the item was more desirable. A score of 3.0 reflects a neutral position.

**Table 4. Selected participation characteristics for each of the eight cross-country skier types.**

Participation characteristic	Cross-country skier type								All		
	1	2	3	4	5	6	7	8			
Number of years skied			3.7	5.0	3.6	2.9	3.4	5.0	9.7	4.7	4.1
Perceived skill level			2.2	2.6	2.4	2.2	1.9	3.0	2.4	1.9	2.3
Number of days skied 1977-78 season			10.3	9.0	11.3	10.0	9.4	16.6	8.8	6.7	11.0
Number of days skied seven or more miles 1977-78 season			1.6	.9	1.6	2.2	.1	3.2	1.9	.2	1.8
Number of places skied 1977-78 season			2.6	2.9	2.6	3.2	1.9	3.7	1.4	1.7	2.6
Number of days skied more than 50 miles from home 1977-78 season			1.0	1.0	.6	1.5	.4	1.8	.3	.2	.9
Percent of outings on weekends 1977-78 season			65.9	77.4	62.9	71.5	62.1	62.0	41.9	49.7	62.7
Number of days skied alone 1977-78 season			2.9	2.4	2.3	1.3	1.3	6.6	2.6	1.7	3.2

**Table 5. Demographic characteristics for each of the eight cross-country skier types. Numbers represent percent of total in that type.**

Characteristic	All	Cross-country skier type							
		1	2	3	4	5	6	7	8
Age 19-24	37	43	26	37	19	15	45	56	39
25-39	40	41	39	36	62	31	45	11	35
40-50 +	23	16	35	27	19	54	10	33	26
Female/male	56/44	57/43	39/61	65/35	69/31	58/42	55/45	28/72	52/48
Household income under \$10,000	15	11	10	27	6	5	31	18	27
\$10,000-\$20,000	41	49	47	32	24	40	27	36	33
\$20,000-\$30,000	29	26	32	32	47	35	27	46	40
More than \$30,000	15	14	11	10	23	20	15	0	0
Residence more than 250,000 population	17	20	10	14	15	15	7	6	9
Residence rural	28	24	29	29	27	12	39	32	32
Professional/technical occupation	30	33	39	22	19	35	36	22	23
Managerial/administrative occupation	12	12	16	7	27	8	12	—	14
Housepersons	12	8	10	12	35	23	10	—	18
Students	23	23	13	29	8	12	31	39	14
Education 13-16 years	43	39	52	53	46	54	38	22	48
more than 16 years	23	23	26	22	35	12	31	11	22



Skier-maintained tracks in the Superior National Forest.

(51.6 percent): A slim majority of the skiers are characterized by a rather even profile and the absence of extreme scores. The highest score (and the score which deviated most from the other types) was given to exercise/fitness. Family solidarity ranked lowest.

When we look at specific preference items, we find Type 1 skiers consistent with their moderate label. They tend to prefer trails of moderate length and difficulty. Or put differently, their preference for long, difficult trails lies somewhere between the extremes of the other types. The moderate also tends to be in between on the questions of breaking trail, man-made developments, and overnight facilities. It may not be significant that the preference of this type for wooded terrain and encountering nobody else while skiing ranked two notches below the median. It does, however, illustrate the distortions which may result if we catered only to the moderate skier.

Participation characteristics tend to follow the same moderate trend. An average of 3.7 years of experience is somewhere in the middle, as is the perceived skill level. Only two of the other types skied more days during the 1977-1978 season, and three types skied seven or more miles more days than did Type 1 skiers. The number of places skied during the

1977-1978 season tells us something about the importance of variety. Here again, an average of 2.6 is close to the median. The number of days skied more than 50 miles from home is heavily influenced by availability—yet, it may reveal something about potential demand. The same can be said of weekend skiing. Type 1 tends to be more of a weekend skier than most of the other types.

The socio-economic characteristics of Type 1 skiers reveal no outstanding differences from the average.

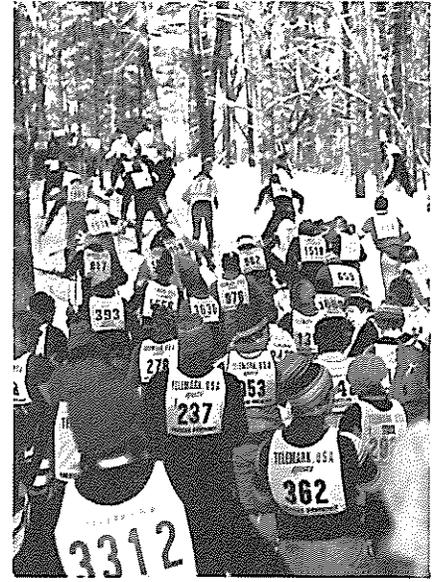
**Type 2—The Family-Nature Skier (6.6 percent):** This type is distinguished by relatively high scores for family solidarity and experiencing nature. Exercise is also important, but close to the total average for all skiers.

This group shows a low preference for trails requiring high skill levels, yet is not opposed to breaking trail, longer trails, and relatively isolated situations. They show the highest preference for overnight accommodations at both ends of the spectrum. All of these preferences are consistent with the family-nature orientation.

Members of this type had skied an average of five years; only one other type had more experience. The perceived skill level was also high. The number of occasions, places, and distance traveled indi-



Starting out at two years of age.



Plenty of companionship during the annual American Birkenbeiner ski race.

cate a fairly high level of commitment. The low number of days skied seven or more miles may show the tempering effect of younger family members.

Demographically, Type 2 skiers are somewhat older than the average and have slightly higher incomes.

**Type 3—The Social Exerciser (12.6 percent):** A rather large group of skiers are seeking exercise and social contacts. Exercise is obviously the dominant motivation, but they also enjoy the company of others. Overall, this group would appear to be highly motivated.

These skiers are moderate or slightly above average in their preferences for long, difficult trails and breaking trails. It is well to keep in mind that trails don't have to be difficult to provide the opportunity for exercise. A high preference for developed overnight accommodations is consistent with their desire for social contacts.

Use patterns also reflect this group's profile. They were second highest in number of days skied, although they showed less tendency to travel. Exercise and socializing do not require too specialized an environment—the setting is created by the skiers themselves.

A higher-than-average percent-

age of the respondents in this group were female. Income was lower than average.

**Type 4—The Family-Social Skier (5.6 percent):** For this group, social contact and family solidarity ranked higher than for any other type. Exercise/fitness ranked higher than average as a reason for participation.

Type 4 skiers showed relatively little preference for long, hard-to-reach, unbroken trails; however, they showed little aversion to difficult terrain. They had a relatively low preference for “encountering nobody else while skiing.”

Experience and skill level were close to the average, as were indices of the rate of participation. This group was second highest on percent of weekend outings.

A higher percentage of female respondents who identified themselves as housepersons characterize this type. Their age tended to be concentrated in the 25-39 bracket. Household incomes were higher than for any other type. Amount of formal education was also highest.

**Type 5—The Older Family Skier (5.6 percent):** Family solidarity stands out as a motivation for Type 5 skiers. Other motivations are average or relatively low.

This group has close to the lowest preference for long, difficult, unbroken trails. They have a relatively high preference for having a

ski patrol on the trail. They are lowest in the expressed desire for developed overnight lodging.

Participation characteristics indicate a fair level of commitment to a relatively low level of distance skied and distance traveled to ski areas.

As the label suggests, this is the oldest group of skiers. Relatively high household incomes and a high percentage in professional/technical occupations also characterize this group. Also, this group had the smallest percentage of those who identified their residence as rural.

**Type 6—The Gung-Ho Wilderness Skier (9.0 percent):** This group is probably the easiest to recognize and describe. Type 6 skiers are highly motivated on all scales, although social contact and family solidarity rank relatively lower. This group ranks achievement, experiencing nature, and escaping pressure higher than any of the other groups.

The preference items reflect the same characterization. They find most of the challenging aspects of the environment highly desirable. Attributes which lessen the challenge, such as developed overnight lodging, ski patrol, and warning signs are ranked low.

Type 6 skiers have had considerable experience, an average of five years. Their perceived skill level is the highest of all the types. They are high on all the indices of

rate of participation and are more inclined to travel to fairly distant locations.

This is a young group. A large percentage identified themselves as students and reported relatively low household incomes. A large percentage of this group defined their residence as rural.

**Type 7—The Naturalist Skier (3.8 percent):** This group is rather specialized—“experiencing nature” ranks far above the other motivations. All of the other scores are below average.

Specific preferences are similar to those of the “gung-ho wilderness skiers,” except that they indicated less preference for overnight facilities and moderately steep hills. Remote, wooded areas and lack of man-made structures are particularly important to this group.

Type 7 skiers have the highest average years of experience and a slightly above average perceived skill level. The rate of participation is relatively low compared to most of the other types.

The age distribution within this group is distinctly bimodal. This pattern is reflected in the occupations of the respondents and the level of formal education.

**Type 8—The Indifferent Skier (4.9 percent):** This type ranked lowest on all the motivational scales except exercise/fitness. Possibly this indicates that cross-country skiing was looked upon as somewhat of a duty or chore rather than a pleasant pastime.

Their relative indifference is also expressed by their low preference scores, and in the case of one item (seeing powerlines and similar man-made structures) a high score.

Although fairly experienced, this group indicated a low level of perceived skill. Type 8 skiers ranked lowest or second lowest on all of the participation indices. At least some of the skiers in this group may be phasing out of the activity. Some evidence is provided by the relatively low number of days skied during the previous season.

It is difficult to characterize



Skiing in the solitude of the Boundary Waters Canoe Area wilderness.

this group demographically, they are close to average.

At this point we have described several subgroups within the larger group of those who participate in cross-country skiing. We have also given an indication of each group's preferences and the relative size of each group. It is important to note that the preceding discussion has emphasized differences among the various types. For example, when we indicated that a preference was high or low we meant that it was high or low relative to the other types. We did not provide any absolute measures of motivation or preference. Our next task is to examine some of the changes that are taking place because participation in cross-country skiing is not a static phenomenon.

### The dynamics of participation in cross-country skiing

The following discussion will point out a number of mechanisms which influence whether an individual participates and at what level. To the extent that our data is appropriate, we will attempt to describe how these mechanisms are affecting participation in cross-country skiing.

The first question is: "Where do cross-country skiers come from?" Similar reasoning applies to the question: "Why do people 'drop-out' of cross-country skiing?" When viewed as a problem of prediction, we can identify two general sources.

The first is a function of individuals changing their demographic or socio-economic status over time. For example, some become "old enough" to ski, and others become "too old." Similar transfers occur in income, education, family, and residential status. All switches of this type affect the probability of participation; none entail an absolute obligation or barrier to participation. In a stable population most of these factors are compensatory and account for very little of the net change in participation.

A far more dynamic and less easily quantified process is the re-



Racing in carefully groomed tracks has special appeal for the competitive spirit.

sult of changes in the activity itself which tend to attract or repel new adherents. The most easily understood is visibility or the level of general awareness and knowledge about the activity. In the case of cross-country skiing, this has increased dramatically over the past several years. Closely associated with visibility is the overall image of an activity. Visibility and large numbers tend to legitimize a form of recreation for those who prefer to follow rather than pioneer. New equipment and opportunities can also have profound effects on an activity. Ski touring trails have been increasing in number; at the same time many trails have become more and more crowded. Although some skiers may drop-out because of crowded conditions, the net effect of new opportunities will be to increase participation.

On the basis of data provided by responses to the question, "Which season did you first go cross-country skiing?" we have estimated a 20-30 percent annual growth rate in participation. This is far more than can be explained by simple changes in demographic categories and probably reflects increased knowledge and acceptance of the sport. Opportunities continue to increase both quantitatively and qualitatively. New

variations such as citizens' races, telemarking (a classic downhill turning technique), and resort-to-resort skiing add interest to the activity and thus attract a wider range of individuals.

External factors will affect how cross-country skiing is viewed relative to other, alternative forms of recreation. Energy shortages and a general decrease in affluence may stimulate participation in less consumptive forms. It is easier to speculate on relative changes than absolute numbers. For example, a lower level of affluence may favor cross-country skiing over snowmobiling, and staying at home over cross-country skiing.

Another type of change occurs within individuals after they become participants. There are two opposite effects. Persons may gain skill and confidence, and thus increase their intensity of involvement and their need for more challenging opportunities. Others may be affected very differently. They will become saturated or bored, drop out of the activity, and seek other, more novel pastimes. Although the individual's personality is certainly a factor, we do not have to take this into account when viewing overall trends. It is more important to judge the inherent appeal of an activity and

whether it offers the variety and range of satisfactions necessary to sustain involvement.

Commitment is another important consideration. Purchase of equipment, efforts to learn skills, and the establishment of social alliances all tend to perpetuate involvement—at least in the short run. An individual may continue to participate beyond the point where the direct satisfactions derived from the activity per se begin to fall off. Again, this kind of phenomenon is best evaluated

when comparing different forms of recreation. It probably helps to explain why the switch from snowmobiling to ski touring hasn't occurred even more rapidly than it has.

For our purposes the most critical question is: "How are these dynamic factors going to influence the relative sizes of each sub-group of cross-country skier?" Both changes in the activity and changes in the experience of participants will need to be considered.

The image of cross-country skiing has undergone a dramatic change, from an obscure, demanding, less than glamorous activity to the popular, stylish, social, and relatively comfortable experience most skiers enjoy today. This change can be expected to increase participation by those who are attracted to these characteristics.

Skiers are also gaining in skill and confidence. As total participation levels off and the proportion of new skiers decreases, we can expect an increase in the demand

**Figure 2. Descriptive Matrix—Eight Types of Cross-Country Skiers and Their Characteristics. A tabulation of data collected by mail questionnaire from a random sample of 597 Minnesota cross-country skiers in 1978. Refer to tables two through five for a more thorough definition of each component.**

Note: Under the heading "environmental preferences" the letters 'H' and 'L' indicate a significantly higher or lower preference for that item relative to the other types; items for which there is a general agreement or consensus across types are not included in this matrix (refer to Table 2).

Type	%	Motivation Profile	Environmental Preferences				
			Trails	Signs Patrol	Facilities	Setting	Other Uses
1 Moderate	51.6	even, moderate scores highest: exercise/ fitness lowest: family solidarity			L— primitive camping	L— wooded areas	
2 Family Nature	6.6	highest: family solidarity, experiencing nature. important: exercise	H—moderate hills L—sharp curves	H—warning signs	L— primitive camping H—lodging	H—wood areas	H— encountering nobody H— powerlines
3 Social Exerciser	12.8	highest: exercise/fitness social contact, achievement. important: experiencing nature.		H—warning signs H—patrol			L—no man- made de- velopments
4 Family Social	5.6	highest: social contact, family solidarity. important: exercise	H—moderate hills	H—warning signs patrol	L— primitive camping		
5 Older Family	5.6	highest: family solidarity	L—moderate hills, skill req. sharp curves breaking trail.		L— primitive camping, lodging	L—wooded areas	L—no man- made de- velopments
6 Gung-Ho Wilderness	9.0	highly motivated except for average scores on social contact and family solidarity	H—25 miles moderate, skill req. sharp curves, breaking trail.		H— primitive camping	H—wooded areas, remote.	H— encountering nobody, no man-made de- velopments. L—powerline
7 Naturalist	3.8	highest: experiencing nature	H—25 miles L—moderate hills	L—warning signs, patrol	L— primitive camping	H—wooded areas, remote.	H—no man- made de- velopments.
8 Indifferent	4.9	low on most scores moderate on exercise	L—25 miles moderate hills, curves, ski track.		L— primitive camping	L—wooded areas, remote.	L— encountering nobody, no man-made de- velopments H—powerlines

for variety and the more challenging kinds of experiences.

We will attempt to predict the direction of change in the relative proportions of skiers in each of the eight types. We do not have the information necessary to accurately quantify the magnitude of change.

Types 3 and 4 can be expected to increase because of the increasing opportunity for social contact provided by cross-country skiing. Type 6 should also increase as a larger proportion of skiers become

skilled and confident of their abilities. We can expect a decreasing percentage of moderates (Type 1) as more skiers begin to identify and associate with specialized interests.

There is little evidence to indicate that the other types (2, 5, 7, and 8) won't remain relatively constant. There will always be a small group of indifferent (Type 8) skiers or those who are phasing out for one reason or another; some because they have gotten all the enjoyment they could from the sport,

and others because they tried it and simply found that it wasn't to their liking.

### A summary matrix

Figure 2 summarizes our data for each of the eight skier types. This matrix will be referred to in the final section where we will discuss the use of the data for making management and planning decisions.

Participation patterns 1977-78 season	Socioeconomic Characteristics	Resource Demands	Projection
3.7 years experience 10.3 days skied 1.6 days 7+ miles 1.0 trips more than 50 miles 2.6 places	no outstanding differences	no "special" needs	decreasing
5.0 years experience 9.0 days skied .9 days 7+ miles 1.0 trips more than 50 miles 2.9 places	slightly older, slightly higher income	easy trails, not too crowded, near lodging	
3.6 years experience 11.3 days skied 1.6 days 7+ miles .6 trips more than 50 miles 2.6 places	higher proportion female, lower than average income	good trails, well groomed, close to home	increasing
2.9 years experience 10.0 days skied 2.2 days 7+ miles 1.5 trips more than 50 miles 3.2 places	high proportion female housepersons, high percent in 25-39 age bracket, high income, most education	good trails, not too difficult, fair tolerance for crowding	increasing
3.4 years experience 9.4 days skied .1 days 7+ miles .4 trips more than 50 miles 1.9 places	oldest group, high income, professional/technical occupations high, smallest percent rural	easy trails, close to home	
5.0 years experience 16.6 days skied 3.2 days 7+ miles 1.8 trips more than 50 miles 3.7 places	youngest group, large proportion students, low incomes, large percent rural	large, remote, undeveloped areas. low need for facilities and maintenance	increasing
9.7 years experience 8.8 days skied 1.9 days 7+ miles .3 trips more than 50 miles 1.4 places	bi-modal age distribution least education	undeveloped, uncrowded areas	
4.7 years experience 6.7 days skied .2 days 7+ miles .2 trips more than 50 miles 1.7 places	close to average	easy trails, close to home	

## Using The Results For Planning And Management Decisions

The results of this study (or similar studies) can be utilized to help accomplish these major management or planning tasks:

1. Assessing and predicting need.
2. Allocating resources.
3. Mixing uses.
4. Designing and implementing.
5. Developing an information system.

We will now describe the rationale and procedures which could be followed for each of these tasks. Obviously, each agency or planning unit will have its own policies and guidelines which must be taken into consideration. Table 2 and Figure 2 will provide most of the necessary information.

### Assessing and predicting needs

Needs have been defined in two ways by our study; first in terms of motivations or reasons for participation, and second, in terms of specific environmental attributes which satisfy those motives. The former help to develop an overall "feel" for the kind of experience skiers are seeking. The latter helps to translate needs into management objectives.

Table 2 provides a list of all the environmental attributes included in our survey instrument. Figure 2 points out the significant differences among the eight types. By identifying subgroups of skiers, we have enabled planners to cater to real needs rather than to the "average skier" which doesn't exist. A brief summary of the resource demands of each skier type is offered in the second to last column of the matrix.

The participation patterns described in the matrix can help to quantify the actual use of trails and areas. This information should be tempered by a knowledge of the desire for variety and the aversion to crowding.

Planning is always for the future. Therefore, it is important to have some idea of trends. We have

attempted to predict the direction of change for each of the skier types. These estimates suggest that we should place more emphasis on supplying those groups with increasing numbers than the current proportions would appear to warrant.

### Allocating resources

Resources are always limited. Therefore, the relevant question is not, "How much does each skier type need?" but rather, "What proportion of the available resources should each type receive?" Our study addresses the latter question. It tells us something about relative needs; it does not provide an absolute measure of need.

Resources can be divided into three general categories: (1) land or space, (2) facilities or developments, and (3) attention or administration. Land or space is fundamental and often the most bitterly contested. A few allocation principles will be suggested.

We can begin with the simple assumption that space should be allocated according to the relative number of participants in each skier type. This follows from the "one person, one vote" principle. In other words, entitlement is not necessarily a function of how rapidly an individual can use up a resource. But, realistically, we can modify this approach somewhat after noting some differences in the requirements of each group. Some types are more tolerant of crowding and have a greater need for well developed and maintained trails. Types 6 and 7 require large, undeveloped, uncrowded areas. We can begin to make trade-offs. We can give Types 6 and 7 more area, but we needn't allocate as much to development and trail maintenance.

Fortunately, these differences can be accommodated quite easily. The large, natural areas tend to be located further from population centers. The demand for concentrated, refined trail systems is greatest in the metropolitan area. Large numbers of users justify higher development and maintenance costs; the smaller number of

skilled wilderness skiers simply need space. A lower level of development also tends to discourage mass use and thus protects the solitude these skiers are seeking.

The approach outlined here is quite different from the more typical "majority rule" or "provide for the average" strategy. Our data show that these traditional methods would meet the needs of less than half of the participants in cross-country skiing. Whatever the allocation process, it is important that the public is aware and involved in its formulation. If the public can agree on a procedure which they feel is equitable, they are far less likely to complain about the results.

### Mixing uses

We cannot realistically cater to every individual's unique set of needs. Our procedures have already lumped cross-country skiers into eight types. We may have to go a step further and form these types into fewer, larger groups. The data provided in Figure 2 enable us to combine subgroups in a logical fashion with the least loss of variety.

For example, Types 6 and 7 have nearly the same environmental requirements and relatively few indications of conflict. Types 3 and 4 are both relatively tolerant of crowding and require safe, well maintained trails. Types 2, 5, and 8 could also be lumped on the basis of their need for easy, accessible trails.

Another kind of mixing is probably even more important in respect to maximizing the benefits derived from our land resources. Cross-country skiers needn't have areas designated only for their use; yet it is critical to know what uses can be combined and which cannot. Table 2 presents a clear indication of which "multiple use sets" are the most likely to be accepted.

It is not exactly a revelation that most ski tourers do not prefer to share areas with snowmobiles. Our data go a step further and provide a basis to compare this level of preference with that for other land uses.

An important finding is that cross-country skiers will mix much more readily with logging or timber management than with snowmobiling. This means that we can use vast areas of forest designated for wood production to meet a large part of the demand for ski touring opportunities. We need not, as has been traditional, think only of the association of cross-country skiing and natural or wilderness areas. The strong preference for wooded areas reinforces this notion, as does the desirability of utilizing abandoned logging roads. There is little reason to believe that functioning logging roads cannot be used on a time-allocated basis.

The ski tourer's low tolerance for crowding also suggests a willingness to compromise on other aspects of the environment. In other words, skiers will share an area with some other types of uses rather than be confined to small areas where their own numbers create a conflict.

A fairly high preference for connecting trails indicates that origins and destinations may be as important as the trail itself. A trail meeting minimal physical and aesthetic standards may be used simply because it goes where the skier wants to go. The high preference for overnight lodging and other complementary facilities may also reveal the importance of trail location as opposed to its immediate characteristics per se. Trails need to be evaluated in the context of an entire system, not as isolated segments.

Mixing is a difficult question rife with debate and political implications. It is important to have a sound empirical base for decision-making.

### **Designing and implementing**

In a general way, the results of this study provide guidelines for trail construction and the provision of complementary facilities. We have some idea of the level of difficulty each group prefers as well as the importance of signing, rest areas, etc.

Skiers (and other user groups)

are often used as consultants for the detailed design and layout of trails. These consultants tend to be the more experienced, highly skilled participants and thus may be biased toward difficult, challenging trails. Although it would be foolish to discourage this type of input, it may be desirable to balance it with skiers who represent the actual group the area is intended for.

### **Developing an information system**

A critical part of any recreation program is the complete, accurate communication of the existence, purpose, and content of available opportunities. This type of information allows the user to make a rational choice of destination and thus maximize the probability of a satisfying experience. A direct indication of the importance of information is shown by the high desirability score for maps and signs in Table 2.

Our data should be an aid in formulating descriptions of ski touring areas and trails. Table 2 provides an indication of the relative importance of the various environmental attributes to all cross-country skiers. Those items at the extremes, i.e., either very desirable or very undesirable, should be included in any description. In addition, it is necessary to include those items which distinguish among the eight types of cross-country skiers, as shown in Table 3.

### **Tasks for the private sector**

With one important exception, the preceding tasks are much the same for the commercial enterprise as for the public sector. The exception is that allocation is replaced by selection, e.g., the resort operator must decide which group(s) he/she will provide for. The private sector has no obligation to allocate resources in an equitable manner.

A glance at the descriptive matrix (Figure 2) should make it clear that a private firm is in a better position to cater to some groups

than to others. The close knit complex of well maintained and groomed trails associated with comfortable overnight accommodations is a more easily captured (in the economic sense) opportunity for which there is a well defined demand. Cross-country skier Types 3 and 4 ("social exerciser" and "family/social") best fit this kind of opportunity.

The private sector can also perform functions which complement the public sector. Meals and lodging can be offered at locations convenient to public areas and trails. Outfitting and guide services can be provided for those who need a little help in visiting the more remote, undeveloped areas. Information systems can be developed and sold by private firms or individuals. In all cases, coordination and cooperation are critical factors.

The remaining tasks are modified only slightly for the private operator. Obviously, resort managers want to know the market and future trends. They must also have a feel for what kind of activities or land uses can be mixed together; more than one enterprise has failed because it attempted to satisfy too diverse a clientele. Design and implementation are easily understood chores. Finally, it is very important for commercial operators to describe their product in a way that appeals to the intended market.

We have not exhausted the possible applications of our data. Most public land management agencies and commercial establishments have a number of specific needs for supporting data which can be provided by the approach we have outlined.

### **Limitations and Refinements**

Cross-country skiing is a rapidly evolving form of recreation. Aspects of the activity which were hardly known yesterday are popular features today. Further complicating the picture is the large number of new skiers entering the sport every year. These inexperi-

enced skiers may not have a clear notion of their major interests or preferences—at this stage they are simply trying it out. It would be a mistake to weigh today's preferences too heavily when planning for tomorrow.

Planners and managers have a strong preference for factual data. Nevertheless, we should not eliminate innovation or trial and error altogether. On a reasonable scale, these techniques can reveal preferences which the most carefully designed study would miss. There is no way for a participant to express a need for something he or she cannot even visualize. The essence of recreation is the search for new and different experiences. With imagination, land managers can contribute to the quest.

A major component of any recreation system is information. The public should know what opportunities are available. There are two important reasons for this knowledge: (1) information allows individuals to more rationally select recreation destinations, and (2) public input to land use decisionmaking is more meaningful when people have a clear notion of what the current supply is. Skiers, for example, need a clear description of the available opportunities. This should include location, level of development, signing, maintenance, and the presence of complementary facilities. A good information system assures constant feedback to the management agency. Any attempt to measure recreational needs should be accompanied by some measure of knowledge or awareness; many expressions of demand may reflect, to some degree, a lack of awareness of what is available.

There are a number of refinements which could be incorporated in subsequent studies. Obviously, the environmental attributes or preference items could be described in much more detail. We could, for example, specify the size and color of signs, the density of forest cover, or the type of mattresses furnished in a lodge. It requires a good deal of judgement to decide how much detail is necessary and which distinctions are significant.

Another refinement would be to put our attributes together into packages and obtain the skiers' responses to these. A realistic format may involve selecting from paired choices or allocating a hypothetical investment.

For planning, the future is all important. Perhaps it would be better to focus on intentions rather than the current use patterns and preferences. This, of course, is risky, but we should give it some consideration.

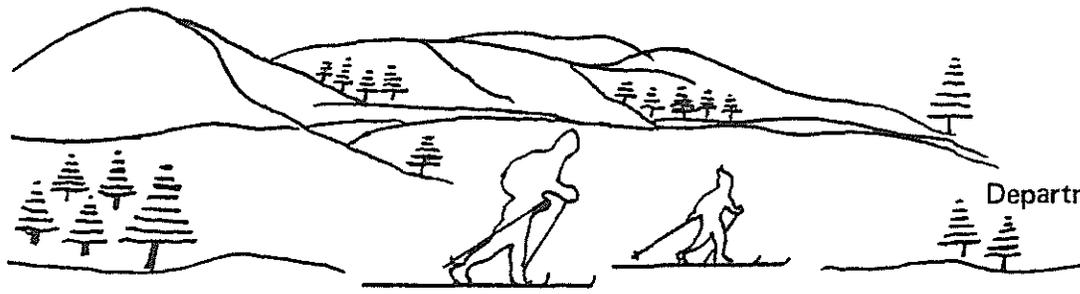
We know very little about the individual's decision making process. Detailed "participation histories" could be obtained from in-depth interviews. Even a small sample might reveal processes which have been largely ignored in the prediction of recreation trends.

Planners and administrators will always be forced to make decisions on the basis of limited information. The data provided by this study of cross-country skiers should add a small measure to the empirical base. We also believe that the procedures we have described for the collection and the application of data can help to improve the rationale for subsequent studies and decisions.

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# Appendix A: The Questionnaire



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## MINNESOTA CROSS-COUNTRY SKIING STUDY-1978

### PART I: YOUR CROSS-COUNTRY SKIING PARTICIPATION

This section of the questionnaire asks about your cross-country skiing during past years. If you cannot remember the exact information, please give your best guess. When we use the word season, we mean cross-country ski season. To identify a specific cross-country ski season use the two years associated with that season. For example, last season went from about November, 1977, to March, 1978, and would be called the 1977-78 season.

1. In which season did you last go cross-country skiing? 19 \_\_\_ - \_\_\_ season
2. In which season did you first go cross-country skiing? 19 \_\_\_ - \_\_\_ season
3. On approximately how many days did you go cross-country skiing that first season? \_\_\_\_\_ Day (s)
4. The first time you ever went cross-country skiing, did you go: (check one)
  - \_\_\_\_\_ A. Alone?
  - \_\_\_\_\_ B. With friend (s) only?
  - \_\_\_\_\_ C. With family member(s) only?
  - \_\_\_\_\_ D. With friend(s) and family member(s)?
5. When you first got involved in cross-country skiing, what made you think you might enjoy it? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
6. Briefly describe the first place you ever went cross-country skiing. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
7. Have you ever taken cross-country ski lessons? \_\_\_\_\_ Yes \_\_\_\_\_ No
8. Do you own one or more pairs of cross-country skis for your own use?  
 \_\_\_\_\_ Yes: How many pairs? \_\_\_\_\_ Pair(s); When did you get your first pair? 19 \_\_\_\_\_  
 \_\_\_\_\_ No: If you have owned cross-country skis in the past, when did you get rid of them? 19 \_\_\_\_\_
9. Of your five closest friends, how many also cross-country ski? \_\_\_\_\_
10. Do you belong to an organized cross-country ski club? \_\_\_\_\_  
 \_\_\_\_\_ Yes: How many years have you been a member of such clubs? \_\_\_\_\_ Year(s)  
 \_\_\_\_\_ No

11. What do you enjoy most about cross-country skiing? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. How would you rate yourself regarding your cross-country skiing skill level? (check one)  
Novice \_\_\_\_\_ : Advanced Novice \_\_\_\_\_ : Intermediate \_\_\_\_\_ : Advanced Intermediate \_\_\_\_\_ : Advanced \_\_\_\_\_ : Expert \_\_\_\_\_

13. Assuming snow conditions are about the same this coming season as they were last season, about how much cross-country skiing do you plan to do this coming season? (check one)  
\_\_\_\_\_ A. I plan to do less this coming season than I did last season.  
\_\_\_\_\_ B. I plan to do about the same amount this coming season as I did last season.  
\_\_\_\_\_ C. I plan to do more this coming season than I did last season.

14. Please rank each of the past five seasons according to the number of days on which you went cross-country skiing in each season. Put a "1" by the season you went the greatest number of days, a "2" by the season you went the second greatest number of days, and so on.

Season	Rank
1977-78	_____
1976-77	_____
1975-76	_____
1974-75	_____
1973-74	_____

15. Last season, at how many different places (e.g., parks, golf courses, recreation areas, forests, and so on) did you go cross-country skiing? \_\_\_\_\_ Place(s)

16. Last season about what percent of your cross-country skiing days were on weekends (Saturday or Sunday)? \_\_\_\_\_ Percent

17. Last season, on how many days did you: (write the appropriate number of days in each blank)

(1) go cross-country skiing? \_\_\_\_\_ Day(s)

(2) cross-country ski alone or with each of the following types of groups?  
Number of days

_____	A. Alone
_____	B. With family member(s) only
_____	C. With friend(s) only
_____	D. With both family member(s) and friend(s)

(3) cross country-ski for each of the following distances:  
Number of days

_____	A. Less than 3 miles
_____	B. 4 to 6 miles
_____	C. 7 to 9 miles
_____	D. 10 miles or more

(4) travel each of the following distances from home to the place where you cross-country skied?  
Number of days

_____	A. Less than 10 miles
_____	B. 10 to 50 miles
_____	C. More than 50 miles

(5) go cross-country skiing with each of the following number of people?  
Number of days

_____	A. 1 other person
_____	B. 2 to 5 other people
_____	C. More than 5 other people.

## PART II: REASONS FOR CROSS-COUNTRY SKIING

People participate in cross-country skiing for a wide variety of reasons. Listed below are reasons some people may consider important. Please check how important each reason is for your participation in cross-country skiing.

	Not at all Important	Slightly Important	Somewhat Important	Very Important	Extremely Important	Of utmost Importance
1. Because my friends do it	( )	( )	( )	( )	( )	( )
2. To help keep me physically fit	( )	( )	( )	( )	( )	( )
3. To develop my skills and abilities	( )	( )	( )	( )	( )	( )
4. To be with others who enjoy the same things I do	( )	( )	( )	( )	( )	( )
5. To enjoy winter scenery	( )	( )	( )	( )	( )	( )
6. Because others recognize and admire me for doing it	( )	( )	( )	( )	( )	( )
7. To get away from other people	( )	( )	( )	( )	( )	( )
8. For a chance to have control over things	( )	( )	( )	( )	( )	( )
9. So the family can do something together	( )	( )	( )	( )	( )	( )
10. Because it gives my mind a rest	( )	( )	( )	( )	( )	( )
11. To feel better about myself	( )	( )	( )	( )	( )	( )
12. So I could do things with my companions	( )	( )	( )	( )	( )	( )
13. To learn things about an area	( )	( )	( )	( )	( )	( )
14. To get away from crowded situations for a while	( )	( )	( )	( )	( )	( )
15. Because it is stimulating and exciting	( )	( )	( )	( )	( )	( )
16. To learn more about nature	( )	( )	( )	( )	( )	( )
17. It's nice for others to see me doing things I'm good at	( )	( )	( )	( )	( )	( )
18. Because of the risks involved	( )	( )	( )	( )	( )	( )
19. For the exercise	( )	( )	( )	( )	( )	( )
20. To help release or reduce some built up tensions	( )	( )	( )	( )	( )	( )
21. To be close to nature	( )	( )	( )	( )	( )	( )
22. To explore things	( )	( )	( )	( )	( )	( )
23. To get away from the demands of other people	( )	( )	( )	( )	( )	( )
24. To do something creative such as sketch, paint, take photographs	( )	( )	( )	( )	( )	( )
25. For a chance to be on my own	( )	( )	( )	( )	( )	( )
26. To help bring the family together more	( )	( )	( )	( )	( )	( )
27. To gain a better sense of self-pride	( )	( )	( )	( )	( )	( )
28. To enjoy distant or unobstructed views	( )	( )	( )	( )	( )	( )
29. To think about my personal values	( )	( )	( )	( )	( )	( )
30. To share my skill and knowledge with others	( )	( )	( )	( )	( )	( )
31. Change from my daily routine	( )	( )	( )	( )	( )	( )
32. To meet new people	( )	( )	( )	( )	( )	( )
33. To be away from the family for a while	( )	( )	( )	( )	( )	( )
34. Because of the uncertainty of not always knowing what will happen	( )	( )	( )	( )	( )	( )
35. To substitute for walking or jogging	( )	( )	( )	( )	( )	( )

## PART III: YOUR CROSS-COUNTRY SKIING PREFERENCES

Listed below are several items describing environmental characteristics, features, and situations you might encounter while cross-country skiing. Thinking of the kind of cross-country skiing you most enjoy, please check how desirable you think it would be to encounter each item while cross-country skiing.

	Very Undesirable	Undesirable	Neutral	Desirable	Very Desirable
1. Well groomed trails	( )	( )	( )	( )	( )
2. Steep hills (at least 20 percent slope)	( )	( )	( )	( )	( )
3. Nature interpretation signs along trails	( )	( )	( )	( )	( )
4. Encountering nobody else while skiing	( )	( )	( )	( )	( )
5. Encountering hikers or showshoers on the trail	( )	( )	( )	( )	( )
6. Skiing through mostly wooded areas	( )	( )	( )	( )	( )
7. Trails at least 25 miles long	( )	( )	( )	( )	( )
8. Distance markers at regular intervals	( )	( )	( )	( )	( )
9. Sharply curved downhill runs	( )	( )	( )	( )	( )
10. Developed overnight facilities (cabins or lodge) nearby	( )	( )	( )	( )	( )
11. Areas that have been logged over within the last 5 years	( )	( )	( )	( )	( )
12. Trails connecting different recreational areas	( )	( )	( )	( )	( )

	Very Undesirable	Undesirable	Neutral	Desirable	Very Desirable
13. Trails through active logging areas	( )	( )	( )	( )	( )
14. Trails wide enough for two skiers	( )	( )	( )	( )	( )
15. Breaking my own trail through unbroken snow	( )	( )	( )	( )	( )
16. Skiing along lakes and streams	( )	( )	( )	( )	( )
17. Rest stops with tables and benches	( )	( )	( )	( )	( )
18. No man-made developments visible at all	( )	( )	( )	( )	( )
19. Trails that have been tracked only by other skiers	( )	( )	( )	( )	( )
20. Signs showing trail route and length	( )	( )	( )	( )	( )
21. Warming house with restroom at trail head	( )	( )	( )	( )	( )
22. Gentle slopes (less than 10 percent slope)	( )	( )	( )	( )	( )
23. Encountering a few other skiers (5-10 per hour)	( )	( )	( )	( )	( )
24. Skiing through mostly open areas	( )	( )	( )	( )	( )
25. Downhill runs with sharp curves at the bottom	( )	( )	( )	( )	( )
26. Remote, hard to reach areas	( )	( )	( )	( )	( )
27. Trails about 5 miles in length	( )	( )	( )	( )	( )
28. Residential development	( )	( )	( )	( )	( )
29. Sounds of autos	( )	( )	( )	( )	( )
30. Wildlife and signs of wildlife	( )	( )	( )	( )	( )
31. Encountering a lot of other skiers (more than 40 per hour)	( )	( )	( )	( )	( )
32. Developed parking area	( )	( )	( )	( )	( )
33. Trails connecting different communities	( )	( )	( )	( )	( )
34. Areas with young pine trees	( )	( )	( )	( )	( )
35. Moderately steep hills (about 15 percent slope)	( )	( )	( )	( )	( )
36. Snowmobiles on parallel trails within 50 feet	( )	( )	( )	( )	( )
37. Encountering large groups of skiers (more than 10 people together)	( )	( )	( )	( )	( )
38. Seeing powerlines and similar man-made structures	( )	( )	( )	( )	( )
39. Snowmobiles on the same trail as I	( )	( )	( )	( )	( )
40. Pocket trail maps	( )	( )	( )	( )	( )
41. Warning signs before steep hills and junctions	( )	( )	( )	( )	( )
42. Ski patrol on trails	( )	( )	( )	( )	( )
43. Areas without trails where I can ski anywhere I want	( )	( )	( )	( )	( )
44. Skiing on abandoned logging roads	( )	( )	( )	( )	( )
45. One-way single land trails	( )	( )	( )	( )	( )
46. Skiing across flat terrain	( )	( )	( )	( )	( )
47. Signs indicating difficulty of trail	( )	( )	( )	( )	( )
48. Primitive winter camping facilities (clearing, outdoor toilet, fireplace)	( )	( )	( )	( )	( )
49. Areas within a short distance of home	( )	( )	( )	( )	( )
50. Hearing or seeing snowmobiles	( )	( )	( )	( )	( )
51. Trails requiring a high degree of skill	( )	( )	( )	( )	( )
52. Skiing across lakes	( )	( )	( )	( )	( )

### PART IV: OTHER INFORMATION

1. Have you ever participated in any of the following activities?

Yes No

- Snowshoeing  
  Downhill skiing  
  Snowmobiling  
  Winter Camping (other than in a trailer or vehicle)

3. What is your age? \_\_\_\_\_

5. Which of the following best describes the area in which you live? (check one)

- Metropolitan area with over 250,000 people  
 Urban area with 25,000-250,000 people  
 City with 10,000-25,000 people  
 Town with under 10,000 people  
 Rural area

7. What is the highest level of education you have completed so far? (circle one)

1 2 3 4 5 6 7 8 9 10 11 12

Elementary

High School

13 14 15 16 17 18 19 20+  
College or Vocational Training

2. Last season, on how many days did you participate in each of the following activities?

Number of days

- \_\_\_\_\_ Snowshoeing  
 \_\_\_\_\_ Downhill skiing  
 \_\_\_\_\_ Snowmobiling  
 \_\_\_\_\_ Winter camping (other than in a trailer or vehicle)

4. What is your sex? \_\_\_\_\_ Female, \_\_\_\_\_ Male

6. Please circle the description (in question 5) which best describes the type of area in which you spent most of the first 18 years of your life.

8. What is your occupation? \_\_\_\_\_

PLEASE USE THE STAMPED, SELF-ADDRESSED ENVELOPE PROVIDED TO RETURN THE COMPLETED QUESTIONNAIRE.  
THANK YOU VERY MUCH FOR YOUR COOPERATION!

## **Appendix B: Statistical Procedures**

### **Construction of motivational scales**

The 35 items contained in Part II of the questionnaire were screened to select the 25 most important "reasons for cross-country skiing." An item was retained if at least 20 percent of the respondents scored it in the upper three response categories.

The responses were coded from "1" (not at all important) to "6" (of utmost importance) and then subjected to an R-type cluster analysis using the Biomedical Computer Programs, P-Series (BMDP1M) "cluster analysis of variables" program. This is a form of hierarchical cluster analysis which groups variables or objects together on the basis of their similarity. Pearson product-moment correlations were used as the measure of association. A "complete linkage" amalgamation rule was used in the analysis to avoid the chaining problem resulting from "single linkage" analysis.

The resulting scales met a standard of .4 average interitem correlation and a reliability coefficient of at least .77.

### **Typing cross-country skiers**

The item scores for each scale were averaged for each respondent. Their mean scores were then cluster analyzed using BMDP2M "cluster analysis of cases" program. Scale scores were standardized before clustering. Thirty-three individuals could not be classified because of incomplete data. Ninety-seven (17.2 percent) could not be classified because of their erratic response patterns. The homogeneity of each type is supported by the observation that each type's standard deviation on each of the scales is, with a few exceptions, much less than that for the ungrouped data.

### **Hypotheses testing**

This procedure investigated the possibility that different types

of cross-country skiers (based on expected benefit profiles) would vary in their preferences for situational attributes. The eight cross-country skiing types served as independent variables and the preference items as dependent variables.

The items were grouped into seven categories: (1) trail characteristics, (2) level of amenities/facilities development, (3) level of encounters with other skiers, (4) proximity to other types of use, (5) general degree of ski area naturalness, (6) vegetative cover type, and (7) ski area location. The general form of the hypotheses was: "The respondents preferences for (one of the seven attribute categories) will vary according to cross-country skier type."

For each hypothesis, one-way analysis of variance was used to test for differences on mean preference scores among the eight cross-country skier types. Where significant differences were found (.05 level) and the crucial analysis of variance assumption of equal variances (.05 level) was met, the Tukey Honest Significant Difference (HSD) test was used to identify the specific types whose preferences differed significantly. A weaker, Least Significant Difference (LSD), procedure was used to locate means where the HSD failed to show a significant difference and the overall F-value did. As reported in the main text, 15 items were identified.





