Winter recreation conflicts in two areas near Missoula, Montana

William Brown Mahoney

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WINTER RECREATION CONFLICTS IN
TWO AREAS NEAR MISSOULA, MONTANA

By
William Brown Mahoney
B.A., Ohio State University, 1969

Presented in partial fulfillment of the requirements for the degree of
Master of Arts
UNIVERSITY OF MONTANA
1973

Approved by:

[Signatures]

Date June 1, 1973
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CHAPTER I

INTRODUCTION

Individuals who participate in outdoor recreation are, consciously or unconsciously, hoping to satisfy certain personal needs. Examples of these needs are exercise, change in routine, or escape from one's urban environment. Outdoor recreation activities are usually physically and psychologically rewarding, although they can end in frustration.\(^1\) Need satisfaction can be frustrated, for example, by lack of adequate facilities or by conflicts with other users. It is upon user conflicts that this study focuses. The word "conflict" is used to refer to the physical or psychological interference of one (or more) recreationist with another.

Objectives

This thesis describes a study of winter recreational conflicts in two areas: the Upper Rattlesnake Creek area north of Missoula, Montana, and the Lolo Pass area where U.S. Highway 12 crosses the Montana-Idaho state line (Figure 1). The recreational activities involved are snowmobiling, cross-country skiing (ski touring), snowshoeing, hiking, and the use of toboggans, sleds, and other downhill sliding conveyances.

FIGURE 1. Study Area Locations
The purpose of this study is to examine the following questions:

1. Do winter recreational conflicts exist? Are there conflicts between snowmobilers and non-motorized recreationists? Do conflicts exist among snowmobilers and among non-motorized recreationists?

2. If there are conflicts, what are their causes? For example, how significant are engine noise and environmental damage in causing conflict of snowmobiling with non-motorized recreation? What do spatial variations of use show about the intensity of conflict? For example, does the spatial distribution of use suggest that some recreationists actively seek to avoid potential conflict?

Classes of Conflict

The conflicts discussed in this study fall into two major categories: inter-group and intra-group. Inter-group conflicts are between motorized and non-motorized recreationists. Intra-group conflicts are among motorized recreationists or among non-motorized recreationists. Thus, there are four classes of possible conflicts and they will be handled in the following order:

1. conflicts of snowmobilers with non-motorized recreationists,
2. conflicts of non-motorized recreationists with snowmobilers,
3. conflicts of snowmobilers with other snowmobilers and
4. conflicts of non-motorized recreationists with other non-motorized recreationists.

The term non-motorized recreationist refers to those for whom recreational travel does not depend on a mechanized vehicle. Motorized recreationists are those who ride on or are pulled by a mechanized vehicle in order to travel within the recreation areas.
The Conflict Schematic

A schematic of recreational conflicts (Figure 2) has been developed to facilitate systematic examination of data. It serves as an organizing framework in describing the interrelationship between the causes of conflict and their results. The schematic also provides a framework for comparing this study with previous recreational conflict research.

The various categories of the schematic are general (not referring specifically to winter recreation conflicts or motorized—non-motorized use conflicts) in order to permit its use in the study of all forms of recreation conflicts, no matter what specific activities or geographical areas are involved.

Selection of Study Areas

The Lolo Pass and Upper Rattlesnake areas were chosen as study areas for the following reasons:

1. Amount of use. Personal interviews with local ski-tourers and snowmobilers revealed that Lolo Pass is one of the most popular areas near Missoula for both snowmobiling and non-motorized recreation. Two preliminary checks of the Upper Rattlesnake indicated that this area is also heavily used for both types of recreation.

2. Controlled access at one point. In order to insure that a representative sample of users was questioned, study areas were needed that had only one access point. A single access was needed because only one person was questioning the recreationists. The Upper Rattlesnake has one public entrance—a gate three feet wide located on the Rattle-
FIGURE 2

A SCHEMATIC OF RECREATIONAL CONFLICTS

<table>
<thead>
<tr>
<th>Basis of Conflict</th>
<th>Direct Causes of Conflict</th>
<th>Results of Conflict</th>
</tr>
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<tbody>
<tr>
<td>impairment of recreationists' opportunities to maximize their personal satisfaction</td>
<td>annoying behavior of some users</td>
<td>Social-behavioral manifestations</td>
</tr>
<tr>
<td></td>
<td>congestion of recreation areas and congestion related problems</td>
<td>decreased user satisfaction</td>
</tr>
<tr>
<td></td>
<td>environmental degradation</td>
<td>antagonism between users</td>
</tr>
<tr>
<td></td>
<td>differences among user objectives</td>
<td>competition for facilities</td>
</tr>
<tr>
<td></td>
<td>differences between user group objectives and management agency objectives</td>
<td>demands for regulation of facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>demands for more facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>decrease or cessation of recreation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>change in form of participation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social-spatial-temporal manifestations</td>
</tr>
<tr>
<td></td>
<td>competition for facilities</td>
<td>attempts to use areas during &quot;slack&quot; periods</td>
</tr>
<tr>
<td></td>
<td>shift to new locations</td>
<td>decrease or cessation of participation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>change in form of participation</td>
</tr>
</tbody>
</table>
snake Road (Figures 1 and 3). Nearly all winter access to the Lolo Pass area is from the plowed-out parking lot at the pass itself (Figures 1 and 4).

3. **Markedly different locational and environmental characteristics of the two areas.** Stankey pointed out that locational and environmental characteristics influence both the type and amount of use.

FIGURE 3. Entrance to Upper Rattlesnake area in late winter. Small open entrance gate is in front of car on the right. (Photo by author)
FIGURE 4. Lolo Pass. The parking area is generally plowed out enough to give a few recreationists room for parking. (Photo by E. Whitaker)

It was felt that the locational and physical environmental differences of these two study areas would increase the possibility of interviewing a relatively diverse sample of users.

For example, the Upper Rattlesnake is only six miles from Missoula; distance and road conditions are likely not a limiting factor on use. On the other hand, Lolo Pass is 45 miles from Missoula. Intervening opportunities might limit its use at times when snowcover is

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adequate at closer locations, such as the Blue Mountain area (5 miles southwest of Missoula), Upper Pattee Canyon (5 miles southeast of Missoula) or the Upper Rattlesnake area.

The physical environment of the Upper Rattlesnake is characterized by narrow valleys, heavily wooded steep hillsides, and generally "wet" snow conditions (Figure 5). In contrast, Lolo Pass has several

FIGURE 5. Rattlesnake Creek near entrance gate looking north with Stuart Peak in background. Probably no other easily accessible winter recreation area within ten miles of Missoula has similar aesthetic quality.  
(Photo by author)
large open meadows and one moderately sloping, partially open hillside (Figure 6). Lower temperatures and deeper, "dryer" snow are found at Lolo Pass.

Data Collection

Field data were collected from January 8 to March 15, 1972, in the Upper Rattlesnake and from January 9 to April 20, 1972, at Lolo Pass. One day each weekend was spent at Lolo Pass and the other at the Upper Rattlesnake. The day spent at each place was alternated every weekend.

The hours of data collection were staggered. It was presumed

FIGURE 6. The Lolo Pass area. View is from segment A to the partially open, moderately sloping hillsides of segment J (Figure 10, p. 49). The latter segment was popular for snowmobile hill climbing and downhill runs by skiers.

(Photo by author)
that very few recreationists would be leaving the study areas before 10 A.M. or after 10 P.M. The hours between 10 A.M. and 10 P.M. were divided into three four-hour periods: 10 A.M. to 2 P.M., 2 P.M. to 6 P.M. and 6 P.M. to 10 P.M. It was correctly assumed that the largest number of parties would be exiting between 2 P.M. and 6 P.M. Thus, on every weekend day when data were collected, the 2 P.M. to 6 P.M. period was spent at one of the two areas. In addition, either the 10 A.M. to 2 P.M. or the 6 P.M. to 10 P.M. period was spent in the same area. Data were, therefore, collected for eight hours on each weekend day.

An average of one weekday was also spent in one of the two study areas each week. The same four hour periods were used for data collection on weekdays.

The source of the data was a schedule administered to one randomly chosen member of each exiting recreation party (Figure 7). A copy of the schedule is found on pp. 72-77. If a recreationist or another member of his party had been questioned previously, he was only asked about the route of his trip in the study area. Consequently, the data concerning other recreationists encountered contains no data from persons questioned more than once.

A total of 225 people were questioned (106 at Lolo Pass and 119 in the Upper Rattlesnake) (Table 1). Prior to March 15, non-motorized recreation was the dominant activity at Lolo Pass. It was only after March 15, when most snow had melted at lower recreational areas, that snowmobiling predominated. In the Upper Rattlesnake, non-motorized parties outnumbered snowmobile parties 2.5 to 1 throughout the sampling
FIGURE 7. The author questioning snowshoers who had just returned from an overnight trip in Spring Gulch, Upper Rattlesnake Area. (Photo by E. Whitaker)

period. Hiking groups were by far the most numerous in this area (Figure 8).
### TABLE 1

**RECREATIONISTS QUESTIONED IN STUDY AREAS**

<table>
<thead>
<tr>
<th>Type of Recreational Transportation</th>
<th>Number of Recreationists Questioned In Lolo Pass Area</th>
<th>Number of Recreationists Questioned in Upper Rattlesnake Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowmobiling</td>
<td>59</td>
<td>33</td>
</tr>
<tr>
<td>Ski touring</td>
<td>32</td>
<td>17</td>
</tr>
<tr>
<td>Snowshoeing</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Hiking</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>Sledding</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>106</strong></td>
<td><strong>119</strong></td>
</tr>
</tbody>
</table>

FIGURE 8. Rattlesnake Road. It was generally well packed and, therefore, attractive to hikers, especially those with small children.
(Photo by E. Whitaker)
CHAPTER II

LITERATURE REVIEW OF RECREATIONAL CONFLICTS AND USE DISTRIBUTION

An examination of the literature dealing with recreational conflicts reveals information which is helpful in answering the three basic questions posed in this study: 1) Do winter recreation conflicts exist? 2) If conflicts exist, what are their causes? 3) What do spatial variations of use show about intensity of conflict? Although little empirically based data were available, some broad conceptual discussions in the literature focused on the general problem of conflict in recreation.

Conflicts Among Recreationists

Conflicts between motorized and non-motorized recreation have been cited in the literature. In Wilderness and Recreation--A Report on Resources, Values and Problems, 73 percent of the hikers interviewed who saw "motorboats or jeeps in the area" found them annoying. In another study, Burch and Wenger examined three styles of family camping: easy access, combination, and remote. They found "most campers in each camping style were unfavorable toward meeting trail scooters, and many provided valid examples of why they considered such mechanized equipment

undesirable."² Hendee et al. reported that more than 80 percent of the wilderness users surveyed felt motorized trail bikes and powerboats should be kept out of the backcountry.³

Lucas' study of the Boundary Waters Canoe Area (BWCA) examined responses of non-motorized canoeists and motorboaters to each other.⁴ The results showed a majority of paddling canoeists disliked encountering motorboats and preferred to see none at all. Motorboaters, on the other hand, either enjoyed encounters with paddling canoeists or were indifferent to their presence. They were predominately indifferent to encountering fellow motorboaters. When asked the number of canoeists and motorboaters they would like to meet, many motorboaters had no preference. Lucas felt "they apparently were not thinking in terms of crowding."⁵ Nearly three-fourths of the paddling canoeists enjoyed meeting other paddling canoeists, while one-fourth were indifferent. A majority preferred meeting between zero and five other non-motorized


⁵Ibid., p. 268.
canoes. It seems paddling canoeists were not adverse to meeting other people—apparently only some aspect or aspects of motorized use disturbed them.

Stankey's study in the BWCA, nine years later, revealed similar attitudes displayed by paddling canoeists and motorboaters. In addition, Stankey found that the satisfaction of paddling canoeists was greatest when about two fellow canoeists were encountered. Their satisfaction, however, declined sharply with any encounters with motorboats. Motorboaters reacted favorably to seeing up to approximately three other parties of either motorboats or canoes. He also found the location of encounters with other parties was important. Over two-thirds of those interviewed in the study areas preferred that any encounters with other parties occur on the wilderness periphery. Very few preferred such encounters in interior locations. Nearly one-fourth of the motorboaters in the BWCA, however, preferred encounters in the interior.

Specific Causes of Conflicts

Much speculation but little research appears to have been done to determine specific aspects of recreation which cause conflict between recreationists.

Several writers have speculated on what causes non-motorized winter recreationists to dislike snowmobiles. Baldwin stated that noise and fumes of snowmobiles are incompatible with the wilderness experience

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6 Stankey, p. 138.
7 Ibid., pp. 150-51.
of silence. Furthermore, according to Baldwin, snowmobiles have adverse effects on fish and wildlife, an aspect which might irritate non-motorized users. (The ecological impact has been well documented. See, for example, Proceedings of the 1971 Snowmobile and Off the Road Vehicle Research Symposium, East Lansing, Michigan, 1971.) At the National Symposium on Trails, Mattesich remarked that deep ruts left on trails by snowmobiles present problems for ski tourers, especially when the snow in these tracks partially melts and refreezes to ice.

On the other hand, no complaints by motorized recreationists about conflicting aspects of either motorized or non-motorized use were reported in the literature.

Information regarding aspects of some non-motorized users which irritate other non-motorized users appears limited. The most common complaint registered by hikers concerning other hikers in Thorsell's Yoho National Park study was littering (mentioned by 5.2 percent of those surveyed). In the study of Hendee et al., more than nine out of ten wilderness users surveyed felt that "barking dogs and yelling

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10 This does not include work such as that of George H. Stankey, "The Perception of Wilderness Recreation Carrying Capacity: A Geographical Study in Natural Resources Management" (unpublished Ph.D. dissertation, Dept. of Geography, Michigan State University, 1971) and J.W. Thorsell, A Trail Use Survey: Banff and Yoho National Parks (Ottawa, Canada: Department of Indian Affairs, 1968), which covered complaints of hikers about horses.
11 Thorsell, A Trail Use Survey..., p. 20.
people do not belong in wilderness-type areas." This may show that many complaints of non-motorized users about noise do not necessarily indicate an aversion to machines.

**Spatial Distribution of Recreationists**

The final question posed in this study involves the relation of spatial variation of use to the intensity of conflicts.

Several studies have examined the total distance traveled by non-motorized recreationists within recreational areas. Thorsell found the average hike in Waterton Lakes National Park was 7.7 miles (round trip) and about three miles in from the road in Banff and Yoho National Parks. In the Banff and Yoho study, only 11 percent of the trail users penetrated more than five miles from the road. He also reported that penetration by ski tourers seldom exceeded eight miles from park highways, even when overnight trips (9 percent of the total) are included. The University of California Wildland Research Center found "crowded use along zones inside wilderness boundaries, usually

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12 Hendee et al., p. 41.
14 Thorsell, A Trail Use Survey..., p. 15.
within half a day's travel distance from roadheads, has obliterated the wilderness atmosphere of several wilderness areas.\(^{16}\)

No information was located to help determine whether non-motorized recreationists spend most of their travel time on trails. Lucas, Schreuder, and James, however, found that the amount of use of lakes in the Mission Mountains Primitive Area was appreciable only for those lakes which had trails leading to them.\(^{17}\)

Use distribution information about motorized users is also limited. Lucas found motorboaters and motor canoeists generally did not penetrate as far into the BWCA as paddling canoeists.\(^{18}\) Heatherington found that snowmobile trail systems varied in length from four to 500 miles and had an average length of 50 miles.\(^{19}\) These were generally looped trails especially designed for snowmobiling which might indicate that most users traveled the entire length.

The studies of Lanier and Chubb\(^{20}\) in Michigan and the Minnesota

\(^{16}\)University of California Wildland Research Center, p. 299.


\(^{18}\)Lucas, The Quetico-Superior Area..., p. 211.


Department of Conservation\textsuperscript{21} revealed that slightly more than 50 percent of snowmobiling involved following cross-country trails. The remaining use included traveling to fishing spots and playing or racing in large open areas. Less open area use would be anticipated in mountainous western Montana.

\textbf{Summary}

If the results of the above studies can be applied to other similar areas and similar forms of motorized and non-motorized recreation, it would seem that non-motorized recreationists generally dislike encounters with motorized vehicles and their satisfaction decreases with increasing numbers of these vehicles. Most do not mind a limited number of encounters with other non-motorized recreationists although for most there is a relatively low tolerance for crowded conditions, particularly as the distance from the roadhead increases. Motorized recreationists, on the other hand, either enjoy encountering other users or show indifference toward them. They generally do not differentiate according to user type. A threshold of crowding probably exists for motorized users, but it is likely to be much higher than that of non-motorized users.

Much speculation but little research appears to have been done to determine specific aspects of recreational use which cause conflicts. But, it appears that non-motorized recreationists may be irritated by noisiness and littering of other recreationists.

Spatial distribution of non-motorized use appears uneven, diminishing rapidly with increasing distance from automobile access points. Motorized recreationists certainly have the potential to travel farther from access points than non-motorized recreationists in the same amount of time. There is a lack of evidence to indicate whether they, in fact, do or not.

The literature review raises several questions about winter recreation conflicts:

1. Are non-motorized winter recreationists as adverse to the presence of snowmobiles as other non-motorized recreationists are to the presence of motorized recreation vehicles?

2. How important are noisy machines, engine fumes, game disturbance, and trail damage in causing the conflict of snowmobiling with non-motorized recreation?

3. Are snowmobilers unconcerned about or perhaps even favorable to the presence of other recreationists, regardless of type, as were the BWCA motorboaters?

4. Does crowding cause conflict among non-motorized winter recreationists, as it did among BWCA paddling canoeists?

5. Are there instances of conflict among non-motorized winter recreationists caused by littering, or noisy people and animals?

6. Do snowmobilers travel farther from roadheads than non-motorized recreationists, as the literature suggests? If they do, does this make it difficult for non-motorized recreationists
to get away from them?

7. Do snowmobilers and non-motorized recreationists use the same general areas or do they usually avoid each other?
CHAPTER III

ANALYSIS OF WINTER RECREATIONAL CONFLICTS

Winter recreationists were surveyed in an attempt to answer the questions raised by the literature review. One member of each exiting party was questioned about other recreationists encountered. Each was asked how many groups of snowmobiles he had seen and his reaction to the number seen: "Was it to few, too many, about the right number, or did it make any difference to you?" Unless the interviewee responded that the number made no difference, he was asked: "What is about the maximum number of parties you could have seen and considered to be about the right number?" If the person had seen at least one snowmobile group he was also asked 1) whether anything in particular bothered him about the snowmobiles and 2) whether he liked or disliked snowmobiles being in the area or whether it made any difference to him. The interviewee was then asked similar questions regarding non-motorized users encountered.

1Non-motorized recreationists were also asked if they had heard any snowmobiles not seen and how they felt about the number of snowmobiles seen and heard.
Conflicts of Snowmobilers with Non-motorized Recreationists

Number of Snowmobile Groups Seen and Heard

A majority of non-motorized recreationists did not like to meet snowmobiles (Table 2). Seventy-seven percent of the non-motorized recreationists who saw no snowmobiles felt this was about the right number to see. Another 14 percent who saw no snowmobiles felt they had heard too many. Fifty-eight percent of the non-motorized users who saw two or more snowmobile groups felt the number they saw was "too many."

Nearly as high a percentage disliked seeing even one snowmobile group.

Thirty-six percent of the non-motorized recreationists reported hearing snowmobiles they did not see. Thus, the potential for inter-group conflict is introduced even where no visual contact occurs, a fact having important implications for zoning conflicting users away from one another.

Maximum Number of Snowmobile Groups Desired

Only 10 percent of the non-motorized recreationists indicated that the number of snowmobile groups seen and heard did not matter. The balance were asked to indicate the maximum number of snowmobile groups that would have been about right. Their responses fell into the
TABLE 2

FEELINGS OF NON-MOTORIZED RECREATIONISTS ABOUT NUMBER OF SNOWMOBILE GROUPS SEEN AND/OR HEARD

<table>
<thead>
<tr>
<th>Feelings about Number of Groups Seen and/or Heard</th>
<th>Percentage of Those Seeing No Snowmobile</th>
<th>1 Snowmobile Group</th>
<th>2 or more Snowmobile Groups</th>
<th>Percentage of All Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Few</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>About right</td>
<td>77</td>
<td>31</td>
<td>22</td>
<td>49</td>
</tr>
<tr>
<td>Too many</td>
<td>14*</td>
<td>54</td>
<td>58</td>
<td>37</td>
</tr>
<tr>
<td>Did not matter</td>
<td>9</td>
<td>0</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>15</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>13</td>
<td>36</td>
<td>92</td>
</tr>
</tbody>
</table>

*These are responses of persons hearing but not seeing snowmobiles and feeling they heard too many.
The following categories:

<table>
<thead>
<tr>
<th>Maximum number of groups</th>
<th>Percentage (N=83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>64</td>
</tr>
<tr>
<td>1-5</td>
<td>20</td>
</tr>
<tr>
<td>4-6</td>
<td>12</td>
</tr>
<tr>
<td>7 or more</td>
<td>0</td>
</tr>
<tr>
<td>miscellaneous</td>
<td>4</td>
</tr>
</tbody>
</table>

Nearly two-thirds of the non-motorized recreationists preferred to meet no snowmobiles at all. They apparently felt even one snowmobile would detract from their recreation enjoyment. This is similar to the responses of paddling canoeists in the BWCA about encounters with motorboaters.

General Feelings about Snowmobiles Seen and Heard

All non-motorized recreationists who reported seeing snowmobiles were asked whether they liked or disliked the snowmobiles being in the area. Eighty-three percent indicated a dislike of the snowmobiles seen. The remaining 17 percent said the presence of the snowmobiles did not matter or gave a similar neutral response.

A much larger percentage indicated dislike for snowmobiles than had indicated preference for no snowmobiles (64 percent). Many of the non-motorized recreationists who said they disliked snowmobiles likely tolerated meeting a few groups because, as some said, "You have to expect that you will meet a few of them."
Specific Objections to Snowmobiles

Ninety percent of those non-motorized recreationists who saw snowmobiles had one or more specific objections. These have been divided into five categories. The percentage giving responses in each category is as follows:

<table>
<thead>
<tr>
<th>Response Category</th>
<th>Percentage of Individuals Questioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>solitude disturbance</td>
<td>85</td>
</tr>
<tr>
<td>physical interference</td>
<td>17</td>
</tr>
<tr>
<td>environmental disturbance</td>
<td>13</td>
</tr>
<tr>
<td>social differences</td>
<td>6</td>
</tr>
<tr>
<td>miscellaneous</td>
<td>11</td>
</tr>
</tbody>
</table>

"Solitude disturbance" includes noise, gasoline fumes, and other aspects of snowmobiles which non-motorized recreationists feel detract from the natural characteristics of the recreation environment (Figure 9). "Physical interference" includes complaints of having to yield the right of way to snowmobiles and damage to the trails—problems which actually interfere with travel. Real or perceived damage to animals and vegetation (for example, charges that snowmobilers ran over small trees or frightened deer) are included under "environmental disturbance." "Social differences" refer to complaints about the snowmobilers themselves, including personality dislikes and obnoxious behavior. Miscellaneous responses include comments such as, "snowmobiles

---

\(^2\)Percentages total more than 100 percent because some people gave more than one response.
FIGURE 9. Snowmobile tracks on Rattlesnake Road near boundary between Segments A and B (Figure 12, p. 51). Several non-motorized recreationists complained that snowmobile tracks detracted from the aesthetic quality of the winter forest setting. (Photo by E. Whitaker)

are sacrilegious" and "I don't like to see people getting into the back country easily."

Eighty-five percent of those questioned gave complaints involving "solitude disturbance." Almost all were complaints about noise and gasoline fumes from snowmobiles. Over 80 percent of the non-motorized recreationists who saw or heard snowmobiles found snowmobile noise offensive and 50 percent disliked the smell of gasoline fumes. Even if other responses were given, these two were usually offered first and most vehemently.

The non-motorized recreationists' objections to noisy, smelly
machines suggest they hold different norms from the snowmobilers. Stankey found, however, only one-third of the motor canoeists and motorboaters in the BWCA recognized that their value systems differed greatly from non-motorized canoeists. If many snowmobilers feel their recreational values are similar to the non-motorized users, they likely would not conceive of their equipment or behavior causing conflicts. As a result, the snowmobilers would make no attempt to respect the desires of the non-motorized recreationists for quiet and isolation.

"Environmental disturbance" responses were given by only 13 percent of those questioned. Perhaps more non-motorized users believed snowmobiles destroyed vegetation and frightened game (especially in the Upper Rattlesnake, which is a winter game range), but hesitated to make accusations without proof.

Only 6 percent of those questioned said snowmobilers were unlikeable, obnoxious people. More may have felt this way but did not want to say anything negative about the snowmobilers themselves to an unknown interviewer.

Conclusions about Conflict of Snowmobiling with Non-motorized Recreation

Snowmobiling conflicts with the experience of a majority of non-motorized recreationists. This is substantiated as follows: 1) Ninety percent of the non-motorized users disliked at least one specific aspect of the snowmobiles they met. 2) Eighty-three percent of those who encountered snowmobiles disliked them in general. 3) Seventy-seven

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Stankey, p. 123.
percent of those meeting no snowmobiles were pleased they had met none.  
4) Sixty-four percent of the non-motorized users stated they wanted to see no snowmobile groups. 5) Fifty-eight percent of those who saw two or more groups thought this was too many.

Conflicts of Non-motorized Recreationists with Snowmobilers

The literature review indicated that motorized users in other settings were either indifferent to the presence of non-motorized recreationists or enjoyed meeting them. An examination of the data concerning the feelings of snowmobilers regarding non-motorized users confirms this attitude.

Number of Non-motorized Groups Seen

More than three-fourths of the snowmobilers felt the number of non-motorized groups seen did not matter (Table 3). Nearly all remaining snowmobilers were equally divided as to whether too few or about the right number of non-motorized recreationists were seen.

Maximum Number of Non-motorized Groups Desired

Fourteen snowmobilers were questioned concerning the maximum number of non-motorized groups that would have been all right. The remaining snowmobilers were not asked, because they had answered "didn't matter" to the previous question (How do you feel about the number of non-motorized groups which you saw today?). Their responses were as
### TABLE 3

FEELINGS OF SHEMNOBILERS ABOUT NUMBER OF NON-MOTORIZED GROUPS SEEN

<table>
<thead>
<tr>
<th>Feelings about Number of Groups Seen</th>
<th>Percentage of Those Seeing:</th>
<th>Percentage of all Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Non-motorized Groups</td>
<td>1 Non-motorized Group</td>
</tr>
<tr>
<td>Too few</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>About right</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Too many</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Did not matter</td>
<td>77</td>
<td>50</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>( N )</td>
<td>26</td>
<td>10</td>
</tr>
</tbody>
</table>
follows:

<table>
<thead>
<tr>
<th>Maximum number of groups</th>
<th>Percentage (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>1-3</td>
<td>0</td>
</tr>
<tr>
<td>4-6</td>
<td>7</td>
</tr>
<tr>
<td>7 or more</td>
<td>21</td>
</tr>
<tr>
<td>didn't matter</td>
<td>36</td>
</tr>
<tr>
<td>miscellaneous</td>
<td>21</td>
</tr>
</tbody>
</table>

Thus, 84 percent of the snowmobilers answered "didn't matter" to either this question or the previous one. Only three snowmobilers preferred to see less than seven non-motorized groups.

**General Feelings about Non-motorized Groups Seen**

Snowmobilers were asked whether they generally liked or disliked the presence of the non-motorized recreationists they encountered. Their responses overwhelmingly indicated indifference—76 percent. The remaining 24 percent indicated they liked the presence of non-motorized recreationists.

**Specific Objections to Non-motorized Recreationists**

Snowmobilers were asked if there was anything which bothered them about the non-motorized recreationists they met. Eighty-seven percent had no objections but eight percent were bothered by "unfriendli-

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4 Includes the following responses: "I couldn't say for sure," "many," "I've never seen too many," "a few more," and no response.

5 52 of the 62 snowmobilers questioned.
ness" of the non-motorized recreationists. "Unfriendliness" included comments by snowmobilers that non-motorized recreationists "gave us dirty looks" or "would not speak to us." This unfriendliness is not surprising considering the hostility of many non-motorized users to snowmobiles.

Conclusions about Conflict of Non-motorized Recreationists with Snowmobilers

What does this high percentage of "don't care" responses suggest? Snowmobilers seem to be more oriented to the social dimensions of recreation than their non-motorized counterparts. Apparently most snowmobilers do not feel a need to get away from other people in order to enjoy themselves. They may see riding a snowmobile as an end in itself. Many snowmobilers express delight at being able to see the beautiful winter scenery of the study areas. The presence of non-motorized users did not seem to spoil the experience of the snowmobilers any more than meeting a group of hikers would spoil the experience of a tourist driving through a national park! As Lucas suggested, non-motorized recreationists probably are viewed with interest as "local color."^6

A review of the data confirms the nearly complete lack of conflict of non-motorized recreation with snowmobiling. None of the snowmobilers who had met non-motorized users disliked their being in the area. Of the snowmobilers who met at least one non-motorized group, only one out of 36 thought this was too many. Only two of the 62 snowmobilers wanted to meet no non-motorized groups at all. Of those meeting non-motor-

ized groups, only 4 percent thought this was about the right number. Only 13 percent disliked at least one aspect of the non-motorized users they had met.

Conflicts of Snowmobilers with Other Snowmobilers

The survey at Lolo Pass and the Upper Rattlesnake revealed virtually no snowmobile intra-group conflicts. Snowmobilers were even more favorable to meeting fellow motorized recreationists than were the motorboaters in the BWCA.

Number of Other Snowmobile Groups Seen

Forty-one percent of the snowmobilers responded "didn't matter" to the question, "How do you feel about the number of snowmobile groups you saw today?" (Table 4). Thirty-seven percent of those seeing no other snowmobile groups felt this was too few, and 36 percent of those seeing more than 4 groups felt this was about the right number. Only 7 percent indicated they had seen too many other snowmobile groups—all of these had seen at least two.

Maximum Number of Other Snowmobile Groups Desired

The snowmobilers who answered other than "didn't matter" to the above question were questioned concerning the maximum number of groups
### TABLE 4

**FEELINGS OF SNOWMOBILERS ABOUT NUMBER OF OTHER SNOWMOBILE GROUPS SEEN**

<table>
<thead>
<tr>
<th>Feelings about Number of Groups Seen</th>
<th>Percentage of Those Seeing:</th>
<th>Percentage of all Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Snowmobile</td>
<td>1 Snowmobile</td>
</tr>
<tr>
<td>Too few</td>
<td></td>
<td></td>
</tr>
<tr>
<td>About right</td>
<td>37</td>
<td>35</td>
</tr>
<tr>
<td>Too many</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Did not matter</td>
<td>13</td>
<td>50</td>
</tr>
<tr>
<td>Other</td>
<td>37</td>
<td>7</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>8</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>
that would have been about right. Their responses were as follows:

<table>
<thead>
<tr>
<th>Maximum number of groups</th>
<th>Percentage (N=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-3</td>
<td>6</td>
</tr>
<tr>
<td>4-6</td>
<td>3</td>
</tr>
<tr>
<td>7 or more</td>
<td>34</td>
</tr>
<tr>
<td>didn't matter</td>
<td>6</td>
</tr>
<tr>
<td>miscellaneous</td>
<td>51</td>
</tr>
</tbody>
</table>

As Lucas found with motorboaters, many snowmobilers did not seem to have ever thought much about crowding. Fifty-one percent (the "miscellaneous" category) gave answers such as "I couldn't say for sure," "many more would be O.K.," "I've never seen to many," or "a few more."

General Feelings about Other Snowmobile Groups Seen

The snowmobilers who had seen other snowmobiles were asked their general feelings about other snowmobiles being in the area. Fifty-three percent were neutral or indifferent while 45 percent liked their presence. There was only one negative response.

Specific Objections to Other Snowmobilers

Fifty-seven of the 58 snowmobilers answered "no" when asked: "Did anything in particular bother you about the other snowmobiles you encountered?" The lack of specific objections is not surprising. Why would a snowmobiler who does not mind noise and fumes of his own snowmobile, object to the noise and fumes from other groups?

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7Ibid., p. 268.
Conclusions about Snowmobile Intra-group Conflicts

The nearly complete lack of snowmobile intra-group conflict is strongly confirmed by the following data: 1) No snowmobilers indicated "zero" when asked about the maximum number of other snowmobile groups that would have been acceptable. 2) Only 2 percent disliked having met other snowmobiles. 3) Only 2 percent had specific complaints about snowmobiles encountered. 4) Only 10 percent of those seeing two or more other snowmobile groups thought this was too many. 5) Only 13 percent who saw no other group thought this was about the right number.

Apparently most snowmobilers either prefer the companionship of other snowmobile groups or are unconcerned whether they are there or not. Many snowmobilers also indicated their preference for several groups in the area in the event of machine breakdown. This reaffirms previous findings about motorized recreationists—they are generally gregarious and insensitive to crowding. Socialization and companionship appear to be important satisfactions derived by these persons. As was pointed out earlier, they likely have much different motivations and perception of the environment than most non-motorized recreationists.

Many snowmobilers in different groups appeared to know each other personally. Perhaps they were workmates, members of the same snowmobile club, or had simply met each other on previous outings. Neverthe-
less, one would expect less likelihood of conflict among groups whose members knew each other.

Conflicts of Non-motorized Recreationists with Other Non-motorized Recreationists

The literature suggested crowding is the major source of conflict among non-motorized recreationists. Instances of crowding among non-motorized recreationists, however, were infrequent in the Lolo and Rattlesnake study areas.

Number of Other Non-motorized Groups Seen

Table 5 shows how non-motorized recreationists felt about the number of other non-motorized groups they saw.

Nearly half of the non-motorized recreationists said the number of other non-motorized groups present did not matter. More than one-third of those seeing one or more non-motorized groups felt the number seen was about right. Very few complained of seeing too many other groups.

Maximum Number of Other Non-motorized Groups Desired

There was a wide variation in the responses of non-motorized recreationists to the question concerning maximum number of non-motorized
### TABLE 5

FEELINGS OF NON-MOTORIZED RECREATIONISTS
ABOUT NUMBER OF OTHER NON-MOTORIZED RECREATIONISTS SEEN

<table>
<thead>
<tr>
<th>Feelings about Number of Groups Seen</th>
<th>Percentage of Those Seeing:</th>
<th>Percentage of All Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Non-motorized Groups</td>
<td>1 Non-motorized Group</td>
</tr>
<tr>
<td>Too few</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>About right</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>Too many</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Did not matter</td>
<td>41</td>
<td>70</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

| N                                   | 22                          | 20                          | 28                          | 23                          | 93                         |
parties desired:

<table>
<thead>
<tr>
<th>Maximum number of groups</th>
<th>Percentage (N=49)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>1-3</td>
<td>12</td>
</tr>
<tr>
<td>4-6</td>
<td>33</td>
</tr>
<tr>
<td>7 or more</td>
<td>12</td>
</tr>
<tr>
<td>didn't matter</td>
<td>12</td>
</tr>
<tr>
<td>miscellaneous\textsuperscript{8}</td>
<td>18</td>
</tr>
</tbody>
</table>

The balanced variety of responses indicates a wide range in the preferences of non-motorized recreationists for the presence or absence of other non-motorized recreationists.

**General Feelings about Other Non-motorized Groups Seen**

A large majority of non-motorized recreationists (62 percent) were neutral about the presence of other non-motorized groups. Thirty-two percent enjoyed their presence while only six percent gave negative responses.

**Specific Objections to Other Non-motorized Recreationists**

As suggested previously, crowding, although infrequent, was the only significant source of conflict. Fourteen percent encountering other non-motorized recreationists complained of crowding while 83 percent had no complaints. There were only two complaints of inappropriate behavior.

\textsuperscript{8} Included such responses as: "I couldn't say for sure," "many," "I've never seen too many," "a few," and "a few more."
Conclusions about Non-motorized Recreationists Intra-group Conflicts

Conflicts of non-motorized recreationists with each other are insignificant in the study areas. This is supported by three points:

1) Only 6 percent of the non-motorized users wanted to see no other non-motorized groups. 2) Only 6 percent disliked having met other non-motorized groups. 3) Of those who saw two or more groups, only 8 percent thought they had seen too many.

Only 16 percent of the non-motorized users expressed a specific complaint about other non-motorized users. Because nearly all of these complaints involved crowding, there appears to be a potential for conflict in more heavily used areas. This is supported by the non-motorized recreationists who met no other non-motorized groups: fifty percent thought meeting no other groups was "about right."

Conclusions

Most non-motorized recreationists are irritated by the presence of snowmobiles. Principal causes are apparently noise and fumes from the snowmobiles. A variety of additional reasons contribute to this conflict, including perceived environmental damage by snowmobiles and motivational differences between the snowmobilers and non-motorized recreationists. Different value systems seem to be associated with motorized and non-motorized recreation. What is considered appropriate behavior by the snowmobilers is considered inappropriate by the non-motorized users.

The conflicts appear to be one-sided, as the snowmobilers seem unconcerned about the presence or absence of non-motorized recreationists.
They apparently find little about ski touring, snowshoeing, hiking, or sledding that physically or psychologically interferes with snowmobiling. Almost no snowmobilers mind the presence of other snowmobiles in a recreation area; many actually prefer it. Non-motorized recreationists apparently find little that is objectionable about other non-motorized recreationists unless they feel there are too many of them.

These data indicate snowmobilers generally do not differentiate between non-motorized recreationists and other snowmobilers. Non-motorized recreationists' feelings about snowmobilers, however, differ sharply from their attitudes toward other non-motorized recreationists. Thus, the data show the fallacy of the following statement, which appeared in a snowmobile trade magazine:

A snowshoer tramps through a national forest, meets a snowmobiler and immediately feels his "right to privacy" has been invaded. His big gripe is that someone besides himself is using and enjoying our natural resources. It would make little difference if the offender rode a snowmobile or was just plain walking.9

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CHAPTER IV

RECREATIONAL USE DISTRIBUTION

What do spatial variations of use tell about the intensity of conflicts? Do snowmobilers and non-motorized recreationists use the same general areas or do they usually avoid each other?

In order to examine these questions, recreationists were asked the route of their trip (within the study areas). The route was sketched on the map in the questionnaire (p. 74). They were then asked, "Were you always on a road or trail during your trip?" If the answer was "no" the recreationist was then asked what percent of the time he was off the roads and trails.

Trail Use

The data examined in this section is divided into snowmobiler, skitourer, snowshoer, and hiker classes, which are sub-divided into Lolo and Rattlesnake use. The term "heavy trail user" is used to refer to persons off the trails 35 percent of the time or less. "Light trail user" refers to recreationists off the trails more than 35 percent of the time.\(^1\)

\(^1\)Thirty-five percent was a convenient point of division chosen after examination of the trail use data.
Snowmobilers

Snowmobilers generally used trails more than non-motorized recreationists. Table 6 shows the percent of time spent off trails by snowmobilers in the Lolo and Rattlesnake areas. Amount of trail use differed sharply between the two areas.

**TABLE 6**

**SNOWMOBILER OFF-TRAIL TRAVEL**

<table>
<thead>
<tr>
<th>Percent of Time off Trails</th>
<th>Percent of Snowmobilers in:</th>
<th>Lolo Pass</th>
<th>Upper Rattlesnake Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>1-35</td>
<td></td>
<td>24</td>
<td>70</td>
</tr>
<tr>
<td>36-65</td>
<td></td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>66-100</td>
<td></td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>27</td>
</tr>
</tbody>
</table>

Only 48 percent of the Lolo Pass snowmobilers were heavy trail users, whereas 89 percent in the Rattlesnake area fell into this category. This is not surprising given the physical characteristics of the two areas. In the Rattlesnake, snowmobilers have fewer open fields for playing and racing. Narrow valleys bordered by steep hillsides limit their off-trail excursions. Lolo Pass, on the other hand, has several large open meadows and flatter topography.
Trail use by snowmobiles at Lolo Pass was heaviest during the months of January and February. During those months snow was usually deep and powdery, increasing the risk of getting stuck for off-trail explorers.

**Ski Tourers**

Table 7 shows the amount of ski tourer trail use. Trail use by skiers was similar to that of snowmobilers at Lolo Pass. In the Rattlesnake, trail use was considerably lighter than that of snowmobilers. Nevertheless, 61 percent of the Rattlesnake skiers were heavy trail users as opposed to 43 percent at Lolo.

**TABLE 7**

<table>
<thead>
<tr>
<th>Percent of Time off Trails</th>
<th>Percent of Ski Tourers in:</th>
<th>Lolo Pass</th>
<th>Upper Rattlesnake Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>1-35</td>
<td>31</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>36-65</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>66-100</td>
<td>27</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>26</td>
<td>13</td>
</tr>
</tbody>
</table>

The larger percentage of off-trail skiing at Lolo Pass can be attributed to the following: 1) A large amount of off-trail time at Lolo was spent
on a clear-cut hill to the southeast of the pass. This hill provides open downhill skiing not to be found in the Upper Rattlesnake area.

2) For those who do not like to climb with skis, the Lolo Pass area offers more open, level terrain for off-trail skiing. 3) Some ski tourers might have read "Places to Ski Tour," an information sheet distributed in the Missoula area. It warns skiers that the lower meadows at Lolo Pass are inundated with snowmobiles on weekends. To avoid snowmobiles, it advises skiers to go up and over the ridge to the south of the meadows. ²

Snowshoers

Every snowshoer interviewed was off the trail at least part of the time (Table 8). Snowshoers were the lightest trail users as a group: 89 percent at Lolo and 40 percent in the Rattlesnake were off the trail more than 35 percent of the time. Their lighter trail use at Lolo might be attributable to some of the same reasons given for the skiers' lighter trail use at that area—a greater amount of open, level terrain and the advice of "Places to Ski Tour."

Hikers

Hikers spent the least amount of time off the trails of all non-motorized groups (Table 9). About forty percent of the hikers interviewed did not leave the trails at all. Difficulty of off-trail travel for hikers in snow is an obvious explanation for this relatively high amount of trail use.

### TABLE 8

**SNOWSHOEER OFF-TRAIL TRAVEL**

<table>
<thead>
<tr>
<th>Percent of Time off Trails</th>
<th>Percent of Snowshoers in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lolo Pass</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-35</td>
<td>13</td>
</tr>
<tr>
<td>36-65</td>
<td>13</td>
</tr>
<tr>
<td>66-100</td>
<td>76</td>
</tr>
<tr>
<td>N</td>
<td>8</td>
</tr>
</tbody>
</table>

### TABLE 9

**HIKER OFF-TRAIL TRAVEL**

<table>
<thead>
<tr>
<th>Percent of Time off Trails</th>
<th>Percent of Hikers in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lolo Pass</td>
</tr>
<tr>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>1-35</td>
<td>0</td>
</tr>
<tr>
<td>36-65</td>
<td>25</td>
</tr>
<tr>
<td>66-100</td>
<td>25</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
</tr>
</tbody>
</table>
Summary of Trail Use

A desire to escape snowmobiles might have caused an increase in off-trail use by all non-motorized recreationists. Several interviewees indicated this had been their motivation in getting off the trail.

More than half of the Lolo recreationists were off the trails at least 35 percent of the time. Given such dispersed use, the number of conflicts might be less than one would otherwise expect. In contrast, more than half of the Rattlesnake recreationists were off the trail only 10 percent of the time or less. Considering this area has only two major trails, it is inevitable that many groups would meet each other.

Spatial Distribution of Snowmobile and Non-motorized Use

Use distribution maps (Figures 10-13) were prepared by subdividing the two study areas into smaller areas, hereafter referred to as "segments" (sixteen segments for the Lolo Pass area and fourteen for the Upper Rattlesnake area). The segments were determined as follows:

1. The completed sketch maps in all the questionnaires (p. 74) were carefully examined to determine the most logical places for segments and the boundaries between them.

2. Boundaries were often placed at forks in trails. An example is the boundary between segments G, H and I in the Lolo Pass area (Figure 10).

3. The break in slope between a valley floor and hillside provided a natural boundary between segments. An example in the Upper Rattlesnake area is the boundary between segments H and I (in the valley of Spring Creek) and M (the adjacent hillside) (Figure 12).
Figure 10. Non-motorized Use Distribution in Lolo Pass Area.

Heavy non-motorized use: more than 2.0 parties per weekend day
Moderate non-motorized use: 0.50 to 2.0 parties per weekend day
Light non-motorized use: 0.01 to 0.49 parties per weekend day

Note: 14 weekend days were surveyed at Lolo Pass.
FIGURE 11. Snowmobile Use Distribution in Lolo Pass Area.

Note: 14 weekend days were surveyed at Lolo Pass.

- **roads & trails**
- **segment boundaries**

- Heavy non-motorized use: more than 2.0 parties per weekend day
- Moderate non-motorized use: .50 to 2.0 parties per weekend day
- Light non-motorized use: .01 to .40 parties per weekend day

Note: 10 weekend days were surveyed in the Upper Rattlesnake area
FIGURE 13. Snowmobile Use Distribution in Upper Rattlesnake Area.

- Heavy snowmobile use: more than 2.0 parties/weekend day
- Moderate snowmobile use: .50 to 2.0 parties/weekend day
- Light snowmobile use: .01 to .49 parties/weekend day

Note: 10 weekend days were surveyed in the Upper Rattlesnake area.
4. Large flowing streams form natural boundaries to recreational movement and were utilized for segment boundaries. For example, Rattlesnake Creek forms the southeast boundary of segments A, B, C and D in the Upper Rattlesnake area (Figure 12).

5. Segment boundaries were placed to include only territory which actually was passed through or near by at least one recreation party. Segment P, Lolo Pass area, for example, does not include Granite Pass because no party reported going that far (Figure 10).

**Differences in Spatial Distribution of Snowmobile and Non-motorized Groups**

In general, use by all recreationists is heaviest near the point of access. The "friction" effect of distance causes use to diminish rapidly from the point of access. The rate of this decrease in use with distance appears to be a function of:

1. **Presence of a trail:** Use can diminish to zero relatively close to the entrance point in localities not served by trails. An example is the area immediately north of segment A in the Lolo Pass area (Figure 14).

2. **Trail quality:** Narrowness or steepness of a trail can cause a relatively rapid decrease in use with increasing distance. On the other hand, it can actually encourage use by non-motorized users who want to escape snowmobiles. This is hypothesized to be the cause of the relatively high non-motorized/snowmobile use ratios in segment H (Upper Rattlesnake area) (Figure 12) and segments O and P (Lolo Pass area) (Figure 10).
FIGURE 14. Area north of segment A in the Lolo Pass area. Thick forest cover was likely the major factor in inhibiting use. (Photo by author)

3. Off-trail presence or absence of natural obstacles: Examples of obstacles are a) steep slopes, which tend to cause a relatively more rapid decrease in use with distance (for example, in segment G, Upper Rattlesnake area--Figure 15), b) heavy forest cover which tends to cause a relatively more rapid decrease in use with distance (an example is the area north of segment A, Lolo Pass area--Figure 14), c) bodies of water, which tend to cause a relatively more rapid decrease of use with distance. An example is segment N, Upper Rattlesnake area--the only public access to this segment, from the entrance gate, is one primitive bridge over Rattlesnake Creek, d) open areas, which tend to cause a relatively less rapid decrease of use with distance (for
example, Packer Meadows, segment B in the Lolo Pass area--Figure 16).

4). Aesthetic quality: The aesthetic quality of a location may cause it to have relatively less decrease in use with distance (an example is Packer Meadows, segment B the Lolo Pass area--Figure 16).

Given these influences upon use, it is interesting to note the similarities and differences of the spatial patterns of snowmobile and non-motorized recreational use. In general, decreased use with distance from point of access is much more rapid for non-motorized recreation than for snowmobiling (Table 10). This is primarily due to the greater speed of the snowmobile, enabling snowmobilers to travel further in a given amount time.
FIGURE 16. Packer Meadows (segment B), Lolo Pass area. The aesthetic quality appealed to both snowmobilers and non-motorized recreationists. (Photo by author)

In addition, motivation may have an effect. Several snowmobilers made unsolicited comments about enjoying the "pretty scenery." Berry felt motorboaters speeding down the Kentucky River at 20 or 30 miles an hour could only be interested in experiencing the country as scenery, "a painted landscape without life or sound."\(^3\) This speculation of a conservation writer bears further examination. If "scenery consumption" motivates some snowmobilers, it may be important for them to cover as much ground as possible in order to be able to experience... 


### Table 10

**Farthest Distance from Entrance Points Reached by Groups**

<table>
<thead>
<tr>
<th>Recreational Type</th>
<th>Number of Groups</th>
<th>Average Farthest Distance Reached Per Group (in miles) from Access Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snowmobilers</td>
<td>91</td>
<td>5.9</td>
</tr>
<tr>
<td>Ski tourers</td>
<td>43</td>
<td>2.3</td>
</tr>
<tr>
<td>Snowshoers</td>
<td>21</td>
<td>2.2</td>
</tr>
<tr>
<td>Hikers</td>
<td>57</td>
<td>1.7</td>
</tr>
<tr>
<td>Sladders</td>
<td>4</td>
<td>0.8</td>
</tr>
</tbody>
</table>

more scenery.

Snowmobilers can and generally do travel farther from entrance points than non-motorized recreationists. It is, therefore, very difficult for the non-motorized recreationists to escape snowmobiles without special effort. To escape might involve climbing steeper slopes or going through denser forests than snowmobilers would want to. Examples include the steep slopes encountered in segments J, K, L and M (Upper Rattlesnake area) (Figure 17) or the dense forest in segment N (Upper Rattlesnake area).

Two relatively accessible areas in which non-motorized recreationist use is much higher than snowmobile use stand out. Segments H and I (Spring Gulch Road and vicinity in the Upper Rattlesnake area) may be
avoided by snowmobilers because the Rattlesnake Road is more desirable. The snowmobilers can travel twice as far on Rattlesnake Road as they can on Spring Gulch Road before encountering steep slopes and deep snow (to the northeast end of segment D as opposed to the north end of segment I). Why go four miles up Spring Gulch Road when one can go eight miles up Rattlesnake Road? The Rattlesnake Valley also has more open fields for snowmobile racing and "scrambling" than does Spring Gulch Valley. Elk Meadows Road at the Lolo Pass area is more desirable for snowmobilers than Crooked Fork Road (segments O and P). It is
FIGURE 18. Crooked Fork Road (segment O, Lolo Pass area). This trail presented the problem of "side-hilling" for snowmobilers. (Photo by author)

much more difficult to get one's snowmobile over the snow bank (created by the snowplows on U.S. 12) on the Crooked Fork side of the highway. Crooked Fork Road is relatively steep and presents snowmobilers with the problem of "side-hilling" (driving along the strike of a slope) (Figure 18). Vistas are better on Elk Meadows Road and segments O and P have no open fields such as those found in segments A and B. Thus, in both cases, when faced with two unequal opportunities in their route, most snowmobilers will choose the easiest, most scenic one and the one providing the greatest number of alternatives. The non-motorized users may share similar feelings of area preference. They may, however, sometimes choose the less attractive areas, hoping to avoid conflicts with the snowmobilers. For example, non-motorized users of Crooked
Fork and Spring Gulch roads often mentioned their chances of conflicts with snowmobiles were less than on the Elk Meadows and Rattlesnake roads.

Spatial Distribution of Conflicts

The greatest number of conflicts appear to occur near the entrance points of both areas. In general, conflicts diminish with increasing distance from entrance points. This of course varies according to the locational amenities previously mentioned which affect one type of use and/or the other.

It appears the farther one travels the fewer conflicts he will have with other users in relation to time spent in the area. Stankey pointed out, however, that most wilderness users dislike encounters in the interior of an area more than on its periphery. One may, therefore, not mind encounters in segment A (Upper Rattlesnake area) and segment A (Lolo Pass area) as much as encounters in segment D (Upper Rattlesnake area) or segment J (Lolo Pass area). As one showshoer pointed out, he did not mind encounters with snowmobilers in segments A, H, and I (Upper Rattlesnake area) but would have strongly objected to encounters in segment J.

These maps only suggest where the greatest numbers of conflicts may occur. Because of the noise of the snowmobiles, conflicts may occur in segments in which they are not even present. For example, a

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4 Refer to Figures 19 and 20 to examine the spatial pattern of conflicts.

5 Stankey, pp. 150-152.
FIGURE 19. Conflict Distribution in Lolo Pass Area.

- High conflict: heavy use by both snowmobiles and non-motorized groups
- Medium conflict: at least moderate use by both snowmobiles and non-motorized groups
- Low conflict: at least light use by both snowmobiles and non-motorized groups
- No conflict: use by snowmobiles or non-motorized groups by not both

Note: 14 weekend days were surveyed at Lolo Pass
FIGURE 20. Conflict Distribution in Upper Rattlesnake Area.

- High conflict: heavy use by both snowmobiles and non-motorized groups
- Medium conflict: at least moderate use by both snowmobiles and non-motorized groups
- Low conflict: at least light use by both snowmobiles and non-motorized groups
- No conflict: use by snowmobiles or non-motorized groups but not both

Note: 10 weekend days were surveyed in the Upper Rattlesnake area.
snowshoer and a ski tourer on two separate occasions complained of being bothered by continuous snowmobile noise even though they were in segment 0 (the Lolo Pass area) where no snowmobiles were present on those particular days.

**Conclusions about Spatial Distribution of Conflicts**

In general, it appears very difficult for non-motorized recreationists to avoid encounters with snowmobilers in the areas studied. This is especially true if the non-motorized recreationist uses trails and travels only short distances from entrance points. Exceptions are weekdays or days when snowmobiling conditions are poor. For example, when snow is deep and powdery at the Lolo Pass area or during a late winter rain in the Upper Rattlesnake area, snowmobilers were often not present for the entire day. Intervening opportunities closer to Missoula in mid-winter might also inhibit snowmobilers from going all the way to the Lolo Pass area. In the Upper Rattlesnake area, non-motorized users on short trips could avoid physical presence of snowmobiles (though not necessarily the noise) by climbing the ridges in segments G and M or by crossing Rattlesnake Creek into segment N. It appears, however, that most users are unwilling to go to this much trouble.

The heavy concentrations of use near or on the trails and near the entrance points might cause many more conflicts than one would otherwise expect. On the other hand, conflicts might not be as extensive as the maps suggest, given the amount of off-trail use. Users in the same segment may often not meet each other if one group is not on the trail. Of course, since one of the major complaints of non-motor-
ized users is noise from snowmobiles, it was felt, in producing the maps, that many of the conflicts would occur regardless of whether there was actual physical contact or not.

A comparison of the use distribution data reveals differences between the two areas. The Rattlesnake had higher user densities and more trail use than Lolo Pass. This apparently had an effect on the amount of conflicts. At Lolo Pass only 20 percent of the non-motorized recreationists saw snowmobiles. An additional 17 percent, although seeing no snowmobiles, heard them. In the Rattlesnake, 70 percent of the non-motorized users saw snowmobiles (two percent heard snowmobiles but did not see any).

If they are so bothered by snowmobiles, one wonders why the non-motorized users do not make more of an attempt to segregate themselves spatially. This might be partially due to lack of knowledge about other areas where snowmobiles are not present. It might also be because of lack of easily accessible areas which have the scenic quality of the Upper Rattlesnake area or the Lolo Pass area.

Spatial distribution of recreationists, then, has a notable effect on the extent of conflict. Snowmobiling is more likely to conflict with non-motorized recreationists who use trails than those who travel cross-country. Chances for encounters with snowmobiles diminish with increased distance from automobile access points. Non-motorized recreationists may often avoid snowmobiles by climbing steep hills, crossing streams or traveling through dense forests. The number of snowmobile encounters may be inversely related to the number of access points to a recreational area, to the number of intervening opportuni-
ties for recreation between population centers and the area in question and to the distance from population centers. They may be directly related to the aesthetic quality of the area and the size of the local snowmobiler population. The zone of conflict of a snowmobile with non-motorized recreationists is expanded in all directions from the snowmobile depending upon how far the noise of the machine carries.

Since snowmobilers have practically no complaints about conflicts or congestion, spatial distribution of other recreationists is of little concern to them. Actually, snowmobilers may be attracted to areas which they perceive have higher use densities given their apparent orientation to the social dimensions of recreation.

Non-motorized recreationist intra-group conflicts caused by congestion are affected by trail usage, topographic and vegetational obstacles, number of access points, intervening opportunities, and size of and distance from population centers. These factors influence intra-group conflict in much the same way as they affect conflict of snowmobiling with non-motorized recreation. There are, of course, two major differences. First, for most non-motorized recreationists, it takes several or many encounters with other non-motorized recreationists to constitute a conflict. But, one encounter with a snowmobile usually constitutes a conflict. Second, unless non-motorized recreationists are very noisy, their zone of impact does not extend more than a few yards in any direction. As a result, non-motorized recreationist intra-group conflicts caused by congestion are likely significant only in heavily used areas or near access points.
Applications of This Study to Recreational Planning

This study, supported by the findings of previous research, strongly suggests that motorized and non-motorized recreation are not compatible. Land management officials need to separate the two groups. Hopefully, they can bridge the gap between irrational extremes. Some snowmobilers, for example, expressed opposition to any controls over their recreation. A few non-motorized recreationists suggested a complete ban of snowmobiling on public lands.

One reasonable alternative is zoning. This can be approached in two ways: spatial or temporal. Spatial zoning has been mentioned a good deal in the literature. Reavley stated that off-road vehicles should be zoned so as not to interfere with non-motorized users' enjoyment.\(^1\) It has been advocated as a means for separating incompatible

uses, minimizing tension, and preventing people with different interests from spoiling each other's experience. Lime and Stankey saw zoning as a means for perpetuating a range of activities in an area. By separating conflicting parties, zoning can actually increase the capacity of an area.

Simply dividing areas such as Lolo Pass into zones may not be enough. The Committee on Environmental Quality at the 1969 International Snowmobile Conference recommended the creation of additional zones to serve as buffers between snowmobile and non-motorized recreation areas. Burch pointed out the necessity of zoning, not area by area, but on a regionwide basis.


6 Lucas, The Quetico-Superior Area..., p. 325.


Temporal zoning is also occasionally mentioned. For example, Wagar suggested restricting water skiing on certain lakes to late morning and early afternoon in order to minimize conflict with fishermen. Temporal zoning of winter recreation might, however, cause a good deal of confusion as to who can use what areas at what times. Spatial zoning rules seem easier for users to understand and for land management officials to administer. Stankey mentioned the development of additional access in order to redistribute use and prevent high concentration at access points. Such action might reduce the need for zoning in some areas. For winter recreation, all that might be necessary would be plowing out additional parking areas on access roads and the use of information signing to make recreationists aware of these additional access points.

If snowmobile, trail bike, and motorboat engines can be quieted down, spatial zoning can be much simpler. As Baldwin pointed out, "Snowmobile proponents should welcome a quieter vehicle, not merely for the health of their hearing but because effective noise control would reduce the 'zone of impact' of the vehicle and could open up new areas and periods for its use."

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9Wagar, p. 11.
10Stankey, p. 296.
12Baldwin, p. 16.
Land management agencies may be heading in the direction of spatial zoning. Recently the Department of Interior released a statement on the use of off-road vehicles on lands managed by the department. Criteria are established whereby off-road vehicles are allowed in specific areas where they will not conflict with other recreational use.

It is important to note that even though motorized recreation often conflicts with non-motorized recreation, both forms of use should be provided for. The rights of some users should not be infringed upon by others, but, at the same time, conflicts should not be used as an excuse for treating motorized use as an illegitimate form of recreation.

Research Implications

Many questions remain unanswered regarding motorized--non-motorized recreational conflicts and their manifestations. These are examined within the framework of the schematic (Figure 2, p. 5).

Clearly, use of motorized vehicles by some recreationists is considered annoying behavior by most non-motorized recreationists. An attempt should be made to determine how far snowmobile noise carries, given different topographical, vegetational and atmospheric conditions. This would aid management officials in planning buffer zones between snowmobiling areas and areas zoned for non-motorized use.

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Congestion of recreation areas conflicts with non-motorized recreationists' maximization of personal satisfaction. At what point, however, do motorized recreationists feel crowded? Perhaps snowmobilers in heavily-used recreation areas near large cities should be questioned about crowding. This might give management officials an idea of the carrying capacity of areas used for motorized recreation.

No attempt was made in this study to uncover differences among user objectives. Personal conversations and observations, however, seemed to indicate motivational differences between motorized and non-motorized recreationists. It would be helpful for management officials to know what personal satisfactions different user groups hope to derive from their recreational experience. If differences in motivation between snowmobilers and non-motorized recreationists are understood, the need for zoning may become even more apparent. Understanding user group objectives may also enable management officials to recognize potential conflict with management agency objectives.

Since it is now apparent that motorized—non-motorized recreationist conflict exists, an attempt needs to be made to uncover the results of the conflict. The conflict seems to cause a decrease in user satisfaction. In addition, antagonism may be developing between user groups. The extent of user dissatisfaction and antagonism is, however, unclear. Furthermore, are there significant changes in spatial or temporal behavior of non-motorized recreationists? Are some attempting to use areas during "slack" periods or seeking new recreation areas where snowmobiles can be avoided? How many non-motorized recreationists make no attempts to spatially or to temporally segregate themselves and
simply tolerate any decrease in satisfaction?

The study of the spatial distribution of recreationists raises some additional questions not directly related to conflict. For example, how accurately do recreationists report the route of their recreational journey over snow-covered trails? Do they tend to over-estimate the distance they actually travel? Perhaps field observation needs to be coordinated with questioning of recreationists in order to get a truer picture of their spatial distribution. Air reconnaissance of winter recreation areas, noting track distribution, may be useful.

An increased understanding of use distribution within recreational areas may present the possibility of developing a model for predicting use distribution given differences in topography, vegetation, local climate, aesthetic quality, user groups, number of access points, and distance from and size of local population centers. Such a model would enable land management officials to increase user satisfaction by planning more highly desirable areas for winter recreation.
APPENDIX

SAMPLE SURVEY SCHEDULE
I am doing a study of winter recreation in the (name of area) area. One of the main purposes of the study is to assist in future planning of trails for snowmobiles, cross-country skiing, and so forth. It would be very helpful to the study if you could give me a few minutes of your time in answering some questions.

(person agreed to participate)

_____yes

_____no

_____member of party questioned previously—ask only questions about route.

I. Concerning the route of your trip:

A. How far did you go and what route did you take getting there and returning? (assist person by showing him map and sketch in route on map on the next page)

B. Were you always on a road or trail during your trip?

_____yes

_____no

_____I don't know

1. If no, what percent of the time were you off the roads and trails?

Comments:
Upper Rattlesnake Area
II. Concerning other persons encountered on the trip:

A. Did you see any of the following and how many groups of each did you see?

_____ cross-country skiers
_____ snowshoers
_____ toboggans, sleds, or other downhill sliding conveyances
_____ hikers, joggers, walkers
_____ horses, mules, burros

1. How do you feel about the number of other people you saw, excluding snowmobilers, during this trip? (check one)

_____ saw too few
_____ about right
_____ saw too many
_____ does not matter to me one way or the other

2. (If answer wasn't "doesn't matter")
What is about the maximum number of parties excluding snowmobiles, you would have wanted to see?

___________________________________________________________

(questions 3, 4 and 5 apply only if person saw at least one non-motorized recreationist)

3. Was there anything in particular you liked about having these other people in the area?

4. Was there anything which bothered you about these other people?

______________________________

Comments:
5. In general, did you like or dislike those other people (excluding snowmobilers) being in the area or did it matter to you? (check one)

____ liked

____ disliked

____ does not matter to me one way or the other

____ other response

C. Did you see any snowmobiles and how many groups did you see?


1. Did you hear any snowmobiles that you didn’t see and about how many times? (does not apply to snowmobilers)


2. How do you feel about the number of snowmobiles you saw (and heard) during this trip? (check one)

____ saw too few

____ about right

____ saw too many

____ does not matter to me one way or the other

3. (if answer wasn’t "doesn’t matter")
What is about the maximum number of snowmobile groups you would have wanted to see?


Comments:
(questions 4, 5 and 6 apply only if person saw at least one snowmobile)

4. Was there anything in particular you liked about having snowmobiles in the area?

5. Was there anything which bothered you about the snowmobiles?

6. In general, did you like or dislike these snowmobiles being in the area or did it matter to you? (check one)
   ______ liked
   ______ disliked
   ______ does not matter to me one way or the other
   ______ other response __________________________________________

Date____________________

Time____________________

Comments: ____________________________
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