STATE TRAIL USE

Summary of Summer Trail Use and User Surveys Conducted in 1996, 1997 and 1998

Minnesota Department of Natural Resources
Trails and Waterways Division &
Office of Management and Budget Services

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EXECUTIVE SUMMARY

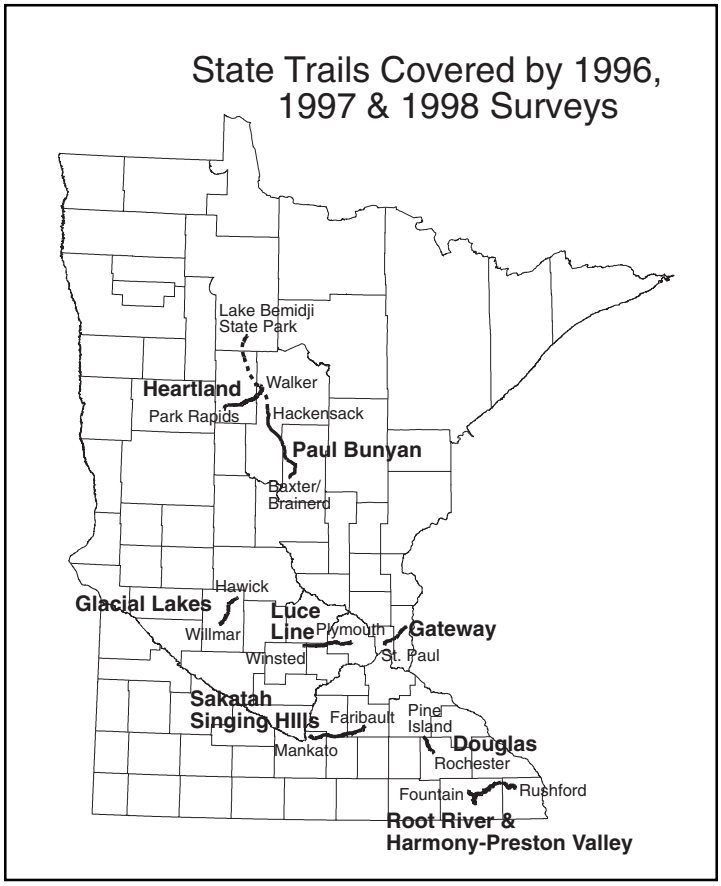
INTRODUCTION

For the purpose of gaining a better understanding of summer state trail use, nine state trail surveys were conducted between 1996 and 1998 (see map). The nine surveys covered the main summer period from Memorial Day to Labor Day. As a group, these nine surveys are sufficient for forming a meaningful system-wide perspective on summer trail use, and on the characteristics and opinions of summer trail users.

The surveys had two broad goals. One goal was to measure overall trail use and the main activities that comprise the use. The second goal was to gain a better understanding of trail users, including the demographic characteristics of the users, where users come from, and what users like and dislike about the trails.

The first goal was accomplished by individuals counting trail users at times and places specified in a statistical sampling schedule.

To accomplish the second goal, trail users were asked to complete a mail-back questionnaire or in-person interview (interviews were only used on the first survey done, which was the Paul Bunyan Trail in 1996).



TRAIL USE

The state trails serve distinct types of geographic markets during the summer. Three of the trails (Douglas, Gateway and Luce Line) draw primarily from a local market, whereas three other trails (Heartland, Paul Bunyan and Root River) serve mostly a long-distance (or tourist) market, and three others (Glacial Lakes, five-mile segment of the Paul Bunyan near Lake Bemidji State Park, and Sakatah Singing Hills) serve a mix of locals and tourists. For the local-market trails, the median travel distance—wherein half of the trail use originates—is only 4 or 5 miles. In contrast, the median travel distances for the tourist-market trails exceed 90 miles. Tourist origins are mostly the Twin Cities metro area and the surrounding states of Iowa, North Dakota and Wisconsin.

Summer use varies considerably from trail to trail, both in terms of total user hours and use intensity (user hours divided by length of trail). In terms of summer-use intensity, each mile of the Gateway is clearly the highest; no other trail is within a factor of two of the Gateway. One reason the Gateway is used so intensively is the large number of people who live near this Twin City trail. After the Gateway Trail, the next most intensively used trails are the Heartland and Root River, followed by the Douglas and the Paul Bunyan. One segment of the Root River Trail (the segment from Isinours to Whalan, which goes through Lanesboro) has an intensity of use comparable to that of the Gateway. The least intensively used trail is Glacial Lakes.

Summer trail use is about evenly split between weekends/holidays and weekdays, which is a common outdoor recreation use pattern.

Since weekdays are more numerous than weekends and holidays, the intensity of use on summer weekend/holidays is about double that on weekdays. It is noteworthy that the intensity of use on *weekdays* on the Gateway exceeds *weekends/holidays* on all other trails.

Biking is the predominant summer activity on each trail, and it accounts for 72 percent of use on all trails combined. On local-market trails (Douglas, Gateway, and Luce Line), biking is the leading activity, but it is not as dominant an activity as on tourist-market trails (Heartland, Paul Bunyan and Root River). This difference is due to the fact that tourists almost exclusively bike (88 percent of tourist use), while local users are much more likely to walk, run and skate. To tourists, the trails are "biking" trails, whereas to locals they are more multiple-use facilities.

Six of the trails surveyed during 1996, 1997 and 1998 have parallel paved and unpaved treadways. The unpaved treadways are not heavily used in comparison to their paved counterparts. Each unpaved treadway accounts for less than 5 percent of total (unpaved plus paved) segment use. The activity patterns on the unpaved treadways are far different than on the paved treadways. About half the use of the unpaved treadways is horseback riding.

TRAIL USER EXPERIENCES AND CHARACTERISTICS

Most trail users first hear about the trail either by living near the trail or by word of mouth from family or friends. The former is more important to local users, while the latter is more important to tourists.

There is substantial agreement across trails and between locals and tourists on the factors that make the trails appealing for summer recreation. Primary among these is the natural setting (scenery/wildlife/beauty) in quiet surroundings that facilitate a general enjoyment of out of doors. Also of primary importance is the fact that the trails are off-road and exclude motorized vehicles.

The tourist-market trails (Heartland, Paul Bunyan and Root River) are significant factors in drawing tourists into their general areas. The Root River, however, is a more important tourist draw for its general area than the Heartland and Paul Bunyan are for their respective areas. Perhaps the Heartland and Paul Bunyan are less important because of the larger number of recreational draws

in the Brainerd lakes area, which diminishes the importance of any one facility (like the Heartland or Paul Bunyan Trail).

Trail users generally give high marks to the trails for their use and enjoyment. Ratings of 'good' to 'excellent' account for 95 percent or more of users on each trail. For all trails combined, 70 percent of users give 'excellent' ratings. Very few users give 'fair' or 'poor' ratings on any trail.

Although positive ratings prevail, there are some important distinctions in the mix of 'good' and 'excellent' ratings. The tourist-market trails (Heartland, Paul Bunyan and Root River) have the highest portions of 'excellent' ratings. The Gateway and the segment of Paul Bunyan near Lake Bemidji State Park, too, are lopsided toward 'excellent', but to a lesser extent than the preceding three. The Douglas, Luce Line, Glacial Lakes and Sakatah Singing Hills have lower ratings; each has less than 60 percent 'excellent' ratings. The Douglas and Glacial Lakes have the lowest ratings, and each has less than half of users rating the trail as 'excellent'.

A number of factors affect these overall trail ratings. One leading factor is the quality of facilities and services on the trail, especially maintenance-related items (trail surface quality, trail maintenance, and management of vegetation in the trail corridor). When satisfaction with these maintenance-related items drops, overall rating of the trail drops too, suggesting that these items are of primary concern to trail users. A second factor is the origin of the user: tourists tend to give higher ratings than locals. A third factor is the activity of the user: skaters tend to give lower ratings, probably due to their higher sensitivity to the quality of the trail surface.

When users were asked about their preference for the type of trail surface for their activity, most selected the surface type of the trail on which they were recreating. All trails have asphalt paving, except the Luce Line, which has a crushed-limestone surface. The Luce Line was the only trail that had more than 10 percent of users expressing a preference for an alternative surface type. Seventeen percent of Luce Line users preferred asphalt and 14 percent preferred a natural surface (grass or dirt). Two-thirds of Luce Line users preferred the existing crushed-limestone surface.

Users' top priority for trail improvement (among 21 possible facilities and services) on each trail is availability of drinking water. Next on the priority lists are usually the availability of toilets and telephones. After these leading items, priorities differ considerably from trail to trail.

Conflicts among users are not all that common. Most trail users (69% or more on each trail) indicated they did not have a problem or conflict with others. When problems or conflicts do occur, the most likely causes are other users blocking the trail, users passing without warning, or pet problems on the trail.

Finding the trail too crowded for enjoyment is not a common experience. Less than 10 percent of users on any trail find it too crowded. The two trails—Gateway and Root River—with the highest intensity of use (user-hours per mile of trail) have correspondingly the highest frequency of 'too crowded' responses (7% and 8% of user responses, respectively).

Trip spending by trail users during the summer period totals to just over $5 million each year. The

bulk of the spending (83%) is attributable to tourists, who bring new dollars into a local economy. And most of the tourist spending (85%) occurs on three trails with high tourist use: Heartland, Paul Bunyan and Root River Trail. For these three trails, summer tourist spending is in the range of $0.75 to $1.50 million. A typical tourist spends between $25 and $39 dollars per day—depending on the trail—mostly on food, lodging and transportation.

Three trails (Heartland, Root River and Sakatah Singing Hills) have quite a bit larger on-trail trip extents, which means that users travel further and spend more time on these trails than on the other trails.

Party size on the Heartland and Root River is larger than on the other trails. The local-market trails (Douglas, Gateway and Luce Line) tend to have smaller party sizes, due in large part to the prevalence of one-person parties. Adult couples are common on all trails, as are parties composed of adults and children.

State trails serve broad segments of the Minnesota population. Trails draw large numbers of users from all age classes, from both genders and from the full range of income classes.

Skaters tend to be younger than other trail users, and walkers older. Walkers are the activity group that is most representative of the age distribution of the Minnesota population.

Some 55 to 50 percent of bikers and skaters are male, while 65 percent of walkers are female.

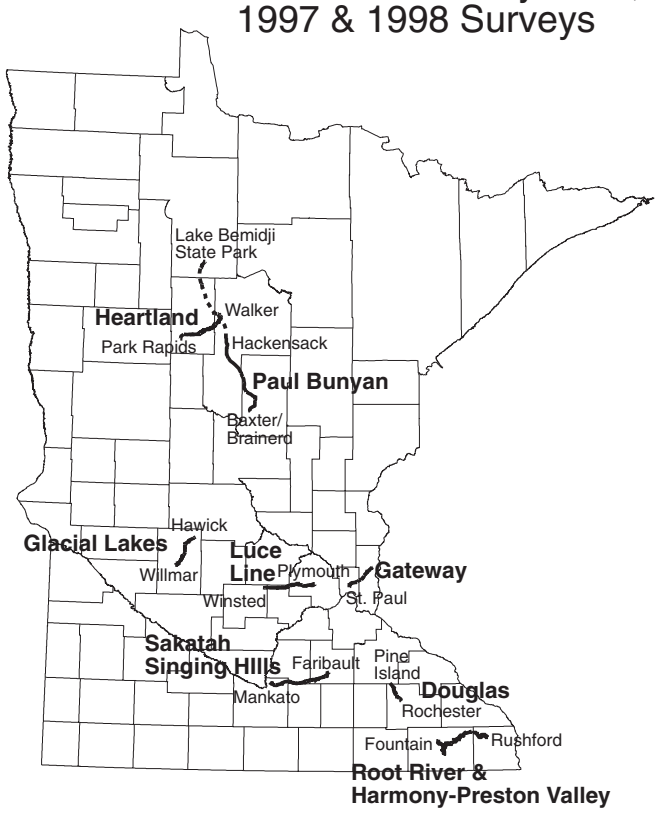
About half of all trail users report household incomes under $50,000, and about 60 percent of users report incomes between $25,000 and $75,000 per year. Trail users have a slightly higher median income (just over $50,000) than Minnesotans as a whole ($46,000 in 1997-98).

INTRODUCTION

For the purpose of gaining a better understanding of summer state trail use, nine state trail surveys were conducted between 1996 and 1998 (Figure 1 & Table 1). The nine surveys covered the main summer period from Memorial Day to Labor Day. Two surveys were done on the Paul Bunyan. One covered the trail from Hackensack south to Baxter/Brainerd (1996) and another covered a five-mile segment near Lake Bemidji State Park (1998).

Figure 1

State Trails Covered by 1996, 1997 & 1998 Surveys



The surveys had two broad goals. One goal was to measure overall trail use and the main activities that comprise the use. State trails vary substantially in their intensity of use and activity patterns. The second goal was to gain a better understanding of trail users, including the demographic characteristics of the users, where users come from, and what users like and dislike about the trails.

The first goal was accomplished by individuals counting trail users while traveling along a selected segment of the trail at times and days specified in a statistical sampling schedule. Each count lasted no longer than one hour. The counter classified trail users according to their activity: biking, walking, running, skating, horseback riding, and other.

To accomplish the second goal, summer trail users were asked to complete a mail-

Table 1

Trail Surveys

Survey	Survey Period	Days in Survey Period	Hours Each Survey Day	Total Hours in Survey Period
Paul Bunyan - Summer 1996	Memorial Day Weekend to Labor Day, 1996, 7:00 AM to 8:00 PM	101	13	1313
Douglas - Summer 1997	Memorial Day Weekend to Labor Day, 1997, 7:00 AM to 8:00 PM	101	13	1313
Gateway - Summer 1997	Memorial Day Weekend to Labor Day, 1997, 7:00 AM to 8:00 PM	101	13	1313
Root River - Summer 1997	Memorial Day Weekend to Labor Day, 1997, 7:00 AM to 8:00 PM	101	13	1313
Glacial Lakes - Summer 1998	Memorial Day Weekend to Labor Day, 1998, 7:00 AM to 8:00 PM	108	13	1404
Heartland - Summer 1998	Memorial Day Weekend to Labor Day, 1998, 7:00 AM to 8:00 PM	108	13	1404
Luce Line - Summer 1998	Memorial Day Weekend to Labor Day, 1998, 7:00 AM to 8:00 PM	108	13	1404
Paul Bunyan segment, near Lake Bemidji State Park - Summer 1998	Memorial Day Weekend to Labor Day, 1998, 7:00 AM to 8:00 PM	108	13	1404
Sakatah Singing Hills - Summer 1998	Memorial Day Weekend to Labor Day, 1998, 7:00 AM to 8:00 PM	108	13	1404

back questionnaire or in-person interview (interviews were only used on the first survey done, which was the Paul Bunyan Trail in 1996). Trail users were queried about a variety of topics, including reasons for using the trail, likes and dislikes about the trail, and money spent in the local economy in association with trail use.

This document is a descriptive summary of results of these trail surveys. Following the next section on methodology, the summary is broken into the following topics:

Trail use
- Market areas
- Intensity of use
- Trail activities
- Use of paved and unpaved trail segments

Trail user experiences and characteristics
- How users first heard about the trail
- Appeal of the trail
- Trail ratings, including ratings of a variety of facilities and services
- Priorities for trail improvements
- User conflicts and crowding
- Tourist expenditures and local economic impact
- Trip characteristics
- Demographic characteristics of trail users

For those who would like more detail on results, questionnaire tabulation documents with breakdowns are available for each trail survey from the Minnesota Department of Natural Resources, Trails and Waterways Division. Electronic versions of all documents can be obtained by sending an e-mail to: Laurie.Young@dnr.state.mn.us. In addition, Appendix A of this document contains trail use estimates with confidence intervals for each survey. Sampling plans from which the use estimates were derived can be obtained in the same way as the preceding documents. These same sampling plans directed the field work to recruit a representative sample of trail users for the mail-back surveys or in-person interviews.

METHODOLOGY

A statistical sampling plan was developed for each survey. It directed field work for obtaining estimates of trail use and recruiting representative samples of users for mail-back surveys or in-person interviews. Data collection for use estimates consisted of an individual counting trail users while traveling along a selected segment of the trail at times and days specified in the sampling plan. Each count lasted no longer than one hour. The counter classified summer trail users according to their activity: biking, walking, running, skating, horseback riding, and other.

The number of sample periods for counting trail users was selected so as to produce 95 percent confidence limits of +/-20 percent or smaller on total seasonal user hours. Seven of the nine surveys had confidence limits less than +/- 20 percent, while two (Douglas-1997 and Paul Bunyan near Lake Bemidji State Park-1998) had confidence limits between +/-20 and +/- 30 percent (see Appendix A). For breakdowns of user hours (e.g., breakdowns by activity or trail

segment), the confidence limits are wider, and become quite large for small estimates. It is good to keep these confidence limits in mind when comparing trail segments or activities.

Trail use is reported in terms of "user hours." One user hour is one person using the trail for one hour. Two people using the trail for one hour is two user hours. Similarly, two people using the trail for four hours is eight user hours. User hours are an effective way to combine and compare trail activities that have different outing lengths. A biking occasion, for example, is typically longer than a walking occasion, which in turn is typically longer than a running occasion. To combine and compare these activities requires that they be measured in an equivalent way. Such an equivalent way of measuring is user hours.

As noted above, the number of use occasions (or visitors) is not the same as the number of user hours. The methodology employed in the trail studies provides accurate estimates of user hours, but will underestimate use occasions. Occasions are underestimated because the number of occasions is derived by dividing user hours by the length of an occasion. Occasion lengths—obtained in the user survey—are overestimates, since the longer a trail user spent on the trail, the more like he/she was to be selected for the survey. Attempts were made to minimize this problem by deriving occasion numbers for the different activities—which typically have different occasion lengths—separately. But the basic problem still remains unaccounted for. It may be that the occasion estimates are relatively close. A future study that collected the necessary information to gauge the level of occasion underestimation would probably be worthwhile, since a number of people have shown interest in reporting the data in terms of use occasions.

Table 2

Summer State Trail Surveys, 1996 to 1998

Survey	Survey Method	Surveys Completed	Survey Return Rate
Paul Bunyan, 1996	In-person interview	217	N/A
Douglas, 1997	Mail	310	65%
Gateway, 1997	Mail	375	70%
Root River, 1997	Mail	601	76%
Glacial Lakes, 1998	Mail	81	68%
Heartland, 1998	Mail	279	69%
Luce Line, 1998	Mail	236	72%
Paul Bunyan segment, near Lake Bemidji State Park, 1998	Mail	94	69%
Sakatah Singing Hills, 1998	Mail	345	59%

The sampling plan specified the places, dates and times when individuals intercepted trail users and asked them to participate in a survey. Surveys in 1997 and 1998 were mail back questionnaires, while the 1996 Paul Bunyan survey was an in-person interview (Table 2). For the mail-back surveys, user names and addresses were obtained on a reminder postcard so nonrespondents could receive another survey some three weeks later. The return rates for the mail-back surveys were high enough (between 59 percent and 76 percent) to provide a good representation of the trail user populations. The number of survey returns is sufficient to characterize users of any trail. It is also sufficient to characterize a few major user breakdowns (such as trail activity breakdowns) for each trail. The low number of returns for the Glacial Lakes Trail and Paul Bunyan Trail near Lake Bemidji State Park means that only the most general characterizations are possible for these trails.

To ensure that each trail's survey returns from a particular activity group or day of week (weekdays and weekend/holidays) are properly represented in the reporting of survey results, surveys are weighted according to trail use estimates obtained in the counting component of the trail study describe above. This same weighting procedure is employed when results are combined across trails.

TRAIL USE

Market Areas

The state trails serve distinct types of geographic markets during the summer. Three of the trails (Douglas, Gateway and Luce Line) draw primarily from a local market, whereas three other trails (Heartland, Paul Bunyan and Root River) serve mostly a long-distance (or tourist) market, and three others serve a mix of locals and tourists (Table 3). For the local-market trails, the median travel distance—wherein half of the trail use originates—is only 4 or 5 miles. Very little use on these trails comes from over 50 miles. In contrast, the median travel distances for the tourist-market trails exceed 90 miles, and over 60 percent of all use originates from over 50 miles. The Paul Bunyan and Heartland have a larger share of total use that originates locally than the Root River. One-third of Paul Bunyan use and 28 percent of Heartland use comes from within 10 miles, while only 6 percent of Root River use comes from within that distance.

Table 3
Travel Characteristics of Trail Users

	Miles from Home to Trail		Percent of use from	Percent of use from
	Median	Mean	within 10 miles of the trail	over 50 miles of the trail
High Local Use				
Douglas, 1997	5	19	80%	8%
Gateway, 1997	5	10	70%	1%
Luce Line, 1998	4	11	72%	2%
High Tourist Use				
Heartland, 1998	90	141	28%	63%
Paul Bunyan, 1996	120	174	33%	62%
Root River, 1997	100	137	6%	71%
Mix Local/Tourist Use				
Glacial Lakes, 1998	15	45	48%	24%
Paul Bunyan segment, near Lake Bemidji SP, 1998	8	88	57%	29%
Sakatah Singing Hills, 1998	25	52	41%	23%

The trails that are a more even mix of local users and tourists draw most of their use from within 10 miles (40% to 60%), but still have a significant share of use coming from over 50 miles (20% to 30%).

The primary origins for the local-market trails are, of course, the counties in which the trails are located: Olmsted for Douglas Trail, Ramsey and Washington

for Gateway Trail, and Hennepin for Luce Line Trail (Table 4). Local counties are also evident for the tourist-market trails and for the trails that serve a mix of locals and tourists: Hubbard for Heartland Trail, Crow Wing for Paul Bunyan Trail, Fillmore for Root River Trail, Kandiyohi for Glacial Lakes Trail, Beltrami for the segment of the Paul Bunyan Trail near Lake Bemidji State Park, and Rice and Blue Earth for Sakatah Singing Hills Trail. Tourist origins are mostly Twin Cities counties and other states, especially the surrounding states of Iowa, North Dakota and Wisconsin.

Table 4

Origins of Trail Users
(named origins contribute at least 5% of total user hours)

High Local Use Trails

Trail	Percent of User Hours
Douglas, 1997	
Olmsted	74
Goodhue	9
All other origins	17
Total	100

Trail	Percent of User Hours
Gateway, 1997	
Ramsey	44
Washington	30
Hennepin	12
Anoka	6
Dakota	5
All other origins	3
Total	100

Trail	Percent of User Hours
Luce Line, 1998	
Hennepin	81
Wright	6
All other origins	13
Total	100

High Tourist Use Trails

Trail	Percent of User Hours
Heartland, 1998	
Out of State*	25
Hubbard	16
Hennepin	12
Becker	5
Cass	5
Ramsey	5
All other origins	33
Total	100

* North Dakota 9%; Iowa 8%

Trail	Percent of User Hours
Paul Bunyan, 1996	
Crow Wing	24
Hennepin	18
Out of State	13
Ramsey	7
Cass	6
All other origins	32
Total	100

Trail	Percent of User Hours
Root River, 1997	
Out of State*	34
Hennepin	13
Olmsted	9
Dakota	8
Fillmore	8
Ramsey	5
All other origins	23
Total	100

* Iowa 19%; Wisconsin 10%

Mix Local/Tourist Use Trails

Trail	Percent of User Hours
Glacial Lakes, 1998	
Kandiyohi	54
Out of State*	10
Stearns	9
Hennepin	6
All other origins	20
Total	100

* Iowa 9%

Trail	Percent of User Hours
Paul Bunyan segment, near Lake Bemidji SP, 1998	
Beltrami	68
Out of State	7
Pine	7
Anoka	5
All other origins	13
Total	100

Trail	Percent of User Hours
Sakatah Singing Hills, 1998	
Rice	19
Blue Earth	18
Hennepin	12
Out of State	11
Dakota	7
Waseca	5
All other origins	28
Total	100

Intensity of Use

Summer use of the trails differs considerably (Table 5). Four of the trails have total summer user hours exceeding 100,000, while another is nearly 100,000 (Sakatah Singing Hills). The remaining trails generate summer use totals between 66,000 and 17,000 user hours, the latter of which is on the particularly short survey segment of the Paul Bunyan Trail near Lake Bemidji State Park.

Table 5

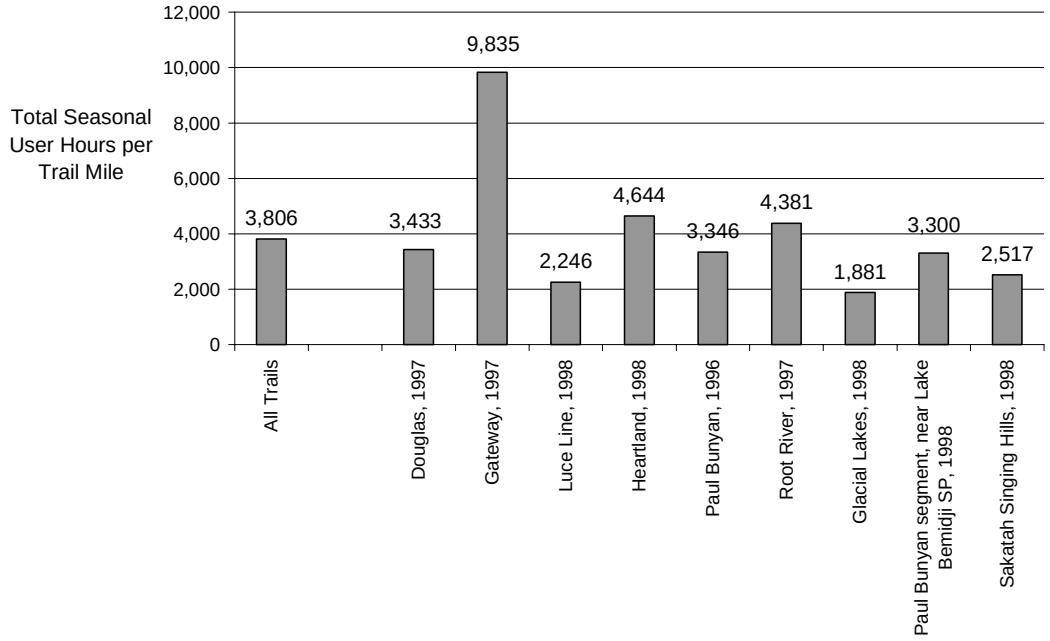
Trail User Hours

	Total Seasonal User Hours	Miles of Trail in Survey	User Hours per Trail Mile
High Local Use			
Douglas - Summer 1997	42,910	12.5	3,433
Gateway - Summer 1997	181,952	18.5	9,835
Luce Line - Summer 1998	65,120	29.0	2,246
High Tourist Use			
Heartland - Summer 1998	125,381	27.0	4,644
Paul Bunyan - Summer 1996	155,268	46.4	3,346
Root River - Summer 1997	178,761	40.8	4,381
Mix Local/Tourist Use			
Glacial Lakes - Summer 1998	33,858	18.0	1,881
Paul Bunyan segment, near Lake Bemidji State Park - Summer 1998	17,488	5.3	3,300
Sakatah Singing Hills - Summer 1998	95,634	38.0	2,517
All Trails	*896,373*	*236*	*3,806*

These hours of use, as noted above, occur over trails of widely varying length. To compare trail use between trails of different lengths, total user hours are normalized by trail length, yielding an intensity of trail use statistic: user hours per trail mile. In terms of summer-use intensity, each mile of the Gateway is clearly the highest; no other trail is within a factor of two of the Gateway (Figure 2). One reason the Gateway is used so intensively is the large number of people who live near the trail (Table 6). Just over one million people live within ten miles of the Gateway, a local population base that is nearly twice as large as the next largest population base found for another Twin City metro area trail (Luce Line).

Figure 2

Intensity of Summer State Trail Use



After the Gateway Trail, the next most intensively used trails are the Heartland and Root River, followed by the Douglas and the two parts of the Paul Bunyan. The least intensively used trail is Glacial Lakes.

Summer trail use is about evenly split between weekends/ holidays and weekdays, which is common for outdoor recreation use patterns. The only trail that has somewhat skewed summer use is the Root River, where 62 percent of use occurs on weekends and holidays (Table 7). Since weekdays are

Table 6

Number of People Living Near the Trail*
(within 10 miles of the trail in 1997)

	Number of People
High Local Use	
Douglas, 1997	114,803
Gateway, 1997	1,083,415
Luce Line, 1998	556,124
High Tourist Use	
Heartland, 1998	17,102
Paul Bunyan, 1996	54,336
Root River, 1997	24,015
Mix Local/Tourist Use	
Glacial Lakes, 1998	42,054
Paul Bunyan segment, near Lake Bemidji SP, 1998	27,348
Sakatah Singing Hills, 1998	119,364

* Based on 1997 population estimates for Minnesota minor civil divisions, which are available from the Office of the State Demographer.

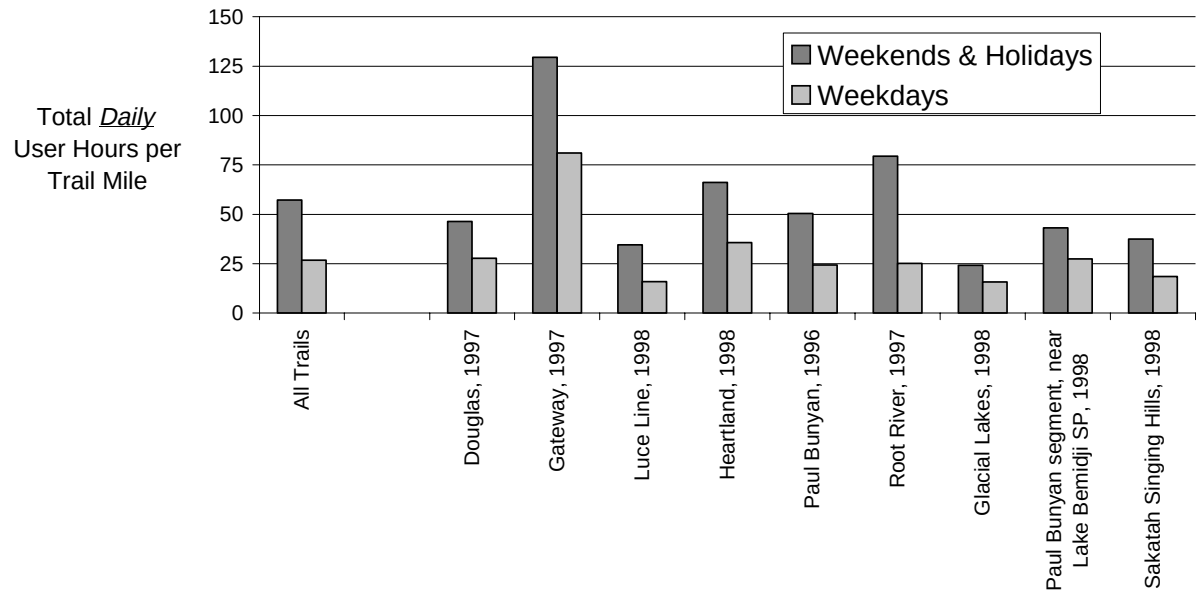
more numerous than weekends and holidays, the intensity of use on summer weekend/holidays is about double that on weekdays (Figure 3). It is interesting to note that the intensity of use on weekdays on the Gateway exceeds weekends/ holidays on all other trails. Only the Paul Bunyan and Root River weekend/ holiday intensities are comparable to the weekday intensities on the Gateway.

Table 7

Trail Use by Day of Week

	Total Seasonal User Hours	Percent of Use: Weekends & Holidays	Weekdays	Total
High Local Use				
Douglas - Summer 1997	42,910	46	54	100
Gateway - Summer 1997	181,952	45	55	100
Luce Line - Summer 1998	65,120	52	48	100
High Tourist Use				
Heartland - Summer 1998	125,381	49	51	100
Paul Bunyan - Summer 1996	155,268	51	49	100
Root River - Summer 1997	178,761	62	38	100
Mix Local/Tourist Use				
Glacial Lakes - Summer 1998	33,858	44	56	100
Paul Bunyan segment, near Lake Bemidji State Park - Summer 1998	17,488	44	56	100
Sakatah Singing Hills - Summer 1998	95,634	51	49	100
All Trails	*896,373*	*51*	*49*	*100*

Figure 3


Intensity of Summer State Trail Use by Day of Week
Total *Daily* User Hours per Trail Mile
150
125
100
75
50
25
0
Weekends & Holidays
Weekdays
All Trails
Douglas, 1997
Gateway, 1997
Luce Line, 1998
Heartland, 1998
Paul Bunyan, 1996
Root River, 1997
Glacial Lakes, 1998
Paul Bunyan segment, near Lake Bemidji SP, 1998
Sakatah Singing Hills, 1998

Douglas Summer Trail Use

On the Douglas Trail, use is distributed evenly between the two segments (Table 8). The segment from Rochester to Douglas, however, is used more intensively than the Douglas to Pine Island segment (Figure 4).

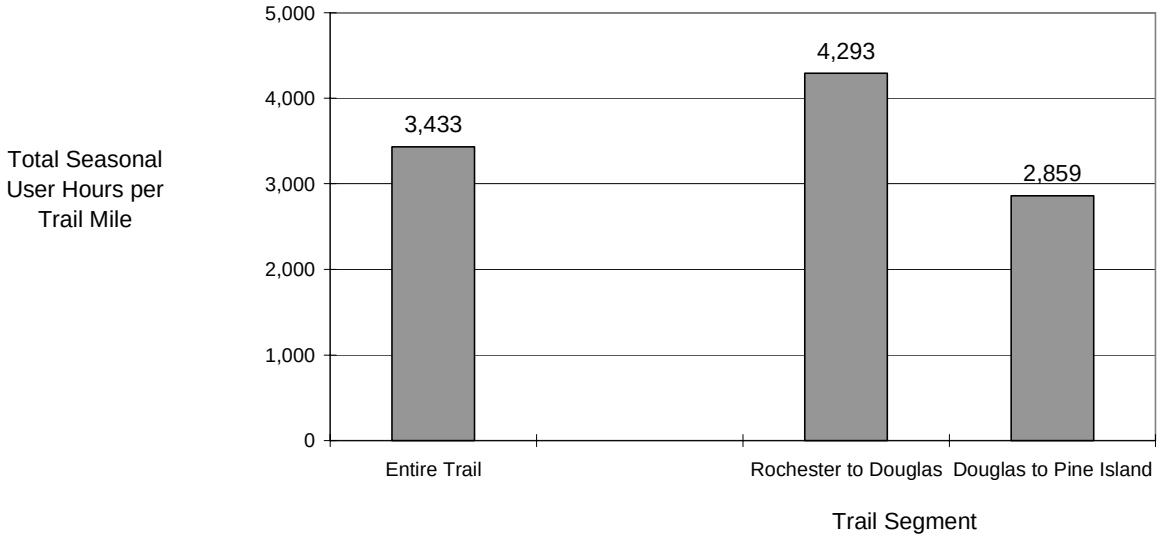
Table 8

Trail Use on Douglas Trail, Summer 1997

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	42,910	100.0	12.5	3,433
Trail Segment				
Rochester to Douglas	21,465	50.0	5.0	4,293
Douglas to Pine Island	21,445	50.0	7.5	2,859

Figure 4

Intensity of Douglas Trail Use
Summer 1997



Gateway Summer Trail Use

Use on the two segments of the Gateway Trail are balanced both in terms of total use (Table 9) and intensity of use (Figure 5).

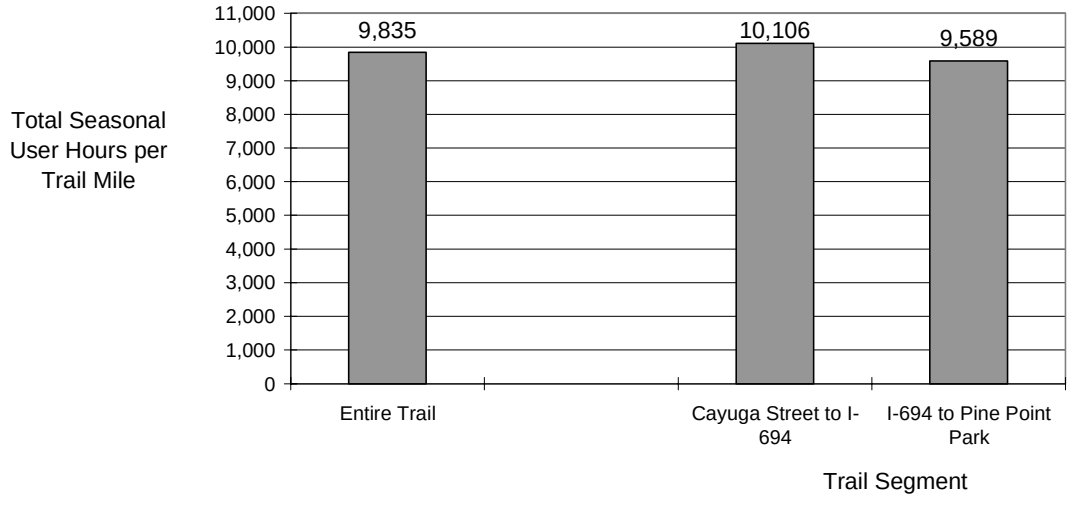
Table 9

Trail Use on Gateway Trail, Summer 1997

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	181,952	100.0	18.5	9,835
Trail Segment				
Cayuga Street to I-694	88,937	48.9	8.8	10,106
I-694 to Pine Point Park	93,015	51.1	9.7	9,589

Figure 5

Intensity of Gateway Trail Use
Summer 1997



Luce Line Summer Trail Use

The eastern segment of the Luce Line accounts for nearly 80 percent of total summer use, and is used far more intensively than the western segment (Table 10). The western segment has one of the lowest use intensities of any segment on any of the trails surveyed to date (Figure 6).

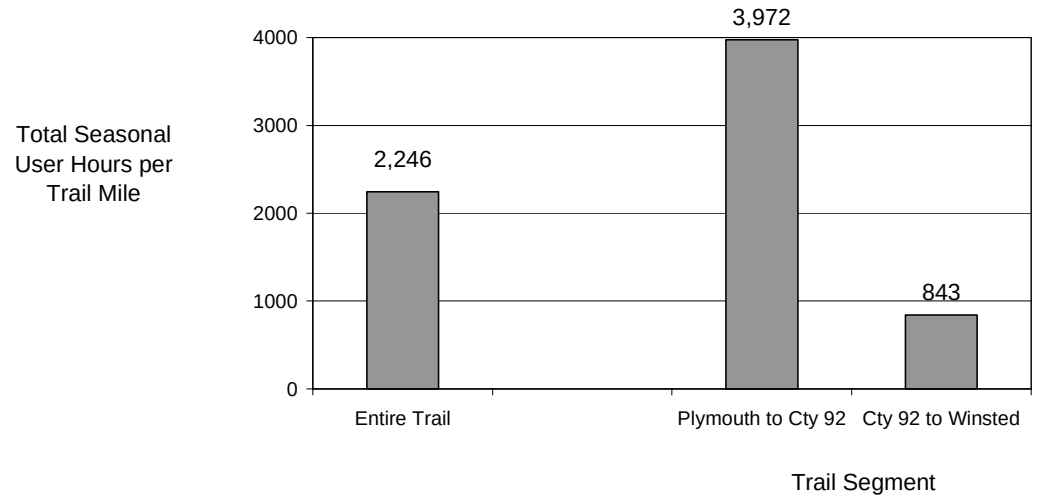
Table 10

Trail Use on Luce Line Trail, Summer 1998

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	65,120	100.0	29.0	2,246
Trail Segment				
Plymouth to Cty 92	51,637	79.3	13.0	3,972
Cty 92 to Winsted	13,484	20.7	16.0	843

Figure 6

Intensity of Luce Line Trail Use
Summer 1998



Heartland Summer Trail Use

About half the trail use occurs on the westernmost segment leading out of Park Rapids (Table 11). This same segment has a somewhat higher intensity of use than the other two segments (Figure 7).

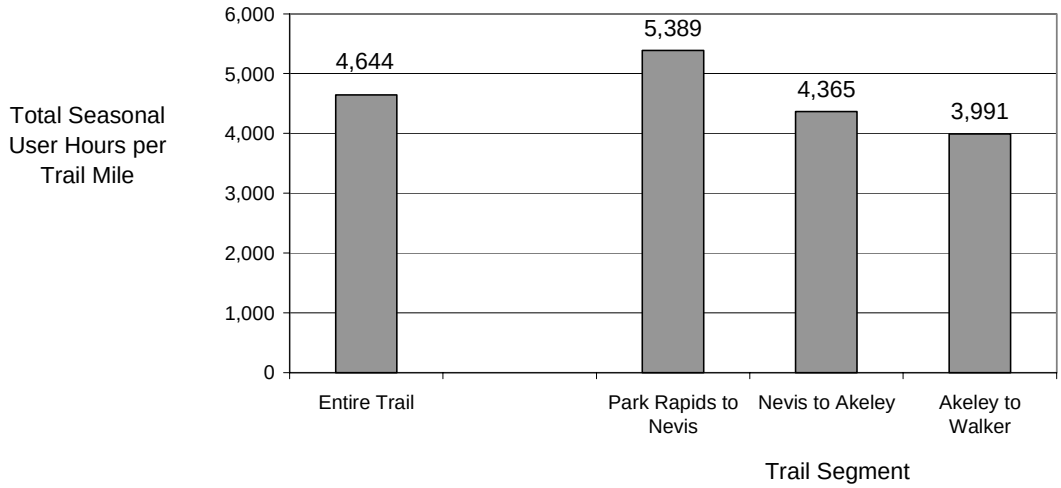
Table 11

Trail Use on Heartland Trail, Summer 1998

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	125,381	100.0	27.0	4,644
Trail Segment				
Park Rapids to Nevis	59,284	47.3	11.0	5,389
Nevis to Akeley	26,192	20.9	6.0	4,365
Akeley to Walker	39,905	31.8	10.0	3,991

Figure 7

Intensity of Heartland Trail Use
Summer 1998



Paul Bunyan Summer Trail Use

The two southern segments of the Paul Bunyan Trail between Baxter and Pequot Lakes account for two-thirds of total trail use (Table 12). These southern segments are the most intensely used as well (Figure 8).

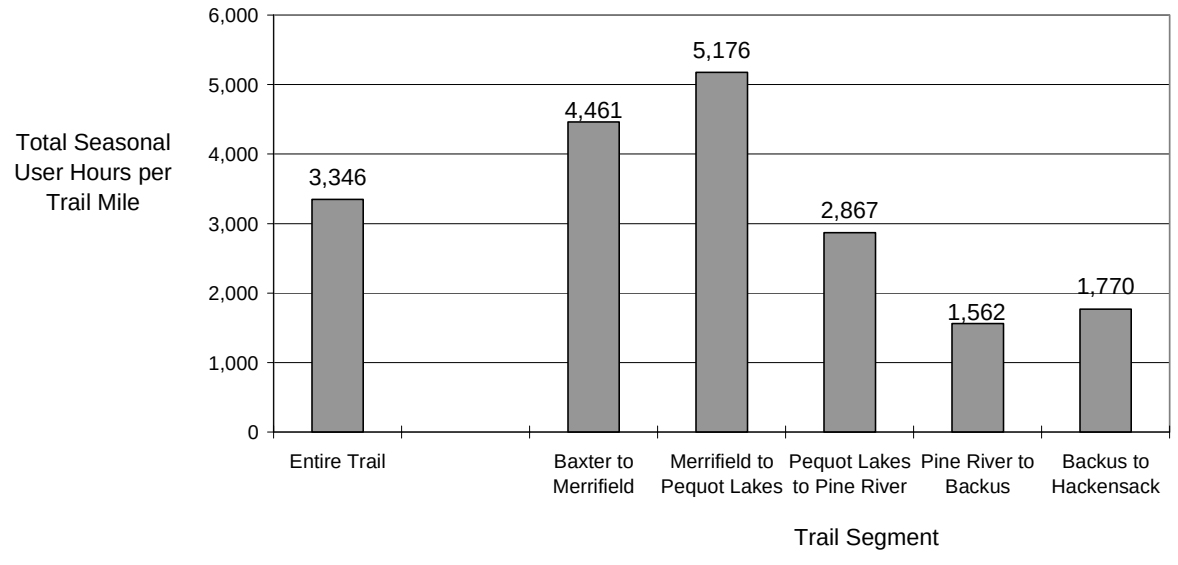
Table 12

Trail Use on Paul Bunyan Trail, Summer 1996

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	155,268	100.0	46.4	3,346
Trail Segment				
Baxter to Merrifield	40,153	25.9	9.0	4,461
Merrifield to Pequot Lakes	62,111	40.0	12.0	5,176
Pequot Lakes to Pine River	25,803	16.6	9.0	2,867
Pine River to Backus	13,747	8.9	8.8	1,562
Backus to Hackensack	13,453	8.7	7.6	1,770

Figure 8

Intensity of Paul Bunyan Trail Use
Summer 1996



Root River Summer Trail Use

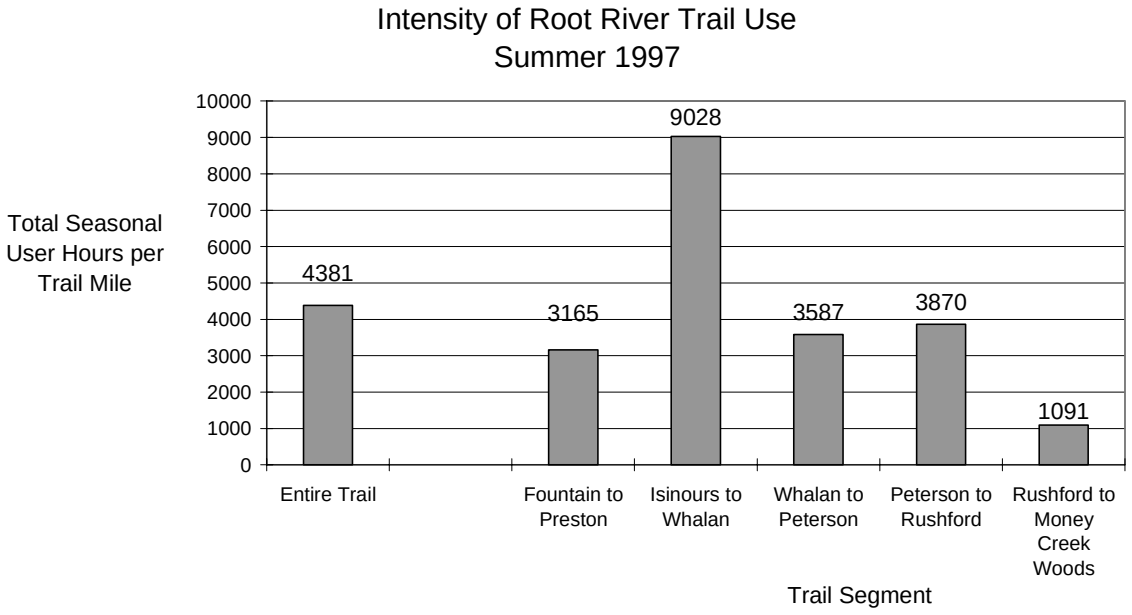
The Root River Trail has large differences between segments. The segment from Isinours to Whalan, which goes through Lanesboro, accounts for nearly half of total trail use (Table 13). This same segment has an intensity of use that is much higher than the other segments (Figure 9) and is comparable to the Gateway. The most eastern segment of the Root is used the least intensively. The other three segments are not markedly different in terms of intensity of use.

Table 13

Trail Use on Root River Trail, Summer 1997

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	178,761	100.0	40.8	4,381
Trail Segment				
Fountain to Preston	37,978	21.2	12.0	3,165
Isinours to Whalan	83,958	47.0	9.3	9,028
Whalan to Peterson	31,921	17.9	8.9	3,587
Peterson to Rushford	18,578	10.4	4.8	3,870
Rushford to Money Creek Woods	6,327	3.5	5.8	1,091

Figure 9



Glacial Lakes Summer Trail Use

The middle segment from Spicer to New London receives just over half of trail use, and is clearly the most intensively used (Table 14). The stretch from New London to Hawick is the least used segment found in the summer surveys for any trail (Figure 10).

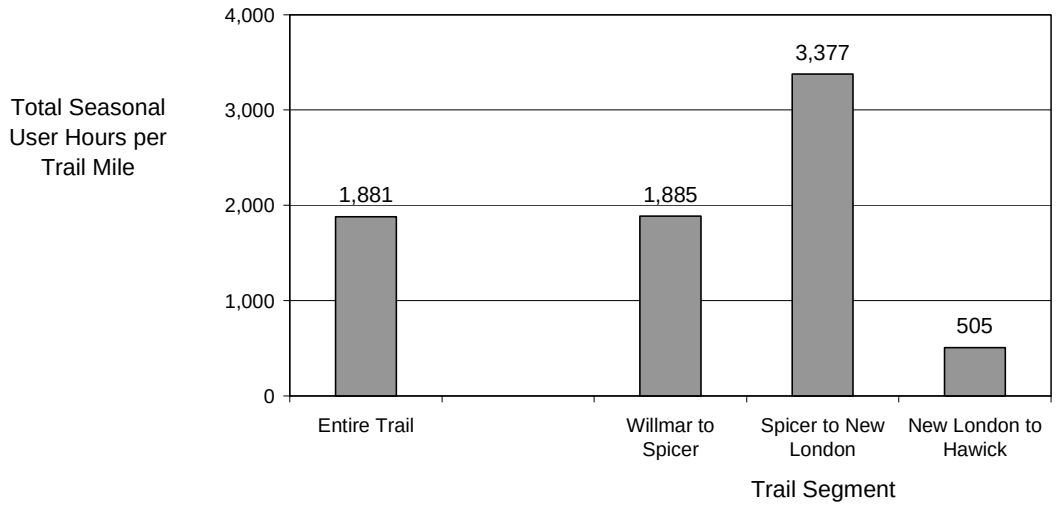
Table 14

Trail Use on Glacial Lakes Trail, Summer 1998

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	33,858	100.0	18.0	1,881
Trail Segment				
Willmar to Spicer	12,251	36.2	6.5	1,885
Spicer to New London	18,576	54.9	5.5	3,377
New London to Hawick	3,032	9.0	6.0	505

Figure 10

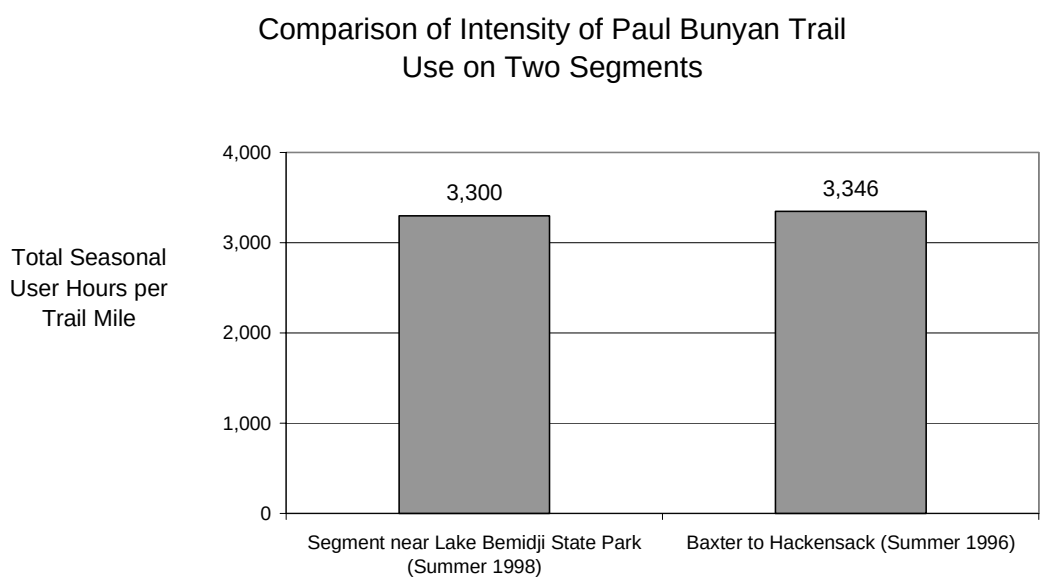
Intensity of Glacial Lakes Trail Use
Summer 1998



Paul Bunyan Segment Near Lake Bemidji State Park, Summer Trail Use

The short five-mile segment of the Paul Bunyan near the State Park receives virtually the same intensity of use as the longer forty-six mile stretch between Baxter/Brainerd and Hackensack (Figure 11).

Figure 11



Sakatah Singing Hills Summer Trail Use

In comparison to other trails, total trail use is relatively evenly spread among the four segments of the Sakatah Singing Hills Trail (Table 15). The intensity of use tends to fall from east to west, however, with the highest intensity occurring on the easternmost segment from Morristown to Faribault (Figure 12).

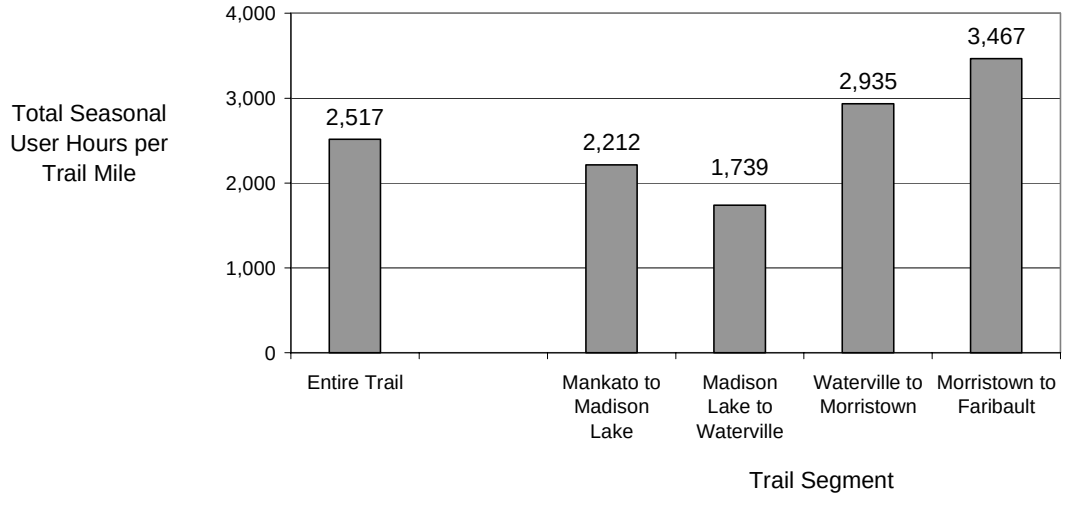
Table 15

Trail Use on Sakatah Singing Hills Trail, Summer 1998

	Total Seasonal User Hours	Percent of User Hours	Miles of Trail in Survey	User Hours per Trail Mile
Entire Trail	95,634	100.0	38.0	2,517
Trail Segment				
Mankato to Madison Lake	20,574	21.5	9.3	2,212
Madison Lake to Waterville	20,696	21.6	11.9	1,739
Waterville to Morristown	21,427	22.4	7.3	2,935
Morristown to Faribault	32,937	34.4	9.5	3,467

Figure 12

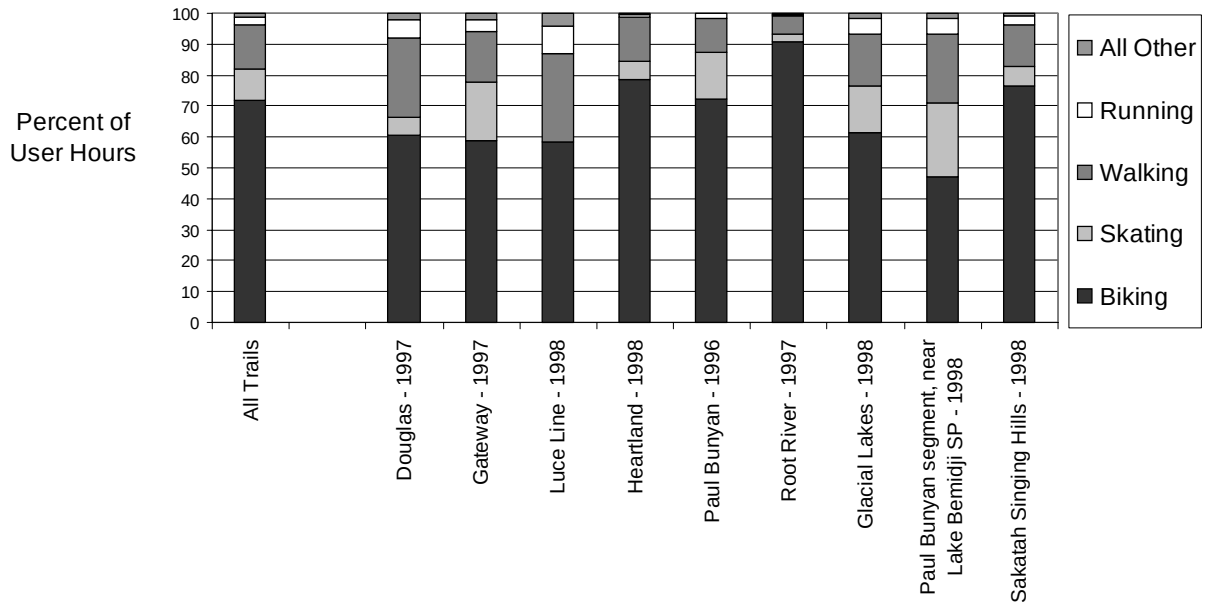
Intensity of Sakatah Singing Hills Trail Use
Summer 1998



Trail Activities

Biking is the predominant summer activity on each trail, and it accounts for 72 percent of use on all trails combined (Figure 13). On local-market trails (Douglas, Gateway, and Luce Line), biking is not as dominant an activity as on tourist-market trails (Heartland, Paul Bunyan and Root River). Instead of biking, users on the local-market trails are more likely to skate, walk and run. On the trails that have a more even mix of local and tourist users, biking varies from a low of 47 percent of total use (Paul Bunyan segment near Lake Bemidji State Park) to a high of 76 percent on the Sakatah Singing Hills Trail. Skating is particularly popular on the segment of the Paul Bunyan near Lake Bemidji State Park.

Figure 13
Trail Activities



The preceding differences between local-market and tourist-market trails are due to the corresponding differences in summer activity patterns between local and tourist users. This is well illustrated by comparing locals and tourists on the same trails. Take the tourist-market trails as an example. Tourists almost exclusively bike (88 percent of total use), while local users are much more likely to walk, run and skate (Table 16). To tourists, the trails are "biking" trails, whereas to locals they are more multiple-use facilities.

Table 16

Local versus Tourist Activity Profiles on Tourist-Market Trails
(based on hours of trail use on the Heartland, Paul Bunyan and Root River Trail)

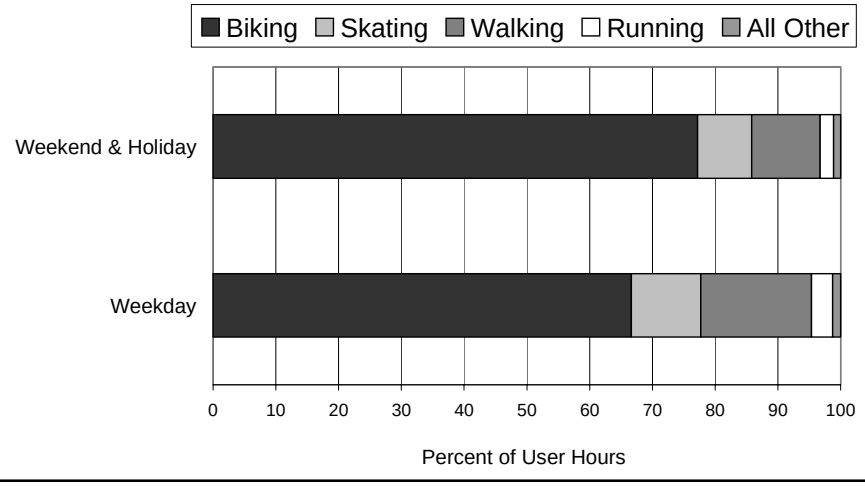
	Percent of Use				
	Biking	Walking & Running	Skating	All Other	Total
Local user*	58	29	13	1	100
Tourist user*	88	5	6	0	100
All Users	81	11	8	0	100

* 'Local' is a trail user who came a short distance to the trail from their permanent home; 'tourist' is a trail user who spend the night prior to trail use away from their permanent home (e.g., at a resort or seasonal home).

The mix of activities does not change greatly between weekdays and weekend/ holidays, but there are some notable differences. On weekdays, users are less likely to bike and more likely to skate, walk and run (Figure 14). These variations in activity patterns by day of week are due in part to local users—who bike less and walk, run and skate more—contributing a larger share of weekday than weekend/holiday use.

Figure 14

Trail Activities by Day of Week for All Trails Combined

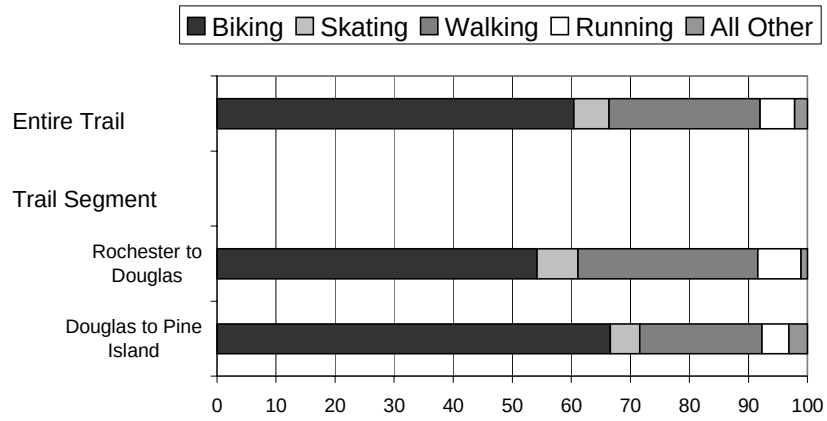


Douglas Trail Summer Activities

On the Douglas Trail, the Rochester to Douglas segment is used more for walking and running and less for biking than the other segment (Figure 15). In both segments, however, biking accounts for about 55-65 percent of use.

Figure 15

Activities on Douglas Trail
Summer 1997

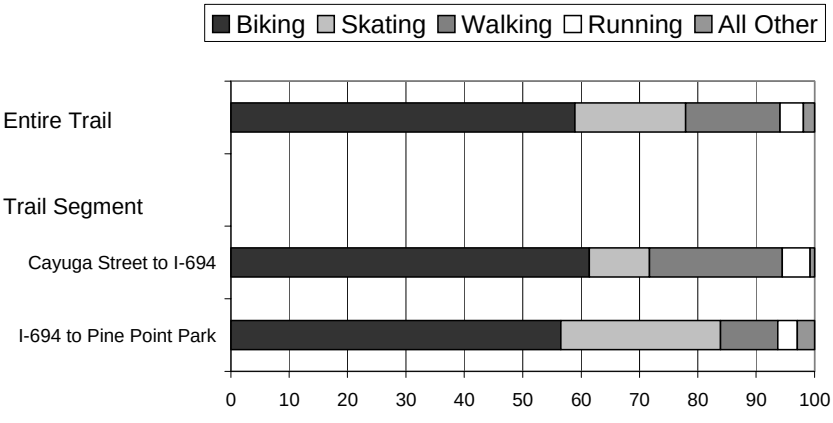


Gateway Trail Summer Activities

The segments of the Gateway are used about the same, except for skating and walking (Figure 16). Skating is more popular on the more rural I-694 to Pine Point Park segment. Walking is more popular on the predominately urban Cayuga Street to I-694 segment.

Figure 16

Activities on Gateway Trail
Summer 1997

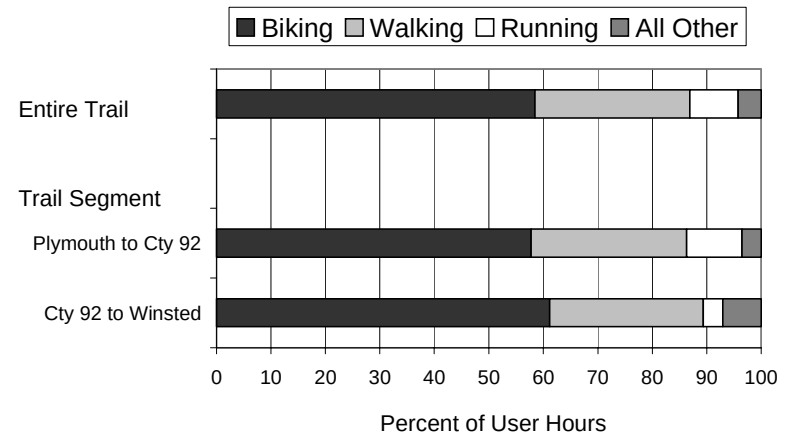


Luce Line Trail Summer Activities

The two segments of the Luce Line are used nearly the same (Figure 17). The Luce Line has no skating because the trail surface is crushed limestone.

Figure 17

Activities on Luce Line Trail
Summer 1998

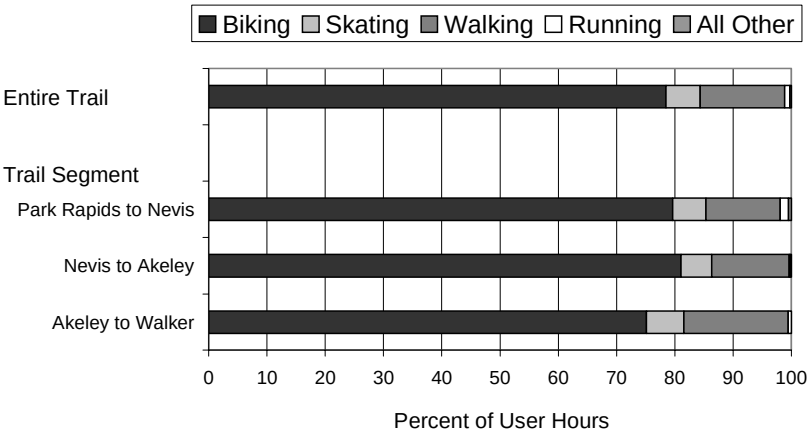


Heartland Trail Summer Activities

Activities do not vary much from segment to segment on the Heartland Trail (Figure 18).

Figure 18

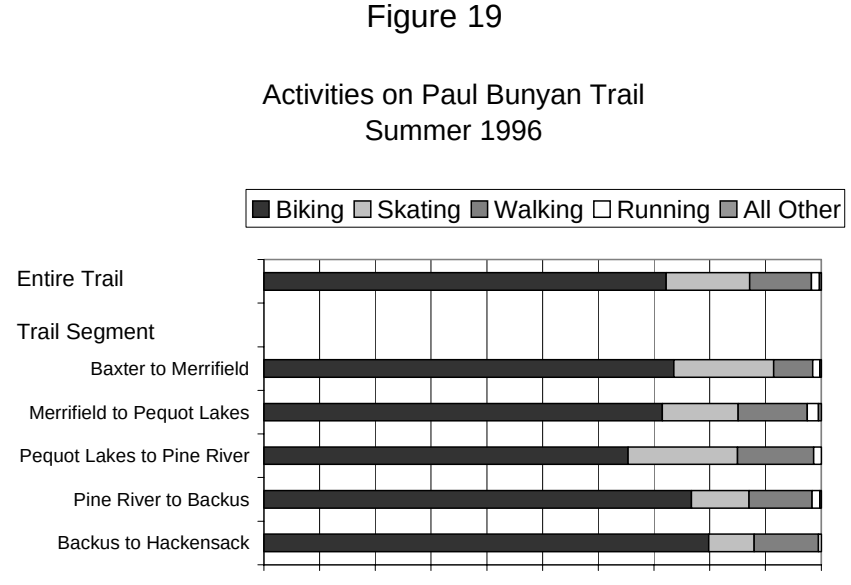
Activities on Heartland Trail
Summer 1998



Paul Bunyan Trail Summer Activities

There are no major differences in activity mix among the Paul Bunyan segments (Figure 19). Biking accounts for somewhat less of the use in the southern segments, and skating for more of the use.

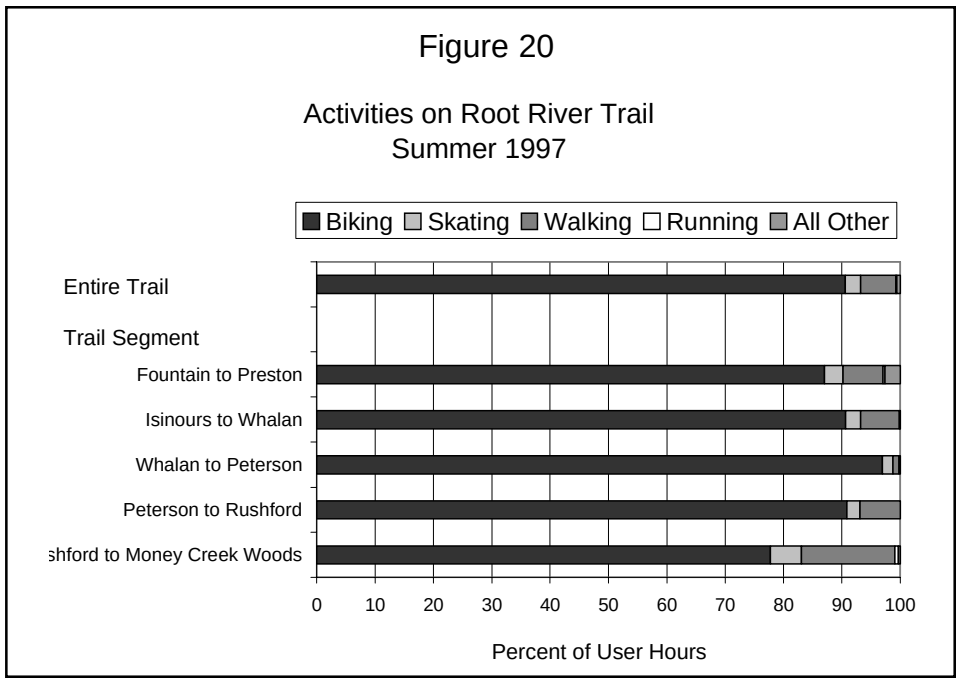
Figure 19



Root River Trail Summer Activities

The segments of the Root River Trail are used about the same, except perhaps for the eastern-most segment (Rushford to Money Creek Woods), which may have a slightly larger contribution from walking (Figure 20).

Figure 20

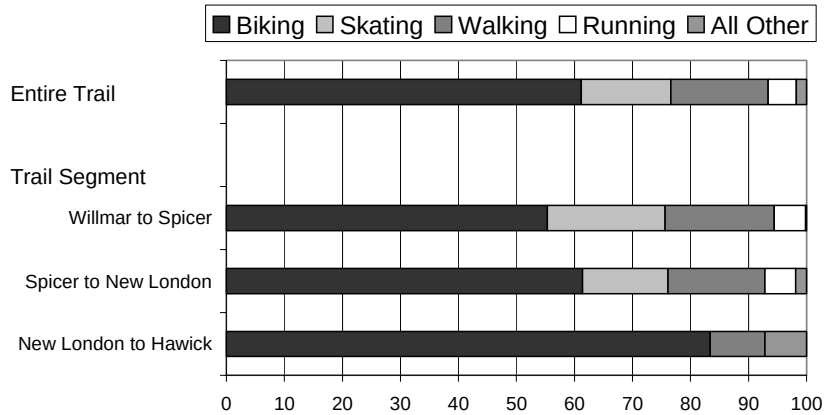


Glacial Lakes Trail Summer Activities

The two higher-used segments of the Glacial Lakes Trail (Willmar to Spicer and Spicer to New London) have similar activity patterns (Figure 21). The least used segment from New London to Hawick appears to be more dominated by biking. This segment has no skating because the trail surface is crushed aggregate.

Figure 21

Activities on Glacial Lakes Trail
Summer 1998

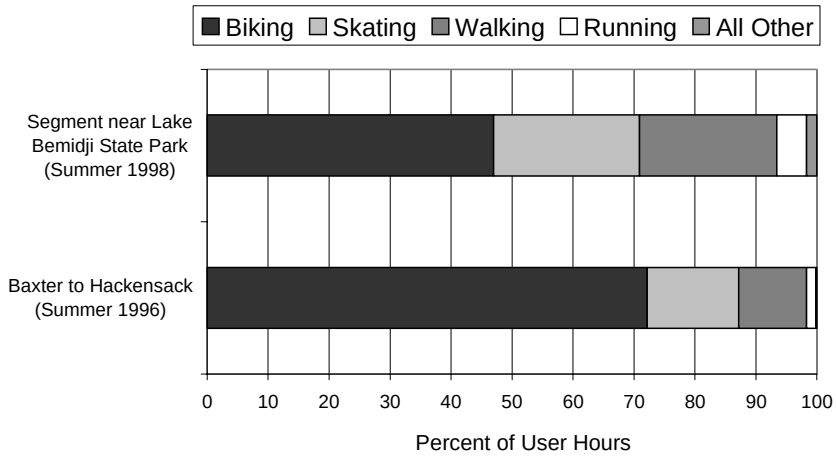


Paul Bunyan Segment Near Lake Bemidji State Park, Summer Activities

The short five-mile segment of the Paul Bunyan near the State Park has less biking and more skating, walking and running than the longer forty-six mile stretch between Baxter/Brainerd and Hackensack (Figure 22).

Figure 22

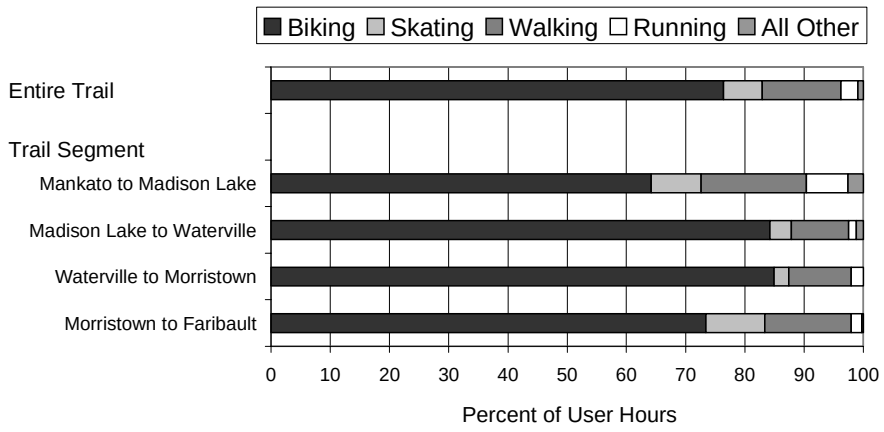
Comparison of Activities on Two Segments
of the Paul Bunyan Trail



Sakatah Singing Hills Trail Summer Activities

The two middle segments of the Sakatah Singing Hills Trail (Madison Lake to Waterville and Waterville to Morristown) have more biking and less skating, walking and running than either the easternmost or westernmost segment (Figure 23).

Figure 23



Use of paved and unpaved trail segments

Six of the trails surveyed during the summers of 1996, 1997 and 1998 have parallel paved and unpaved treadways. The unpaved treadways are not heavily used in comparison to their paved counterparts. Each unpaved treadway accounts for less than 5 percent of total (unpaved plus paved) segment use (Table 17).

Table 17

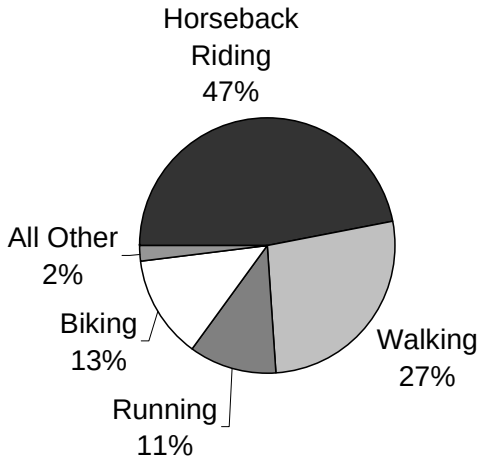
Percent of User Hours on Unpaved Treadways

Trail	Segment with Unpaved and Paved Treadways	Percent of Segment User Hours on Unpaved Treadway
Douglas, 1997	All of trail in survey	4.3
Gateway, 1997	I-694 to Pine Point Park	3.7
Glacial Lakes, 1998	All of trail in survey	0.3
Heartland, 1998	All of trail in survey	0.1
Luce Line, 1998	All of trail in survey	2.2
Sakatah Singing Hills, 1998	Portion of Mankato to Madison Lake segment	not measured

The summer activity patterns on the unpaved treadways are far different than on the paved treadways. About half the use of the unpaved treadways is horseback riding. The other half of the use is walking, running and biking (Figure 24).

Figure 24

Activities on Unpaved Treadways for All Trails Combined



TRAIL USER EXPERIENCES AND CHARACTERISTICS

How Users First Heard About the Trail

Most trail users first hear about the trail either by living near the trail or by word of mouth from family or friends (Table 18). The former is more important to local users, who dominate the use of the Douglas, Gateway and Luce Line. The latter is more important to tourists, who comprise a large share of the use of the Heartland, Paul Bunyan and Root River Trail. The only other major source is newspapers and magazines, an important source for the Paul Bunyan, but not for the other trails. It is interesting to note that the 1996 survey of the Paul Bunyan coincided with the opening of the trail, which was widely publicized in newspapers and magazines.

Table 18

How Did You First Hear About the Trail?
(percent of users giving a source of information)

Source of Information	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Paul Bunyan, 1996	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
I live or work nearby	49		72	62	73		34	33	22		55	46	52
From family or friends - by word of mouth	28		21	25	19		34	22	52		31	38	25
From newspapers, magazines, radio or tv	8		1	5	1		4	25	8		1	3	5
DNR brochure, map or DNR Info Center	4		2	2	2		6	3	7		9	4	7
Tourism, Chamber of Commerce, or Convention & Visitors Bureau Info	3		0	0	1		8	8	6		2	2	2
Internet site	0		0	0	0		1	(not asked)	0		0	0	0
Other	7		4	6	4		12	9	5		2	6	8
Total	100		100	100	100		100	100	100		100	100	100

Appeal of the Trail

There is substantial agreement across trails and between locals and tourists on the factors that make the trails appealing for summer recreation. Primary among these is the natural setting (scenery/wildlife/beauty) in quiet surroundings that

facilitate a general enjoyment of out of doors (Tables 19 and 20). Also of primary importance is the fact that the trails are off-road and exclude motorized vehicles. The trails additionally provide important places for exercise and for having 'fun'. And the users appreciate the fact that the trails are not too physically demanding (are 'easy, flat').

Table 19

What Do You Like Most About This Trail?
(percent of users giving response; table sorted from high to low for all trails combined)

Response	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
Scenery/wildlife	88		78	91	85		86	96		89	79	86
Quiet, peaceful	87		86	85	87		90	90		89	84	85
No cars or motorized vehicles	79		76	84	79		80	81		73	66	71
Good place for exercise	76		74	75	84		79	71		72	91	73
Like the trail surface	73		36	82	62		82	78		67	77	64
Well-maintained, clean	71		56	72	60		80	83		73	71	63
It's fun	70		58	75	60		69	75		74	69	62
Easy, flat trail	67		56	70	57		74	66		73	51	70
Little development	63		49	63	73		65	70		54	62	57
Reduces tension, stress	58		58	55	63		60	60		56	72	56
Like the length	58		49	59	61		62	63		60	35	56
Other	8		6	9	9		4	12		8	12	6

Recreators very much like the trail surface and the way it is maintained. This is generally the case for users of all trails, except for users of the Douglas Trail. As will be shown later, the quality of the trail surface is a leading issue to users of the Douglas.

Table 20

What Do You Like Most About This Trail?
(percent of users giving response)

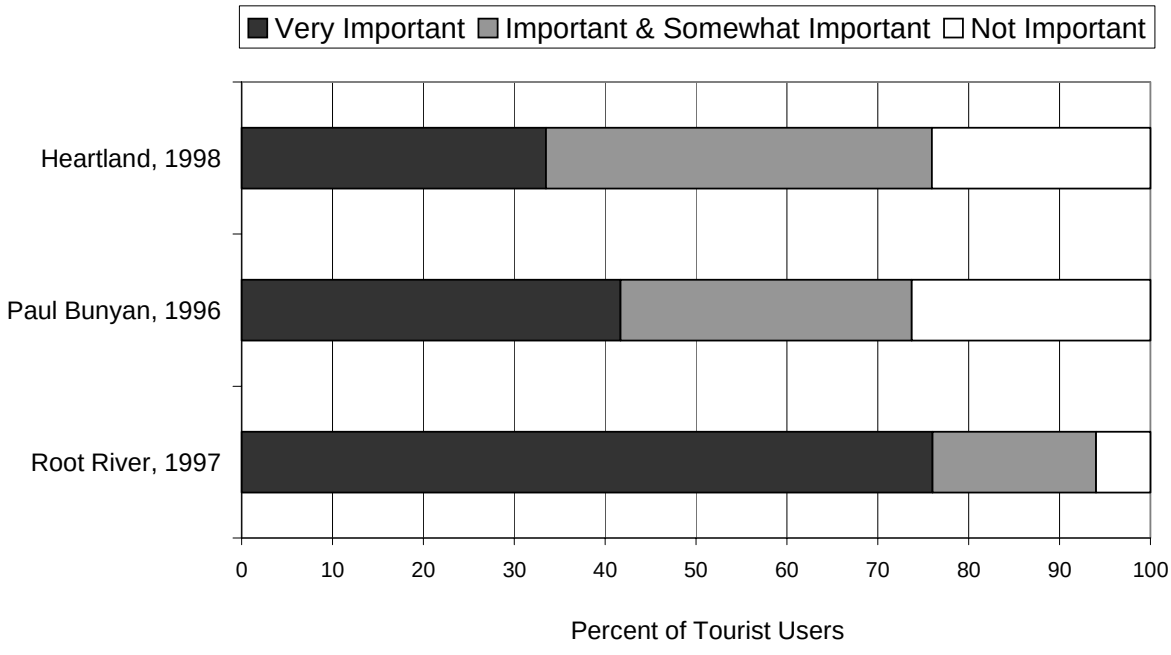
Response	Paul Bunyan 1996 Survey (percent)
Enjoying natural beauty	57
Flat-easy riding, walking	40
No cars or motorized vehicles	39
Quiet, tranquil	26
Good place for exercise	26
Views of countryside/scenery	25
Convenient location	21
Well-maintained, no litter	12
Not crowded	11
Like the length	8
A wonderful recreational facility	6
Economic opportunity for communities	5
Connects to communities	4
No fees	3
Good fishing access	1
Other	7

The trails are a significant factor in drawing tourists into the general area of the trail. For the Root River, 76 percent of tourists said the trail was 'very important' in their decision to visit the area (Figure 25). Only 6 percent said it was 'not important'. The Paul Bunyan and Heartland, too, are important tourist draws for their locales, but they are of lesser importance than the Root River is to its locale. For the Paul Bunyan, 42 percent of users said the trail was 'very important' as a reason to visit the area, but 26 percent said it was 'not important'. Similarly, for the Heartland, 33 percent of users said the trail was 'very important' as a reason to visit the area, and 24 percent said it was 'not important'. Perhaps these differences between the Root River and Paul Bunyan and Heartland are due to the larger number of recreational draws in the Brainerd lakes area, which diminishes the importance of any one facility (like the Paul Bunyan or Heartland Trail).

Figure 25

Importance of Trail to Tourists in Decision to Visit General Area

(the 'important' response category was only asked on the Paul Bunyan survey in 1996)



Trail Ratings

Trail users generally give high marks to the trails for their use and enjoyment. Ratings of 'good' to 'excellent' account for 95 percent or more of users on each trail (Table 21). Very few users give 'fair' or 'poor' ratings on any trail.

Table 21

Trail Ratings
(percent of users giving a rating)

Rating	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Paul Bunyan, 1996	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
Excellent	70		45	69	58		82	82	81		48	67	56
Good	28		50	30	38		16	14	18		48	32	41
Fair	2		5	0	4		1	2	1		2	1	2
Poor & Very Poor	0		1	0	0		1	1	0		1	0	1
Total	100		100	100	100		100	100	100		100	100	100

As further evidence of high positive ratings, nearly all users would recommend the trail to a friend (Table 22).

Table 22

Would You Recommend This Trail to a Friend?
(percent of users giving a recommendation; 1996 Paul Bunyan survey did not include this question)

Recommendation	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
Yes, would recommend	99		99	99	100		98	99		100	100	99
No	1		1	1	0		2	1		0	0	1
Total	100		100	100	100		100	100		100	100	100

Although positive ratings prevail, there are some important distinctions in the mix of 'good' and 'excellent' ratings. The tourist-market trails (Heartland, Paul Bunyan and Root River) have the highest portions of 'excellent' ratings. The Gateway and the segment of Paul Bunyan near Lake Bemidji State Park, too, are

lopsided toward ‘excellent’, but to a lesser extent than the preceding three. The Douglas, Luce Line, Glacial Lakes and Sakatah Singing Hills have the lower ratings; each has less than 60 percent ‘excellent’ ratings. The Douglas and Glacial Lakes have the lowest ratings, and each has less than half of users rating the trail as ‘excellent’.

A number of factors affect these overall trail ratings. One factor is the origin of the user. A second is the quality of facilities and services on the trail. And a third is the activity of the user. Another possible factor (perceived crowding of the trail) is shown in a later section to be associated with trail ratings, but the prevalence of crowding perceptions is too infrequent to exert a substantial influence on trail ratings. Thus, crowding is not discussed further in this section.

With regards to user origin, tourist users tend to give higher ratings than local users (those who live near the trail). This contributes, in part, to the high ratings of the tourist-market trails. On the tourist-market and mix tourist/local-market trails, tourists give some 10 to 15 percent more excellent ratings than local users (Table 23). On the local-market trails, the ratings are reversed: locals give higher ratings. This local-market result, however, is less well established than the preceding ones, because very few tourists use these local-market trails, and the result is based on a small sample of tourists. It is important to note that both locals and tourists give higher ratings on the tourist-market trails than locals and tourists on the other trails. In fact, the local users on the tourist-market trails give higher ratings than the tourist users of the mix local/tourist-market trails. The tourist-

Table 23

Trail Ratings by Local and Tourist Users for Trail Groupings*
(percent of users giving a rating)

Rating	High Local Use: Local users	High Local Use: Tourist users	High Local Use: All users	High Tourist Use: Local users	High Tourist Use: Tourist users	High Tourist Use: All users	Mix Local/Tourist Use: Local users	Mix Local/Tourist Use: Tourist users	Mix Local/Tourist Use: All users
Excellent	65	39	64	76	85	82	51	64	56
Good	33	59	35	19	14	16	47	33	42
Fair	1	2	2	3	1	2	2	2	2
Poor & Very Poor	0	0	0	1	1	1	1	0	1
Total	100	100	100	100	100	100	100	100	100

* ‘Local’ is a trail user who came a short distance to the trail from their permanent home; ‘tourist’ is a trail user who spend the night prior to trail use away from their permanent home (e.g., at a resort or seasonal home).

market trails, in other words, are more 'excellent' in the eyes of both locals and tourists. Clearly, factors other than the user's origin affect trail ratings.

A second influence on trail ratings has to do with the quality of facilities and services on the trail. If users are dissatisfied with key facilities and services, they are more likely to lower their rating of the trail. Similarly if they are satisfied with key facilities and services, they are more likely to raise trail ratings. The survey included user satisfaction ratings for 21 facilities and services. Each of these was examined relative to overall trail ratings. The examination was looking for principle facilities and services that were strongly associated with trail ratings.

Few of the facilities and services had any substantial association with trail ratings.

Table 24

Facilities and Services That Have a Strong Association with Overall Trail Ratings*

Facility/Service **Group** & Item	**High Local Use** Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use** Heartland, 1998	Root River, 1997	**Mix Local/Tourist Use** Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
General Characteristics								
Trail location								
Trail design								
Maintenance								
Trail surface quality	x		x			x		
Maintenance of the trail	x		x					x
Management of vegetation in the trail corridor			x					x
Safety and Enforcement								
Bridges								
Personal safety concerns								
Safety of road crossings								
Availability of parking areas						x	x	
Security of parking areas							x	
Enforcement of trail rules								
Information								
Trail rules, traffic signs, and etiquette signs							x	
Information about getting to the trail								
Information about what to expect about the trail								
Information about trail connections								
Information about what you can see from the trail								
Facilities								
Availability of benches								
Availability of picnic areas or shelters						x		
Availability of toilet facilities								
Availability of drinking water								
Availability of telephones	x							

* To be indicated in this table, satisfaction/dissatisfaction with the facility/service had to have a substantial correlation with trail rating (Cramer's V of 0.25 or higher), and a substantial portion of non-excellent trail ratings (30% or more) had to be associated with non-satisfied facility/service responses.

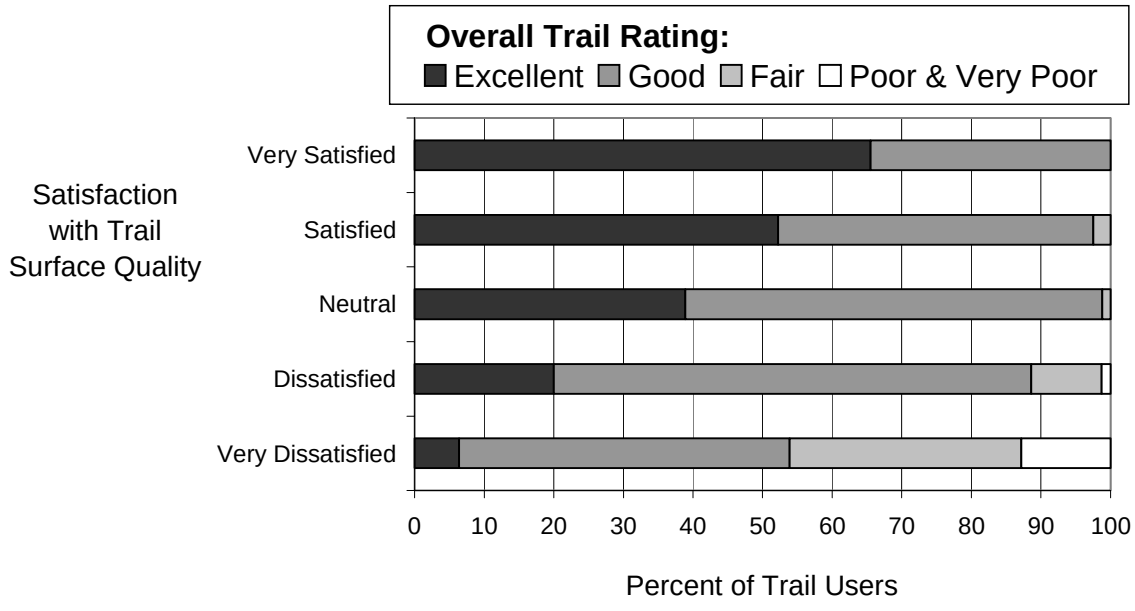
Most that had a strong association were related to a trail maintenance group of items (Table 24). The items included in the group were trail surface quality, trail maintenance, and management of vegetation in the trail corridor. The trails that included at least one of these three items were the Douglas (2 items), Luce Line (3 items), Glacial Lakes (1 item), and Sakatah Singing Hills (2 items). These four trails are also the trails with the lowest ratings (see Table 21).

The connection between the trail ratings and satisfaction with this maintenance group of items suggests that these items are of primary concern to trail users. When satisfaction with these items drops, overall rating of the trail drops too. In other words, if high trail ratings is a goal, these maintenance items appear to be the first that ought to be focused on, and efforts to ensure the items are kept in excellent condition should be given top priority.

To illustrate a connection between trail ratings and a maintenance item, take the first item in Table 24, trail surface quality on the Douglas Trail. As will be shown later, far fewer Douglas trail users are satisfied (and far more are dissatisfied) with the trail surface than users on the other trails. These lower levels of satisfaction

Figure 26

Relationship Between Overall Trail Rating and Satisfaction with Trail Surface Quality for Douglas Trail, 1997



are associated with lower overall trail ratings. A high portion (over 60%) of those who are 'very satisfied' with the Douglas trail surface give 'excellent' overall trail ratings. As satisfaction diminishes, overall trail ratings shift from predominately 'excellent' and 'good' to a mix of 'good' and 'fair' (Figure 26).

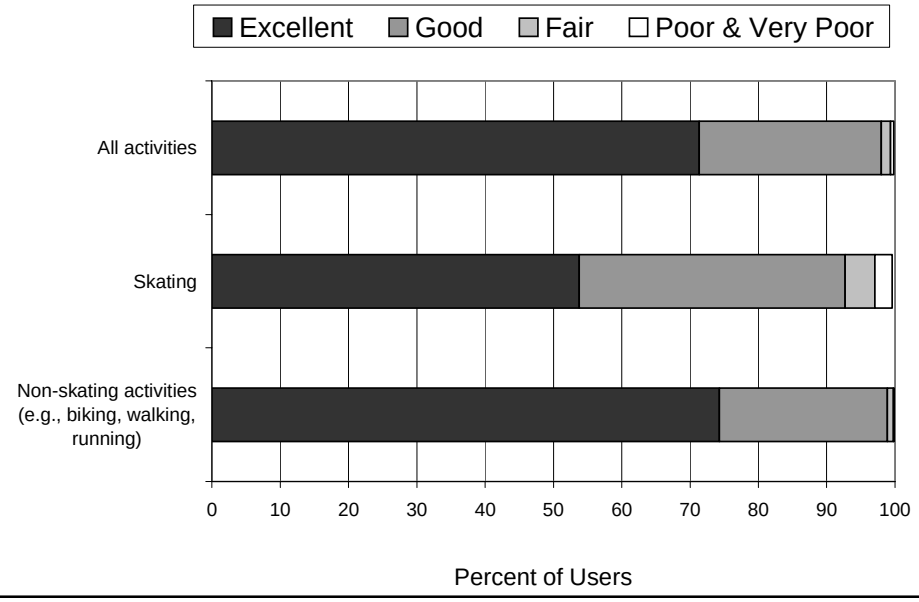
There are other facilities and services associated with trail ratings. Parking concerns show up on the Glacial Lakes and Paul Bunyan segment near Lake Bemidji State Park. Concerns on the Paul Bunyan segment are over both availability and security of parking areas. One information item (trail rules, traffic signs, and etiquette signs) is evident on the Paul Bunyan segment. Two facility items complete the findings: availability of telephones on the Douglas Trail and availability of picnic areas or shelters on the Glacial Lakes Trail.

The third factor associated with trail ratings is the activity of the user. One activity group, skaters, stands out as giving lower trail ratings. On each trail, except the Root River, skaters are much more likely to shift their overall trail ratings away from 'excellent' and into 'good' and 'fair'. For all trails combined, skaters give 20 percent fewer ratings of 'excellent' than users engaged in other activities (Figure 27). These lower ratings are due to the higher sensitivity of skaters to the

Figure 27

Skaters Tend to Give Lower Trail Ratings

(excludes all Luce Line users because the Luce Line has no skating)



quality of the trail surface. Skaters are more likely than other activity groups to be less satisfied (and more dissatisfied) with maintenance of the trail, quality of trail surface, and bridges (which may be more difficult to traverse on skates than by bike or by foot). In the 1996 Paul Bunyan survey (and not asked in the other surveys), skaters were the leading group suggesting a ban on metal traction devices for snowmobiles (e.g., carbide studs), presumably because of their belief that such traction devices lowered the quality of the trail surface for their activity.

Users were asked about their preference for the type of trail surface for their activity. Most users selected the surface type of the trail on which they were recreating (Table 25). All trails, other than the Luce Line, have asphalt paving. The users looking for an alternative to asphalt were mostly walkers and runners; a large majority of walkers and runners on the asphalt trails, however, selected asphalt. The only time more than 10 percent of users expressed a preference for an alternative surface type was on the Luce Line, which has a crushed limestone surface. There, 17 percent of users preferred asphalt and 14 percent preferred a natural surface (grass or dirt). The asphalt preference came mainly from bikers, and the natural-surface preference came from bikers, walkers and runners. The large majority of Luce Line users (67%), however, expressed a preference for the existing surface of compacted crushed limestone. This included nearly 60 percent of bikers (57%) and nearly 80 percent of walkers and runners (77% and 79%, respectively).

Table 25

What type of trail surface do you like best for your type of trail use on the day of the survey?
(percent of users giving a preference)

Surface (existing surface in ***bold italic***)	**High Local Use** Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use** Heartland, 1998	Root River, 1997	**Mix Local/Tourist Use** Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
Asphalt paving	***82***	***93***	17	***92***	***91***	***88***	***94***	***90***
Compacted crushed limestone	4	1	***67***	2	4	2	0	3
Natural surface (grass or dirt)	9	4	14	3	2	7	5	5
Other	5	2	1	2	3	4	2	3
Total	100	100	100	100	100	100	100	100

A variety of trail facility and services were rated by the trail users in the 1997 and 1998 surveys. Users were asked how satisfied or dissatisfied they were with each facility or service. The users—through their responses—grouped these 21 specific facilities/services into five groups (items were grouped using principal components analysis with varimax rotation): general characteristics, maintenance, safety and enforcement, information and facilities. Facilities/services in a group were responded to similarly by users.

Those facilities and services with the highest satisfaction ratings are in the general-characteristics group: trail location and trail design (Table 26). These had high satisfaction for all trails. The next highest group includes maintenance items: trail surface quality, maintenance of the trail, and management of vegetation in the trail corridor. These were the items that had a substantial association with overall trail ratings, as discussed above. When satisfaction with an item in this group is near 80 percent or lower, it was usually associated with a noticeable lowering of

Table 26

Percent of Users Who are "Satisfied" or "Very Satisfied" With the Facility or Service

Facility/Service **Group** & Item	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
General Characteristics												
Trail location	97		95	98	99		98	96		97	97	97
Trail design	95		91	95	96		98	98		95	93	94
Maintenance												
Trail surface quality	89		62	94	80		94	98		77	95	87
Maintenance of the trail	88		72	92	78		93	95		88	91	81
Management of vegetation in the trail corridor	83		85	78	79		86	90		86	87	82
Safety and Enforcement												
Bridges	86		90	81	86		87	95		88	83	88
Personal safety concerns	78		77	75	76		84	88		74	81	73
Safety of road crossings	78		80	66	77		89	95		84	69	81
Availability of parking areas	73		89	58	63		92	87		79	56	82
Security of parking areas	64		78	40	67		83	86		78	63	72
Enforcement of trail rules	56		59	43	58		62	66		58	64	65
Information												
Trail rules, traffic signs, and etiquette signs	77		69	80	66		81	77		80	72	78
Information about getting to the trail	65		62	61	39		74	82		70	63	67
Information about what to expect about the trail	55		51	45	40		65	81		45	52	61
Information about trail connections	51		44	43	34		54	79		50	56	55
Information about what you can see from the trail	48		46	35	37		56	74		47	59	55
Facilities												
Availability of benches	65		68	70	53		51	74		67	32	71
Availability of picnic areas or shelters	55		62	52	31		59	74		46	37	66
Availability of toilet facilities	50		51	61	26		47	64		7	33	47
Availability of drinking water	28		35	20	12		36	54		10	19	32
Availability of telephones	24		24	12	15		32	48		21	22	26

trail ratings.

In the safety and enforcement group, satisfaction levels vary from high to medium depending on the facility or service. The Gateway has a number of items that stand out as having lower (at least 10% lower) than average satisfaction: availability and security of parking areas, safety of road crossings, and enforcement of trail rules. Availability of parking areas also has lower satisfaction for the segment of the Paul Bunyan near Lake Bemidji State Park.

Information items, like safety and enforcement items, have satisfaction levels that vary from high to medium. In this group, the Luce Line stands out for all items as having lower (at least 10% lower) than average satisfaction. The Gateway has one item (information about what you can see from the trail) that stands out as having lower than average satisfaction.

In general, items in the facility group have the lowest satisfaction levels. The Luce Line—as with the information items—stands out as having lower (at least 10% lower) than average satisfaction with a large number of items in this group. Similarly, three of the items (availability of benches, picnic areas or shelters and toilet facilities) stand out as having lower than average satisfaction. Running water facilities (toilets and drinking water) have lower than average satisfaction on the Glacial Lakes Trail. The Heartland Trail has lower satisfaction for availability of benches, and the Gateway has lower satisfaction for availability of telephones. Facilities and the other items near the bottom of Table 26 have the lowest satisfaction and highest dissatisfaction. These are taken up in the next section on improvements, since improvements are closely associated with fixing the facilities and services that produce dissatisfaction.

Priorities for Trail Improvements

Improvements were examined in two ways for the 1997 surveys. One way found improvements using an open-ended question in the survey that asked users what facilities and services were missing that they expected or needed. The second way was to infer improvements from user dissatisfaction with 21 facilities and services, employing the simple logic that what people are dissatisfied with is what they want improved. The two techniques produced nearly the same results. Because it is easier to work with, the dissatisfaction approach will be presented below for both the 1997 and 1998 trail surveys. For the Paul Bunyan survey in 1996, opinions on improvements were asked directly in a open-ended fashion during the in-person interview (Table 27).

Table 27

Suggested Improvements to the Paul Bunyan Trail, 1996
(improvements given by at least 5% of users)

Improvement	Percent of Users Indicating Improvement
Facility Related	
Provide water	32
Provide toilets	28
Improve/fix trail surface	26
Provide rest/picnic areas	21
Policy Related	
Ban studs on snowmobiles	32
Ban snowmobiles	7
Better enforcement of rules	5
Information Related	
More information on trail	12
More info on rules and regulations	7
Better map	5

Facilities, as a group, lead the lists of items with which users are dissatisfied (Table 28). For each trail, availability of drinking water is the number one facility or service that leads the list of improvements. Toilets are close behind drinking water. Telephones, too, are near the top of the improvement list. Availability of picnic areas and benches are not nearly as high in terms of user dissatisfaction as those facilities/services involving running water, except for benches on the Paul Bunyan segment near Lake Bemidji State Park.

The information items have low dissatisfaction for all trails combined. Users of the Luce Line and Paul Bunyan segment near Lake Bemidji State Park tend to have more dissatisfaction with these items than users on the other trails.

In the safety and enforcement group, dissatisfaction is generally low, except for a few items on a few trails. The Gateway tends to have elevated dissatisfaction for

many of these items. Availability of parking areas and parking security have higher dissatisfaction on the Paul Bunyan segment near Lake Bemidji State Park. Safety of road crossing is higher for this segment too.

The maintenance items, although of generally low dissatisfaction, are associated with lower overall trail ratings if dissatisfaction for any item reaches 10 percent for more. Trails with items reaching to about 10 percent or more include Douglas, Luce Line, Glacial lakes and Sakatah Singing Hills.

The two items in the general characteristics group have very low dissatisfaction, which is never above 2 percent for either item on any trail.

Table 28

Percent of Users Who are "Dissatisfied" or "Very Dissatisfied" With the Facility or Service

Facility/Service **Group** & Item	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
Facilities												
Availability of drinking water	41		35	47	56		33	21		59	38	36
Availability of telephones	22		28	28	27		15	7		26	29	22
Availability of toilet facilities	21		12	13	32		23	16		52	23	24
Availability of picnic areas or shelters	10		3	11	14		11	5		14	12	6
Availability of benches	9		10	6	6		17	5		15	28	6
Information												
Information about trail connections	12		7	14	25		10	4		12	19	7
Information about what you can see from the trail	9		4	12	14		9	5		10	11	6
Trail rules, traffic signs, and etiquette signs	7		7	7	10		4	8		4	14	4
Information about what to expect about the trail	6		2	7	8		5	3		8	12	6
Information about getting to the trail	6		2	9	5		4	3		5	9	4
Safety and Enforcement												
Enforcement of trail rules	12		8	21	11		8	5		4	8	4
Safety of road crossings	6		7	8	7		3	1		10	19	5
Availability of parking areas	6		1	7	13		2	2		10	23	4
Security of parking areas	5		0	12	3		1	0		0	5	5
Personal safety concerns	4		2	7	5		3	1		0	9	5
Bridges	3		3	3	3		2	2		2	2	6
Maintenance												
Maintenance of the trail	6		12	3	11		3	3		8	7	9
Trail surface quality	5		21	2	8		3	1		16	5	7
Management of vegetation in the trail corridor	4		4	0	8		6	4		1	4	7
General Characteristics												
Trail design	1		0	1	0		0	0		2	1	2
Trail location	1		0	1	0		0	1		0	2	1

User Conflicts and Crowding

Conflicts among users are not all that common. Most trail users (69% or more on each trail) indicated they did not have a problem or conflict with others (Table 29). When they do have problems or conflicts, the most likely causes are other users blocking the trail, users passing without warning, or pet problems on the trail. The Gateway and Root River Trails have more problems than other trails with users blocking the trail. These two trails, as noted below, are perceived to be more crowded than other trails, which is consistent with the fact that they have the highest intensities of use. Users passing without warning is more prevalent on the Douglas and Gateway than on other trails. Pet problems are most prevalent on the Douglas, Luce Line and Glacial Lakes Trail.

Table 29

Did You Have Any Problems or Conflicts With Other Trail Users?
(responses given by at least 10% of users on any trail)

Response	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Paul Bunyan, 1996	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
No problems with other trail users	81		79	69	82		90	88	82		83	87	86
Other trail users blocking traffic	8		6	16	3		3	3	11		5	3	7
Other trail users passing without warning	6		11	10	6		5	1	6		8	5	3
Problems with other people's pets	5		9	4	11		3	(not broken out)	1		12	7	3

Finding the trail too crowded for enjoyment is not a common experience. Less than 10 percent of users on any trail find it too crowded (Table 30). The two trails—Gateway and Root River—with the highest intensity of use (use per mile of trail) have correspondingly the highest frequency of 'too crowded' responses (for intensity of use information, see Figures 2 & 4 through 12). For all the other trails, crowding is of minimal concern to users.

Where it does occur, crowding is a significant detractor to a user's overall rating of the trail for use and enjoyment. For the two trails that had the highest percentage of 'too crowded' responses (albeit a low percent between 5% and 10%), users who perceived conditions as 'too crowded' shift a sizable share of trail ratings from 'excellent' to 'good' (Table 31). Fortunately, crowding perceptions are too infrequent to be exerting a major influence on trail ratings at this time.

Table 30

Is the Trail Too Crowded for Your Enjoyment?
(percent of users giving a crowding response)

Response	All Trails Combined	**High Local Use**	Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use**	Heartland, 1998	Paul Bunyan, 1996	Root River, 1997	**Mix Local/Tourist Use**	Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
Yes, too crowded	4		3	7	2		1	2	8		3	1	3
No	96		97	93	98		99	98	92		97	99	97
Total	100		100	100	100		100	100	100		100	100	100

Table 31

Perceptions of Crowding are Associated With Lower Trail Ratings
(percent of users giving a response)

	Gateway, 1997 survey		Root River, 1997 survey	
Trail Rating	All Users	User seeing trail as 'too crowded'	All Users	User seeing trail as 'too crowded'
Excellent	70	33	82	65
Good	30	66	18	32
Fair	0	2	1	3
Poor	0	0	0	0
Total	100	100	100	100

Tourist Expenditures and Local Economic Impact

Associated with trail activities is recreator spending, which contributes to the local economy near the trail. Local spenders differ from tourists with respect to their impact on the local economy. Tourists bring new dollars into the local economy and, thus, represent a new source of income. Local spenders, on the other hand, simply circulate existing dollars and income within their local economy; they are not a source of new income. For these reasons, most of the interest in economic impact focuses on tourist expenditures.

Trip spending by trail users during the summer period totals to just over $5 million each year (Table 32). The bulk of the spending (83%) is attributable to

tourists, who are away from home on a trip. And most of the tourist spending (85%) occurs on three trails with high tourist use: Heartland, Paul Bunyan and Root River Trail. For these three trails, tourist spending is in the range of $0.75 to $1.50 million annually during the summer. The goods and services tourists purchase are very similar among the trails. Most of the expenditures (80% to 85%) are for food, lodging and transportation (Table 33). The amount spent per person on the day of trail use ranges from $25 for the Heartland to $33 for the Paul Bunyan to $39 dollars for the Root River (Table 33).

Table 32

Trip Spending Associated with Trail Use
(total spending for the summer period)

	Spending by Local* Users	Spending by Tourist* Users	Total Spending
All Trails Combined	$859,000	$4,202,000	$5,061,000
High Local Use			
Douglas, 1997	$45,000	$41,000	$86,000
Gateway, 1997	$289,000	$155,000	$444,000
Luce Line, 1998	$119,000	$9,000	$128,000
High Tourist Use			
Heartland, 1998	$76,000	$747,000	$823,000
Paul Bunyan, 1996	$131,000	$1,344,000	$1,475,000
Root River, 1997	$55,000	$1,469,000	$1,524,000
Mix Local/Tourist Use			
Glacial Lakes, 1998	$37,000	$106,000	$143,000
Paul Bunyan segment, near Lake Bemidji SP, 1998	$10,000	$60,000	$70,000
Sakatah Singing Hills, 1998	$97,000	$271,000	$368,000

* 'Local' is a trail user who came a short distance to the trail from their permanent home; 'tourist' is a trail user who spend the night prior to trail use away from their permanent home (e.g., at a resort or seasonal home).

Table 33

Profile of Tourist Spending Associated with Trail Use

Expenditure Category	Heartland 1998 survey (percent)	Paul Bunyan 1996 survey (percent)	Root River 1997 survey (percent)
Overnight accommodations	30	37	36
Restaurants	34	30	31
Groceries	8	8	5
Gasoline	7	10	8
Entertainment	4	5	4
Equipment rental	3	1	3
Shopping	11	(included in 'other')	13
Other	2	10	1
Total	100	100	100
Dollars spent per person per day	*$25.25*	*$33.08*	*$39.19*

Trip Characteristics

Three trails are different from the others in terms of typical trip extent. The miles traveled, and corresponding hours on the trail are quite a bit larger on the Heartland, Root River and Sakatah Singing Hills Trail (Table 34). Part of the reason for the longer trips is the higher portion of bikers on these trails. Bikers tend to travel further and spend more time on the trail than do other types of recreators. But even for bikers, hours spent and miles traveled are quite a bit higher on these three trails.

Party size on the Heartland and Root River is larger than on the other trails. Larger adult groups (parties of three or more adults) are far more common on the Heartland and Root River than the other trails; solo adults are far less common.

Table 34

Trip Characteristics

Characteristic	**High Local Use** Douglas, 1997	Gateway, 1997	Luce Line, 1998	**High Tourist Use** Heartland, 1998	Paul Bunyan, 1996	Root River, 1997	**Mix Local/Tourist Use** Glacial Lakes, 1998	Paul Bunyan segment, near Lake Bemidji SP, 1998	Sakatah Singing Hills, 1998
All Activities									
Miles traveled on trail (average)	11.9	13.8	11.7	21.3	13.3	27.3	11.0	10.4	19.7
Hours spent on trail (average)	1.8	1.6	1.8	2.8	2.0	3.6	1.9	1.7	2.7
People in party (average)	2.3	2.4	1.8	3.4	2.1	4.5	3.0	2.8	3.1
Party composition (% of parties)									
1 adult (over 18)	37	46	49	11	31	10	32	28	22
2 adults	34	31	24	38	42	36	26	29	38
3 or more adults	5	6	7	11	3	27	8	5	12
Adult(s) with children (under 18)	20	12	12	35	21	26	28	36	23
Children	4	5	8	5	3	1	6	2	6
Total percent	100	100	100	100	100	100	100	100	100
Biking									
Miles traveled on trail (average)	17.6	19.1	19.5	28.7	20.9	32.8	15.7	17.0	28.3
Hours spent on trail (average)	2.1	2.1	2.3	3.2	2.7	4.1	2.2	1.8	3.4
People in party (average)	2.6	2.5	2.1	3.6	2.3	4.8	2.5	3.1	3.7
Party composition (% of parties)									
1 adult (over 18)	30	43	41	8	24	7	29	28	20
2 adults	33	33	28	35	44	37	38	25	34
3 or more adults	4	7	11	16	6	31	12	2	16
Adult(s) with children (under 18)	27	13	15	37	24	25	18	42	27
Children	6	5	4	4	2	1	3	2	2
Total percent	100	100	100	100	100	100	100	100	100

The local-market trails have the smallest party sizes, due in large part to the high percentage of one-person parties. Nearly half of all Gateway (46%) and Luce Line (49%) parties are solo adults. Adult couples are common on all trails, as are parties composed of adults and children. Local-market trails tend to have a lower share of parties comprised of adults with children.

Demographic Characteristics of Trail Users

State trails serve broad segments of the Minnesota population. Trails draw users from all age classes (Table 35). The youngest and oldest age classes, however, are somewhat underrepresented in the age distribution of trail users, and the middle age group (40 to 64) is somewhat overrepresented. The ages of bikers is very close to that of all trail users, since bikers comprise most of the trail use. Skaters tend to be a younger group; just over 40 percent of skaters are 18 or less. Walkers are the group that is most representative of the Minnesota population. A much higher portion of walkers than other trail users are older than 65.

A higher portion of trail users are male than female, although the gender split is not extreme: 55 percent male and 45 percent female (Table 36). Some 55 to 60 percent of bikers and skaters are male. On the other hand, 65 percent of walkers are female.

Table 35

Ages of Trail Users

Age Class	Minnesota Population, 1995* (percent)	All Trail Users (percent)	Bikers (percent)	Skaters (percent)	Walkers (percent)
12 or under	20	16	15	11	23
13 to 18	9	13	11	31	9
19 to 39	32	28	28	33	21
40 to 64	27	39	42	24	33
65+	13	5	4	1	13
Total	100	100	100	100	100

* Population estimates for 1995 taken from: State Demographic Center, MN Planning. Faces of the Future. May 1998.

Table 36

Gender Mix of Trail Users
(gender of adult survey respondents over 24 years old)

Gender	Minnesota Population, 1995* (percent)	All Trail Users (percent)	Bikers (percent)	Skaters (percent)	Walkers (percent)
Females	52	45	43	44	65
Males	48	55	57	56	35
Total	100	100	100	100	100

* Population estimates for 1995 taken from: State Demographic Center, MN Planning. Faces of the Future. May 1998.

Trails draw users from a wide distribution of income classes (Table 37). About half of all trail users report incomes under $50,000, and about 60 percent of users are between $25,000 and $75,000 per year. The median household income for all of Minnesota was around $46,000 in 1997-98, which is somewhat below the median for the trail users (just over $50,000).

Table 37

Annual Household Incomes of Trail Users

Income Class	All Trail Users (percent)	Bikers (percent)	Skaters (percent)	Walkers (percent)
less than $25,000	14	9	11	15
$25,000 to $50,000	33	33	36	40
$50,000 to $75,000	25	29	28	22
over $75,000	27	29	25	23
Total	100	100	100	100

REFERENCES

State Demographic Center, Minnesota Planning. May 1998. Faces of the Future.

U.S. Bureau of the Census. 1990 Census of Population.

U.S. Bureau of the Census. 2000. Median household income for Minnesota in 1997-98.

APPENDIX A

Survey Use Estimates, Confidence Limits, Trail Descriptions and Maps

Douglas Trail, Summer Season 1997*

	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (± percent)	Miles of Trail
Total Use Hours	42,910	100.0	23.3	12.5 (total miles)
By Day of Week				
Weekend/Holidays	19,684	45.9	33.6	
Weekdays	23,226	54.1	32.1	
By Trail Type**				
Paved Trail	41,064	95.7	24.0	
Unpaved Trail	1,845	4.3	86.1	
By Trail Segment				
Rochester to Douglas	21,465	50.0	28.9	5.0
Douglas to Pine Island	21,445	50.0	23.9	7.5
By Trail Activity				
Biking	25,922	60.4	26.0	
Skating	2,559	6.0	42.5	
Walking	10,978	25.6	35.4	
Running	2,533	5.9	39.3	
Horseback Riding	832	1.9	88.6	
Other	87	0.2	162.9	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

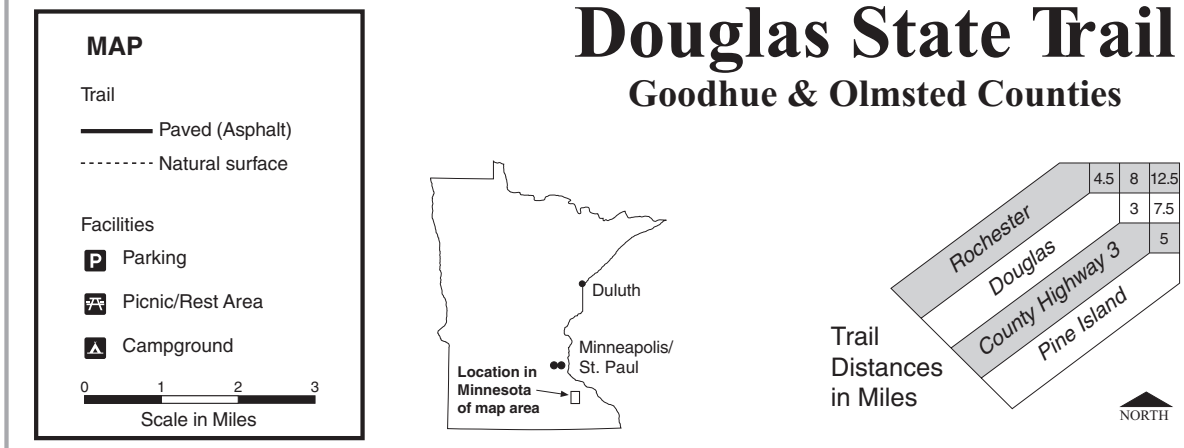
** The paved and unpaved treadways extend over the entire trail.

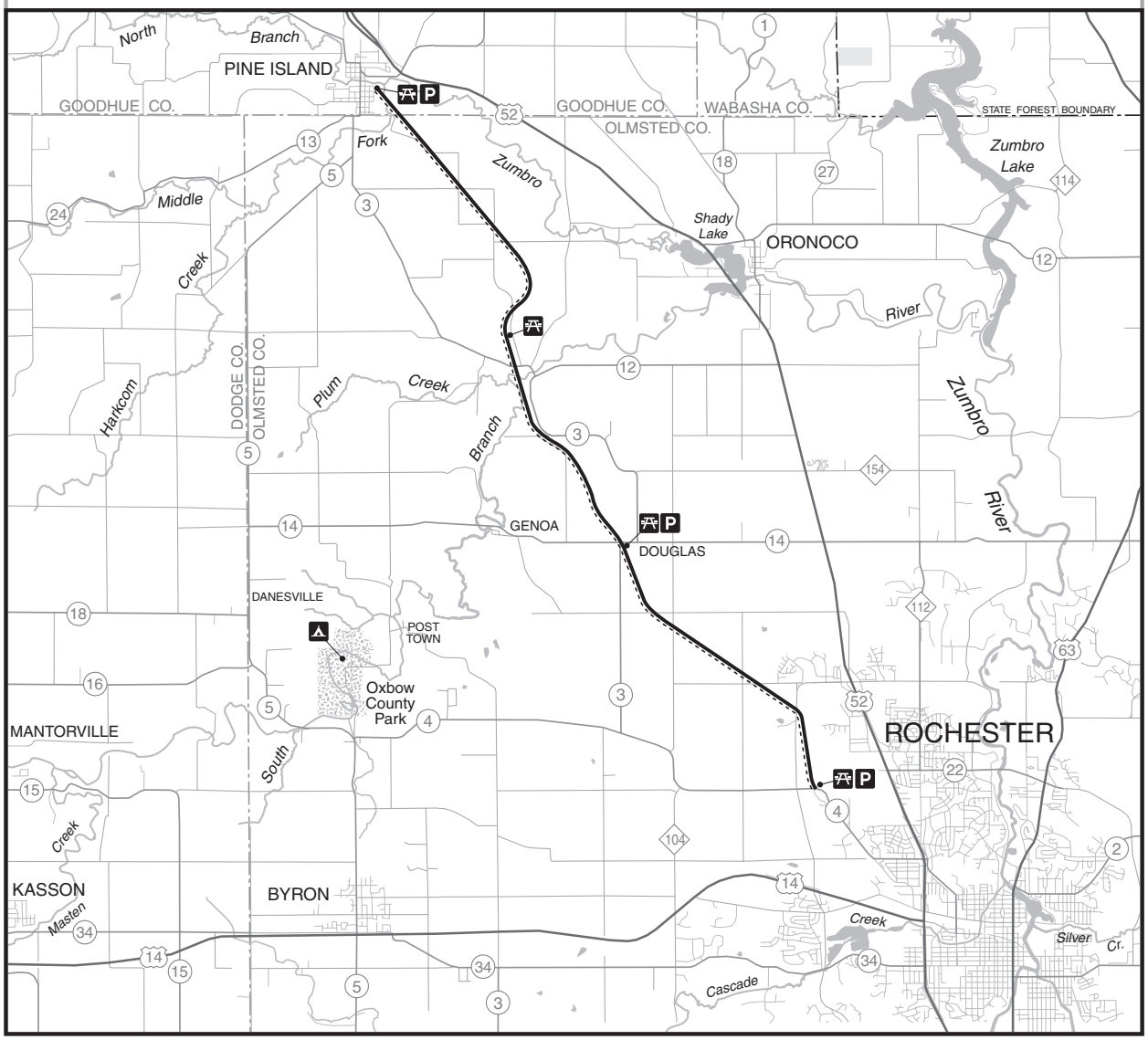
Description

The Douglas State Trail is a 12.5 mile, multiple use state trail developed on an abandoned railroad grade. This trail crosses outstanding rural scenery, traversing some of the richest agricultural land in Minnesota. One treadway is paved for bicyclists, hikers, in-line skaters and skiers; the other is a natural surface for horseback riders and snowmobilers. The trail begins in northwestern Rochester, travels through the small town of Douglas (for which the trail is named) and terminates in Pine Island. Present trail access includes three parking lots with rest facilities.

Douglas State Trail

Goodhue & Olmsted Counties





Gateway Trail, Summer Season 1997*

	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (± percent)	Miles of Trail
Total Use Hours	181,952	100.0	14.7	18.5 (total miles)
By Day of Week				
Weekends/Holidays	81,426	44.8	17.2	
Weekdays	100,525	55.2	22.8	
By Trail Segment & Type				
Cayuga Street to I-694	88,937	48.9	15.3	8.8
I-694 to Pine Point Park** - total	93,015	51.1	24.8	9.7
I-694 to Pine Point Park - paved	89,595	49.2	25.1	
I-694 to Pine Point Park - unpaved	3,420	1.9	29.2	
By Trail Activity				
Biking	107,198	58.9	13.8	
Skating	34,571	19.0	36.0	
Walking	29,406	16.2	23.7	
Running	7,307	4.0	19.3	
Horseback Riding	1,869	1.0	35.0	
Other	1,601	0.9	94.7	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

** The paved and unpaved treadways extend over this entire trail segment.

Description

The Gateway State Trail is an 18.5 mile long, multiple use trail starting in St. Paul. This paved trail cuts through a cross-section of urban areas, parks, lakes, wetlands and fields in Ramsey and Washington Counties. Many trail users are surprised to find these rural landscapes so close to the metro area, while others appreciate the access it provides to downtown St. Paul and the State Capitol complex. Located on a former Soo Line Railway grade, the trail is very level and is wheelchair accessible. It provides access to other trail opportunities in Phalen-Keller Regional Park, connections to Stillwater and other destinations in Washington County. For 9.7 miles of the Gateway, between I-694 and the eastern end at Pine Point Park, the paved trail adjoins a separate, unpaved trail for horseback riding or carriage driving. These 9.7 miles are groomed for cross country skiing in the winter on the paved trail. Motorized vehicles are not permitted anywhere on the trail.

Gateway State Trail

Ramsey & Washington Counties

MAP EXPLANATION

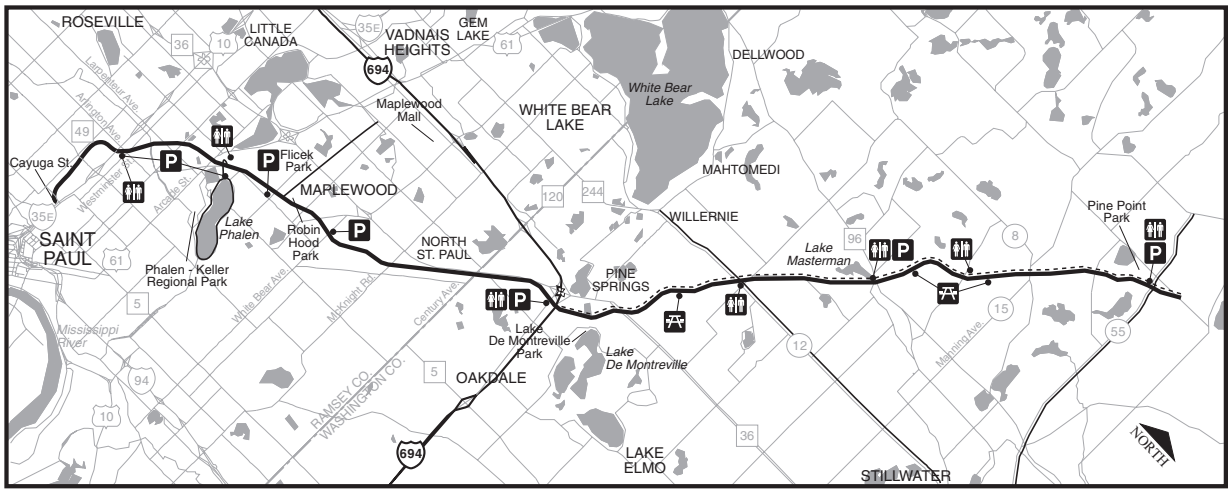
Trail
- Paved (Asphalt)
- Horse Trail (Gravel)
- Other Trails (Asphalt)

Facilities
- Parking
- Picnic/Rest Area
- Toilet

0 2 4
Scale in Miles

Trail Distances in Miles

Cayuga St. (not in matrix)	0.4		1.6	3.5	4.6	5.7	7.2	8.3	10.1	12.4	14.0	15.1	16.9
Arlington Ave	1.0	1.2	3.1	4.2	5.3	6.8	7.9	9.7	12.0	13.6	14.7	16.5	
Wheelock Pkwy bridge		0.2	2.1	3.2	4.3	5.8	6.9	8.7	11.0	12.6	13.7	15.5	
Arcade Ave (Hwy 61)		1.9	3.0	4.1	5.6	6.7	8.5	10.8	12.4	13.5	15.3		
Phalen Park (Keller Cr)			1.1	2.2	3.7	4.8	6.6	8.9	10.5	11.6	13.4		
White Bear Ave bridge				1.1	2.6	3.7	5.5	7.8	9.4	10.5	12.3		
McKnight Rd bridge					1.5	2.6	4.4	6.7	8.3	9.4	11.2		
Century Ave (Hwy 120)						1.1	2.9	5.2	6.8	7.9	9.7		
I - 694 underpass							1.8	4.1	5.7	6.8	8.6		
Hwy 36 tunnel								2.3	3.9	5.0	6.8		
County Rd 12									1.6	2.7	4.5		
Hwy 96										1.1	2.9		
Lansing Ave (Co Rd 8)											1.8		
Manning Ave (Co 15)													
Pine Point Pk (Co 55)													



Glacial Lakes State Trail, 1998 Summer Season*

	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (+/- percent)	Miles of Trail
Total Use Hours	33,858	100.0	15.0	18.0 (total miles)
By Day of Week				
Weekend/Holidays	14,795	43.7	20.3	
Weekdays	19,063	56.3	21.4	
By Trail Type**				
Paved Trail	33,765	99.7	15.1	
Unpaved Trail	94	0.3	200.0	
By Trail Segment				
Willmar to Spicer	12,251	36.2	24.8	6.5
Spicer to New London	18,576	54.9	16.9	5.5
New London to Hawick	3,032	9.0	84.6	6.0
By Trail Activity				
Biking	20,713	61.2	19.8	
Skating	5,217	15.4	30.9	
Walking	5,691	16.8	26.1	
Running	1,646	4.9	51.0	
Horseback Riding	423	1.3	86.7	
Other	169	0.5	175.3	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

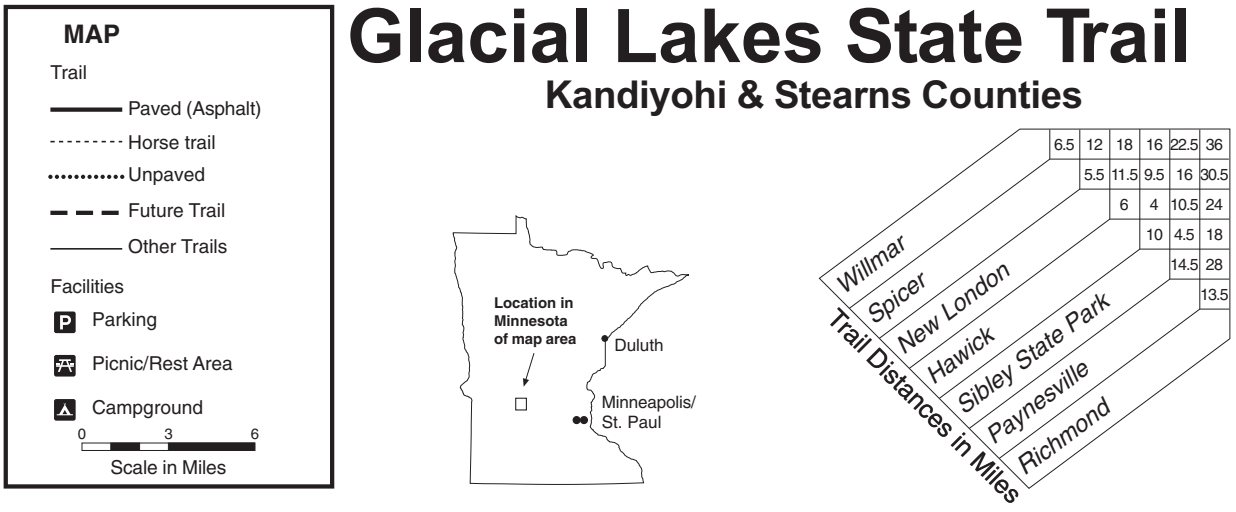
** The paved and unpaved treadways extend the full length of the trail.

Description

The Glacial Lakes State Trail is located on a former Burlington Northern Railroad grade, and is generally level and wheelchair accessible. The trail is paved with asphalt for 12 miles between Willmar and New London. This segment has a parallel grass treadway for horseback riding. From New London to Hawick is a 6 mile long trail surfaced with crushed granite for hiking, biking, and horseback riding. The remaining 22 miles, between Hawick and just past Richmond, is undeveloped and has the original railroad stones as a surface. Some railroad bridges have been removed.

Glacial Lakes State Trail

Kandiyohi & Stearns Counties



Heartland State Trail, 1998 Summer Season*

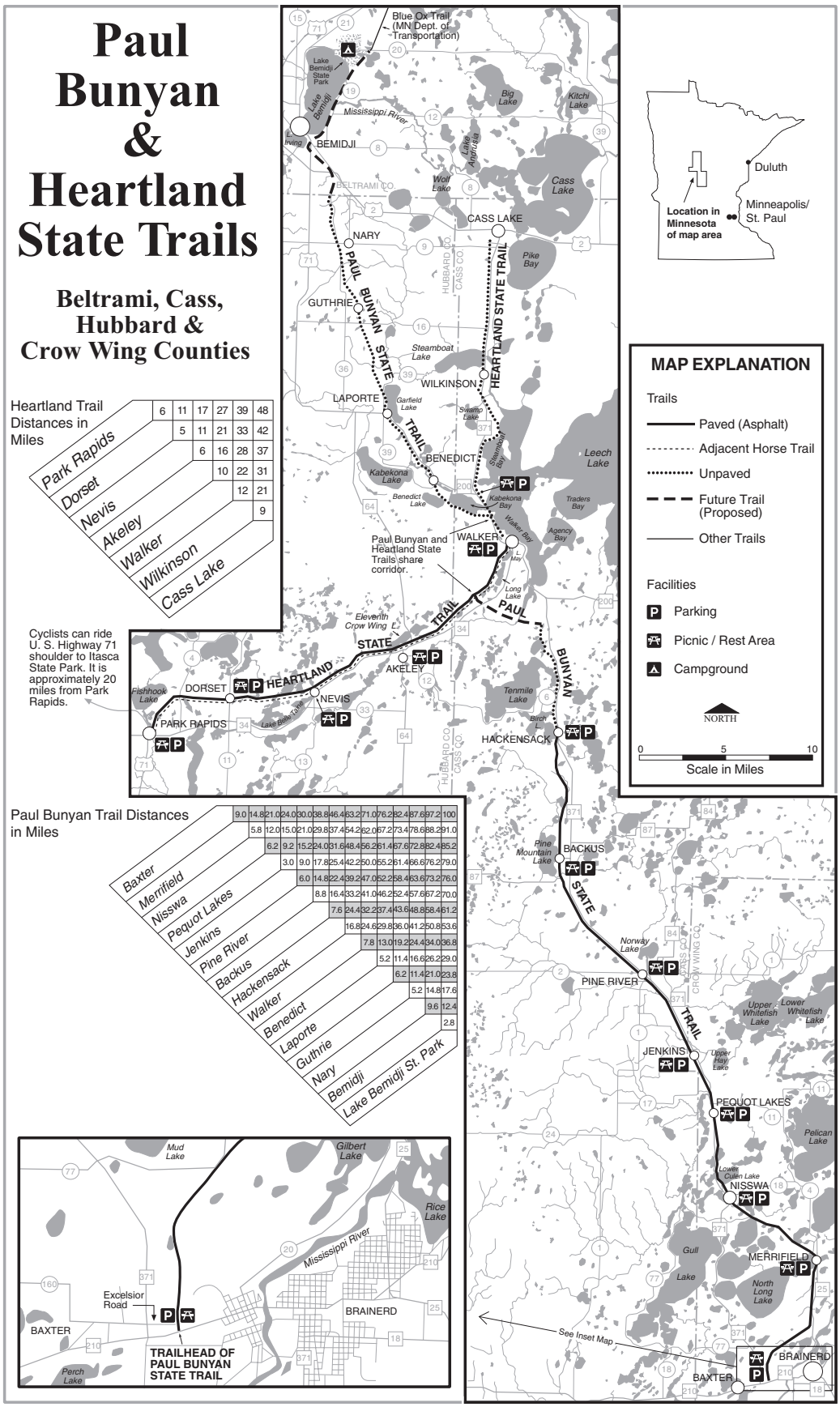
	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (+/- percent)	Miles of Trail
Total Use Hours	125,381	100.0	18.3	27.0 (total miles)
By Day of Week				
Weekend/Holidays	60,821	48.5	23.0	
Weekdays	64,560	51.5	28.2	
By Trail Type**				
Paved Trail	125,228	99.9	18.3	
Unpaved Trail	153	0.1	120.6	
By Trail Segment				
Park Rapids to Nevis	59,284	47.3	28.2	11.0
Nevis to Akeley	26,192	20.9	34.0	6.0
Akeley to Walker	39,905	31.8	32.7	10.0
By Trail Activity				
Biking	98,420	78.5	19.9	
Skating	7,340	5.9	26.7	
Walking	18,173	14.5	21.2	
Running	1,112	0.9	77.9	
Horseback Riding	39	0.0	200.0	
Other	297	0.2	132.8	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

** The paved and unpaved treadways extend the full length of the trail.

Description

The Heartland State Trail was one of the first rail-to-trail projects in the country. It is a 49 mile, multiple use trail between Park Rapids and Cass Lake. The trail is located entirely on a level abandoned railroad grade except for a four mile segment north of Walker, which is on sharply rolling terrain. The 27 mile segment between Park Rapids and Walker has a paved surface. This segment also has a second grassy treadway for horseback riding and mountain biking. The remaining 22 mile segment to Cass Lake is primarily compacted gravel and railroad ballast with occasional sandy areas and can be used for hiking, horseback riding and mountain biking. The entire trail is groomed in the winter for snowmobiling, however studded tracks are prohibited on the pavement. The Heartland State Trail also provides connections to many miles of groomed snowmobile trails in the Hubbard county Grant-in-Aid trail system.


Paul Bunyan & Heartland State Trails
Beltrami, Cass, Hubbard & Crow Wing Counties
Heartland Trail Distances in Miles
Park Rapids 6 11 17 27 39 48
Dorset 5 11 21 33 42
Nevis 6 16 28 37
Akeley 10 22 31
Walker 12 21
Wilkinson 9
Cass Lake
Cyclists can ride U. S. Highway 71 shoulder to Itasca State Park. It is approximately 20 miles from Park Rapids.
Paul Bunyan and Heartland State Trails share corridor.
Paul Bunyan Trail Distances in Miles
Baxter 9.0 14.8 21.0 24.0 30.0 38.8 46.4 63.2 71.0 76.2 82.4 87.6 97.2 100
Merrifield 5.8 12.0 15.0 21.0 29.8 37.4 54.2 62.0 67.2 73.4 78.6 88.2 91.0
Nisswa 6.2 9.2 15.2 24.0 31.6 48.4 56.2 61.4 67.6 72.8 82.4 85.2
Pequot Lakes 3.0 9.0 17.8 25.4 42.2 50.0 55.2 61.4 66.6 76.2 79.0
Jenkins 6.0 14.8 22.4 39.2 47.0 52.2 58.4 63.6 73.2 76.0
Pine River 8.8 16.4 33.2 41.0 46.2 52.4 57.6 67.2 70.0
Backus 7.6 24.4 32.2 37.4 43.6 48.8 58.4 61.2
Hackensack 16.8 24.6 29.8 36.0 41.2 50.8 53.6
Walker 7.8 13.0 19.2 24.4 34.0 36.8
Benedict 5.2 11.4 16.6 26.2 29.0
Laporte 6.2 11.4 21.0 23.8
Guthrie 5.2 14.8 17.6
Nary 9.6 12.4
Bemidji 2.8
Lake Bemidji St. Park
Excelsior Road
TRAILHEAD OF PAUL BUNYAN STATE TRAIL
BAXTER
BRAINERD
Mississippi River
Gilbert Lake
Mud Lake
Rice Lake
Perch Lake
See Inset Map
Blue Ox Trail (MN Dept. of Transportation)
BEMIDJI
NARY
GUTHRIE
CASS LAKE
WILKINSON
LAPORTE
BENEDICT
WALKER
AKELEY
DORSET
NEVIS
PARK RAPIDS
HACKENSACK
BACKUS
PINE RIVER
JENKINS
PEQUOT LAKES
NISSWA
MERRIFIELD
PAUL BUNYAN STATE TRAIL
HEARTLAND STATE TRAIL
Location in Minnesota of map area
Duluth
Minneapolis/ St. Paul
MAP EXPLANATION
Trails
Paved (Asphalt)
Adjacent Horse Trail
Unpaved
Future Trail (Proposed)
Other Trails
Facilities
Parking
Picnic / Rest Area
Campground
NORTH
0 5 10
Scale in Miles

Luce Line State Trail, 1998 Summer Season*

	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (+/- percent)	Miles of Trail
Total Use Hours	65,120	100.0	18.1	29.0 (total miles)
By Day of Week				
Weekend/Holidays	34,103	52.4	28.6	
Weekdays	31,017	47.6	21.4	
By Trail Type**				
Crushed-limestone Trail	63,706	97.8	18.1	
Unpaved Trail	1,414	2.2	65.0	
By Trail Segment				
Plymouth to Cty 92	51,637	79.3	22.1	13.0
Cty 92 to Winsted	13,484	20.7	22.3	16.0
By Trail Activity				
Biking	38,078	58.5	21.9	
Walking	18,524	28.4	19.3	
Running	5,758	8.8	26.9	
Horseback Riding	1,077	1.7	71.9	
Other	1,684	2.6	61.0	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

** The crushed-limestone and unpaved treadways extend the full length of the trail.

Description

The Luce Line State Trail is a 63 mile long, former railroad grade which is developed for biking, hiking, horseback riding, mountain biking, snowmobiling, and skiing. The limestone-surfaced trail runs from Plymouth 29 miles west to Winsted, with a parallel treadway for horseback riding. From Winsted to Cosmos (34 miles) the trail has a natural surface with 3 missing bridges. Snowmobiles are allowed on the trail west of Stubbs Bay Road.

Luce Line State Trail

Hennepin, Carver, McLeod and Meeker Counties

Trail Distances in Miles

Vicksburg Lane Trailhead	6	7	19	29	37	44	63
Wakefield - Conry Rest Area		1	13	23	31	38	55
Stubb's Bay Road Trail Access			12	22	30	37	54
Watertown				10	18	25	42
Winsted					8	15	33
Silver Lake						7	24
Hutchinson							17
Thompson Lake (near Cosmos)							

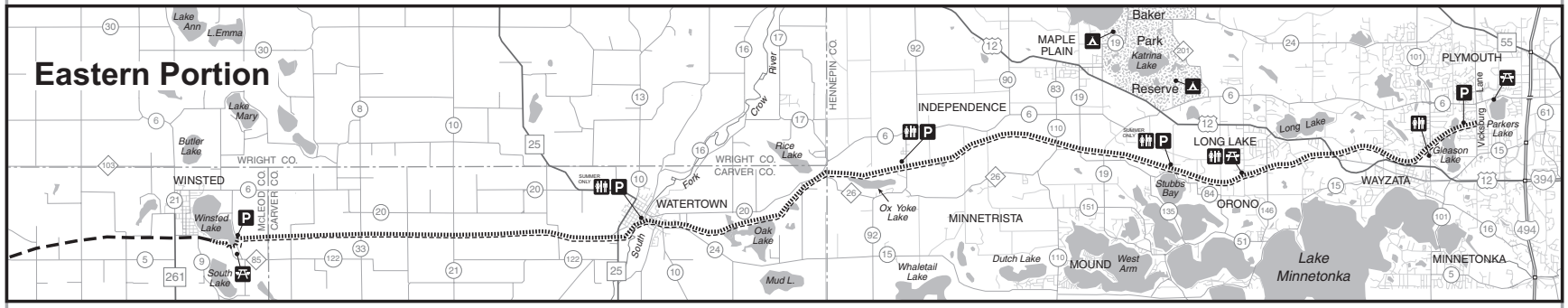
MAP

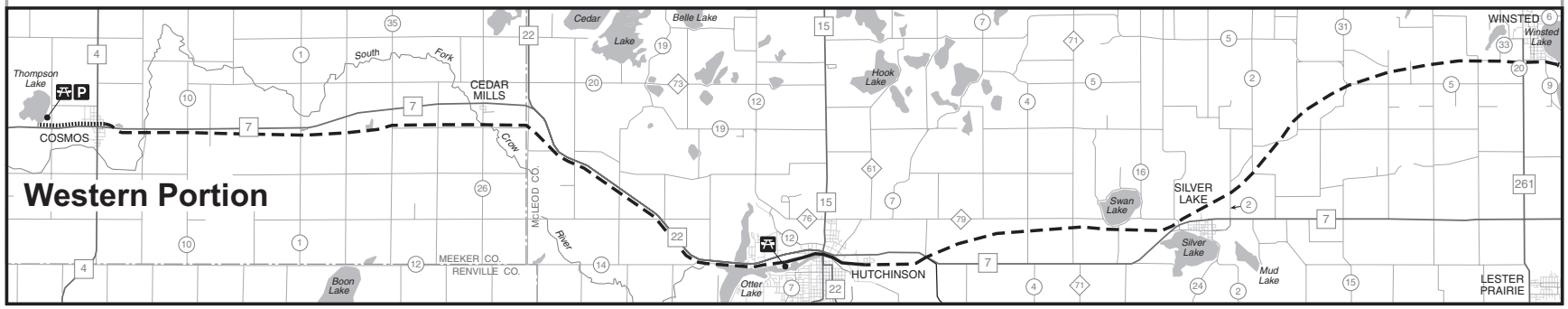
Trails
- Crushed Limestone
- Adjacent Horse Trail
- Undeveloped
- Paved (Asphalt)

Facilities
- Parking
- Picnic / Rest Area
- Campground
- Toilet

0 1 2 3 4 5
Scale in Miles

NORTH





Paul Bunyan Trail, Summer Season 1996*

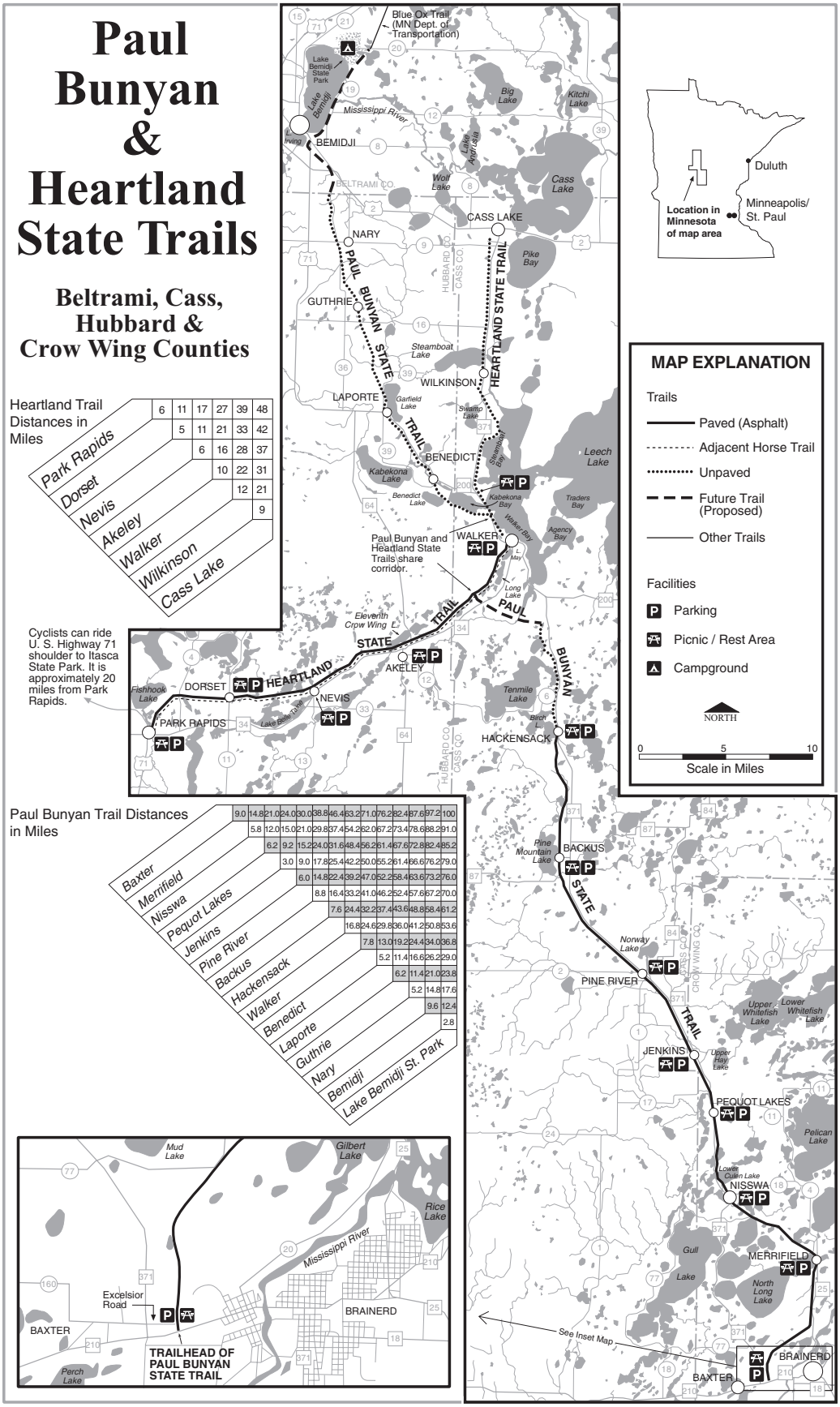
	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (± percent)	Miles of Trail
Total Use Hours	155,268	100.0	14.9	46.4 (total miles)
By Day of Week				
Weekends/Holidays	79,668	51.3	22.4	
Weekdays	75,600	48.7	19.3	
By Trail Segment				
Baxter to Merrifield	40,153	25.9	24.3	9.0
Merrifield to Pequot Lakes	62,111	40.0	26.6	12.0
Pequot Lakes to Pine River	25,803	16.6	40.5	9.0
Pine River to Backus	13,747	8.9	32.8	8.8
Backus to Hackensack	13,453	8.7	42.7	7.6
By Trail Activity				
Biking	112,090	72.2	15.0	
Skating	23,236	15.0	23.9	
Walking	17,177	11.1	20.8	
Running	2,316	1.5	34.7	
Other	448	0.3	71.0	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

Description

When completed, the Paul Bunyan State Trail will be a 100 mile long, multiple use trail between Brainerd /Baxter and Bemidji. Primarily located on a former Burlington Northern Railroad grade, the trail is generally level and is wheelchair accessible. Currently, 46.4 miles of the trail are paved, from Baxter to Hackensack and 5.3 miles from Lake Bemidji State Park to Co. Rd. 2D and the Mississippi River trestle. The remaining 53.6 mile section is undeveloped with variable surface material ranging from the original railroad ballast to sand.

Main summer uses of developed portions of the Paul Bunyan State Trail include hiking, bicycling, and in-line skating. Snowmobiling is the primary winter use along both the paved and undeveloped sections of the trail.


Paul Bunyan & Heartland State Trails
Beltrami, Cass, Hubbard & Crow Wing Counties
Blue Ox Trail (MN Dept. of Transportation)
Lake Bemidji State Park
Lake Bemidji
Mississippi River
BEMIDJI
Big Lake
Kitchi Lake
Lake Andrusia
Wolf Lake
Cass Lake
BELTRAMI CO.
CASS LAKE
NARY
Pike Bay
HUBBARD CO.
CASS CO.
PAUL BUNYAN STATE TRAIL
HEARTLAND STATE TRAIL
GUTHRIE
Steamboat Lake
WILKINSON
LAPORTE
Garfield Lake
Swamp Lake
BENEDICT
Leech Lake
Kabekona Lake
Benedict Lake
Kabekona Bay
Traders Bay
Walker Bay
Agency Bay
WALKER
Paul Bunyan and Heartland State Trails share corridor.
Long Lake
Eleventh Crow Wing L.
AKELEY
Cyclists can ride U. S. Highway 71 shoulder to Itasca State Park. It is approximately 20 miles from Park Rapids.
Fishhook Lake
DORSET
NEVIS
PARK RAPIDS
Lake Belle Taine
Tenmile Lake
Birch Lk.
HACKENSACK
Location in Minnesota of map area
Duluth
Minneapolis/ St. Paul
MAP EXPLANATION
Trails
Paved (Asphalt)
Adjacent Horse Trail
Unpaved
Future Trail (Proposed)
Other Trails
Facilities
Parking
Picnic / Rest Area
Campground
NORTH
0 5 10
Scale in Miles
Heartland Trail Distances in Miles
Park Rapids 6
Dorset 11 5
Nevis 17 11 6
Akeley 27 21 16 10
Walker 39 33 28 22 12
Wilkinson 48 42 37 31 21 9
Cass Lake
Paul Bunyan Trail Distances in Miles
Baxter 9.0
Merrifield 14.8 5.8
Nisswa 21.0 12.0 6.2
Pequot Lakes 24.0 15.0 9.2 3.0
Jenkins 30.0 21.0 15.2 9.0 6.0
Pine River 38.8 29.8 24.0 17.8 14.8 8.8
Backus 46.4 37.4 31.6 25.4 22.4 16.4 7.6
Hackensack 53.2 45.4 39.2 32.4 32.2 24.6 16.8
Walker 71.0 62.0 56.2 47.0 41.0 37.4 29.8 24.6 7.8
Benedict 76.2 67.2 61.4 52.2 46.2 43.6 36.0 29.8 13.0 5.2
Laporte 82.4 73.4 67.6 58.4 52.4 48.8 41.2 36.0 19.2 11.4 6.2
Guthrie 87.6 78.6 72.8 63.6 57.6 53.8 50.8 24.4 16.6 11.4 5.2
Nary 97.2 88.2 82.4 73.2 67.2 58.4 53.8 34.0 26.2 21.0 14.8 9.6
Bemidji 100 91.0 85.2 76.0 70.0 61.2 53.6 36.8 29.0 23.8 17.6 12.4 2.8
Lake Bemidji St. Park
Pine Mountain Lake
BACKUS
STATE TRAIL
Norway Lake
PINE RIVER
CROW WING CO.
Upper Whitefish Lake
Lower Whitefish Lake
JENKINS
Upper Hay Lake
PEQUOT LAKES
Pelican Lake
Lower Cullen Lake
NISSWA
Gull Lake
MERRIFIELD
North Long Lake
See Inset Map
BRAINERD
BAXTER
Mud Lake
Gilbert Lake
Rice Lake
Mississippi River
Excelsior Road
TRAILHEAD OF PAUL BUNYAN STATE TRAIL
Perch Lake

Segment of Paul Bunyan State Trail Near Bemidji State Park, 1998 Summer Season*

	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (+/- percent)	Miles of Trail
Total Use Hours	17,488	100.0	28.6	5.3 (total miles)
By Day of Week				
Weekend/Holidays	7,779	44.5	28.0	
Weekdays	9,709	55.5	46.3	
By Trail Segment and Type (the survey was done in one segment, all of which is paved)				
By Trail Activity				
Biking	8,217	47.0	30.8	
Skating	4,187	23.9	53.0	
Walking	3,933	22.5	25.0	
Running	852	4.9	63.6	
Other	299	1.7	89.2	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

See page 67 for description and page 68 for map.

Root River Trail, Summer Season 1997*

	Total Seasonal Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (± percent)	Miles of Trail
Total Use Hours	178,761	100.0	15.1	40.8 (total miles)
By Day of Week				
Weekends/Holidays	110,153	61.6	22.0	
Weekdays	68,608	38.4	17.4	
By Trail Segment				
Fountain to Preston	37,978	21.2	29.2	12.0
Isinours to Whalan	83,958	47.0	26.9	9.3
Whalan to Peterson	31,921	17.9	23.9	8.9
Peterson to Rushford	18,578	10.4	32.0	4.8
Rushford to Money Creek Woods	6,327	3.5	44.8	5.8
By Trail Activity				
Biking	161,876	90.6	15.8	
Skating	4,712	2.6	27.2	
Walking	10,846	6.1	21.3	
Running	311	0.2	80.4	
Other	1,019	0.6	105.9	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

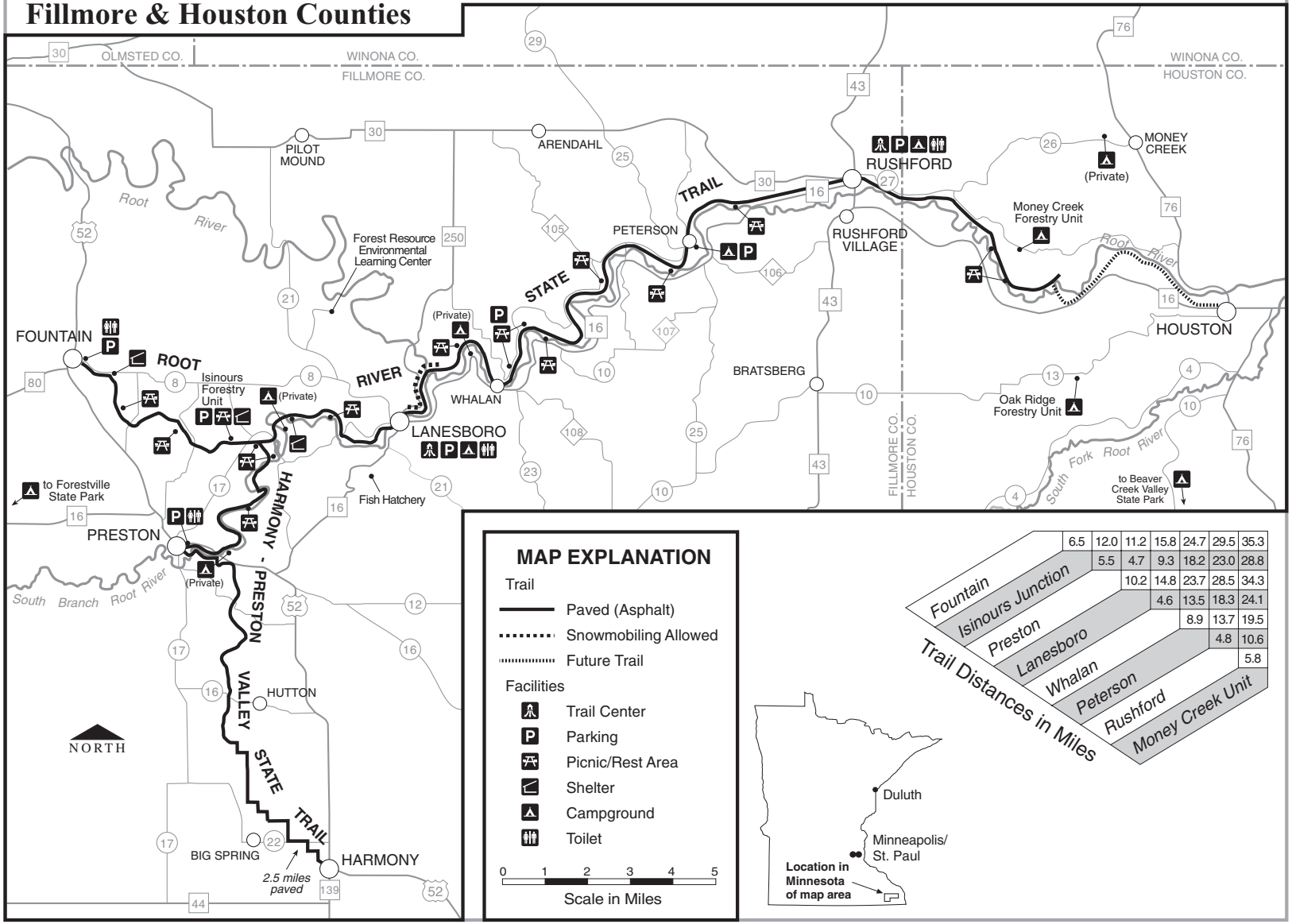
Description

The Root River State Trail is a 36 mile long, multiple use trail from Fountain to 5.3 miles east of Rushford at the DNR Forestry site at Money Creek Woods. Developed on an abandoned railroad grade, the entire trail is paved. The trail is generally level and wheelchair accessible as it descends from Fountain into the Root River Valley. Bicycling, in-line skating, and hiking are the main summer uses of the trail. Cross country skiing is popular in the winter.

One of two segments that comprise the Blufflands Trail System, the Harmony-Preston Valley State Trail is an 18 mile long, multiple use trail connecting the communities of Harmony and Preston with the existing Root River State Trail. The trail was completely paved with asphalt in the fall of 1997. Main summer uses of the trail are hiking, biking, and in-line skating. The trail is groomed for cross country skiing in the winter.

Root River State Trail & Harmony-Preston Valley State Trail

Fillmore & Houston Counties



Sakatah Singing Hills State Trail, 1998 Summer Season*

	Total Seasonal User Hours	Percent of Total Hours	95% Confidence Interval of Total Hours (+/- percent)	Miles of Trail
Total Use Hours	95,634	100.0	11.7	38.0 (total miles)
By Day of Week				
Weekend/Holidays	48,398	50.6	15.9	
Weekdays	47,236	49.4	17.1	
By Trail Type**				
Paved Trail	94,578	98.9	11.7	38.0
Unpaved Trail	1,056	1.1	88.8	4.0
By Trail Segment				
Mankato to Madison Lake	20,574	21.5	25.2	9.3
Madison Lake to Waterville	20,696	21.6	22.1	11.9
Waterville to Morristown	21,427	22.4	23.9	7.3
Morristown to Faribault	32,937	34.4	21.7	9.5
By Trail Activity				
Biking	73,009	76.3	12.8	
Skating	6,271	6.6	25.4	
Walking	12,729	13.3	18.1	
Running	2,744	2.9	31.8	
Horseback Riding	70	0.1	200.0	
Other	810	0.8	73.6	

* Summer extends from the Saturday of Memorial Day weekend to Labor Day.

** The paved treadway extends the full length of the trail; the unpaved treadway covers a portion of the segment from Mankato to Madison Lake.

Description

The Sakatah Singing Hills State Trail is a 39 mile, multiple use trail from Mankato to Faribault which has been developed on an abandoned railroad grade. The trail lies in the transition zone between what was once the "Big Woods" and the vast prairies. Remnants of these plant communities can still be found scattered throughout what is now cultivated land. The trail has been developed for bicycling, hiking, in-line skating, horseback riding, skiing, and snowmobiling, however, studded tracks are prohibited. It begins at Lime Valley Road near Mankato and ends east of Interstate 35 at Faribault (trail users will need to use the signed route on city streets through Waterville). The Sakatah Singing Hills State Trail provides a paved treadway. A second treadway for horseback riding is completed from Lime Valley Road to Eagle Lake. A second horseback segment travels from Sakatah Lake State Park to Morristown. Sakatah Lake State Park is along

the trail and provides a separate bicycling campground, picnic grounds, swimming beach, boat access, and additional hiking trails.