Parks & Trails
COUNCIL OF MINNESOTA

STATE OF THE TRAILS

2018 / 2019 Report

Featuring data collected by the

research BiKe

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State of the Trails is a project of the Parks & Trails Council of Minnesota, a statewide non-profit organization dedicated to acquiring, protecting, and enhancing critical land for the public's use and benefit. The *State of the Trails Project* provides detailed data on state trail conditions and examines changes in trail conditions over time. Gathering this information is essential for answering a broad set of policy questions, and provides lawmakers, managers, and the public with the information they need to maintain and enjoy Minnesota's world-class trail system.

Special thanks to the Minnesota Department of Natural Resources for their continued commitment to caring for Minnesota's trails and sharing data for this report.

The Research Bike was made possible by generous support from Erik's Bike Shop.

This report was designed using resources from Freepik.com.

Project Lead: Andrew Oftedal
Research Intern: Karl Hedlund

Published June 2019

Executive Summary

Key Findings:

See pages 6-31 and Appendix B for details

- Minnesota's paved state trail system is in good condition. Our inventory found 75% of paved state trail miles are in either excellent or good condition.
- Only 32 miles – 6% of the system – are in poor or very poor condition. The remaining 20% of the system – 121 miles – are in fair condition.
- However, conditions declined since our 2016 *State of the Trails Report*. If current trends continue, we project the share of the paved state trail system in excellent or good condition will fall to 70% by 2023 and 50% by 2030.

Methodology:

See pages 4-5, Appendix A and Appendix C for details

- We rated the surface conditions of Minnesota's paved state trail system using a metric called the "Trail Roughness Index," which measures how smooth or rough a trail is to ride.
- We took approximately 100,000 photos of the paved state trail system to verify ratings and illustrate conditions.
- All of our data was collected using the Research Bike, an electric-assist bicycle equipped with cameras and sensors. In addition to rating trail conditions, we used the Research Bike to put Minnesota's State Trails on Google Street View.

Recommendations:

See pages 32-35 for details

- Maintain a "25-50-25" surface standard for the state trail system, where the goal is to keep 25% of the system's trail surfaces in excellent condition, 50% in good condition, and the remaining 25% in fair condition.
- Rehabilitate an average of 24 state trail miles per year, which is the pace needed to maintain the state trail system at a "25-50-25" standard.
- Fund state trail rehabilitation at needed levels – approximately $4.8 million per year, not including bridges and culverts – through a mix of bonding appropriations, Legacy funds, and LCCMR funds.

Why Trails are Important:

Trails are community assets that make Minnesota a better place to live, work, and visit. Trails connect people and communities to the outdoors, improve health by encouraging physical activity, boost tourism and spending at local businesses, enhance safety, protect ecosystems and wildlife corridors, and are fun for people of all ages, means, and abilities. The *State of the Trails Project* aims to provide trail managers and lawmakers with the data they need to ensure all Minnesotans, both now and in the future, have access to smooth, safe, and enjoyable trails.

How We Calculate Our Ratings

Our trail condition ratings are based on the premise that trails in excellent condition are smooth to ride and trails in poor condition are rough to ride. We measure how rough each trail is to ride using a metric called the "Trail Roughness Index", or "TRI" for short. We created the TRI in 2016 as a method to objectively rate the condition of paved bike trails. We updated our methodology in 2018 to improve reliability and validity.

Trail Roughness Index is measured by riding a trail with a device called an accelerometer mounted on the bike's handle bars. When the bicyclist hits a crack or bump in the trail, the accelerometer measures the force of the jolt felt by the bicyclist. The TRI is a statistical summary of the accelerometer data that indicates the roughness of the ride. Low TRI scores indicate trails in excellent condition (TRI < 30) and high TRI scores indicate trails in very poor condition (TRI > 75).

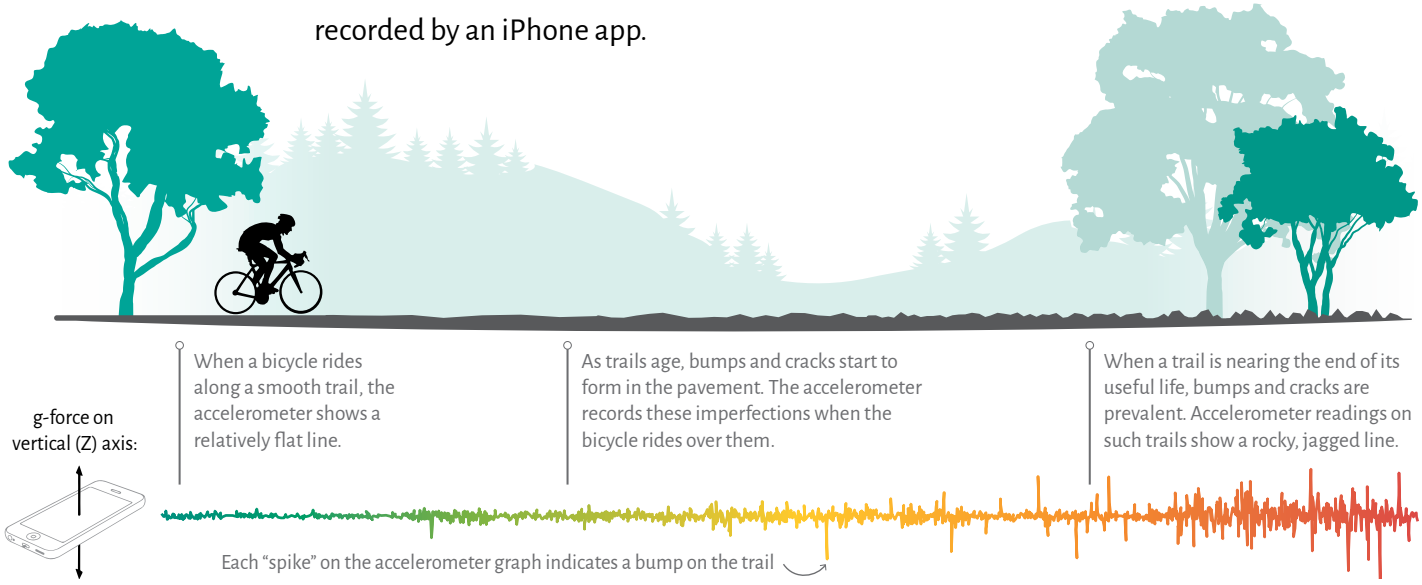
We used TRI scores to rate the condition of Minnesota's paved state trail system on a segment-by-segment basis. Additionally, we assigned each trail an overall grade using a scale where "excellent" is equal to an "A" and "very poor" is equal to an "F". The overall trail grade represents the condition of the trail's average mile.

All of our data was collected by a Parks & Trails Council intern. The intern rode nearly 600 miles of the paved state trail system on the Research Bike, an electric-assist bicycle equipped with cameras and sensors. All data was collected during the summer and fall of 2018.

Our TRI scores are supplemented with photos taken during the data collection process. Photos were used to verify condition classifications and are helpful to visualize on-the-ground conditions. See Appendix A and Appendix C for more details on our methodology.

How the *Trail Roughness Index* Works

The Trail Roughness Index (TRI) measures the variation in g-forces felt by a bicyclist riding on a trail. The g-force is measured by an accelerometer in a bicycle-mounted iPhone and is recorded by an iPhone app.



How to Understand Our Ratings

TRI < 30
Excellent

Trail feels like new and provides near-ideal conditions for bicyclists and inline skaters. Small blemishes and crack sealing may be present in isolated areas but do not negatively impact user experience.

TRI 30-45
Good

Trail offers a comfortable ride for bicyclists and inline skaters, with infrequent bumps and depressions. Trail may require minor rehabilitation and crack sealing in isolated areas.

TRI 45-60
Fair

Trail has intermittent bumps and depressions, but is tolerable to ride for the majority of bicyclists. Some sections may be difficult for inline skaters. Trail may require moderate rehabilitation and crack sealing in several areas.

TRI 60-75
Poor

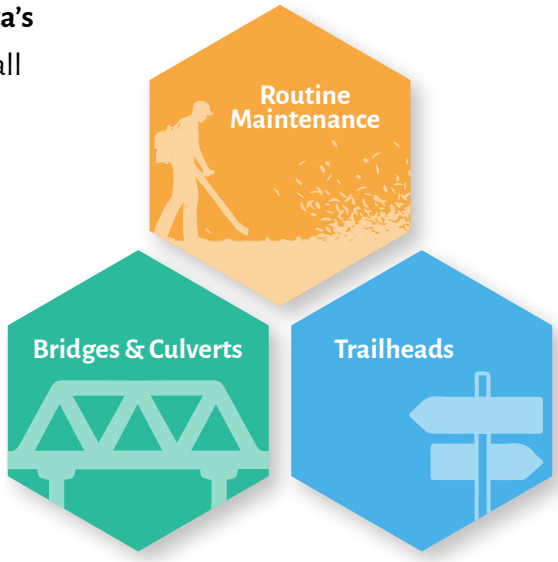
Trail has frequent bumps and depressions and is uncomfortable to ride for bicyclists. Many sections may be difficult for inline skaters. Trail is at the end of its life and requires major rehabilitation.

TRI >75
Very Poor

Trail is in complete disrepair with very frequent bumps and depressions. Trail may be suitable only for mountain and fat-tire biking. Trail is past its useful life and likely needs to be entirely rebuilt.

What our Ratings Don't Measure

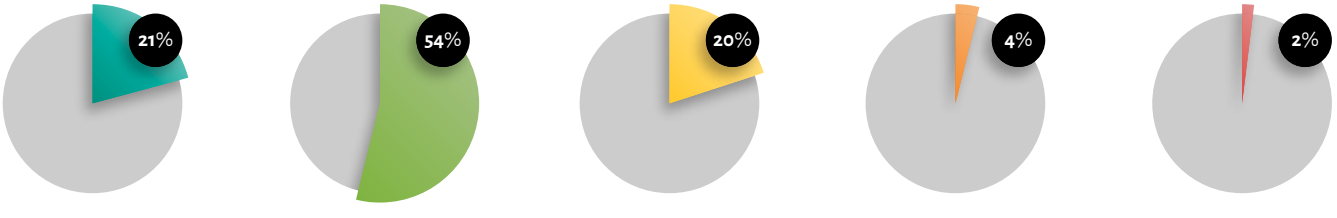
Our ratings only answer a simple question: **How smooth are Minnesota's State Trails to ride?** While we use this question as a proxy for the overall condition of each trail, there are several components of a safe, well-maintained trail system that our ratings don't capture. Our ratings do not consider the integrity of trail bridges, culverts or the underlying trail foundation. Our ratings do not consider the condition of parking areas, interpretive displays or signage. And our ratings only consider day-to-day upkeep to the extent it impacts the smoothness of the ride (e.g., debris on an unswept trail is rougher to ride than a freshly swept trail). See Appendix A for more details on project scope and limitations.



Key Findings

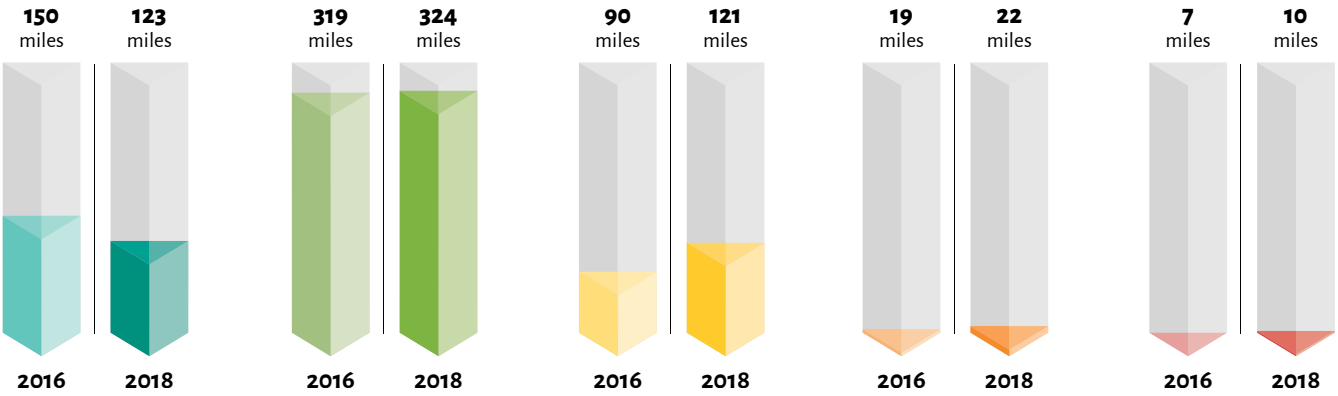
Minnesota's paved state trails are still in good condition, *but* conditions declined since our 2016 report.

2018 State Trail Conditions:



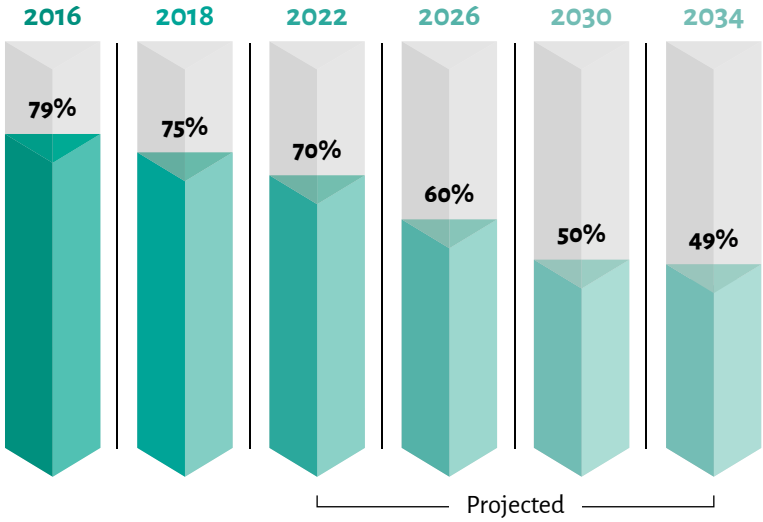
Excellent Condition | **Good** Condition | **Fair** Condition | **Poor** Condition | **Very Poor** Condition

Comparison to 2016:



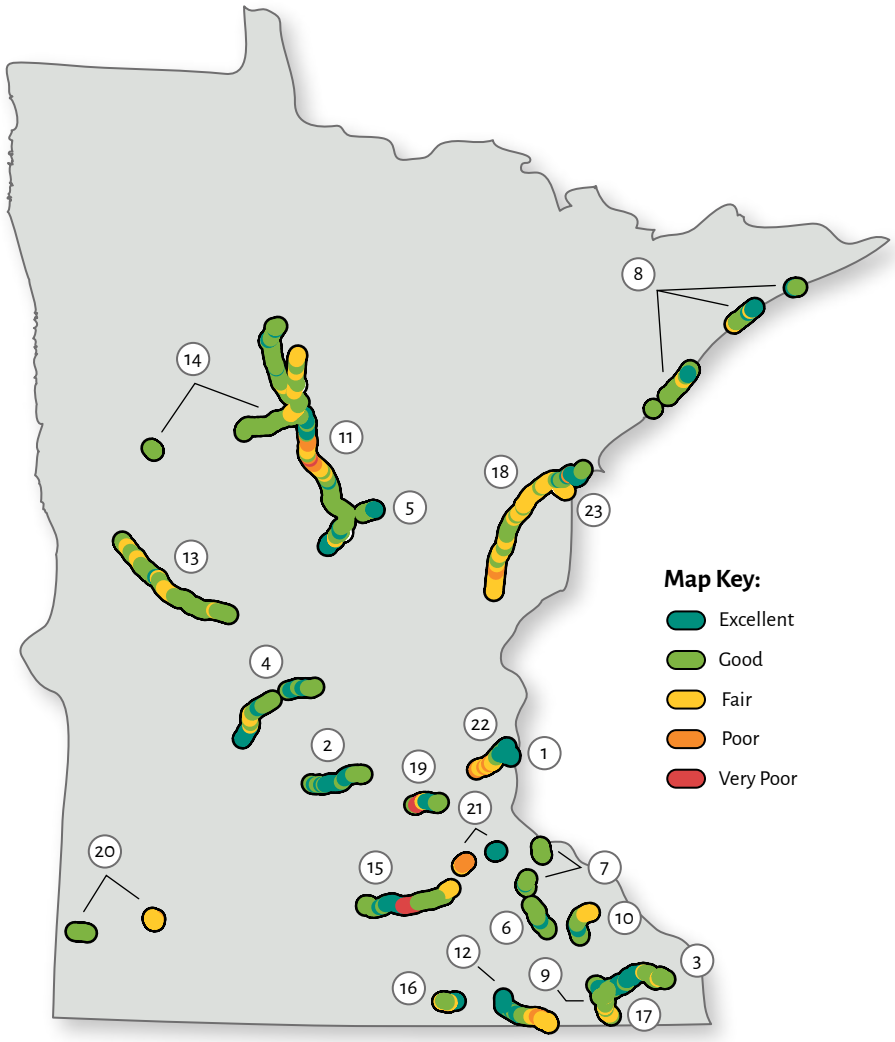
If current rehabilitation trends continue, state trail conditions are projected to steadily decline.

Projected share of state trail system in good or excellent condition:



Report Card

1	Brown's Creek *(p. 10)*	A
2	Luce Line *(p. 22)*	B+
3	Root River *(p. 27)*	B+
4	Glacial Lakes *(p. 17)*	B
5	Cuyuna Lakes *(p. 13)*	B
6	Douglas *(p. 14)*	B
7	Goodhue Pioneer *(p. 18)*	B
8	Gitchi Gami *(p. 16)*	B
9	Preston Forestville *(p. 20)*	B
10	Great River Ridge *(p. 19)*	B-
11	Paul Bunyan *(p. 26)*	B-
12	Shooting Star *(p. 29)*	B-
13	Central Lakes *(p. 12)*	B-
14	Heartland *(p. 21)*	B-
15	Sakatah Singing Hills *(p. 28)*	B-
16	Blazing Star *(p. 9)*	C+
17	Harmony Preston *(p. 20)*	C+
18	Munger *(p. 25)*	C+
19	Minnesota Valley *(p. 24)*	C+
20	Casey Jones *(p. 11)*	C+
21	Mill Towns *(p. 23)*	C
22	Gateway *(p. 15)*	C
23	Alex Laveau *(p. 8)*	C



TOP TEN Roughest Miles

Sakatah Singing Hills State Trail
5 miles between Elysian and Waterford

Minnesota Valley State Trail
3 miles between Chaska and Shakopee

Paul Bunyan State Trail
1 mile between Pine River and Backus

Munger State Trail
1 mile between Carlton and Duluth

NEWLY OPENED Smooth Miles (since 2016)

Douglas State Trail *2 miles between Douglas and Pine Island* ***(Rehabilitation)***

Shooting Star State Trail *3 miles between Rose Creek and Austin* ***(New)***

Glacial Lakes State Trail *6 miles between Willmar and Spicer* ***(Rehabilitation)***

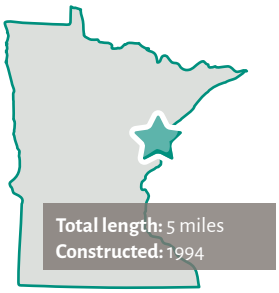
Root River State Trail *5 miles between Peterson and Rushford* ***(Rehabilitation)***

Munger State Trail *7 miles between Carlton and Duluth* ***(Rehabiltation)***

Gitchi Gami State Trail *1 mile between Beaver Bay and Silver Bay* ***(New)***

Sakatah Singing Hills State Trail *7 miles between Madison Lake and Elysian* ***(Rehabilitation)***

Alex Laveau State Trail

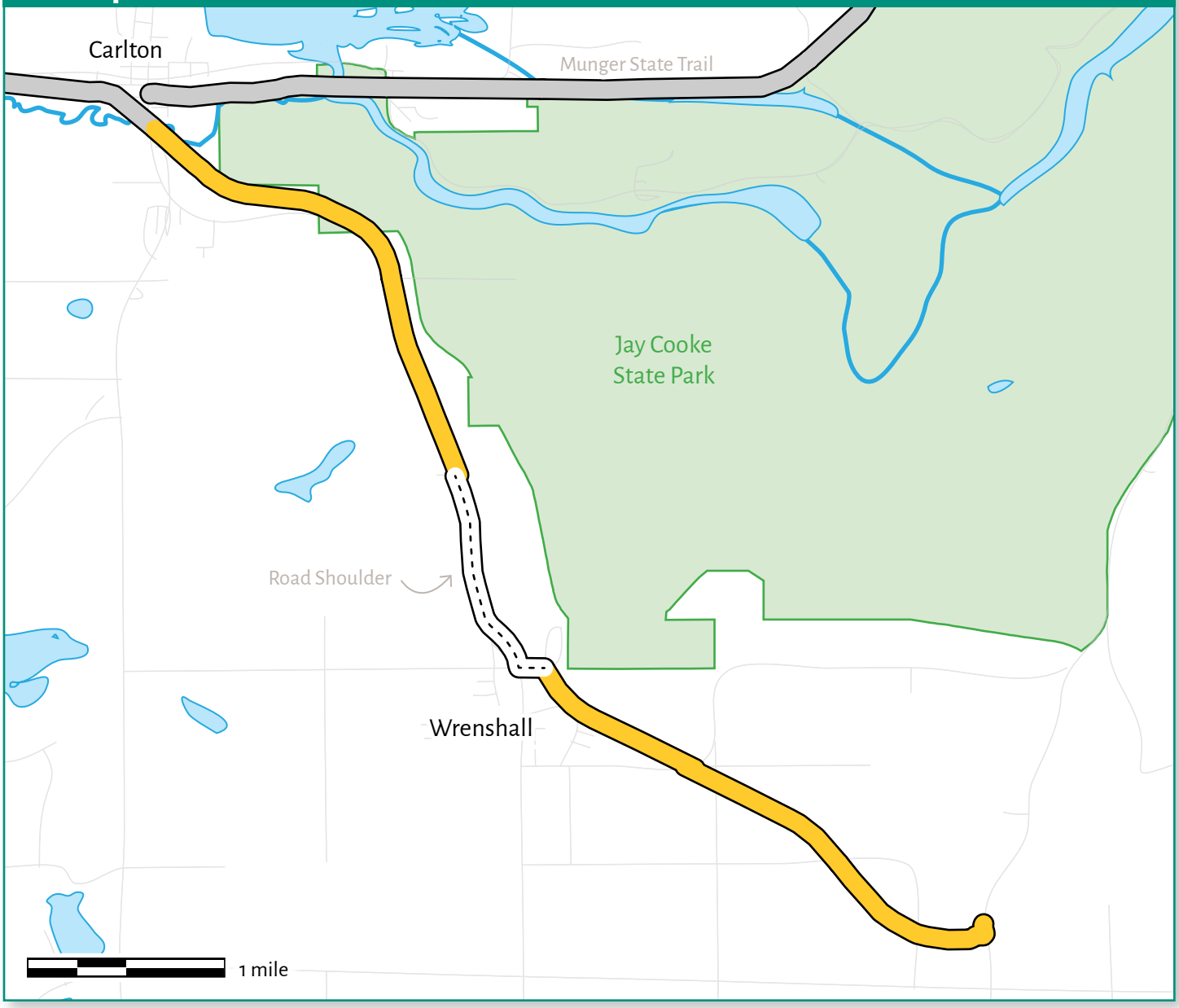


Overall Grade:

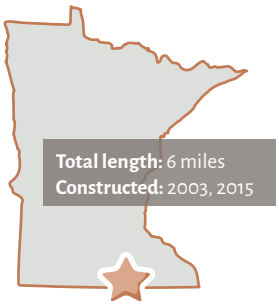
C

Miles by Condition:

Trail Map of Conditions



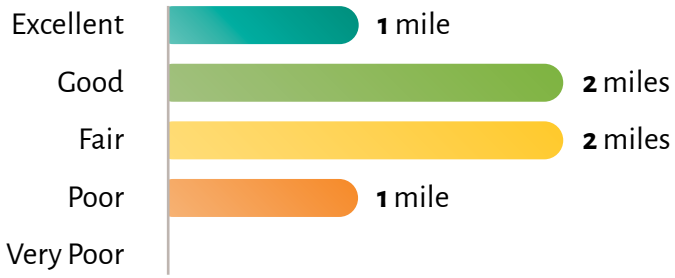
Blazing Star State Trail



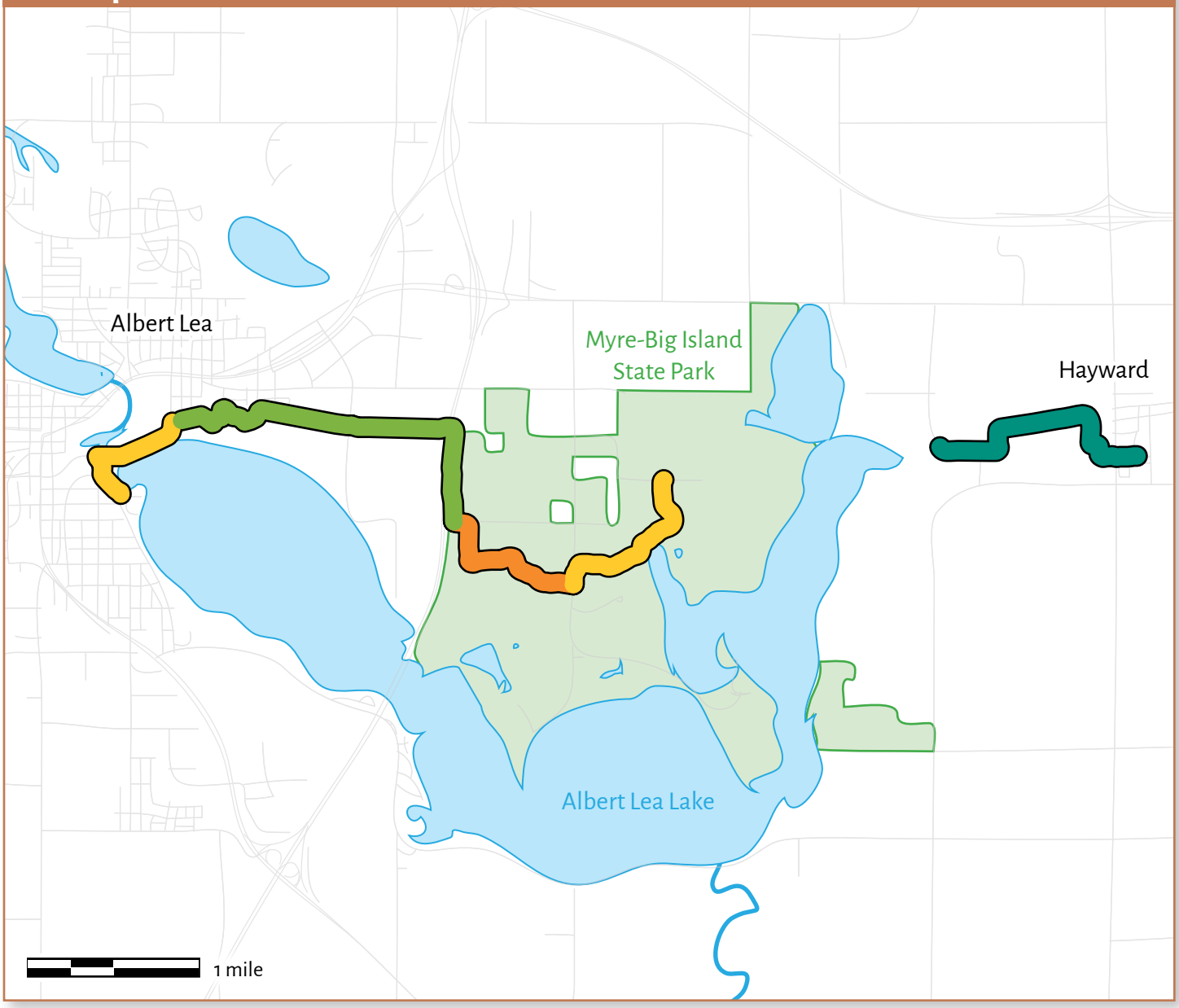
Overall Grade:

C+

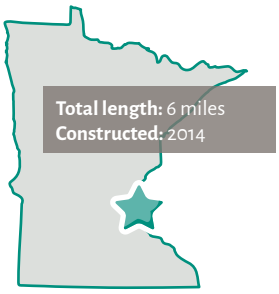
Miles by Condition:



Trail Map of Conditions



Brown's Creek State Trail



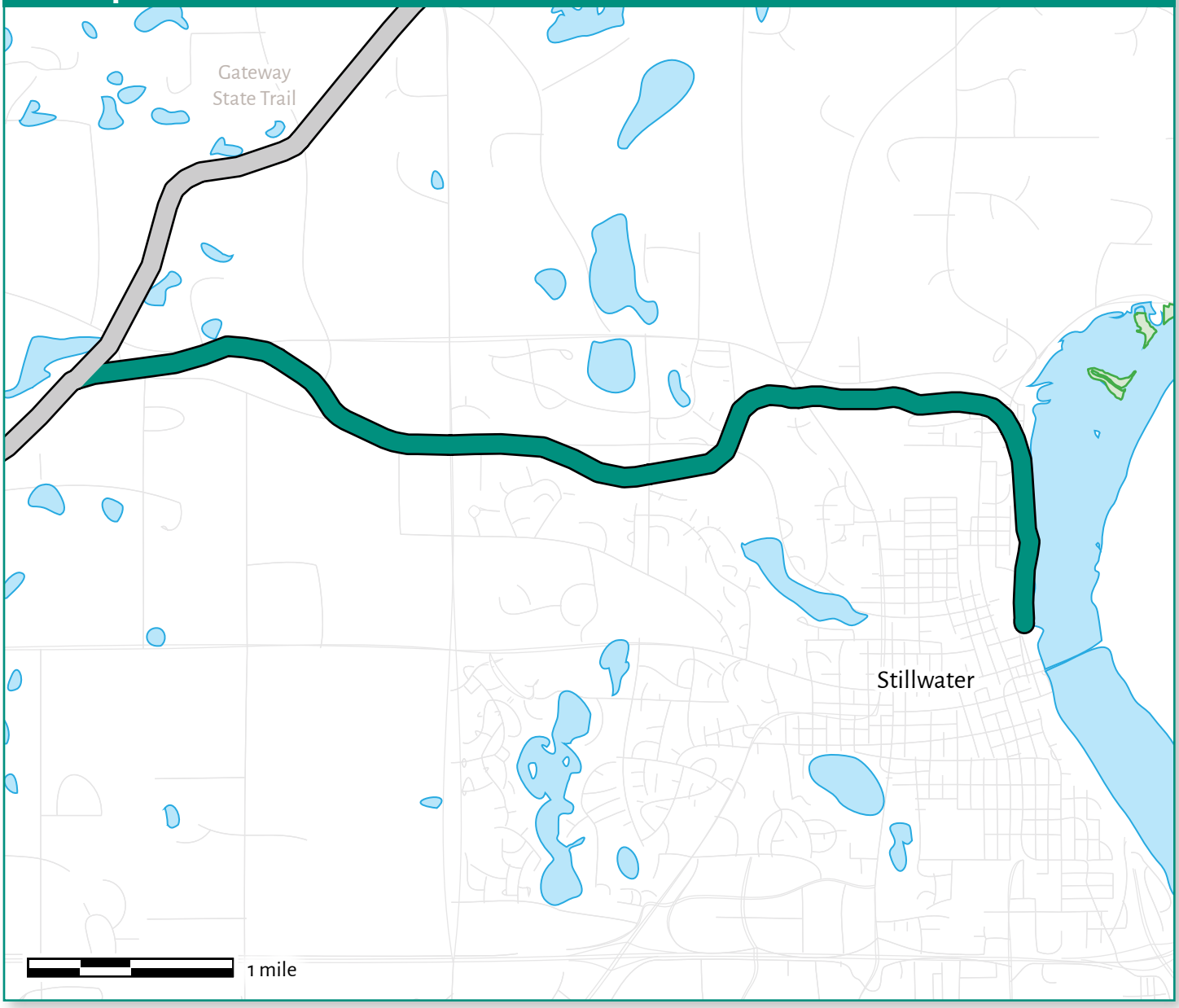
Overall Grade:

A

Miles by Condition:

Excellent	**6** miles
Good	
Fair	
Poor	
Very Poor	

Trail Map of Conditions

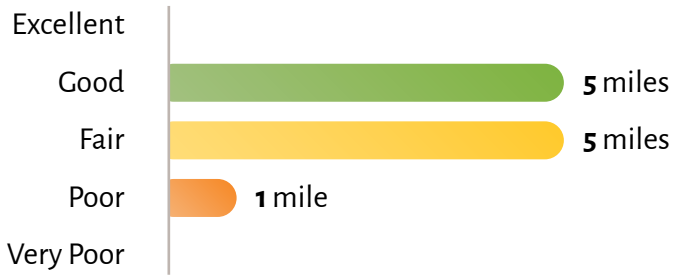


Casey Jones State Trail

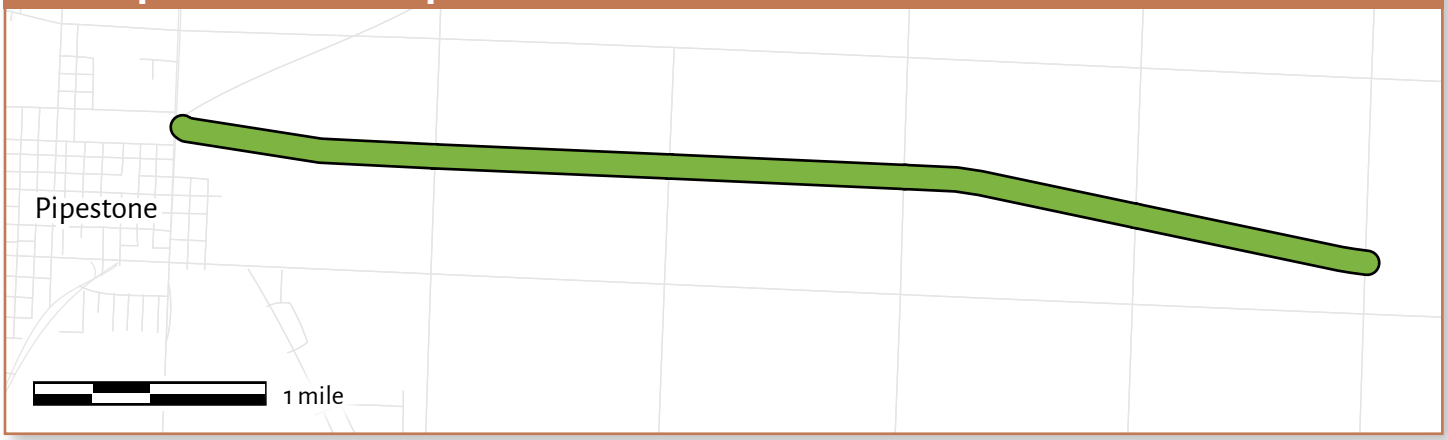
Overall Grade:

C+

Miles by Condition:

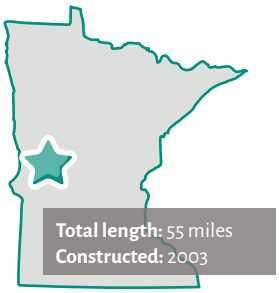


Trail Map of Conditions -- Pipestone Section



Trail Map of Conditions -- Lake Shetek State Park Section

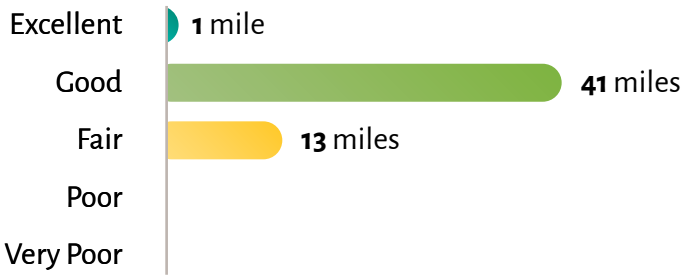
Central Lakes State Trail



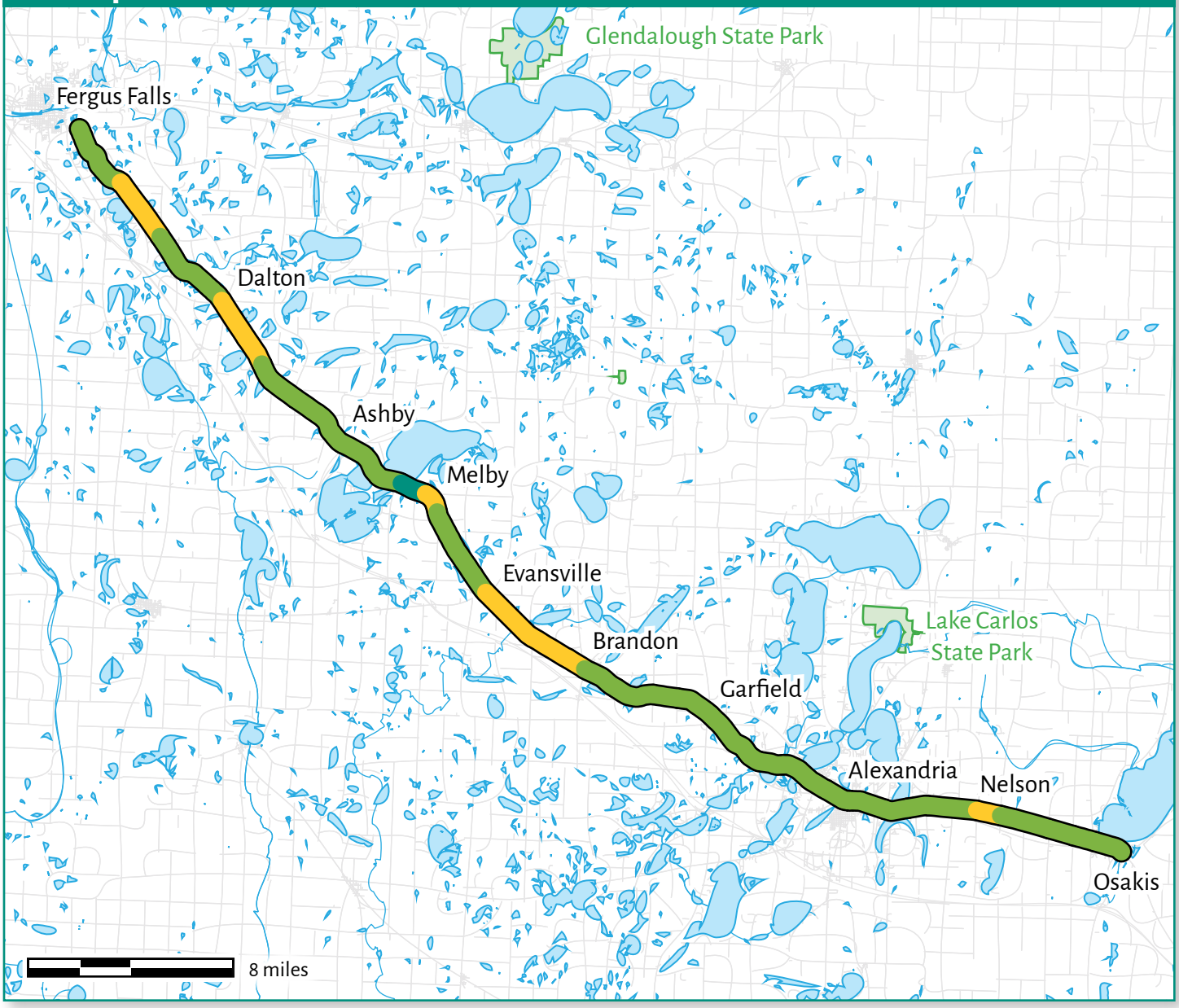
Overall Grade:

B-

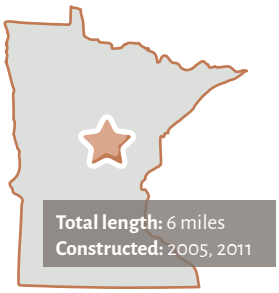
Miles by Condition:



Trail Map of Conditions



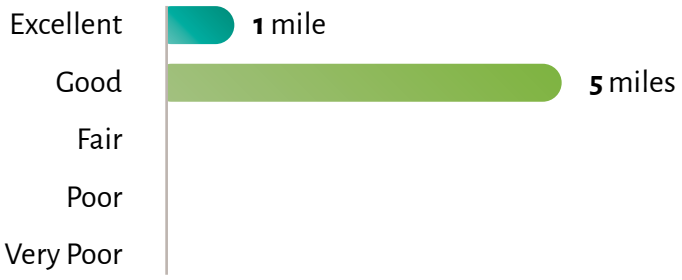
Cuyuna Lakes State Trail



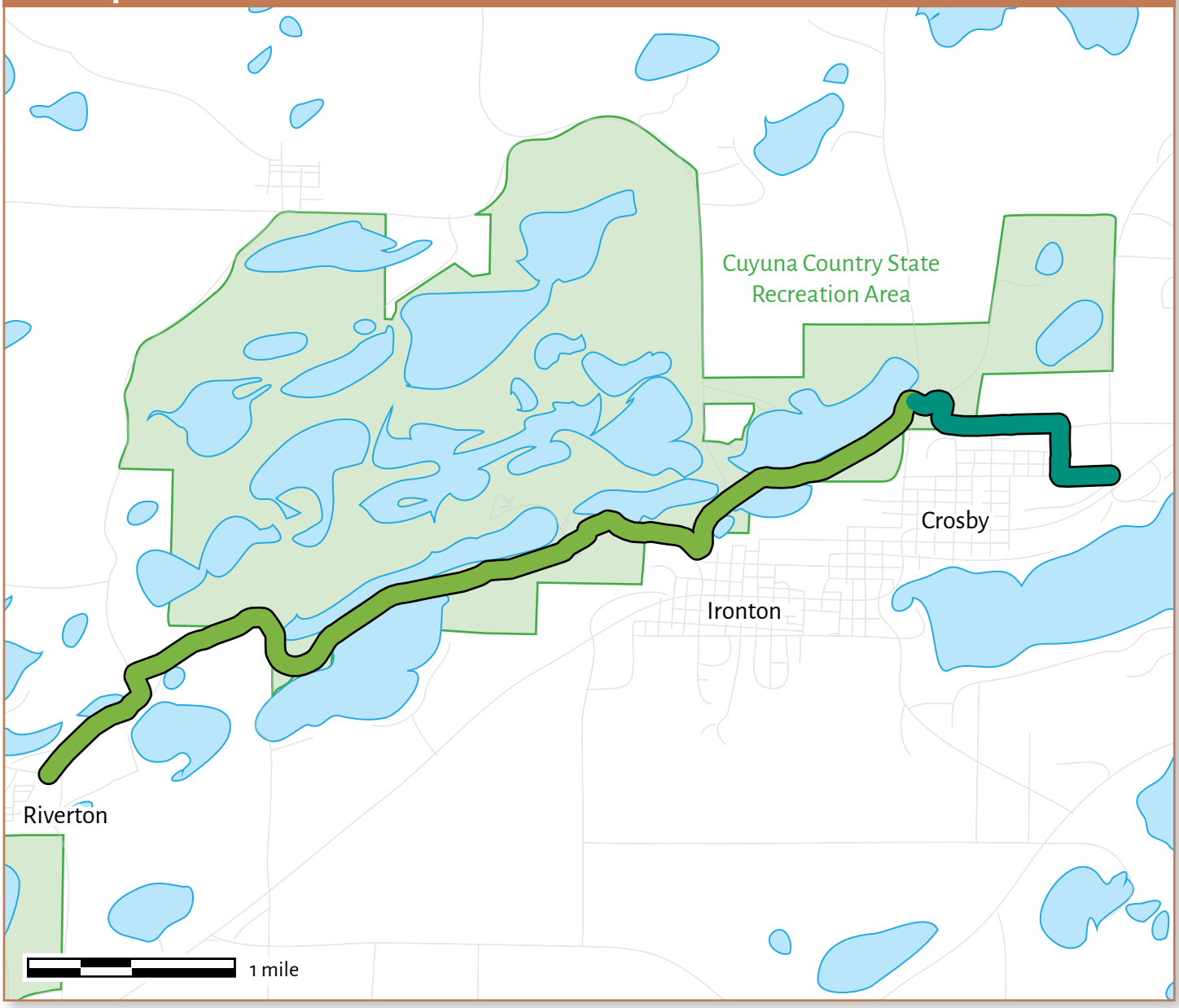
Overall Grade:

B

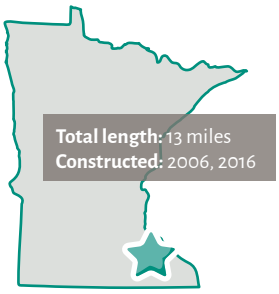
Miles by Condition:



Trail Map of Conditions



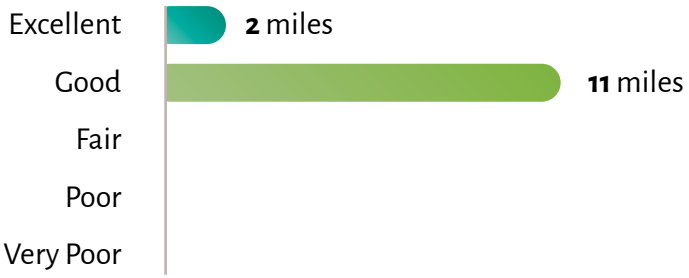
Douglas State Trail



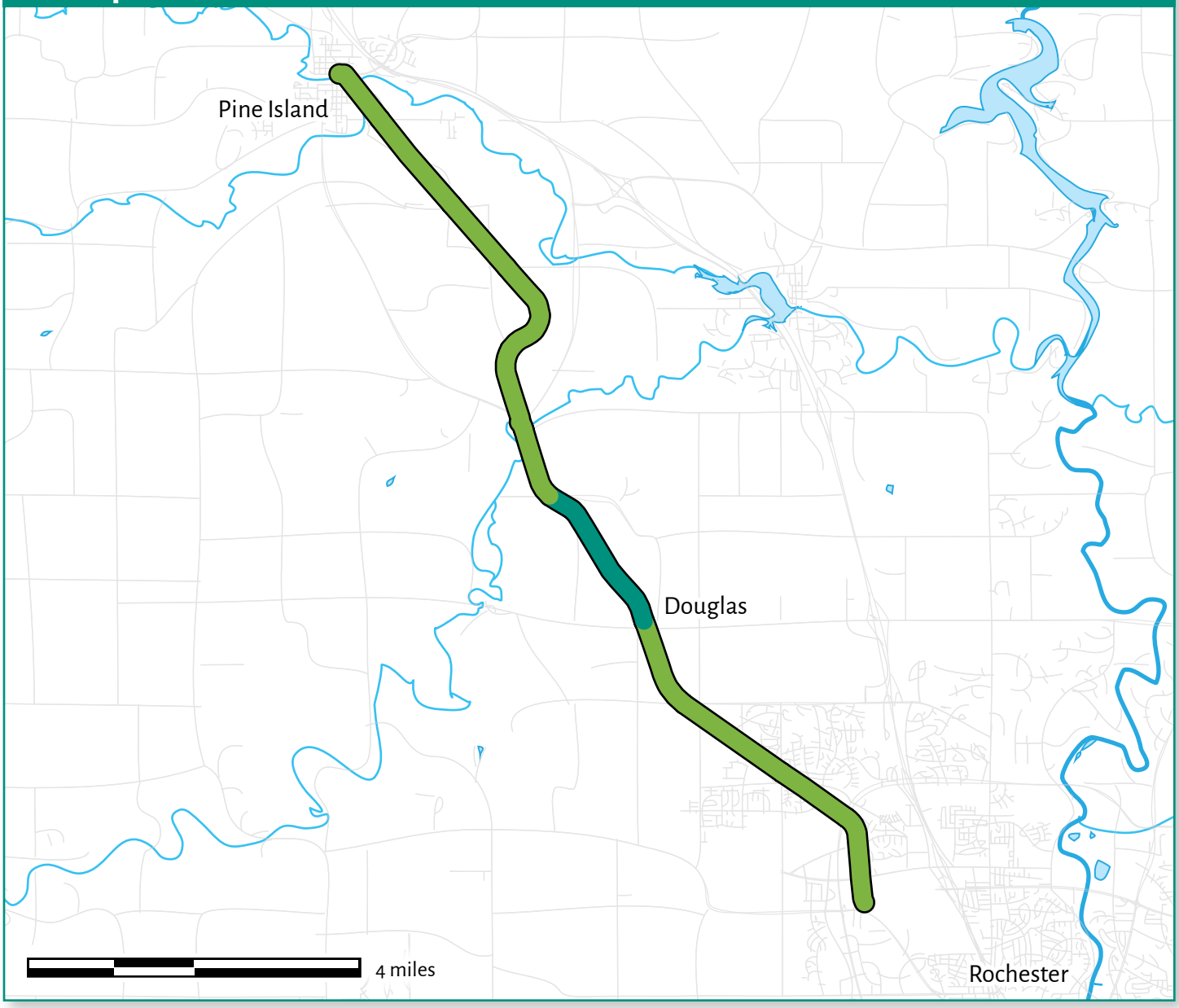
Overall Grade:

B

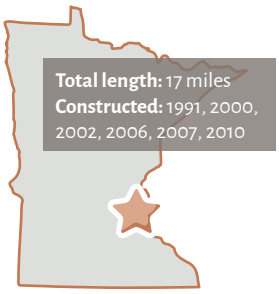
Miles by Condition:



Trail Map of Conditions



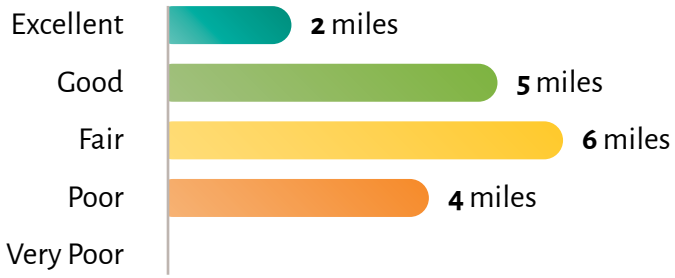
Gateway State Trail



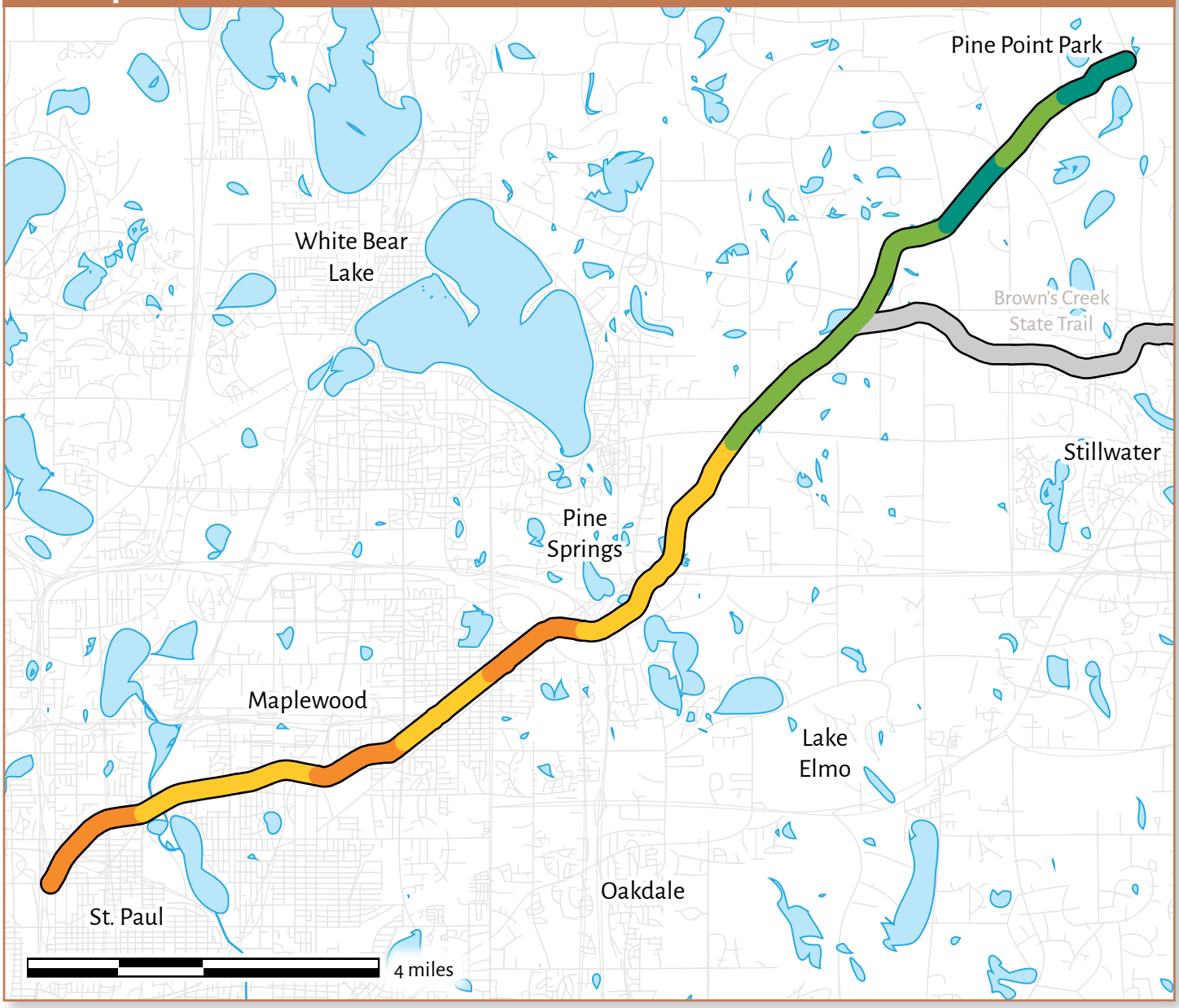
Overall Grade:

C

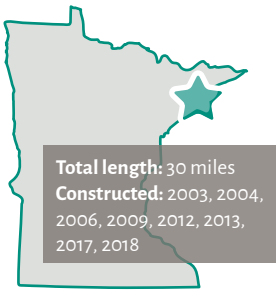
Miles by Condition:



Trail Map of Conditions



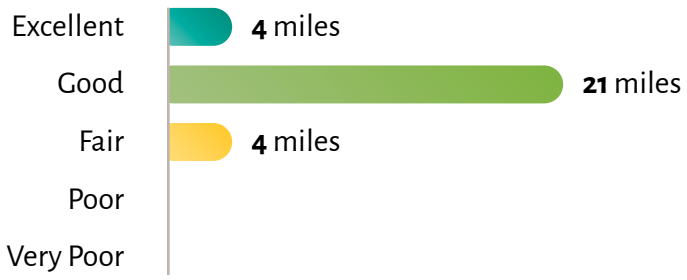
Gitchi Gami State Trail



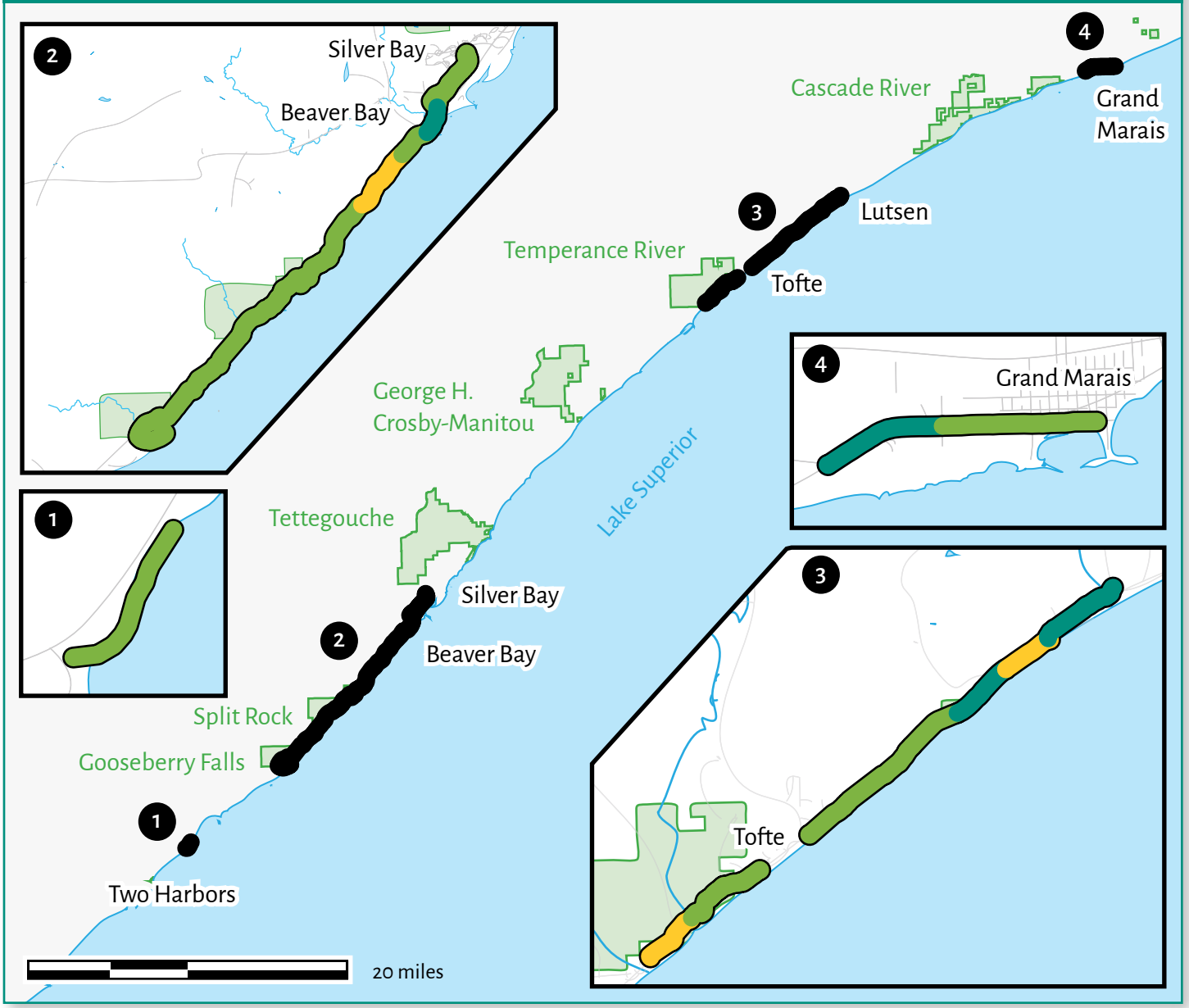
Overall Grade:

B

Miles by Condition:



Trail Map of Conditions



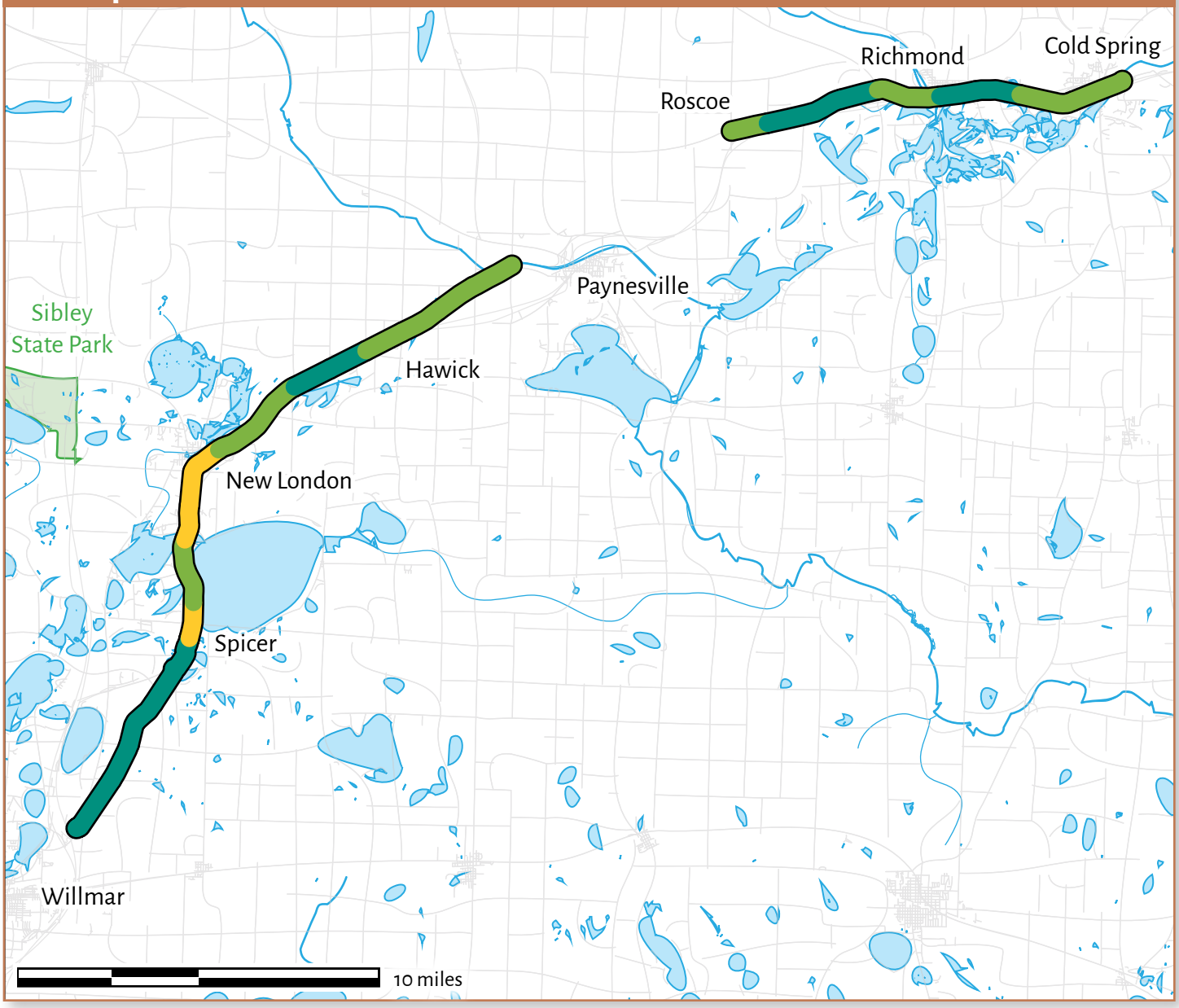
Glacial Lakes State Trail

Overall Grade:

B

Miles by Condition:

Trail Map of Conditions

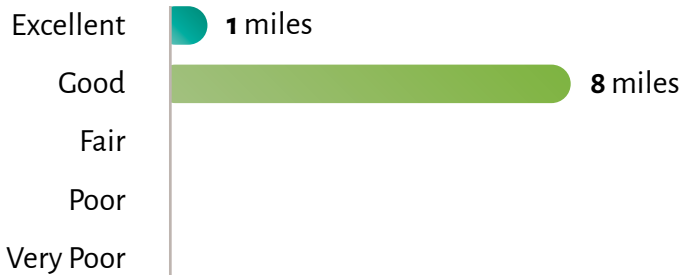


Goodhue Pioneer State Trail

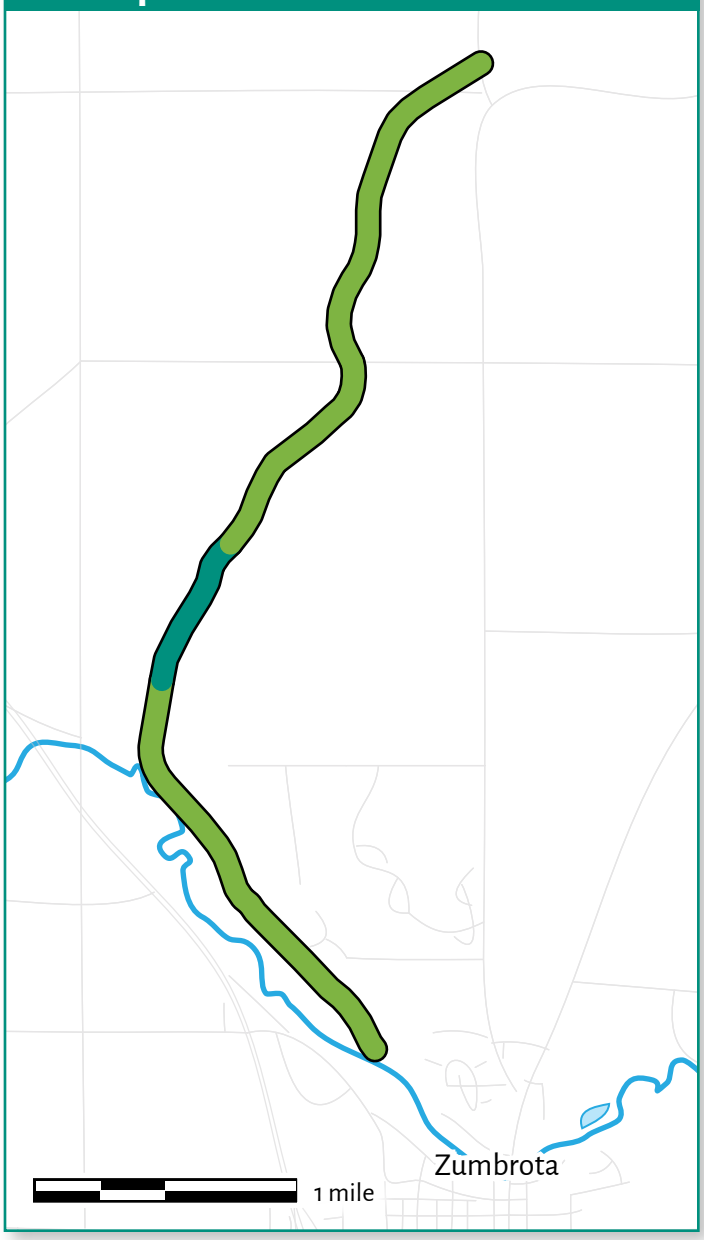
Overall Grade:

B

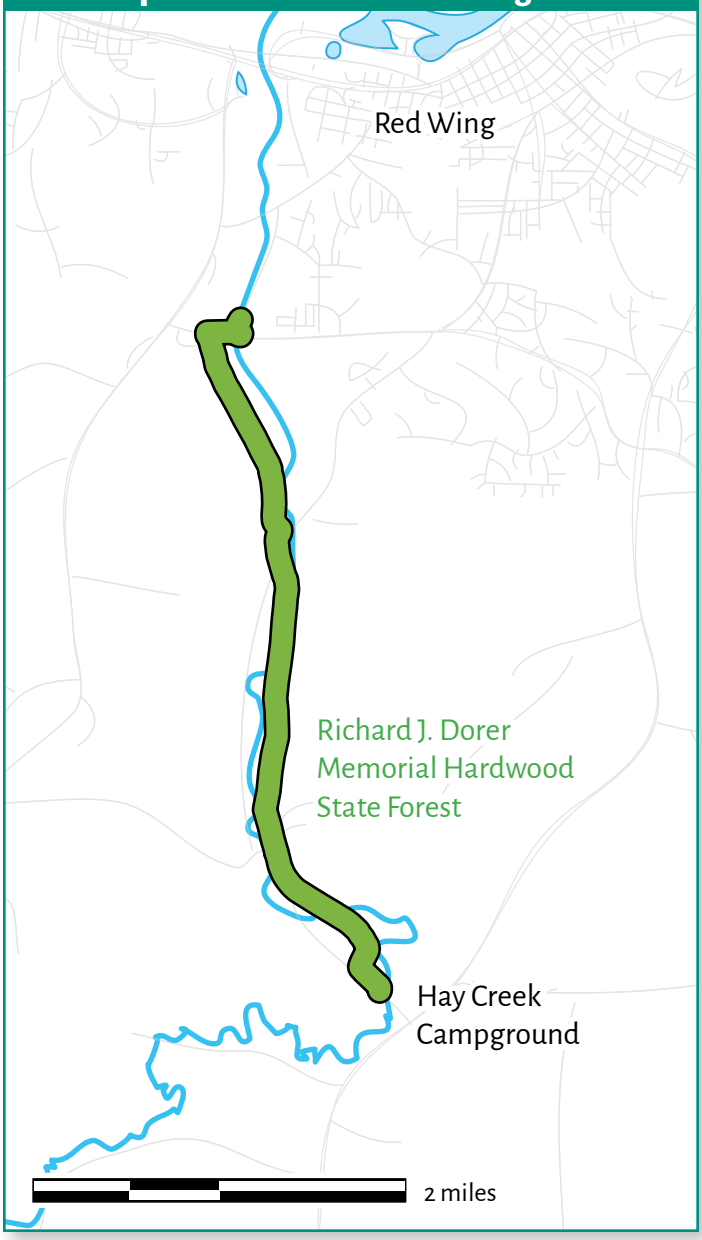
Miles by Condition:



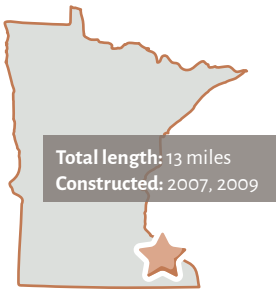
Trail Map of Conditions - Zumbrota Section



Trail Map of Conditions - Red Wing Section



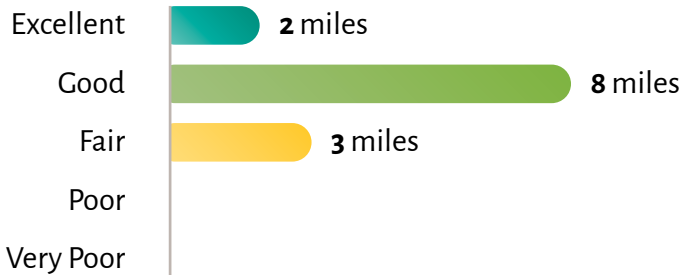
Great River Ridge State Trail



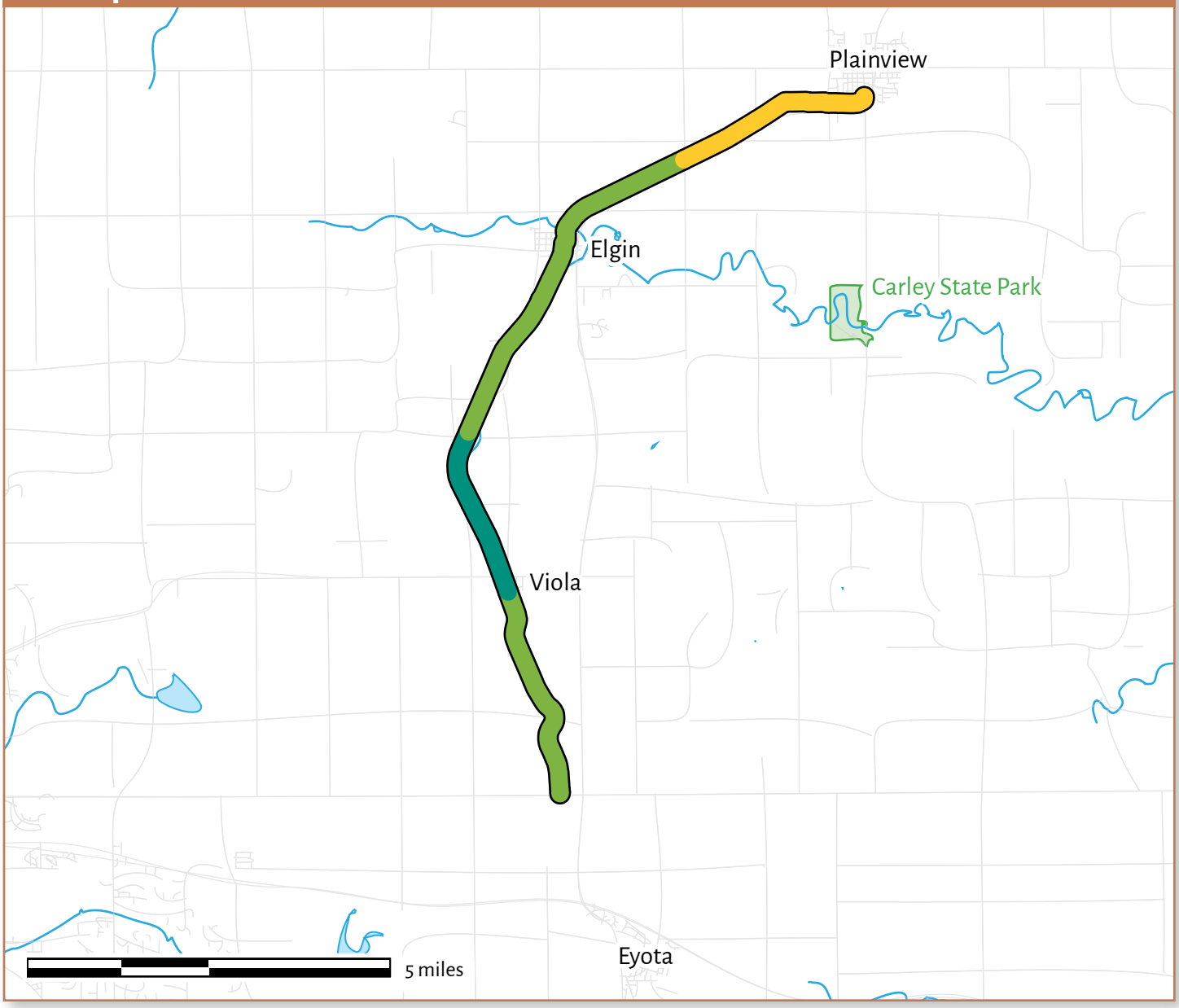
Overall Grade:

B-

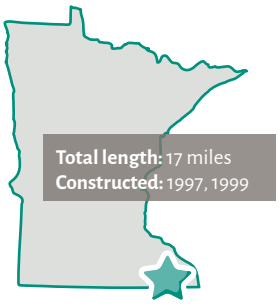
Miles by Condition:



Trail Map of Conditions



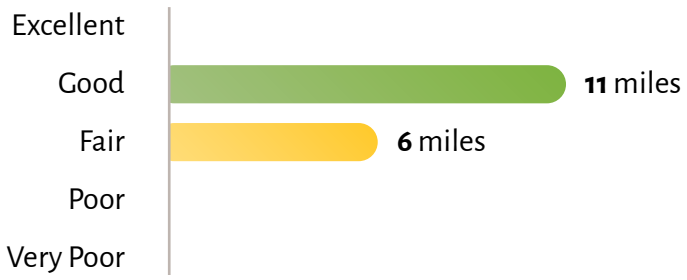
Harmony-Preston Valley State Trail



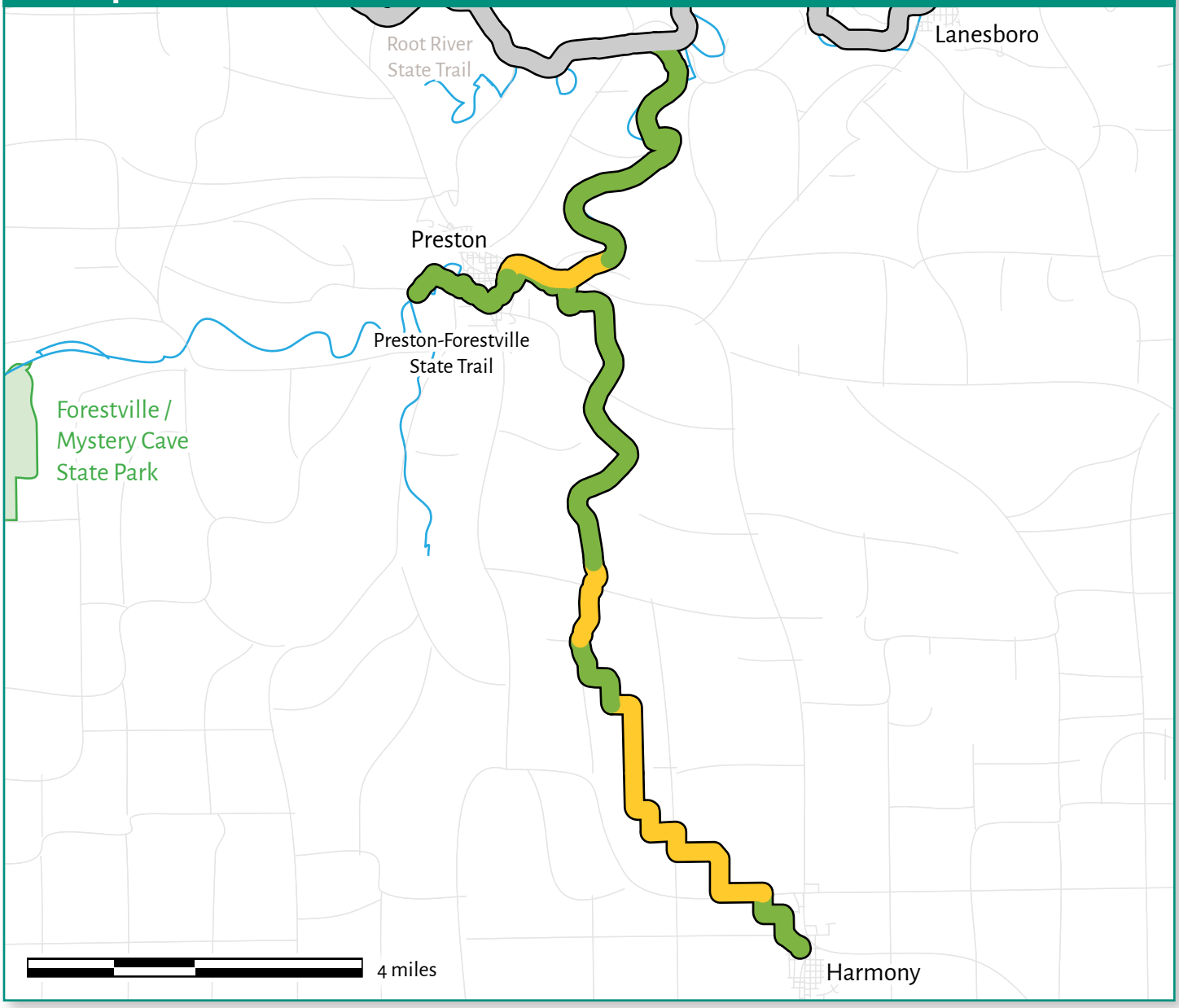
Overall Grade:

C+

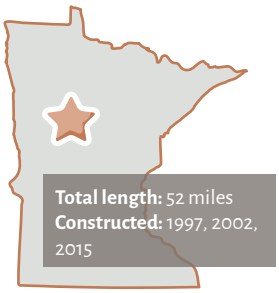
Miles by Condition:



Trail Map of Conditions



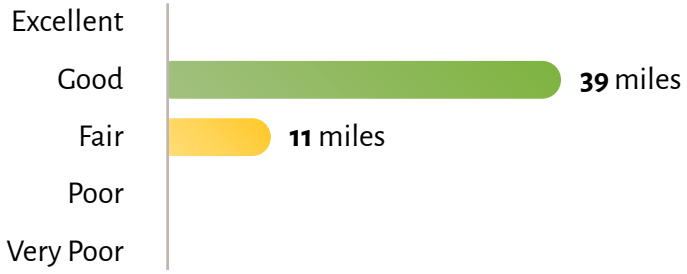
Heartland State Trail



Overall Grade:

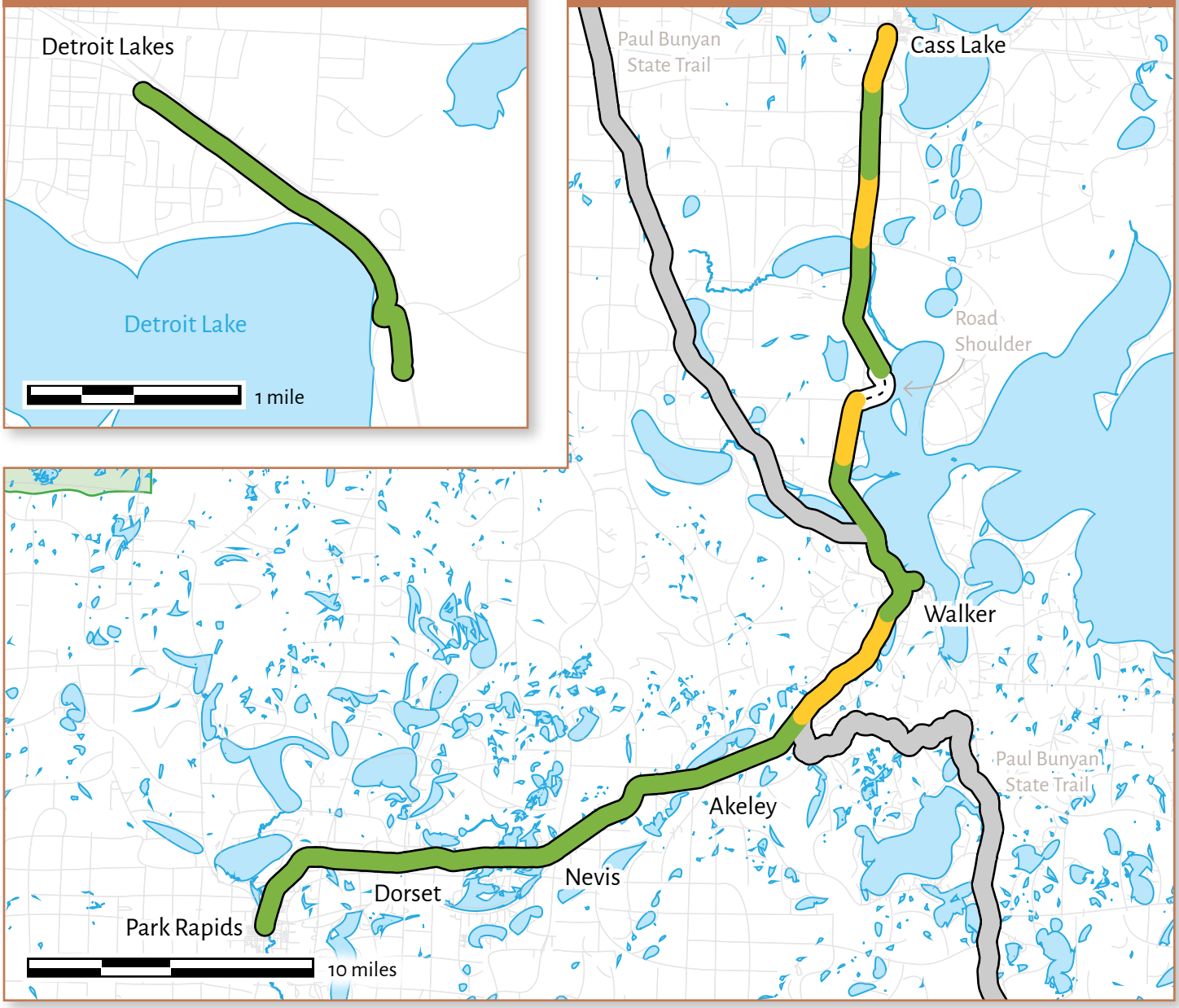
B-

Miles by Condition:

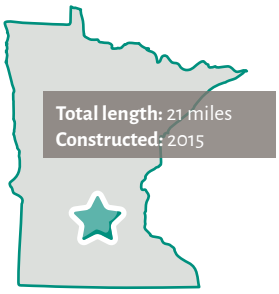


Trail Map of Conditions - Detroit Lakes Section

Trail Map of Conditions - Park Rapids to Cass Lake



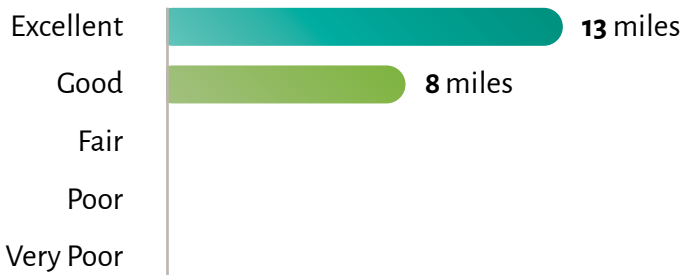
Luce Line State Trail



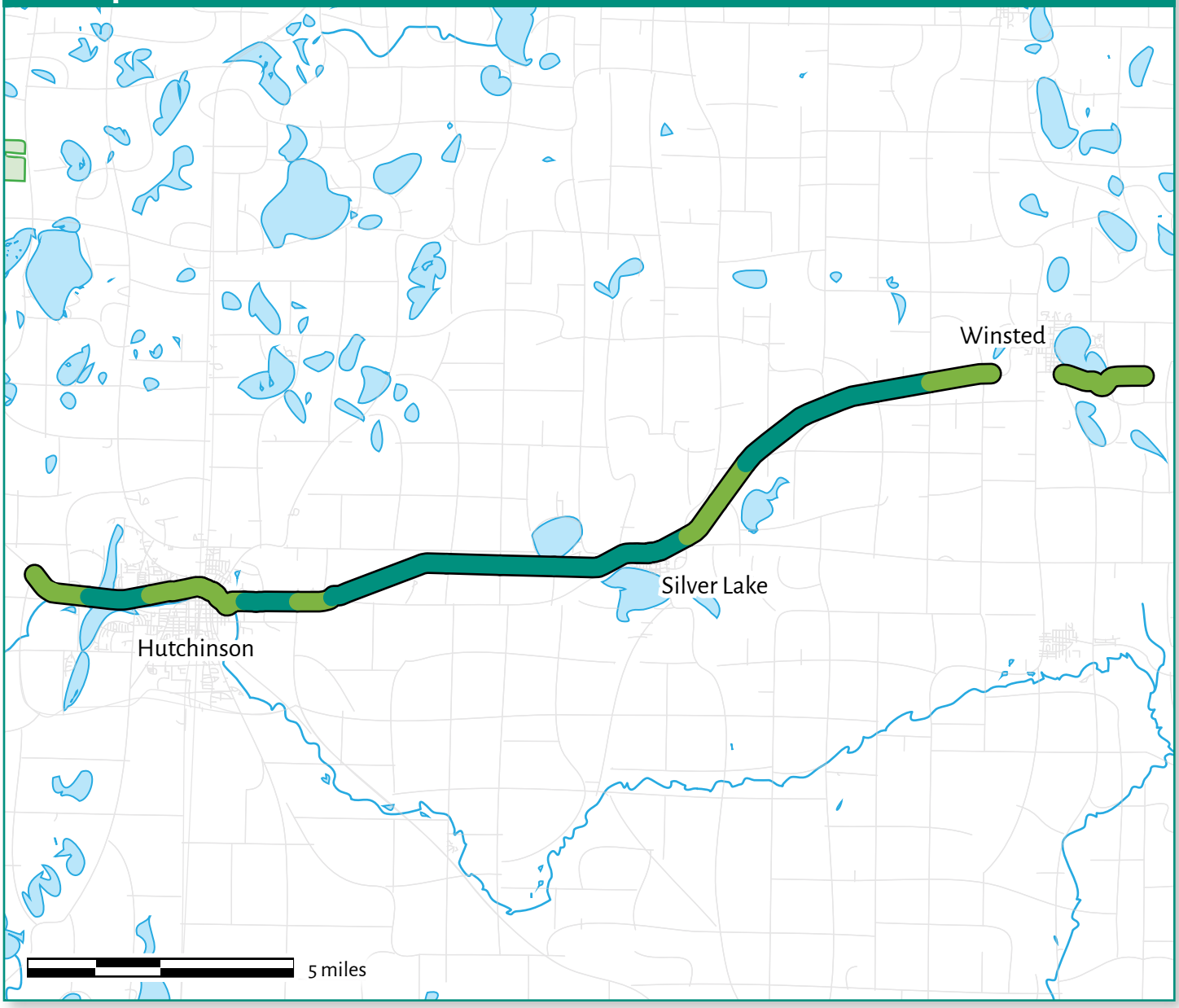
Overall Grade:

B+

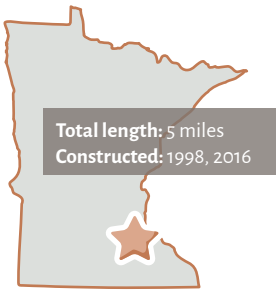
Miles by Condition:



Trail Map of Conditions



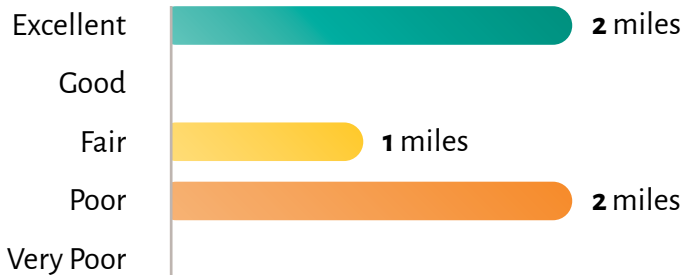
Mill Towns State Trail



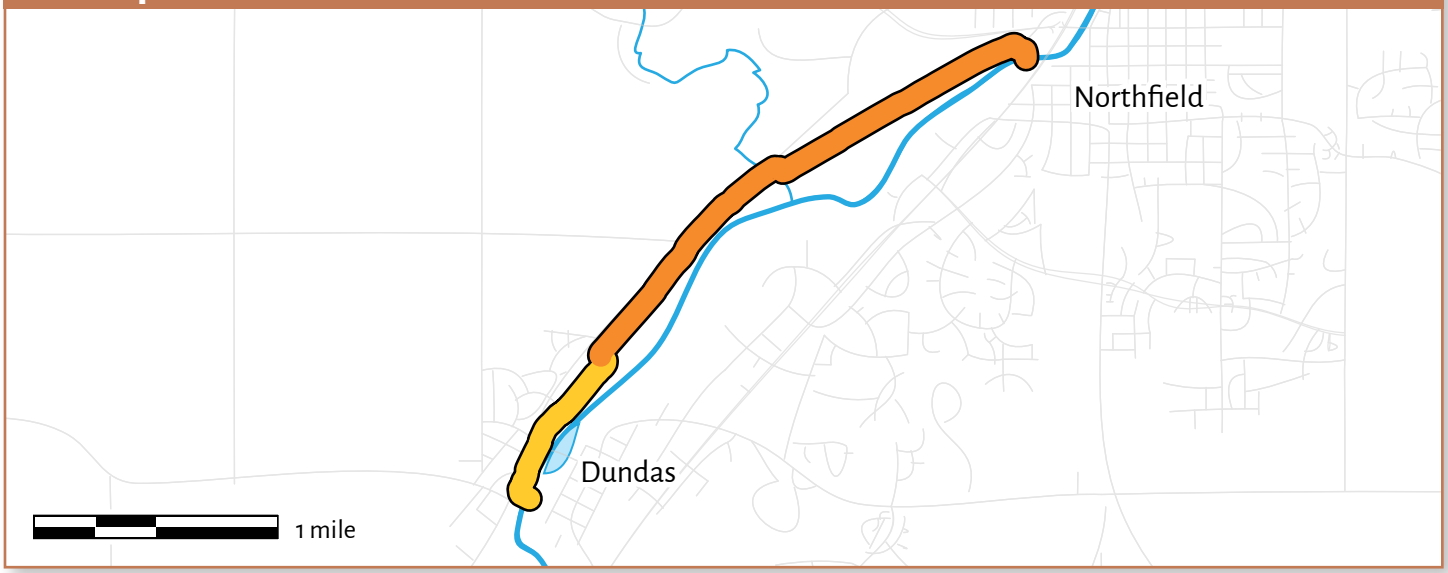
Overall Grade:

C

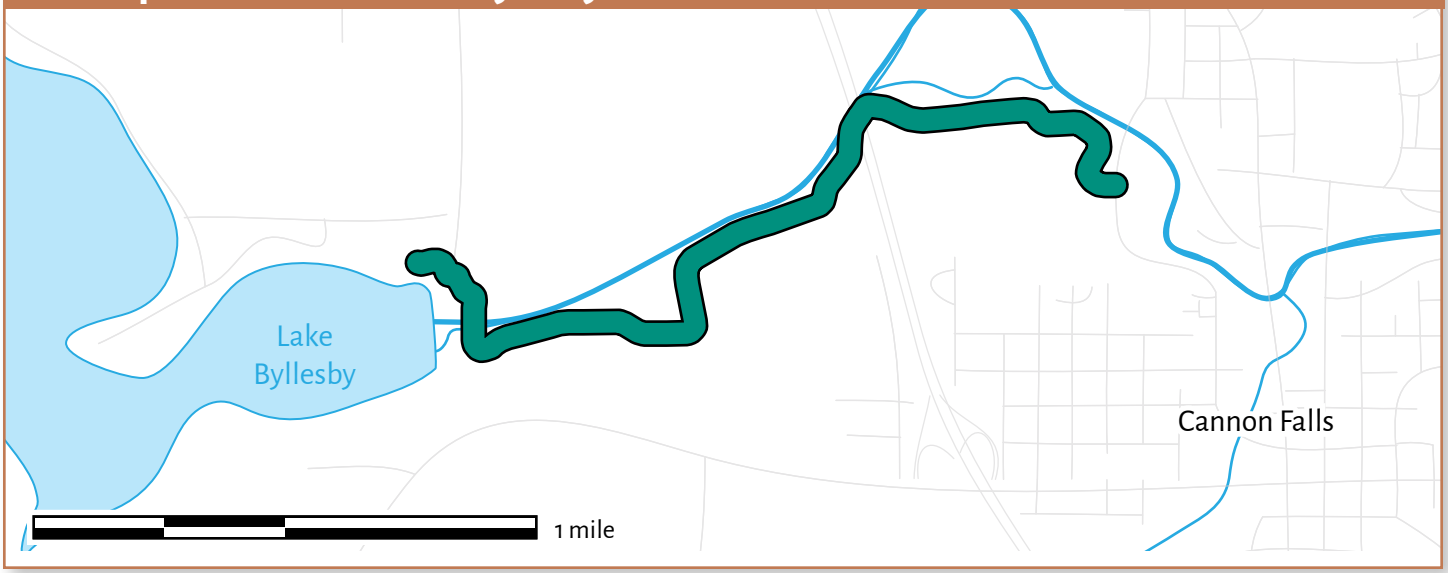
Miles by Condition:



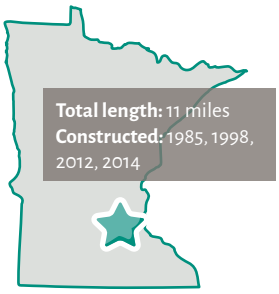
Trail Map of Conditions -- Northfield Section



Trail Map of Conditions -- Lake Byllesby Section



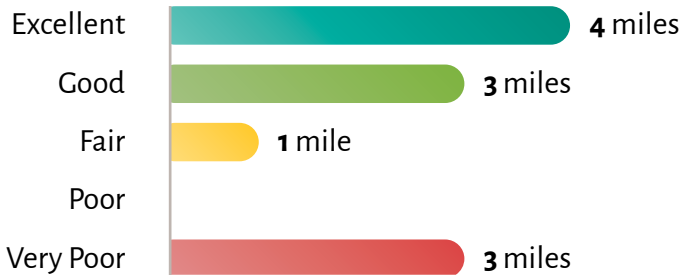
Minnesota Valley State Trail



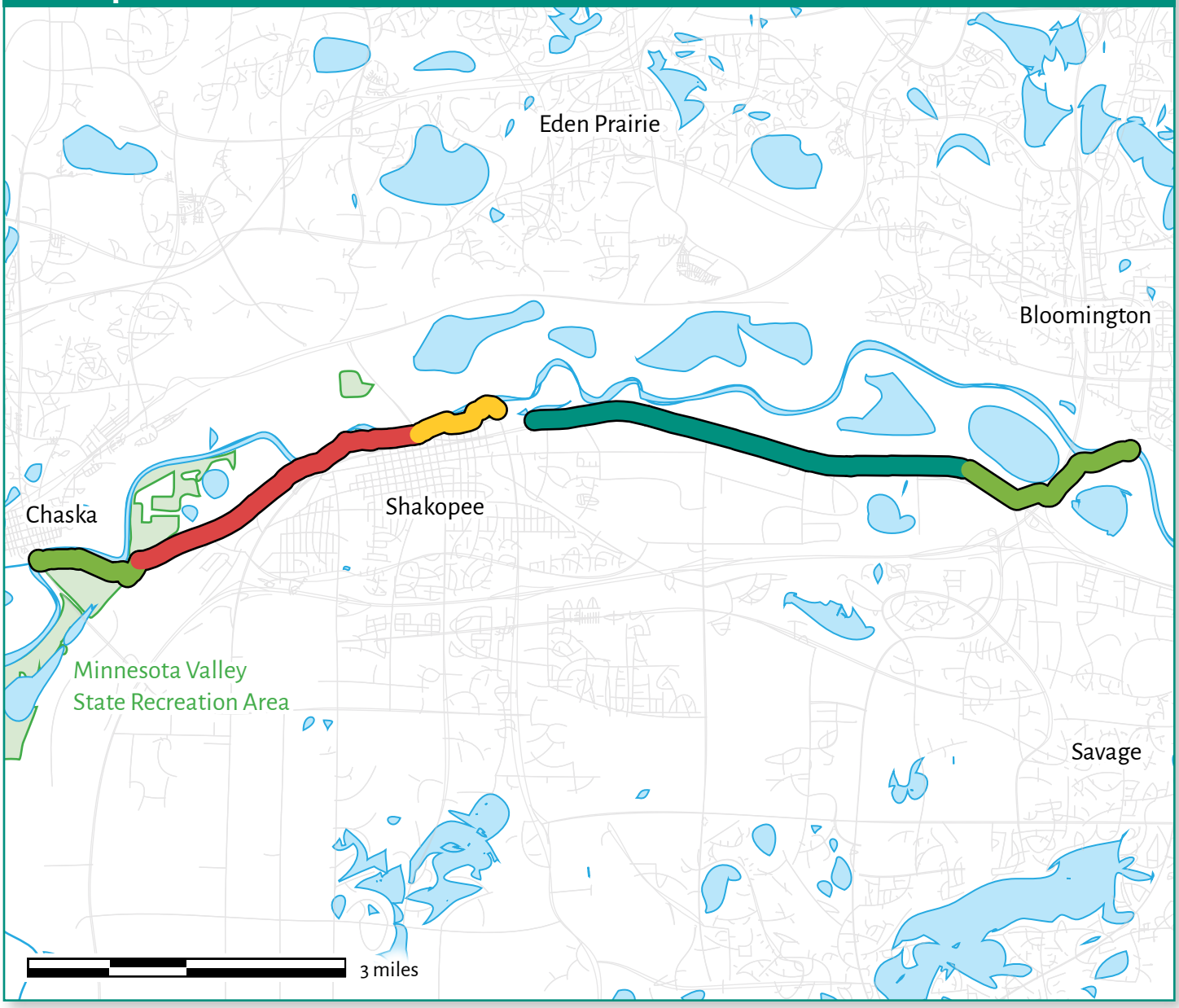
Overall Grade:

C+

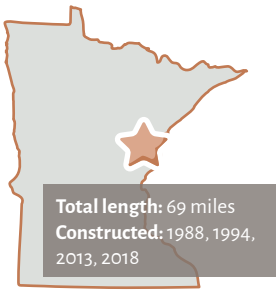
Miles by Condition:



Trail Map of Conditions



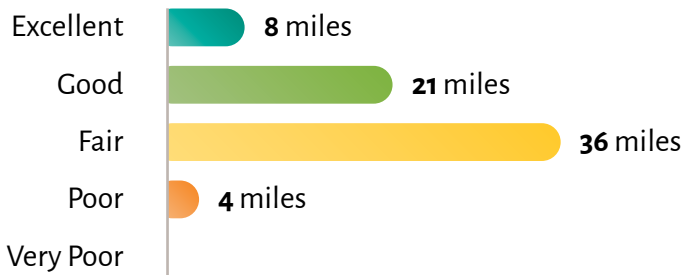
Munger State Trail



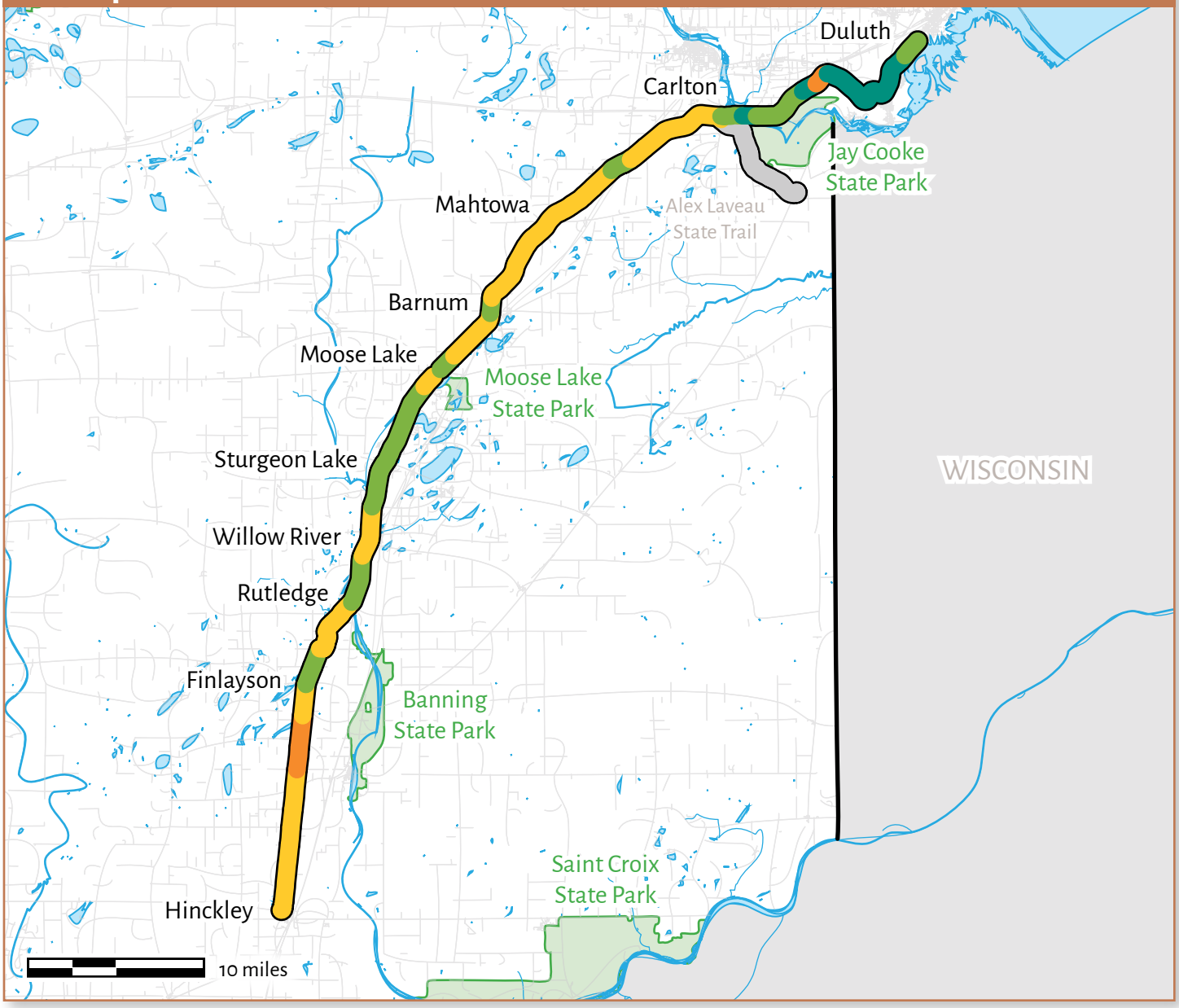
Overall Grade:

C+

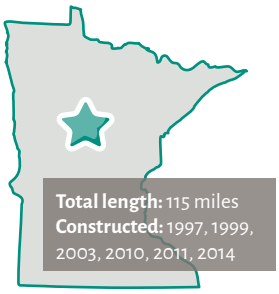
Miles by Condition:



Trail Map of Conditions



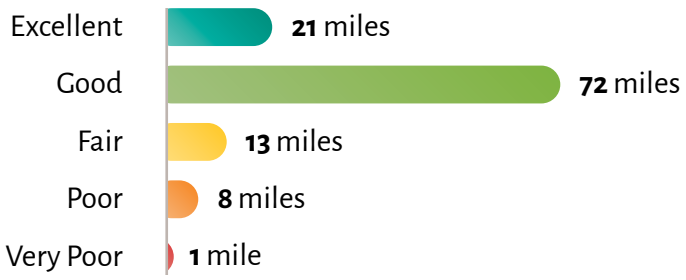
Paul Bunyan State Trail



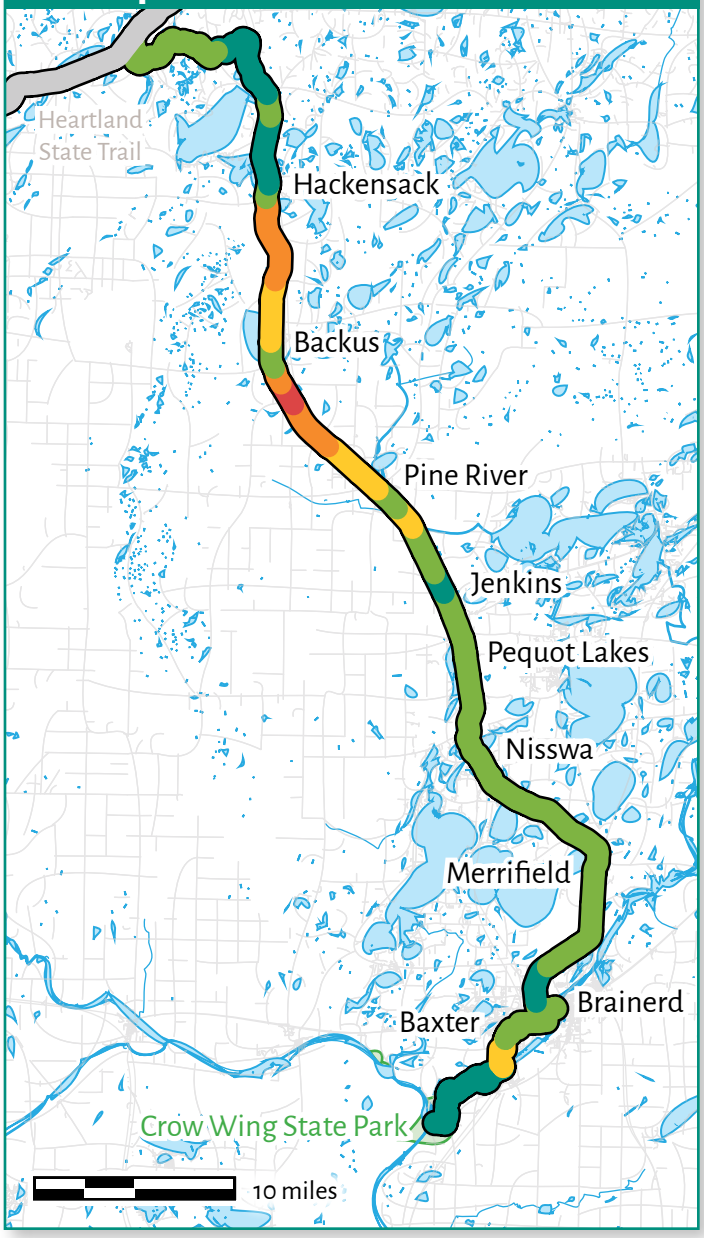
Overall Grade:

B-

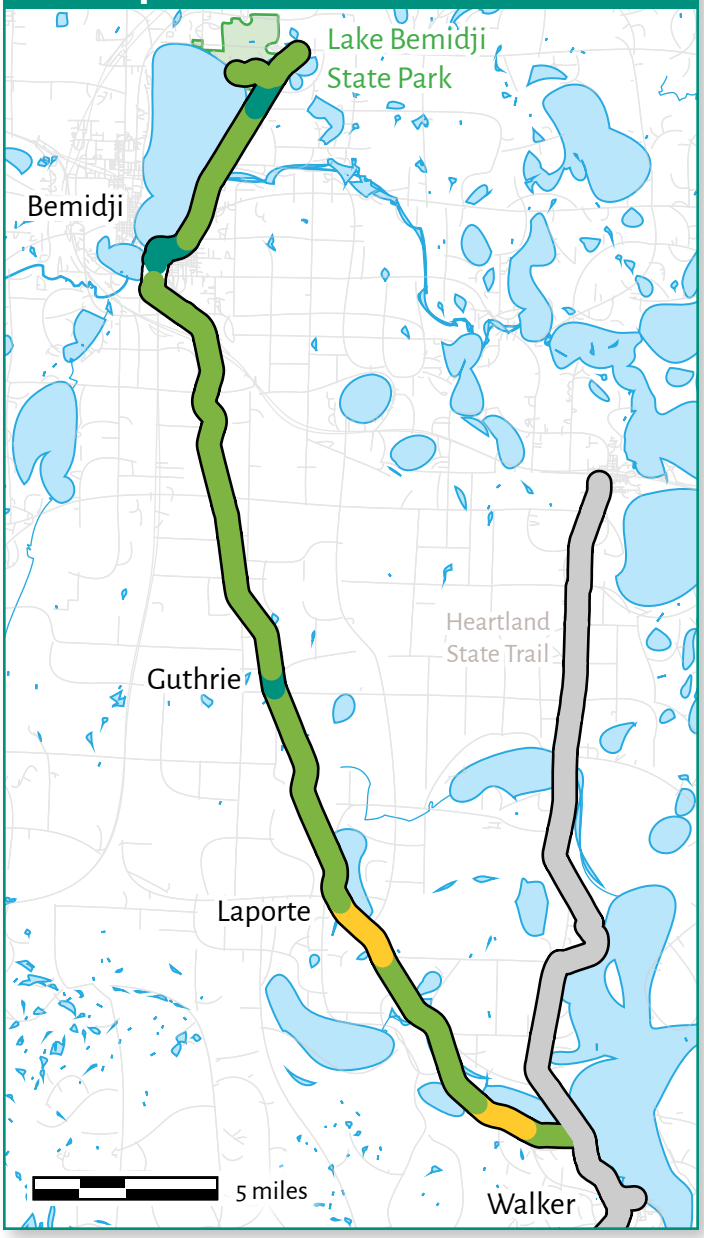
Miles by Condition:



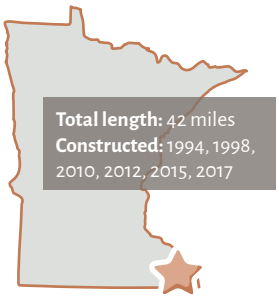
Trail Map of Conditions - Southern Section



Trail Map of Conditions - Northern Section



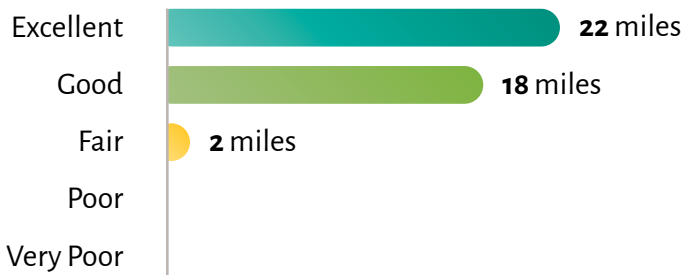
Root River State Trail



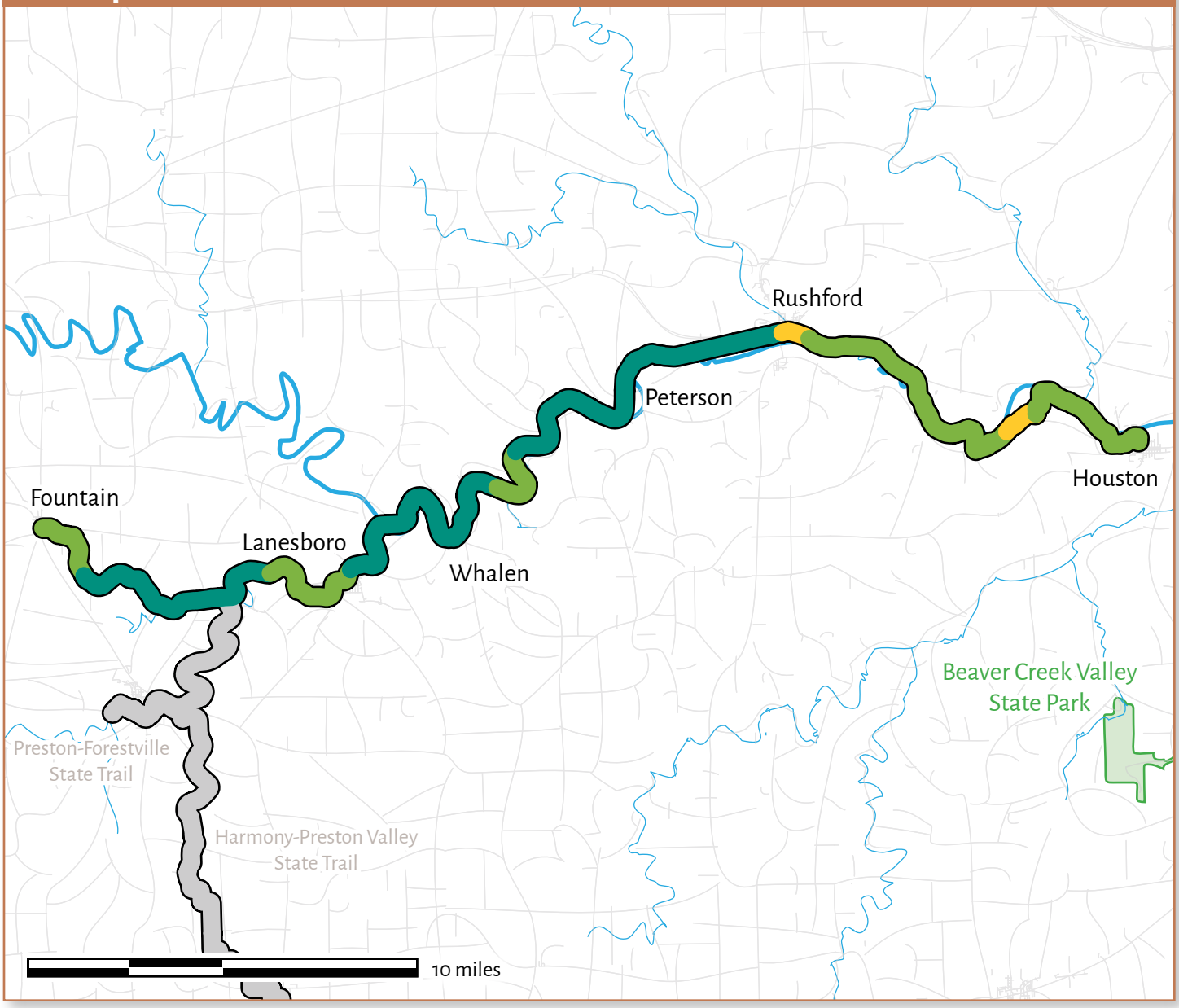
Overall Grade:

B+

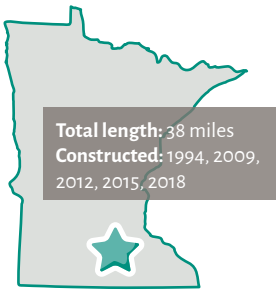
Miles by Condition:



Trail Map of Conditions



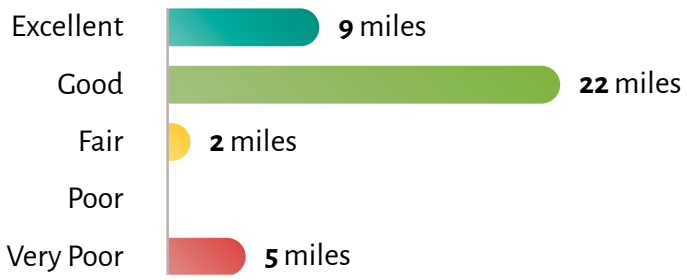
Sakatah Singing Hills State Trail



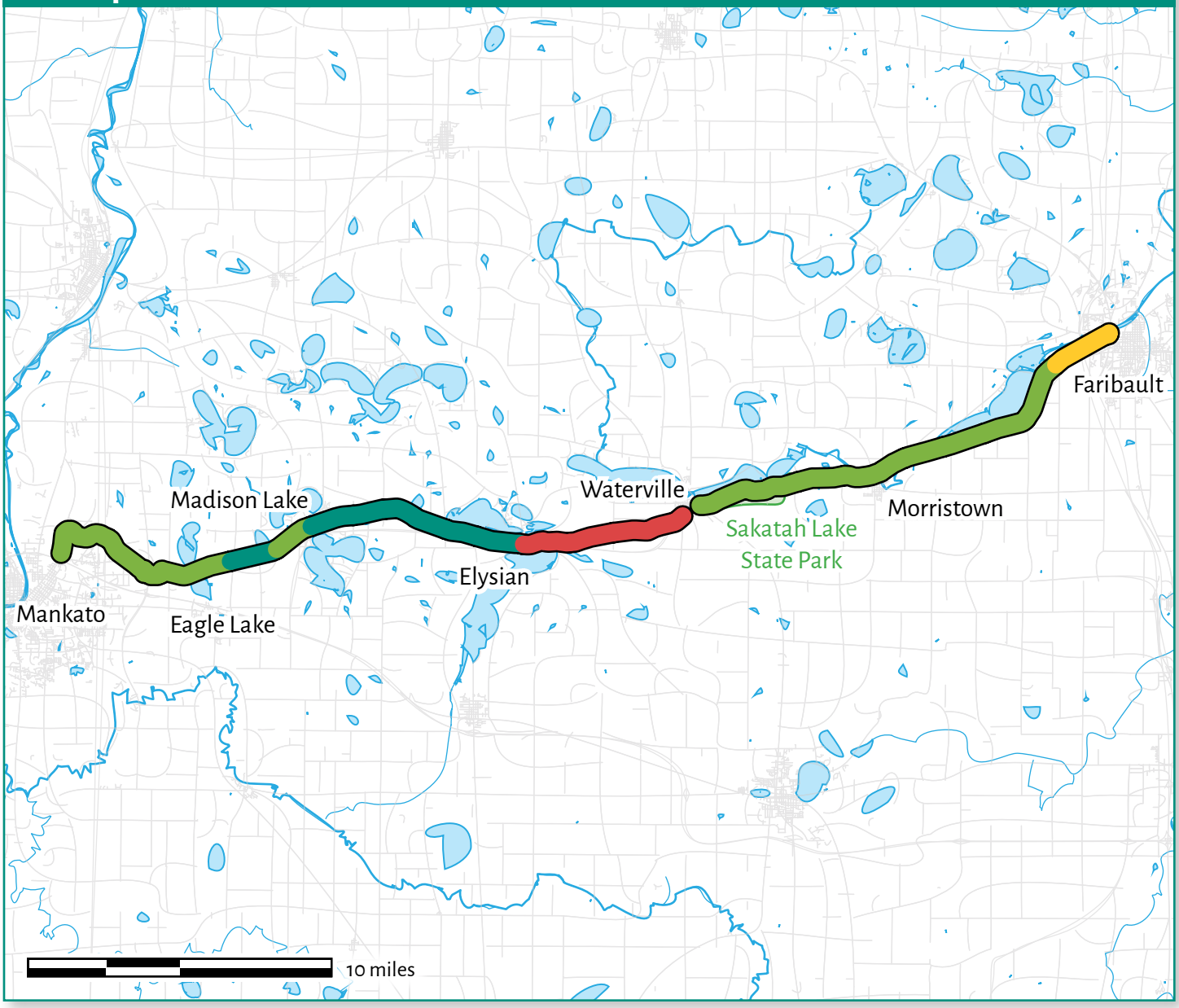
Overall Grade:

B-

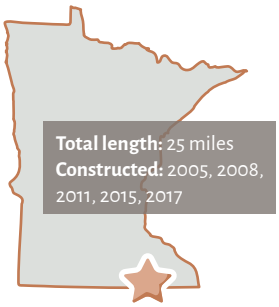
Miles by Condition:



Trail Map of Conditions



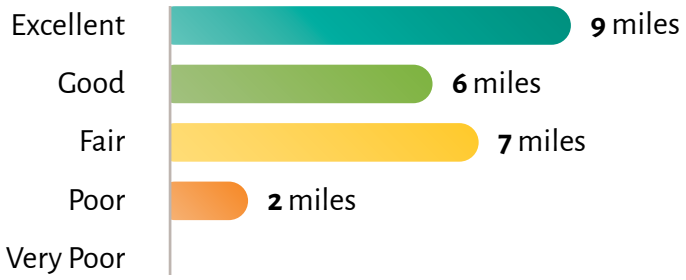
Shooting Star State Trail



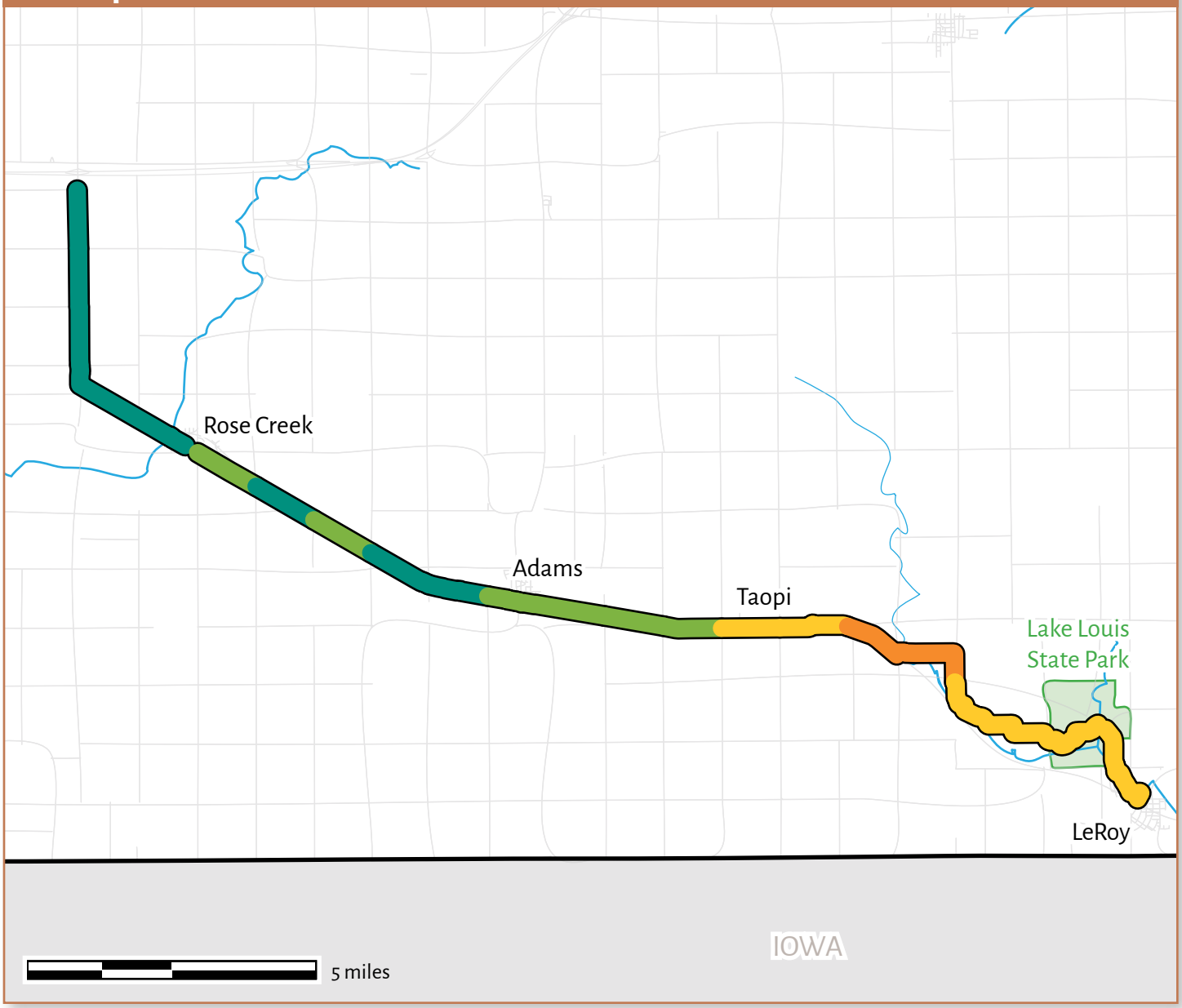
Overall Grade:

B-

Miles by Condition:



Trail Map of Conditions



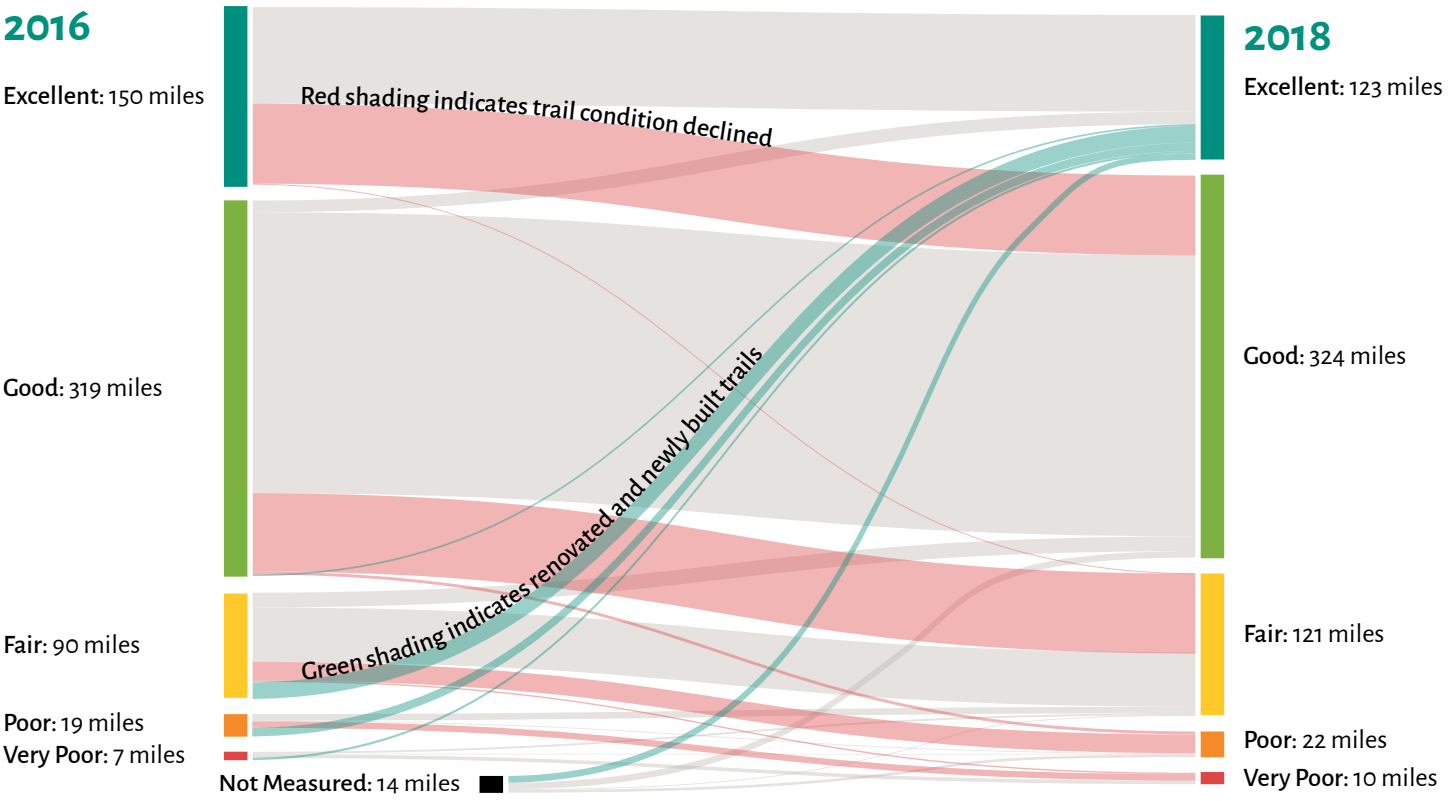
Minnesota's Aging Trail System

Minnesota's paved state trails are in good condition. But the system is aging and conditions declined since our last *State of the Trails* report. Using our 2016 data as a baseline, and pairing our TRI data with the age of each trail, we can estimate how the paved state trail system will age over the next 10-15 years.

Between 2016 and 2018, the share of the system in excellent or good condition fell from 79% to 75% and the share of the system in poor or worse condition increased from 4% to 6%. These declines are due to trails deteriorating faster than the Minnesota DNR can rehabilitate them. Nearly a quarter of the state trails system – 154 miles – showed worsened conditions from our 2016 report. Twenty-eight miles showed improved conditions due to repaving. Another 29 miles were shown to be in better condition in 2018 than in 2016. Improvement in these 29 miles is likely due to maintenance. As a note of caution, changes in trail conditions may be due to discrepancies between data collection processes in 2016 and 2018. See Appendix A for details.

The 2016-2018 period is a small sample, but is indicative of an obvious point: trails deteriorate as they age. Our data suggests Minnesota's paved bike trails have an average life-span of 28 years: Newly built trails stay in excellent condition for 7 years on average, are in good condition until they reach the 20-year mark, and are in fair condition until their 28th year. While

How Trails Conditions Changed Between 2016 and 2018

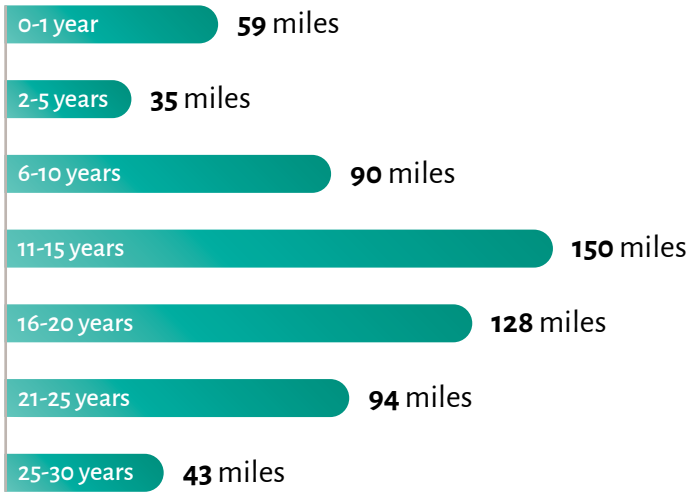


there is significant variation in how different trails age, understanding the average aging cycle is useful for planning purposes. In practice, numerous factors – some controllable (e.g., regular trail upkeep) and others uncontrollable (e.g., severe storms and flooding) – will effect the actual life span of any given trail.

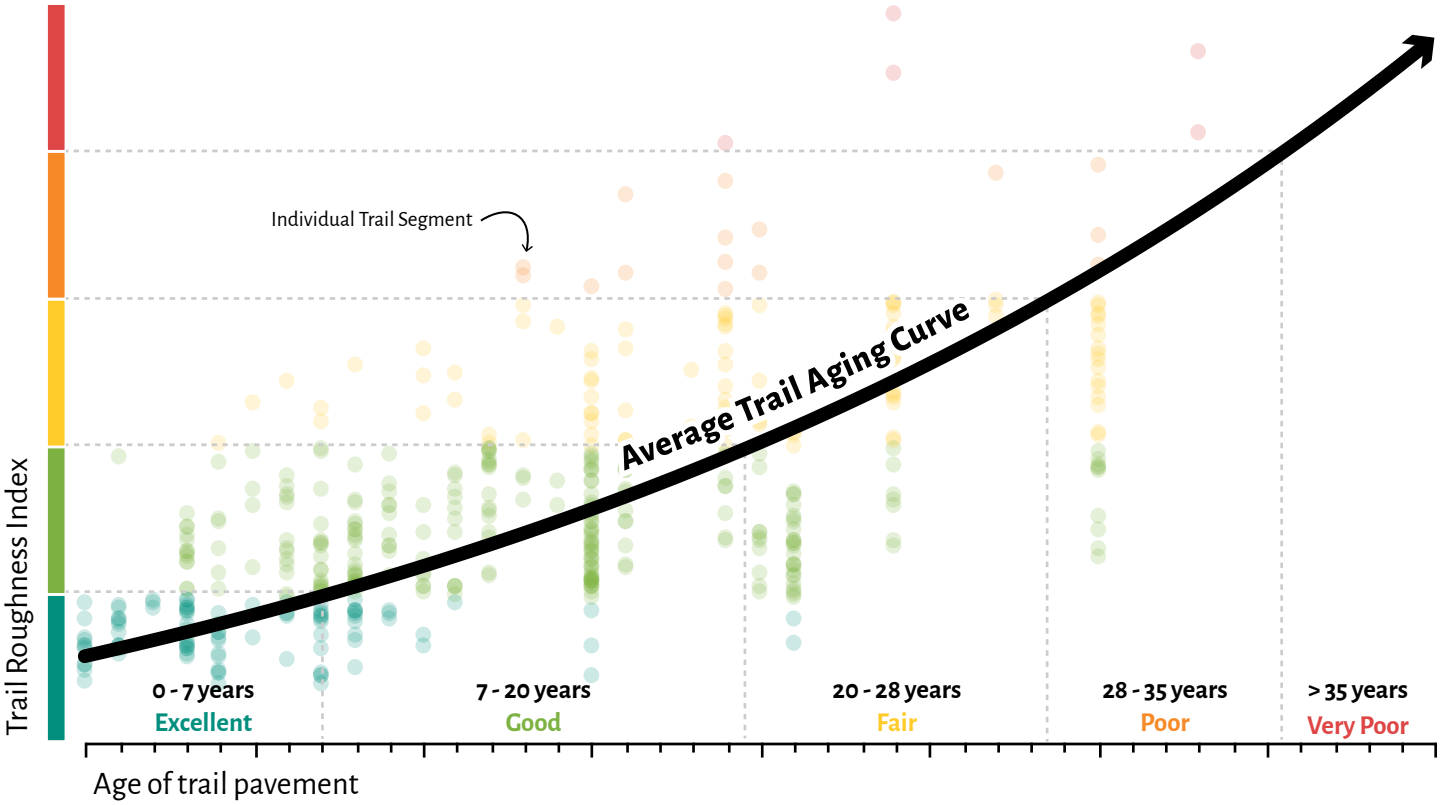
Overall, most paved state trails are near the midway point of their life cycle. We estimate the average state trail mile has 14 years remaining until major repair or replacement is needed. But that doesn't mean there aren't urgent needs. Nearly 60 miles of trail have expected replacement dates by 2020 or sooner. Taking care of these present needs, while also planning for the future, is the challenge facing Minnesota's State Trails.

Service Life Remaining

Expected number of years until major rehabilitation or replacement is needed



Correlation Between Trail Roughness Index and Trail Age



Recommendations

Minnesota's State Trails are at a tipping point. The system remains in overall good condition. But conditions declined since 2016, and that trend will continue unless the pace of trail rehabilitation increases. Relying on our 2018 data, we've crafted a set of recommendations to address the challenges facing Minnesota's state trails.

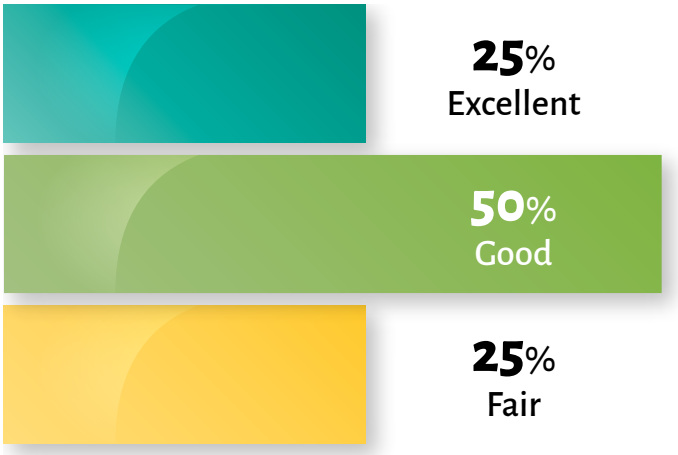
Maintain a "25-50-25" Surface Standard

We propose "25-50-25" as a standard for the Minnesota state trail system. At any given time, the goal should be to keep 25% of the system's trail surfaces in excellent condition, 50% in good condition, and 25% in fair condition. This goal is based loosely on the life-cycle of Minnesota state trails, where a trail is expected to be in good condition for roughly half of its 28-year life.

We offer "25-50-25" as a starting point, and recognize some will find the goal too ambitious and others will think it's not ambitious enough. The question "How good is good enough" is never an easy one to answer and always involves difficult trade offs. The acceptable standard for Minnesota's state trails may change as conditions change, more data is collected, and additional stakeholders are brought to the table. But in light of existing conditions and political realities, we think 25-50-25 strikes an attainable yet ambitious goal for capital investment planning.

Proposed Surface Standard

We suggest "25-50-25" as a goal for Minnesota State Trails



Rehabilitate 24 Miles Annually

The Minnesota DNR's current trail rehabilitation goal is to renew 20 miles per year (Division of Parks and Trails Strategic Plan, 2012-2022), a goal that theoretically is sufficient to maintain a 25-50-25 standard over the long-term. Because of current trail conditions, however, and how the system is expected to age over the next decade, our data suggests 24 miles of trail will need to be rehabilitated in the average year to maintain trail surfaces at a 25-50-25 standard.

Rehabilitating 24 miles per year is a significant need and almost twice the number of miles the Minnesota DNR was able to rehabilitate between 2016 and 2018. But if the current pace of rehabilitation – 14 miles per year – continues, we project 70% of the system will be in good or excellent condition by 2023, and only half the system will be in good condition by 2030.

Accelerating the pace of trail rehabilitation to 24 miles per year would reverse the trend of declining conditions and maintain a 25-50-25 standard through 2034 (and beyond). Of note, 24 miles is the *average* annual need over the next 15 years. Precise rehabilitation needs to maintain a 25-50-25 surface standard will vary year-to-year, and it may be more efficient to rehabilitate more than 24 miles in some years and fewer in others. Long

term, however, rehabilitating an average of 24 miles per year is needed to maintain a 25-50-25 standard. Maintaining that pace will require consistent funding from the Minnesota Legislature.

Fund Trail Rehab at $4.8 Million Annually

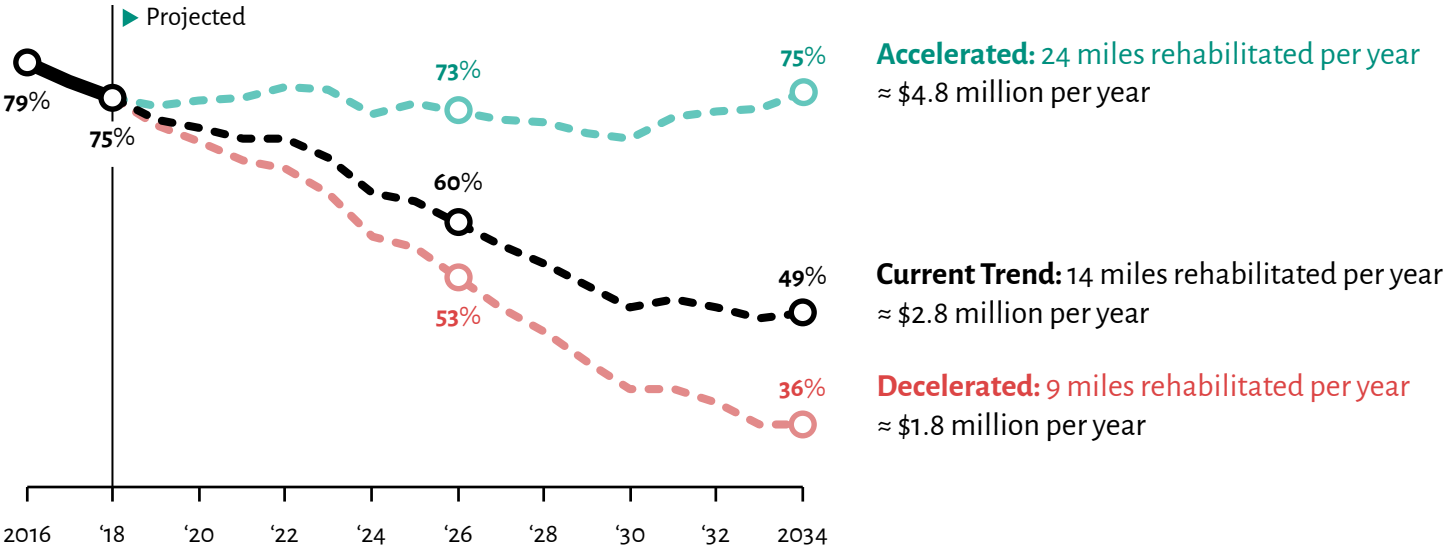
We estimate maintaining a 25-50-25 surface standard will cost approximately $4.8 million annually. This figure assumes rehabilitating 24 miles annually at an average cost of $200,000 per mile. Using a baseline cost is necessary for long-term planning even though actual costs fluctuate widely. Our research suggests $200,000 is a good, conservative estimate that is actually higher than the cost of the recent rehabilitation projects for which data is publicly available.

Trail skeptics will argue spending $4.8 million on trail rehabilitation annually is outlandish, but the number is well grounded. As of 2012, which is the most recent year with available data, the sale of bicycles, parts, and accessories generates $5.3 million annually in state general sales tax (U.S. Census Bureau). And three funding sources already exist that could feasibly cover the cost: state bonding appropriations, the Parks and Trails Legacy Fund, and the Environment and Natural Resources Trust Fund.

Bonding is the traditional method to pay for trail rehabilitation projects, and large bonding bills are typically passed in even-numbered years. Bonding used to be a relatively stable source of funding: The 2008 bill included nearly $6 million for trail rehabilitation, the 2010 bill included $4 million, and the 2012 bill included $4 million split between trail and park rehabilitation. Starting in 2014, rather than receiving a line-item appropriation as it had in prior years, trail rehabilitation was lumped together with all of the DNR's rehabilitation needs in a category called

Different Scenarios for the Future of Minnesota State Trails

Share of Minnesota's paved state trails in good or excellent condition under different funding scenarios



NOTES: Funding amounts assume trail rehabilitation costs of $200,000 per mile. Actual costs will vary. Current trend is based on the number of trail miles rehabilitated between 2016 and 2018. Estimates do not include the cost of bridges or new miles being added to the system.

Recommendations, continued

"natural resources asset preservation," which received $10 million in 2014, $15 million in the 2016-2017 biennium and $30 million in the 2018-2019 biennium. The question of whether it's preferable to line-item appropriations or group them into larger categories is a managerial and political one, but we fear state trail rehabilitation gets lost as a small fish in a big pond when included in the larger "asset preservation" category. We'd prefer to see an appropriation specific to trail rehabilitation – in the $4 to $6 million range as was done from 2008-2012 – to better provide for the system and improve legislative oversight.

In addition to bonding appropriations, the Parks and Trails Legacy Fund is a significant funding source. The Parks and Trails Legacy Fund was created in 2010 with the passage of the Clean Water, Land and Legacy Amendment in 2008, and is guaranteed until 2034. Currently, the fund receives approximately $20 million each year for State Parks and Trails, a small portion of which is used for trail rehabilitation. On average, since 2010, the Parks and Trails Legacy Fund has funded an average of 9 miles of state trail rehabilitation per year (or about $1.8 million per year).

The final major source of trail funding is the Environment and Natural Resources Trust Fund, which receives lottery proceeds and is appropriated based on recommendations of the Legislative-Citizens Commission on Minnesota Resources (LCCMR). LCCMR currently makes recommendations on how to spend roughly $50 million annually, and in recent years significant sums have been awarded to the state trail system. Recent LCCMR appropriations to the state trail system have included $1 million in 2017, $2.5 million in 2018, and $5 million in 2019. These funds have been for a mixture of acquisition, development, and rehabilitation projects.

Funding State Trail Rehabilitation

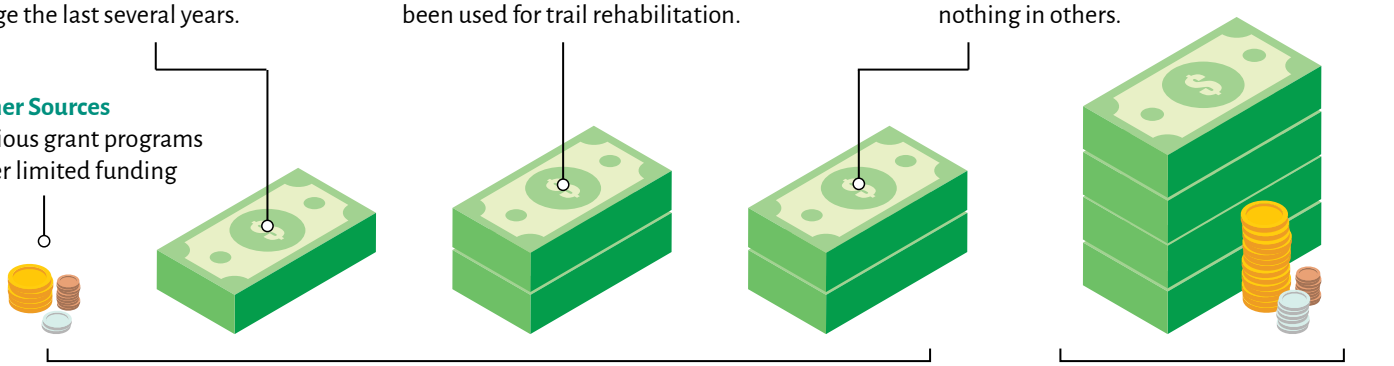
Potential funding sources to secure the estimated $4.8 million per year to maintain a 25-50-25 surface standard

LCCMR
LCCMR distributes roughly $50 million of lottery proceeds each year to environmental projects. LCCMR funding for trail projects has varied, but has been in the $1 - $5 million range the last several years.

Parks & Trails Fund
The Parks & Trails Fund was created in 2010 to supplement traditional funding sources. The fund currently generates roughly $20 million per year for State Parks and Trails. In most years just under $2 million of the fund has been used for trail rehabilitation.

Bonding
Bonding is the traditional method to pay for capital improvement projects. Bonding appropriations for trail rehabilitation have varied wildly, however, including up to $6 million in some bienniums and nothing in others.

Other Sources
Various grant programs offer limited funding



Potential Funding Sources

The Need (≈ $4.8 million / year)

Each of these funding sources have been variable from year to year, and none of them are guaranteed to fund future trail rehabilitation. But there is historical precedent of all three funding state trail rehabilitation in amounts that, taken together, are sufficient to care for the existing state trail system. Importantly, our estimates only include the capital improvement side of the state trail budget; A robust general fund appropriation is also vital for day-to-day upkeep of the state trail system. Further, our estimates do not include the costs of expanding the state system, nor do they include the costs of bridges and trailheads. Bridges, in particular, are a primary factor driving cost fluctuations from mile-to-mile, and are often specifically line-itemed in budget requests and appropriations.

Capital Improvement Planning

We remain convinced that capital improvement planning is crucial to the long-term health of the state trail system. Capital improvement plans are critical because they provide clarity and allow lawmakers to make informed decisions. For illustrative purposes, we've provided a simple example of what a capital improvement plan might look like. Our sample plan is based solely on TRI scores and doesn't include culverts or bridges. An actual plan would need to include such infrastructure, and would likely also consider additional criteria – such as system plan classification, trail use, and geographical location – when determining priorities. Despite the overt simplicity of our sample plan, we think the benefits of such a priority list are clear: Lawmakers know exactly what they're funding and how that funding is part of a long-term program, and the public knows when to expect their local trail to be repaired.

Our 2018 State of the Trails Report provides compelling evidence that while Minnesota's state trails are in good condition, they are at risk. But the challenges facing the trail system are solvable. Parks & Trails Council is committed to working with trail managers, lawmakers, and the public to ensure we all have a trail system we can be proud of.

Sample Capital Improvement Plan

Potential five-year priority list of rehabilitation projects and based on current and projected TRI scores. Does not include the costs of bridges or culverts.

Priority Rehabilitation Projects			Miles	Cost Est.
2019	1	Sakatah *(#13-15)*	5.4	$1,080
	2	Minnesota Valley *(#2-3)*	3.0	$602
	3	Munger *(#45)*	0.9	$174
	4	Paul Bunyan *(#35-37)*	4.7	$940
	5	Mill Towns *(#1-3)*	2.9	$586
	6	Gateway *(#1-8)*	7.1	$1,420
2020	7	Munger *(#1-7)*	11.1	$2,210
	8	Blazing Star *(#4-5)*	1.9	$380
	9	Shooting Star *(#14-20)*	9.7	$1,940
2021	10	Paul Bunyan *(#39-41)*	7.3	$1,450
	11	Casey Jones *(#6-11)*	5.7	$1,140
	12	Munger *(#37-39)*	6.0	$1,198
	13	Alex Laveau *(#1-6)*	5.4	$1,080
2022	14	Heartland *(#36-37)*	1.8	$360
	15	Munger *(#11-16)*	9.1	$1,813
	16	Munger *(#23-35)*	16.0	$3,196
2023	17	Glacial Lakes *(#6-10)*	5.7	$1,134
	18	Paul Bunyan *(#31-34)*	5.7	$1,148
	19	Harmony Preston *(#2-5)*	3.9	$780
	20	Root River *(#29-37)*	8.7	$1,740

NOTES: Priority list is for illustrative purposes only and do not necessarily reflect the official policy or position of any agency or P&TC. Cost estimates based on $200,000 per mile. Actual costs will vary. All costs in $1,000s. Trails reference segment numbers assigned by P&TC; See Appendix B for descriptions.

Appendix A

Detailed Methodology

Project Scope

We limited this project to paved trails that are authorized under Minnesota Statute 85.015. While we often refer to such trails as "state trails", they are actually only a small portion of the state trail system at large. Overall, the Minnesota DNR manages more than 1,500 miles of state trails; 4,100 miles of hiking, biking, and motorized trails in state parks, state recreation areas, and state forests; and 22,000 miles of snowmobile trails.

We excluded several paved trail segments from our analysis that are authorized under Minnesota Statute 85.015 but not owned and managed by the Minnesota DNR. These segments, which total approximately 20 miles, include the Minnesota River Trail, the Taconite Trail, the Wagon Wheel Trail, and intracity sections of the Cuyuna Lakes Trail. Additionally, a short segment of the Minnesota Valley State Trail located within Fort Snelling State Park wasn't included in our analysis.

Data Collection

All of the data was collected by a Parks & Trails Council intern using the Research Bike, an electric-assist bicycle equipped with cameras and sensors (see Appendix C). Data was collected between July 23, 2018 and September 25, 2018.

An accelerometer in an iPhone SE mounted to the Research Bike's handle bars collected the data used to calculate Trail Roughness Index (TRI) scores. Accelerometer data, along with location data and speed, was collected twice per second using the SensorLog app. In total we collected 526,071 accelerometer data points used for analysis.

Additionally, a rear-facing GoPro camera took photos every two seconds (approximatley every 45 feet). A total of 65,834 photos were taken.Links to these photos are provided in Appendix B and through an interactive map on our website.

Data was collected riding in both directions on each trail. Due to equipment malfunctions, data was only collected traveling in one direction for 12 of the 599 miles we surveyed.

Data Analysis

All of the data was analyzed on a segment-by-segment basis. Trail segments were demarcated using road intersections, keeping the length of each segment to as close to one mile as possible. In total, we rated the condition of 460 segments with an average length of 1.3 miles (*Mdn* = 1.1; *Max* = 4.9; *Min* = 0.45).

Trail condition ratings are based on TRI scores. TRI is equal to the standard deviation of the g-force felt along the vertical (Z) axis of the Research Bike while riding a given trail segment (excluding road intersections and wood-decked bridges), multiplied by 100 for scale, and adjusted for speed. TRI break points between rating categories were determined by analyzing trail photos.

TRI scores from our 2016 report are not directly comparable to 2018 scores because of changes in methodology. The 2016 data was collected by different volunteers using different bikes, and then adjusted to control for the differences, whereas our 2018 data was all collected using the Research Bike. Despite the TRI scale being different between our 2016 and 2018 data, the condition ratings remain comparable. When we say

a trail is in "good" condition, for example, we mean the same thing in 2018 as we did in 2016. We did, however, further differentiate the "poor" category into "poor" and "very poor" for our 2018/2019 report.

Speed Adjustment

Controlling for speed is important to ensure TRI scores are comparable across data samples. We attempted to maintain a consistent speed throughout the data collection process, but the lack of a speed control mechanism on the Research Bike made speed fluctuations unavoidable. Across all of our samples (n=942), the average speed was 7.1 meters per second ($Mdn = 7.0$, $SD = 0.07$). We calculated a simple adjustment factor to control for this variation by analyzing 455 paired samples for the effect of average speed on TRI. On average, increasing speed one meter per second increased TRI by 3 points ($R^2 = 0.07$, $p < .001$). All of our TRI scores are adjusted to estimate an average speed of 7 meters per second (15.7 mph).

Margin of Error

TRI scores from different samples collected on the same segment often vary for numerous reasons: different lines taken by the bicycle, error associated with the speed adjustment, and random noise associated with vibrations in the bicycle frame and rider movements. We estimate our TRI scores have an average margin of error of +/- 6.1 points, which is acceptable. Confidence intervals for each segment are reported in Appendix B.

Photo Verification

In many cases (n=201), different samples from the same segment had TRI scores indicative of different condition ratings. In these cases, trail photos were used to verify TRI scores. For the majority of these segments (n=155), the average of TRI scores resulted in the correct condition classification. For the remaining segments (n=46), one TRI score was chosen over another based on staff assessment of trail photos.

Limitations

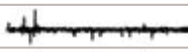
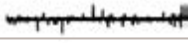
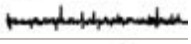
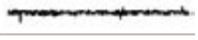
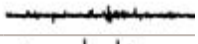
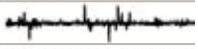
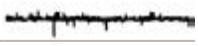
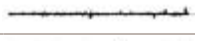
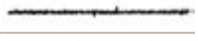
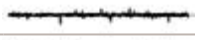
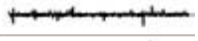
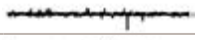
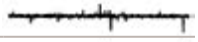
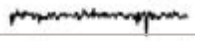
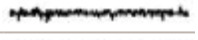
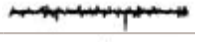
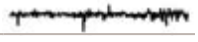
The TRI only measures the smoothness of the path taken by the bicycle, and as such likely underestimates the overall condition of trails with easily avoidable bumps and cracks (i.e. those forming along pavement edges or longitudinally down the center). Conversely, the TRI likely overestimates the condition of trails with excess debris due to its setting, time of year, recent storm activity, or infrequent sweeping.

Additionally, the TRI is a summary statistic for a given segment of trail. Over the course of a mile, a trail may be in excellent condition for one stretch and in poor condition for another. Consequently, segments we have rated as excellent or good may have stretches of poor pavement. And stretches we have rated as poor may have stretches of good pavement.

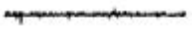
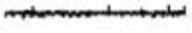
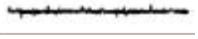
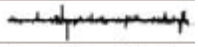
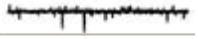
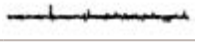
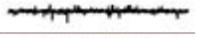
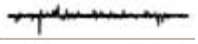
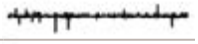
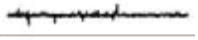
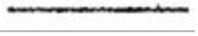
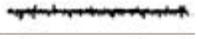
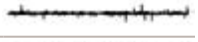
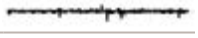
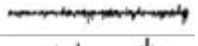
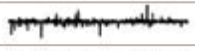
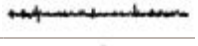
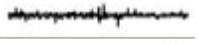
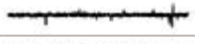
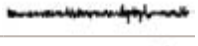
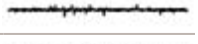
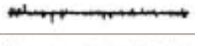
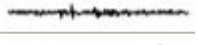
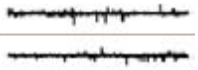
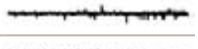
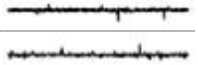
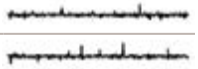
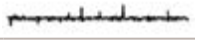
Despite these limitations, the TRI is an objective measurement of trail smoothness based on a replicable methodology and verified with photos. Our intention is that TRI scores supplement, rather than replace, professional trail assessments conducted on the ground by trained engineers.

Appendix B

Segment Ratings

Click on any segment description to see photos	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
Alex Laveau State Trail						
1. Carlton Trailhead to Leimer Rd	1.52	Fair	54.2	37.2 - 71.1	↘	
2. Leimer Rd to Clarence Rd	1.07	Fair	57.3	44.6 - 69.9	→	
3. Clarence Rd to Parkwood Dr (Road Shoulder)	1.19	NA				
4. Parkwood Dr to Co Rd 18	0.93	Fair	59.5	57.5 - 61.4	↘	
5. Co Rd 18 to Cemetery Rd	0.94	Fair	45.8	38.1 - 48.2	↘	
6. Cemetery Rd to Hwy 23	0.96	Fair	46.0	44.6 - 47.3	↘	
Blazing Star State Trail						
1. Albert Lea Trailhead to Front St Parking Area	0.80	Fair	54.8	NA	→	
2. Front Street Parking Area to 767th St	1.10	Good	37.8	NA	→	
3. 767th St to 197th St	1.20	Good	39.5	NA	→	
4. 197th St to 780th St	0.90	Poor	61.4	NA	↘	
5. 780th St to Pavement End	1.00	Fair	54.1	NA	→	
6. Hayward Segment	1.40	Excellent	25.0	23.6 - 26.2	→	
Brown's Creek State Trail						
1. Duluth Junction to Stillwater Oaks Golf Course	1.01	Excellent	22.6	21.5 - 23.5	→	
2. Stillwater Oaks Golf Course to Manning Ave	0.98	Excellent	21.3	20.4 - 22.1	→	
3. Manning Ave to Coldwater Trailhead	1.00	Excellent	22.3	16.8 - 27.7	→	
4. Coldwater Trailhead to Stonebridge Trail Underpass	0.90	Excellent	24.3	23.4 - 25.1	→	
5. Stonebridge Trail Underpass to St. Croix Trail Bridge	1.10	Excellent	22.4	20.7 - 23.9	→	
6. St. Croix Trail Bridge to Stillwater Downtown	1.00	Excellent	24.1	23.8 - 24.3	→	
Casey Jones State Trail						
1. Pipestone Trailhead to 90th Ave	1.10	Good	31.1	28.4 - 33.6	→	
2. 90th Ave to 100th Ave	1.00	Good	40.2	27.1 - 53.1	→	
3. 100th Ave to 110th Ave	1.00	Good	40.8	30 - 51.5	→	
4. 110th Ave to 120th Ave	1.00	Good	42.6	37.7 - 47.5	→	
5. 120th Ave to 130th Ave	1.00	Good	39.0	33.7 - 44.1	→	
6. Lake Shetek State Park HQ to Trail's Edge General Store	1.60	Fair	58.4	55.7 - 60.9	↗	
7. Trail's Edge General Store to 166th St	0.50	Poor	72.1	68.9 - 75.2	→	
8. 166th St to End-O-Line Railroad Park (Currie)	0.90	Fair	53.5	48.5 - 58.5	↗	
9. End-O-Line Railroad Park (Currie) to Lake Shetek Dam	0.90	Fair	50.0	41.5 - 58.3	↗	
10. Lake Shetek Dam to Smith Lake	0.90	Fair	57.4	57.3 - 57.4	↗	
11. Smith Lake to Lake Shetek State Park HQ	0.90	Fair	58.1	48.1 - 67.9	↗	

Central Lakes State Trail

Click on any segment description to see photos	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Hwy 210 (City of Fergus Falls) to Delagoon Park	1.06	Good	31.0	23.3 - 33.5	↘	
2. DeLegoon Park to Co Rd 29 Crossing	1.85	Good	31.1	30.8 - 31.2	→	
3. Co Rd 29 Crossing to 170th St	2.76	Fair	48.5	34.1 - 53.1	↘	
4. 170th St to Pomme de Terre River	1.10	Good	31.4	17.3 - 74.7	↘	
5. Pomme de Terre River to City of Dalton (Main Street)	2.63	Good	41.8	18.8 - 64.6	↘	
6. City of Dalton (Main Street) to 130th St	1.84	Fair	51.9	42.2 - 61.5	↘	
7. 130th St to 120th St	1.23	Fair	48.6	36.8 - 60.2	↘	
8. 120th St to 295th Ave	0.80	Good	35.2	31 - 39.3	→	
9. 295th Ave to 305th Ave	1.21	Good	44.0	42 - 45.8	→	
10. 305th Ave to Pelican Creek	1.11	Good	43.0	39 - 46.9	→	
11. Pelican Creek to Co Rd 10 (City of Ashby)	1.63	Good	41.7	41.4 - 41.9	→	
12. Co Rd 10 (City of Ashby) to Ashby Resort & Campground	2.02	Good	31.7	25.2 - 38.1	→	
13. Ashby Resort & Campground to Palmquist Lk Shore Rd	1.00	Good	35.7	18.8 - 41.1	→	
14. Palmquist Lk Shore Rd to Co Rd 24 NW (City of Melby)	1.07	Excellent	22.1	16.2 - 27.9	→	
15. Co Rd 24 NW (City of Melby) to Old Bridge Rd NW	0.94	Fair	50.1	44.9 - 55.2	↘	
16. Old Bridge Rd NW to Co Rd 1 NW	2.96	Good	30.0	29.9 - 30	→	
17. Co Rd 1 NW to Gran St (City of Evansville)	0.89	Good	31.6	30.9 - 32.2	↘	
18. Gran St (City of Evansville) to Stowe Lake Rd NW	2.65	Fair	47.6	34.8 - 51.7	↘	
19. Stowe Lake Rd NW to Burlington Rd NW	1.69	Fair	45.3	41.3 - 49.1	↘	
20. Burlington Rd NW to Central Ave (City of Brandon)	0.80	Fair	46.3	37 - 55.4	↘↘	
21. Central Ave (City of Brandon) to Hermanson Rd	1.54	Good	36.7	28.2 - 45.2	→	
22. Hermanson Rd to Co Rd 109 (Halvorson Rd NW)	1.59	Good	31.5	26.4 - 36.5	→	
23. Co Rd 109 (Halvorson Rd NW) to Utopia Dr NW	1.00	Good	33.4	32.6 - 34.1	→	
24. Utopia Dr NW to State St (City of Garfield)	1.54	Good	35.3	25.7 - 44.9	→	
25. State St (City of Garfield) to Centennial Dr NW	2.06	Good	33.9	30 - 37.6	→	
26. Centennial Dr NW to Brophy Ln	0.74	Good	34.9	24.8 - 44.9	→	
27. Brophy Ln to North Union Lake/Lake Story Overlook	1.01	Good	30.7	NA	→	
28. Lake/Lake Story Overlook to Ruby St NW	1.23	Good	31.9	NA	→	
29. Ruby St NW to Co Rd 22 NW	0.83	Good	32.5	NA	→	
30. Co Rd 22 NW to Broadway (City of Alexandria)	0.79	Good	39.4	NA	→	
31. Broadway (City of Alexandria) to S Birch Ave	1.79	Good	31.9	29.6 - 34.1	→	
32. S Birch Ave to Freedom Rd NE	0.95	Good	31.0	27.7 - 34.2	→	
33. Freedom Rd NE to Liberty Rd NE	0.84	Good	36.5	29.1 - 43.8	→	
34. Liberty Rd NE to Nelson St (City of Nelson)	2.00	Good	35.4	35.2 - 35.5	→	
35. Nelson St (City of Nelson) to Wildlife Ln SE	0.99	Fair	52.1	21.8 - 82.3	↘	
36. Wildlife Ln SE to Bird Lake Rd SE	2.04	Good	37.6	24.5 - 50.5	→	
37. Bird Lake Rd SE to Calvary Rd SE	1.04	Good	34.0	30.5 - 37.5	→	
38. Calvary Rd SE to Co Rd 3 SE	0.91	Good	36.3	26.3 - 46.3	→	
39. Co Rd 3 SE to Hwy 27 (City of Osakis)	1.19	Good	42.9	30.3 - 55.4	→	

Click on any segment description to see photos

Cuyuna Lakes State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Brainerd Segment	1.58	NA				
2. Riverton Trailhead to Loon Lane	1.45	Good	35.1	30 - 40.1	→	
3. Loon Lane to Cuyuna Parking Lot	1.74	Good	39.9	36.7 - 43.1	→	
4. Cuyuna Parking Lot to Irene Ave (Ironton)	0.62	Good	42.1	40.2 - 43.9	→	
5. Irene Ave (Ironton) to Hwy 6 (Crosby Parking Area)	1.43	Good	42.2	41.6 - 42.6	→	
6. Hwy 6 (Crosby Parking Area) to Cuyuna Road (Co Rd 31)	1.31	Excellent	29.1	26.2 - 31.8	→	
7. Aitkin Segment	0.86	NA				

Douglas State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Valleyhigh Dr to W Circle Dr	1.08	Good	44.8	35.7 - 53.8	→	
2. W Circile Dr to 50th Ave	0.94	Good	43.1	36.4 - 63.4	→	
3. 50th Ave to 65th St NW	1.43	Good	36.6	35.5 - 37.5	→	
4. 65th St NE to Douglas (75th St NW Parking Lot)	1.12	Good	38.6	22.8 - 54.3	→	
5. Douglas (75th St NW Parking Lot) to 90th St NW	1.91	Excellent	29.5	23.5 - 35.3	↗↗↗	
6. 90th St NW to Plum Creek Bridge	0.86	Good	35.9	33.6 - 38.2	→	
7. Plum Creek Bridge to New Haven Rd	1.02	Good	45.0	44.7 - 45.1	→	
8. New Haven Rd to 117th St NW	1.28	Good	38.9	32.8 - 44.9	→	
9. 117th St NW to 85th Ave NW	1.00	Good	32.5	23.1 - 35.5	→	
10. 85th Ave NW to 8th St SE	1.33	Good	43.3	22.9 - 63.5	↘	
11. 8th St SE to Pine Island Trailhead	0.75	Good	44.9	31.9 - 57.9	→	

Gateway State Trail

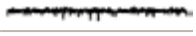
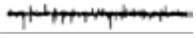
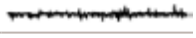
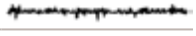
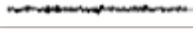
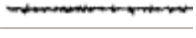
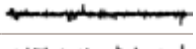
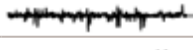
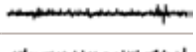
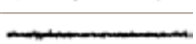
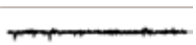
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Arlington Ave to Larpenter Ave	0.60	Poor	70.5	59.4 - 81.6	→	
2. Larpenter Ave to Hwy 61 Underpass	0.80	Poor	62.7	51.4 - 73.8	↘	
3. Hwy 61 Underpass to Bruce Vento Trail Junction	1.10	Fair	59.4	49.9 - 68.8	→	
4. Bruce Vento Trail Junction to White Bear Ave Bridge	1.00	Fair	58.2	50.3 - 66.1	→	
5. White Bear Ave Bridge to McKnight Rd Bridge	1.10	Poor	60.1	55.1 - 65	↘	
6. McKnight Rd Bridge to Century Ave	1.30	Fair	45.6	41.6 - 49.4	→	
7. Century Ave to 55th St Parking Lot	1.30	Poor	72.9	59.7 - 86	↘	
8. 55th St Parking Lot to Hwy 36 tunnel	1.20	Fair	53.0	40.2 - 65.6	→	
9. Hwy 36 tunnel to Co Rd 12 tunnel	1.80	Fair	47.1	41.9 - 52.2	→	
10. Co Rd 12 tunnel to Duluth Junction	1.90	Good	30.2	21.9 - 38.4	→	
11. Duluth Jct to Lansing Ave	1.70	Good	31.1	21.4 - 40.7	→	
12. Lansing Ave to Manning Ave	0.90	Excellent	29.5	24.4 - 34.5	→	
13. Manning Ave to Myeron Rd	1.00	Good	32.1	19.2 - 45	→	
14. Myeron Rd to Pine Point County Park	0.80	Excellent	22.9	20 - 25.7	↗	

Gitchi Gami State Trail

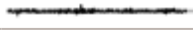
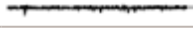
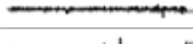
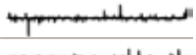
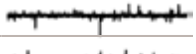
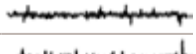
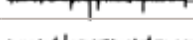
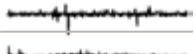
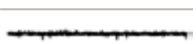
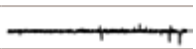
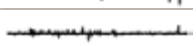
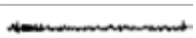
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Silver Creek Segment	0.53	Good	39.2	37.4 - 40.9	→	
2. Gooseberry SP Campground to Campground Road	0.99	Good	32.1	29.7 - 34.4	→	

Click on any segment description to see photos

Gitchi Gami State Trail, con't

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
3. Gooseberry SP Campground Road to J Gregers Inn	1.44	Good	38.1	36 - 40.1	→	
4. J Gregers Inn to Iona's Beach Water Access	1.72	Good	40.5	38.1 - 42.8	→	
5. Iona Beach Water Access to Split Rock River Trailhead	1.43	Good	43.4	41.2 - 45.5	→	
6. Split Rock River Trailhead to Split Rock Lighthouse SP	2.96	Good	43.5	38.9 - 48	↗	
7. Split Rock Lighthouse to Pine Bay Loop	2.67	Good	44.8	39.6 - 49.9	→	
8. Pine Bay Loop to Cove Point Crossing	1.86	Fair	46.4	36.8 - 55.9	→	
9. Cove Point Crossing to Beaver Bay Trailhead	0.96	Good	44.0	30.4 - 85.5	→	
10. Parrellell to West Road	0.80	Excellent	29.4	28.5 - 30.2	NA	
11. West Road to Pipe Line Rd	0.84	Good	35.7	30.3 - 40.9	→	
12. Pipe Line Rd to Silver Bay	1.47	Good	41.3	37.5 - 45	→	
13. Schroeder to Temperance River Bridge	1.10	Fair	57.2	52.3 - 72	→	
14. Temperance River Bridge to Co Rd 1201	0.94	Good	44.2	39.8 - 48.5	NA	
15. Co Rd 1201 to Hwy 61	0.75	Good	41.7	36.6 - 57.1	↘	
16. Hwy 61 to Leveuax Ridge	2.50	Good	41.5	41.5 - 41.5	→	
17. Leveuax Ridge Ray Berglund Wayside	1.04	Good	39.4	33.8 - 44.8	→	
18. Ray Berglund Wayside to Rollins Creek Road	1.20	Excellent	27.8	26.6 - 28.8	→	
19. Rollins Creek Road to Hwy 61 Tunnel	1.02	Fair	49.7	46.1 - 53.1	↘	
20. Hwy 61 Tunnel to Ski Hill Rd	1.59	Excellent	29.2	25.1 - 33.2	↗	
21. Co Rd 13 & Hwy 61 to Harborview Trail	0.86	Excellent	28.6	22.7 - 46.6	→	
22. Harborview Trail to 1st Ave W (Grand Marais)	1.06	Good	31.8	29.4 - 34.1	↘	

Glacial Lakes State Trail

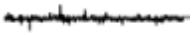
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Willmar Civic Center to 45th Ave	1.69	Excellent	24.4	21.5 - 27.1	↗↗	
2. 45th Ave to 60th Ave	1.10	Excellent	25.1	23.9 - 26.2	↗↗↗	
3. 60th Ave to Co 127	1.37	Excellent	25.1	25 - 25	↗↗	
4. Co 127 to Hwy 23 Tunnel	1.09	Excellent	29.3	28.1 - 30.4	↗↗	
5. Hwy 23 Tunnel to W South St. (City of Spicer)	1.09	Excellent	27.7	25.6 - 29.7	↗↗	
6. W South St to Medayte St	1.01	Fair	48.7	48.3 - 48.9	→	
7. Medayte St to Nest Lake Bridge	1.79	Good	44.6	43.8 - 46.8	→	
8. Nest Lake Bridge to Little Crow Country Club	0.99	Fair	47.8	44.7 - 50.7	→	
9. Little Crow C.C. to Co Rd 9 Tunnel (New London)	0.96	Fair	51.7	33 - 70.3	↗	
10. Co Rd 9 Tunnel (City of New London) to 187th Ave	0.93	Fair	48.5	39.1 - 57.9	→	
11. 187th Ave to 115th St NE	2.77	Good	36.5	31.5 - 41.3	→	
12. 115th St NE to 130th St NE	1.10	Excellent	26.2	25.4 - 26.9	→	
13. 130th St NE to 145th St NE	1.12	Excellent	25.1	20.4 - 29.7	→	
14. 145th St NE to 160th St NE (City of Hawick)	1.12	Good	32.5	29.7 - 35.2	→	
15. 160th St NE (City of Hawick) to 175th St NE	1.18	Good	32.1	24.8 - 39.3	→	
16. 175th St NE to 255th Ave NE	1.16	Good	30.4	24.8 - 36	→	
17. 255th Ave NE to Roseville Rd NE	1.23	Good	31.0	29.8 - 32.1	→	
18. Main St (City of Roscoe) to 246th Ave	1.02	Good	31.1	23.6 - 33.5	↘	
19. 246th Ave to Roschien Lake	2.15	Excellent	24.7	17.7 - 31.6	→	

Click on any segment description to see photos

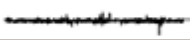
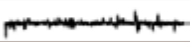
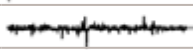
Glacial Lakes State Trail, con't

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
20. Roschien Lake to Maine St (Co Rd 43)	1.06	Excellent	23.6	18.7 - 28.4	→	
21. Maine St (Co Rd 43) to Grant Ave SW (City of Richmond)	1.76	Good	30.8	21.4 - 33.8	↘	
22. Grant Ave SW (City of Richmond) to 191st Ave	1.01	Excellent	28.1	26.9 - 29.2	→	
23. 191st Ave to 178th Ave	1.24	Excellent	26.0	22.5 - 29.4	→	
24. 178th Ave to 14th Ave S (City of Cold Spring)	1.51	Good	32.6	19.4 - 36.8	↘	
25. 14th Ave S to Sauk River Rd (City of Cold Spring)	1.49	Good	30.7	22.8 - 38.5	→	

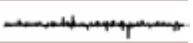
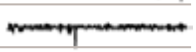
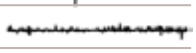
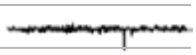
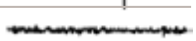
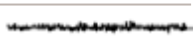
Goodhue Pioneer State Trail

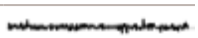
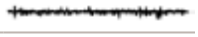
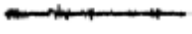
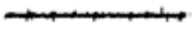
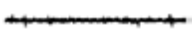
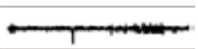
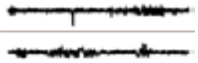
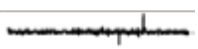
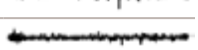
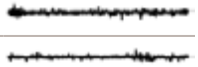
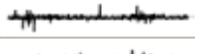
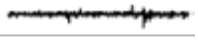
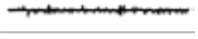
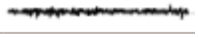
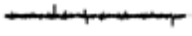
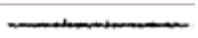
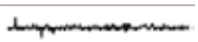
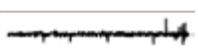
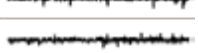
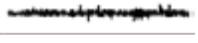
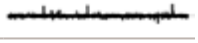
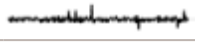
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Trail Junction to Covered Bridge	1.68	Good	35.9	18 - 53.7	→	
2. Covered Bridge to Gravel Driveway	0.58	Excellent	29.7	29.1 - 30.2	↗	
3. Gravel Driveway to 420th St	0.85	Good	30.5	27.7 - 33.2	→	
4. 420th St to 180th Ave	1.33	Good	31.1	30.9 - 31.2	→	
5. Hay Creek Campground to Hay Creek Rec. Area Parking Area	1.02	Good	31.2	29.6 - 32.6	→	
6. Hay Creek Rec. Area Parking Area to Hay Creek Trail	1.77	Good	37.8	36.8 - 38.8	→	
7. Hay Creek Trail to Pioneer Road	1.44	Good	36.6	29.2 - 43.8	→	

Great River Ridge State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Eyota Trailhead (Co Rd 9) to Silver Creek Rd NE	1.00	Good	32.2	24.6 - 39.8	↘	
2. Silver Creek Rd NE to 105th Ave NE (Viola)	2.00	Good	34.7	29.9 - 39.4	↘	
3. 105th Ave NE (VIola) to 55th St NE	1.30	Excellent	28.4	26.6 - 33.8	→	
4. 55th St NE to 65th St NE	1.10	Excellent	28.7	27.2 - 33.4	→	
5. 65th St NE to Co Rd 24 NE	0.50	Good	35.1	21.4 - 48.7	→	
6. Co Rd 24 NE to T-271	0.80	Good	36.1	30.5 - 41.7	↘	
7. T-271 to Main Street (Elgin)	1.50	Good	44.5	33.4 - 55.5	→	
8. Main Street (Elgin) to T-229	2.10	Good	42.4	39.3 - 45.4	→	
9. T-229 to 265th Ave	1.10	Fair	50.0	40.9 - 58.9	↘	
10. 265th Ave to Plainview Trailhead	1.60	Fair	52.7	46.1 - 59.1	↘	

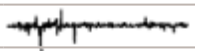
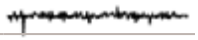
Harmony-Preston State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Harmony to Mile Marker 17	1.00	Good	41.2	38.9 - 43.4	→	
2. Mile Marker 17 to Mile Marker 16	0.97	Fair	49.1	22.1 - 57.9	↘	
3. Mile Marker 16 to Mile Marker 15	1.05	Fair	46.9	37.9 - 49.8	→	
4. Mile Marker 15 to Mile Marker 14	0.85	Fair	47.5	33.9 - 51.8	↘	
5. Mile Marker 14 to Mile Marker 13	1.04	Fair	47.0	40.7 - 53.3	↘	
6. Mile Marker 13 to Mile Marker 12	0.99	Good	36.0	35 - 36.8	→	
7. Mile Marker 12 to Mile Marker 11	1.00	Fair	45.3	33.9 - 56.6	↘	
8. Mile Marker 11 to Mile Marker 10	1.03	Good	35.8	32.9 - 38.7	→	
9. Mile Marker 10 to Mile Marker 9	1.01	Good	41.2	37.3 - 44.9	→	
10. Mile Marker 9 to Mile Marker 8	0.98	Good	44.2	43.2 - 45	→	
11. Mile Marker 8 to Mile Marker 7	1.02	Good	44.5	43.5 - 47.2	→	
12. Mile Marker 7 to Preston	1.33	Good	38.5	32.6 - 44.3	→	

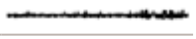
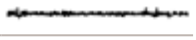
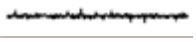
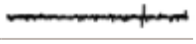
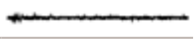
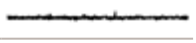
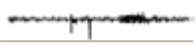
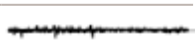
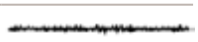
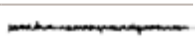
Click on any segment description to see photos	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
Harmony-Preston State Trail, con't						
13. Preston to Mile Marker 4	1.40	Fair	46.5	42.2 - 50.7	↘	
14. Mile Marker 4 to Mile Marker 3	1.02	Good	37.9	34.7 - 41	→	
15. Mile Marker 3 to Mile Marker 2	1.05	Good	38.1	37 - 39.2	→	
16. Mile Marker 2 to Mile Marker 1	1.06	Good	40.4	34.5 - 46.1	→	
17. Mile Marker 1 to Isinours Junction	0.98	Good	40.6	33.7 - 47.3	↗	
Heartland State Trail						
1. Detroit Lakes segment	1.98	Good	38.3	26.8 - 49.7	NA	
2. 1st St E (City of Park Rapids) to Co Rd 1	1.33	Good	35.7	17.5 - 53.9	→	
3. Co Rd 1 to Co Rd 4	1.89	Good	33.2	24.3 - 42	→	
4. Co Rd 4 to 185th Ave	1.60	Good	36.7	30.7 - 42.5	↗	
5. 185th Ave to 189th Ave	0.49	Good	33.2	29.9 - 36.4	→	
6. 189th Ave to Hwy 226 (City of Dorset)	1.02	Good	30.7	24.3 - 37	→	
7. Hwy 226 (City of Dorset) to 219th Ave	2.02	Good	35.3	27.6 - 43	→	
8. 219th Ave to Co Rd 18	1.17	Good	40.3	26 - 54.4	→	
9. Co Rd 18 to Bunyan Trails Rd (City of Nevis)	2.14	Good	35.4	33.2 - 37.5	→	
10. Bunyan Trails Rd (City of Nevis) to 269th Ave	1.79	Good	32.3	26.8 - 37.6	↘	
11. 269th Ave to 275th Ave	1.18	Good	31.4	23.7 - 38.9	→	
12. 275th Ave to 285th Ave	1.40	Good	39.2	29.6 - 48.8	→	
13. 285th Ave to Hillside Ave (City of Akeley)	1.69	Good	35.7	30.1 - 41.3	→	
14. Hillside Ave (City of Akeley) to Horseshoe Rd	1.43	Good	33.4	30 - 36.7	→	
15. Horseshoe Rd to Horseshoe Rd (VFA)	1.11	Good	34.3	29.8 - 38.7	→	
16. Horsehoe Rd (VFA) to Paul Bunyan Trail Junction	1.52	Good	32.8	31.1 - 34.3	→	
17. Paul Bunyan Trail Junction to Lake Alice Rd NW	0.97	Fair	45.1	40.4 - 49.8	→	
18. Lake Alice Rd NW to 6th Lake Rd NW	3.82	Fair	46.3	40.5 - 51.9	→	
19. 6th Lake Rd NW to Co Rd 12 NW	0.94	Good	37.7	29.7 - 45.6	↗	
20. Co Rd 12 NW to Walker Downtown Spur	0.55	Good	30.2	29.6 - 30.8	→	
21. Walker Downtown Spur	0.64	Good	40.5	39 - 42	→	
22. Walker Downtown Spur to Walker Bay Dr NW	1.20	Good	42.7	31.4 - 53.9	→	
23. Walker Bay Dr NW to Paul Bunyan/Heartland Trail Junction	0.45	Good	33.4	22.6 - 36.8	→	
24. Paul Bunyan Trail Jct to Trails RV Park	1.69	Good	42.7	42.6 - 42.7	→	
25. Trail RV Park to 100th St NW	1.52	Good	38.8	29.2 - 48.3	→	
26. 100th St NW to 108th NW	2.04	Fair	45.9	40.9 - 50.7	→	
27. Steamboat Loop (Road Shoulder)	1.89	NA				
28. Cove Dr NW to Hwy 371	1.83	Good	41.0	39.7 - 42.2	→	
29. Hwy 371 to Co Rd 66	0.88	Good	37.6	24.7 - 50.5	→	
30. Co Rd 66 to Steamboat Lake Water Access	2.10	Good	37.6	31.9 - 43.1	→	
31. Steamboat Lake Water Access to 134th St NW	0.89	Fair	48.8	37.1 - 60.5	↘	
32. 134th St NW to 140th St NW	1.49	Fair	45.9	45.5 - 46.1	↘	
33. 140th St NW to 144th St NW	1.04	Good	33.1	31.4 - 34.7	→	
34. 144th St NW to 148th St NW	0.99	Good	35.1	33.9 - 36.3	→	

Click on any segment description to see photos

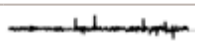
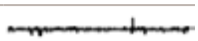
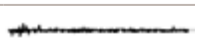
Heartland State Trail, con't

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
35. 148th St NW to 152nd St NW	1.00	Good	43.1	31.8 - 77.7	→	
36. 152nd St NW to Nary Rd	1.06	Fair	55.2	54.3 - 55.9	↘	
37. Nary Rd to Railroad St (City of Cass Lake)	0.79	Fair	56.9	54.1 - 59.5	→	

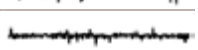
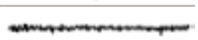
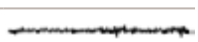
Luce Line State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Vale Ave to MnDNR office	1.16	Good	34.3	26.7 - 41.8	↘	
2. MnDNR office to Les Koubla Parkway	1.15	Excellent	29.6	27.5 - 35.9	→	
3. Les Koubla Parkway to Hwy 15 Tunnel	1.02	Good	33.5	26.1 - 40.8	↘	
4. Hwy 15 Tunnel to Michigan St	0.96	Good	34.6	31.1 - 38.1	↘	
5. Michigan St to Hwy 22 Bridge	1.00	Excellent	28.8	25.3 - 39.4	→	
6. Hwy 22 Bridge to Hwy 7 Tunnel	0.66	Good	35.8	32.6 - 38.9	↘	
7. Hwy 7 Tunnel to Major Ave	2.26	Excellent	28.9	28.3 - 29.3	→	
8. Major Ave to Co Rd 71	1.00	Excellent	25.1	23.9 - 26.1	→	
9. Co Rd 71 to Kale Ave	1.01	Excellent	23.9	22.4 - 25.3	→	
10. Kale Ave to Molly's Cafe (Silver Lake)	1.61	Excellent	28.7	27.1 - 30.1	→	
11. Molly's Cafe (Silver Lake) to County Rd 2	1.01	Excellent	24.7	22.7 - 26.6	→	
12. County Rd 2 to Bridge over Otter Creek	0.87	Good	30.8	28 - 33.4	↘	
13. Otter Creek to Garden Ave	0.89	Good	34.7	29.5 - 39.7	↘	
14. Garden Ave to Eagle Ave	2.85	Excellent	24.7	19.5 - 29.8	→	
15. Eagle Ave to Dairy Ave	1.01	Excellent	24.2	21.9 - 26.4	→	
16. Dairy Ave to Cable Ave (Winsted Municipal Airport)	1.16	Good	34.1	33.6 - 34.5	↘	
17. Kingsley St (Winsted) to Zion Ave	0.97	Good	33.6	25.9 - 41.3	↘	
18. Zion Ave to Zebra Ave	0.65	Good	36.2	32.6 - 39.8	↘	

Mill Towns State Trail

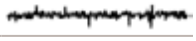
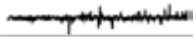
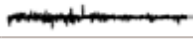
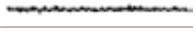
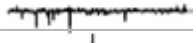
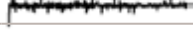
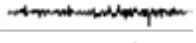
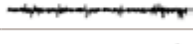
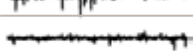
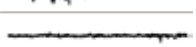
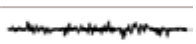
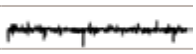
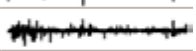
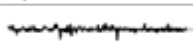
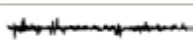
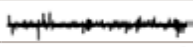
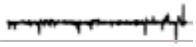
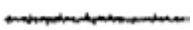
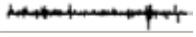
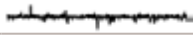
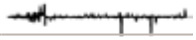
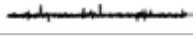
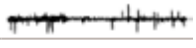
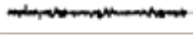
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Dundas to Railroad tracks	0.70	Fair	59.4	49.2 - 69.5	NA	
2. Raidroad tracks to Sechler Park	1.08	Poor	67.0	57.9 - 75.9	NA	
3. Sechler Park to Cannon River	1.16	Poor	62.7	58.1 - 67.3	NA	
4. Lake Byllesby to Hwy 52	1.13	Excellent	28.9	27.3 - 33.5	→	
5. Hwy 52 to Cannon Falls	0.65	Excellent	29.6	27.7 - 31.4	→	

Minnesota Valley State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Hwy 41 Bridge to Old Trail Jct	1.14	Good	32.6	28.6 - 36.5	→	
2. Old Trail Jct. to Jordan Brewery ruins	1.24	Very Poor	85.1	79.3 - 90.8	→	
3. Jordan Brewery ruins to Hwy 101	1.77	Very Poor	76.9	74.5 - 79.2	→	
4. Hwy 101 to Shakopee Travelodge	0.90	Fair	45.0	42.4 - 47.6	→	
5. Shakopee Travelodge to The Landing	1.08	Excellent	25.6	22.6 - 28.6	→	
6. The Landing to Valley Park Drive	1.58	Excellent	28.3	23.4 - 33.1	→	
7. Valley Park Drive to Hwy 101 Trailhead	1.48	Excellent	27.2	26.4 - 28	→	
8. Hwy 101 Trailhead ot Hwy 169 Underpass	0.83	Good	30.6	26.9 - 34.2	→	
9. Hwy 169 Underpass to Bloomington Ferry Trailhead	0.98	Good	36.0	33.1 - 38.8	→	

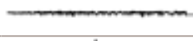
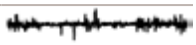
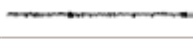
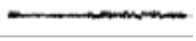
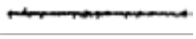
Click on any segment description to see photos

Munger State Trail

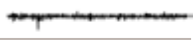
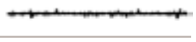
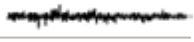
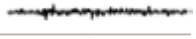
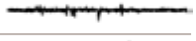
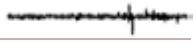
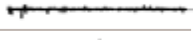
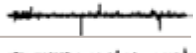
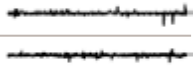
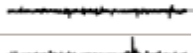
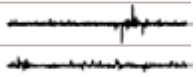
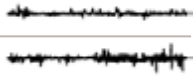
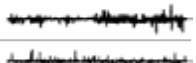
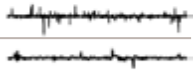
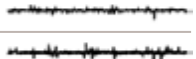
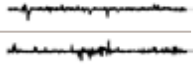
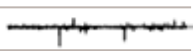
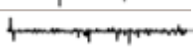
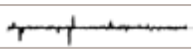
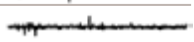
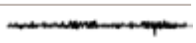
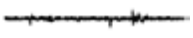
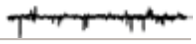
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Hinckley Trailhead to 7th Street NE	0.56	Fair	54.7	48.2 - 61	↘	
2. 7th St NE to Happys Dr	3.18	Fair	58.6	50.8 - 66.3	→	
3. Happys Dr to Friesland Rd	0.99	Fair	56.4	53.9 - 58.8	↗	
4. Friesland Rd to Miller Rd	1.01	Fair	53.3	51.3 - 55.1	→	
5. Miller Rd to Skunk Lake Rd	2.25	Fair	57.4	54.2 - 60.5	→	
6. Skunk Lake Rd to Groningen Rd	1.26	Poor	63.4	50.1 - 76.6	↘	
7. Groningen Rd to Marshland Dr	1.80	Poor	66.6	40.6 - 75	↘	
8. Marshline Dr to Hwy 18 (Finlayson)	1.76	Fair	46.4	44 - 48.6	→	
9. Hwy 18 (Finlayson) to Dixon Line Rd	1.07	Good	35.0	14.9 - 55.1	→	
10. Dixon Line Rd to Lewis Rd	1.08	Good	42.9	23.7 - 62	→	
11. Lewis Rd to Pine River Bridge	1.83	Fair	59.4	50.4 - 68.3	↘	
12. Pine River Bridge to 1st Ave (Rutledge)	0.79	Fair	58.5	47.1 - 69.7	↘	
13. 1st Ave to Kettle River Bridge	0.87	Fair	55.0	53.2 - 56.7	↘	
14. Kettle River Bridge to Long Lake Rd	2.71	Good	38.1	19.2 - 96.1	→	
15. Long Lake Rd to Main St (Willow River)	1.01	Fair	51.2	43.7 - 58.7	↘	
16. Main St (Willow River) to Dago Lake Rd	1.86	Fair	54.1	45.4 - 62.7	→	
17. Dago Lake Rd to Denham Crossing Rd	1.03	Good	43.9	38.1 - 49.5	→	
18. Denham Crossing Rd to New Sawmill Rd	1.04	Good	43.0	35.6 - 50.4	→	
19. New Sawmill Rd to Market St (Sturgeon Lake)	0.48	Good	34.0	22.4 - 45.6	→	
20. Market St to Green Leaf Rd	0.64	Good	44.6	20.8 - 68.4	→	
21. Green Leaf Rd to Moose Lake County Airport	2.19	Good	43.3	41.7 - 44.8	→	
22. Moose Lake County Airport to Moose Horn River	2.08	Good	36.9	26.8 - 67.6	→	
23. Moose Horn River Crossing to Moose Lake	0.80	Fair	59.7	28.4 - 91	→	
24. Industrial Rd (Moose Lake) to Aspen Rd	1.08	Good	43.1	40.4 - 51.2	→	
25. Aspen Rd to Driveway	2.08	Fair	50.1	48.7 - 51.3	↘	
26. Driveway to Barnum trailhead (Main Street)	1.12	Fair	54.0	45.7 - 62.2	↘	
27. Barnum trailhead (Main Street) to Point Rd	0.87	Good	40.3	35.5 - 45.1	→	
28. Point Rd to Gilbert Rd	1.72	Fair	50.4	44.9 - 55.8	↘	
29. Gilbert Rd to Hwy 61 Tunnel	0.73	Fair	49.3	44.6 - 53.9	→	
30. Hwy 61 Tunnel to Town Rd 294	1.72	Fair	50.3	47.8 - 52.7	→	
31. Town Rd 294 to Mahtowa Ave	0.95	Fair	51.8	31.8 - 71.8	→	
32. Mahtowa Ave to Carlson Rd	1.96	Fair	49.7	38.6 - 60.7	↘	
33. Carlson Rd to Waller Rd	0.85	Fair	46.5	46.2 - 46.8	→	
34. Waller Rd to Bromfield Rd	0.70	Fair	59.7	54.5 - 64.9	↘	
35. Bromfield Rd to Old Atkinson Rd	1.40	Fair	50.7	45.7 - 55.6	↘	
36. Old Atkinson Rd to I-35 Underpass	1.25	Good	39.3	34.9 - 43.7	→	
37. I-35 Underpass to Gillogly Rd	1.04	Fair	56.7	15.7 - 97.6	↘	
38. Gillogly Rd to Douglas Rd	1.44	Fair	59.6	32.6 - 86.5	↘	
39. Douglas Rd to Carlton Trailhead	3.51	Fair	45.1	35.6 - 48.1	↘	
40. Carlton Trailhead to St. Louis River Bridge	1.21	Good	39.2	27.7 - 50.6	↘	
41. St. Louis River Bridge to Deeridge St	0.79	Excellent	26.0	23.8 - 28.2	→	

Click on any segment description to see photos

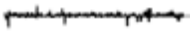
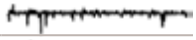
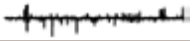
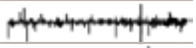
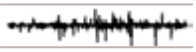
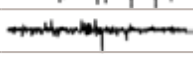
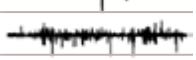
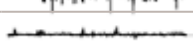
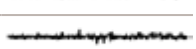
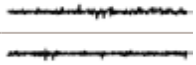
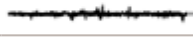
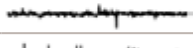
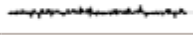
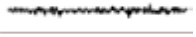
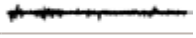
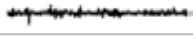
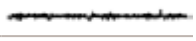
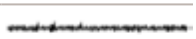
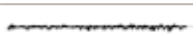
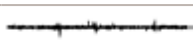
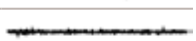
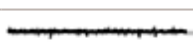
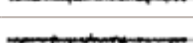
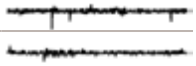
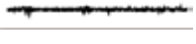
Munger State Trail, con't

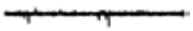
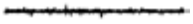
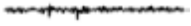
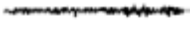
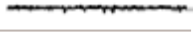
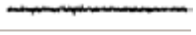
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
42. Deeridge St to Jay Cooke Rd	1.40	Good	40.9	34.7 - 46.9	→	
43. Jay Cooke Rd to Kangas Rd	1.76	Good	44.7	38.9 - 50.5	→	
44. Kangas Rd to Stenman Rd	0.87	Excellent	23.3	20.7 - 25.7	↗↗↗	
45. Stenman Rd to Buffalo House Restaurant	0.87	Poor	73.5	56.7 - 90.3	↘	
46. Buffalo House Restaurant to Becks Rd Underpass	2.21	Excellent	23.1	17.9 - 28.2	↗↗	
47. Becks Rd Underpass to N 95th Ave W Trail Access	3.48	Excellent	25.0	17.7 - 32.2	↗↗	
48. N 95th Ave W Trail Access to Riverside Dr	0.90	Excellent	27.8	13.3 - 42.1	↗↗	
49. Riverside Dr to Willard Munger Inn	1.10	Good	32.9	25.5 - 40.2	→	

Paul Bunyan State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. Crow Wing State Park to Crow Wing Heights Dr SW	4.90	Excellent	26.4	24.3 - 28.4	→	
2. Crow Wing Heights Dr SW to Hwy 371	1.58	Excellent	26.3	26.1 - 26.4	→	
3. Hwy 371 to Highland Scenic Rd	1.87	Fair	45.4	43.3 - 46	→	
4. Scenic Rd to Isle Drive	0.89	Good	37.9	33.6 - 42.1	NA	
5. Isle Drive to Dogwood Drive	1.17	Good	43.5	41.6 - 49.2	↗	
6. Dogwood Drive to Industrial Park Rd S	1.00	Good	34.8	34.2 - 35.2	↗	
7. Industrial Park Rd S to Northland Arboretum	1.90	Good	37.7	33.3 - 42.1	→	
8. Northland Arboretum to Beaver Dam Road	1.94	Excellent	25.1	24.2 - 26	→	
9. Beaver Dam Road to Wise Rd N	1.77	Good	38.5	34.2 - 42.7	→	
10. Wise Rd N to Curell Rd N	1.08	Good	34.7	33.2 - 36.2	↘	
11. Curell Rd N to Legionville Rd	1.24	Good	32.1	31.2 - 32.9	→	
12. Legionville Rd to N Long Lake Road	1.52	Good	38.1	26.1 - 50	→	
13. N Long Lake Rd to Merrifield Parking Area	1.02	Good	34.7	31.5 - 37.8	→	
14. Merrifield Parking Area to Mollie Lake Rd N	1.98	Good	44.5	20.4 - 68.5	→	
15. Mollie Lake Rd N to Co Rd 137	2.36	Good	44.3	43.8 - 44.6	→	
16. Co Rd 137 to Co Rd 13 N	0.53	Good	33.1	22.6 - 43.6	→	
17. Co Rd 13 N to Shady Acres Lane	1.01	Good	31.7	29.6 - 33.7	→	
18. Shady Acres Lane to Nisswa Trailhead	1.13	Good	40.3	24.1 - 56.5	→	
19. Nisswa Trailhead to Poplar Ave	0.62	Good	39.1	37.3 - 40.8	↘	
20. Poplar Ave to Wilderness Rd	1.33	Good	36.9	31.1 - 42.6	→	
21. Wilderness Rd to Olson Rd	1.42	Good	32.9	21.4 - 44.3	→	
22. Olson Rd to Co Rd 107	0.63	Good	33.8	NA	→	
23. Co Rd 107 to Derksen Rd	1.02	Good	42.8	NA	→	
24. Derksen Rd to Pequot Lakes Trailhead	0.89	Good	43.5	NA	→	
25. Pequot Lakes to Patriot Avenue	0.95	Good	43.3	NA	→	
26. Patriot Avenue to Myers Rd	1.28	Good	37.5	20.1 - 54.7	→	
27. Myers Rd to Lilac Ave (Jenkins)	1.10	Good	36.7	27.5 - 45.8	↘	
28. Lilac Ave (Jenkins) to 12th Ave SW	1.06	Excellent	28.2	10.4 - 45.8	→	
29. 12th Ave SW to 36th St SW	1.19	Good	31.1	27.7 - 34.4	↘	
30. 36th St SW to Hassman Hills Rd SW	1.26	Good	35.6	27.6 - 43.5	↘	
31. Hassman Hills Rd SW to Bites Grill & Bar	1.22	Fair	53.6	42.3 - 64.8	↘	

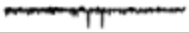
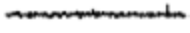
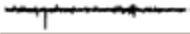
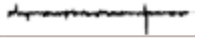
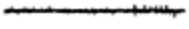
Paul Bunyan State Trail, con't

Click on any segment description to see photos	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
32. Bites Grill & Bar to Pine River Trailhead	1.31	Good	39.9	35 - 44.8	→	
33. Pine River Trailhead to Golfview Dr	1.22	Fair	54.8	47.9 - 61.5	↘	
34. Golfview Dr to 16th St SW	1.99	Fair	51.2	49.6 - 52.7	↘	
35. 16th St SW to 8th St SW	2.68	Poor	61.0	57 - 64.9	↘	
36. 8th St SW to 4th St SW	1.19	Very Poor	75.8	60.2 - 91.3	↘	
37. 4th St SW to Hwy 87	0.84	Poor	66.2	64 - 68.3	↘	
38. Hwy 87 to Washburn Ave (Backus)	1.30	Good	41.9	28.6 - 55	→	
39. Washburn Ave (Backus) to Pine Mountain Lake Rd NW	2.00	Fair	58.7	34.4 - 82.9	↘	
40. Pine Mountain Lake Rd NW to 16th St NW	1.03	Fair	57.3	55.7 - 58.8	→	
41. 16th St NW to Co Hwy 40 NW	4.22	Poor	63.8	60.3 - 67.2	↘	
42. Co Hy 40 NW to Birch Lake Rd NW	0.68	Good	35.4	27.3 - 43.5	↘	
43. Birch Lake Rd NW Birch Lake Lane	1.46	Excellent	27.6	13.9 - 41.2	→	
44. Birch Lake Lane to Lower 10 Mile Lake Rd NW	0.97	Excellent	22.0	17.7 - 26.2	→	
45. Lower 10 Mile Lake Rd NW to Long Bay Rd NW	0.95	Excellent	22.2	18.8 - 25.5	→	
46. Long Bay Rd NW to Co Rd 50	1.12	Good	30.6	28.7 - 32.3	↘	
47. Co Rd 50 to Portage Lake	1.88	Excellent	21.3	19.4 - 23	→	
48. Portage Lake to Shingobee Trail Junction	1.06	Excellent	22.0	17.1 - 26.9	→	
49. Shingobee Trail Junction to Co Rd 50 NW	2.07	Excellent	28.8	25.7 - 37.8	→	
50. Co Rd 50 NW to Bachelor Rd NW	0.92	Good	32.8	24.9 - 40.5	→	
51. Bachelor Rd NW to Cass Line Rd	4.79	Good	35.4	35.1 - 35.6	↘	
52. Cass Line Rd to Hwy 34 Trailhead	0.82	Good	35.8	32.2 - 39.3	→	
53. Hwy 34 Trailhead to Heartland Trail Junction	0.67	Good	37.5	36.1 - 38.8	→	
54. Paul Bunyan/Heartland Trail Jct to Woodland Resort	1.65	Good	40.8	39.3 - 42.1	↗	
55. Woodland Resort to Co Rd 38	1.48	Fair	47.7	32.8 - 52.5	→	
56. Co Rd 38 to Co Rd 39	1.25	Good	44.8	14.6 - 76.8	→	
57. Co Rd 39 to Merganser Dr	1.82	Good	31.1	31 - 31.1	→	
58. Merganser Dr to Nickolson Dr	1.69	Good	44.9	44.4 - 46.1	→	
59. Nickolson Dr to 2nd Street (City of Laporte)	1.85	Fair	49.2	46.8 - 51.5	→	
60. 2nd Street (City of Laporte) to Co Rd 39	1.51	Good	31.5	21.3 - 41.5	→	
61. Co Rd 39 to Co Rd 16	4.57	Good	32.7	19.8 - 45.6	→	
62. Co Rd 16 to 444th St	0.51	Excellent	28.0	23.6 - 32.2	↗	
63. 444th St to 470th St	2.70	Good	31.4	30.7 - 31.9	→	
64. 470th St to 482nd St	1.15	Good	37.7	30.9 - 44.3	→	
65. 482nd St to Co Rd 9 (City of Nary)	0.88	Good	33.3	29.3 - 37.2	→	
66. Co Rd 9 (City of Nary) to 510th St	2.07	Good	32.8	30.6 - 34.9	→	
67. 510th St to N Plantgenet Rd SE	1.10	Good	31.7	21.7 - 41.7	→	
68. N Plantgenet Rd SE to Hwy 2 Overpass	1.42	Good	34.3	23.9 - 44.6	→	
69. Hwy 2 overpass Carr Lake Rd SE	0.87	Good	32.6	29.7 - 35.4	→	
70. Carr Lake Rd SE to Clausen Ave	1.37	Good	32.2	31.1 - 33.1	→	
71. Clausen Ave Shoulder (Road Shoulder)	0.49	NA				
72. Clausen Ave to Lake Shore Dr NE	0.61	Excellent	28.7	27.8 - 29.4	↗	

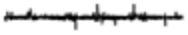
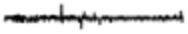
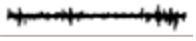
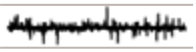
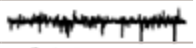
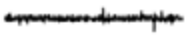
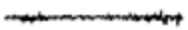
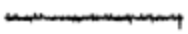
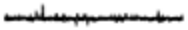
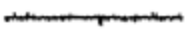
Click on any segment description to see photos	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
Paul Bunyan State Trail, con't						
73. Lake Shore Dr NE to Blue Ox Trail Junction	0.91	Excellent	25.4	22.4 - 28.3	↗	
74. Blue Ox Trail Junction to Mississippi River Trail Bridge	1.80	Good	30.1	26 - 34.1	→	
75. Mississippi RIver Trail Bridge to Whitetail Rd NE	2.16	Good	32.2	27.4 - 36.9	↗	
76. Whitetrail Rd to New Bass Rd NE	1.00	Excellent	27.8	27.4 - 28.2	↗	
77. New Bass Rd NE to Lake Bemidji State Park	1.13	Good	35.3	28.2 - 42.2	→	
78. New Bass Rd NE to Birchmont Beach Rd	0.88	Good	30.5	29.7 - 31.3	NA	
Preston-Forestville State Trail						
1. Pavement End to Fillmore St. W	0.76	Good	39.6	31.6 - 63.9	NA	
2. Fillmore St. W to Preston Trailhead	0.88	Good	36.8	31 - 42.5	→	
Root River State Trail						
1. Fountain to Mile Marker 1	0.97	Good	31.1	29.9 - 32.1	↘	
2. Mile Marker 1 to Mile Marker 2	0.98	Good	31.4	30 - 32.6	↘	
3. Mile Marker 2 to Mile Marker 3	0.99	Excellent	28.4	23.6 - 33.1	→	
4. Mile Marker 3 to Mile Marker 4	1.05	Excellent	26.2	25.6 - 26.6	↗	
5. Mile Marker 4 to Mile Marker 5	0.98	Excellent	25.7	21 - 30.3	→	
6. Mile Marker 5 to Isinours Jct	1.23	Excellent	28.5	25 - 31.9	↗	
7. Isinours Jct to Mile Marker 7	0.81	Excellent	27.4	25.7 - 29	→	
8. Mile Marker 7 to Mile Marker 8	0.99	Excellent	28.5	26.2 - 35.6	→	
9. Mile Marker 8 to Mile Marker 9	1.04	Good	31.2	29.1 - 33.2	↘	
10. Mile Marker 9 to Mile Marker 10	0.99	Good	31.6	20.9 - 42.2	↘	
11. Mile Marker 10 to Lanesboro	1.04	Good	36.2	32.8 - 39.6	→	
12. Lanesboro to Mile Marker 12	0.99	Excellent	29.5	26.3 - 32.6	→	
13. Mile Marker 12 to Mile Marker 13	1.01	Excellent	30.0	26.4 - 33.4	→	
14. Mile Marker 13 to Mile Marker 14	1.05	Excellent	28.5	26.1 - 30.8	→	
15. Mile Marker 14 to Mile Marker 15	1.00	Excellent	28.0	24.4 - 31.5	→	
16. Mile Marker 15 to Whalan	0.76	Excellent	28.4	23.8 - 32.9	→	
17. Whalan to Mile Marker 17	1.28	Excellent	29.2	26.3 - 31.9	→	
18. Mile Marker 17 to Mile Marker 18	1.05	Excellent	27.2	20.6 - 47	→	
19. Mile Marker 18 to Mile Marker 19	0.99	Good	37.0	27.8 - 46.1	↘	
20. Mile Marker 19 to Mile Marker 20	0.98	Good	37.2	31.5 - 42.7	↘	
21. Mile Marker 20 to Mile Marker 21	0.93	Excellent	28.4	27.3 - 29.4	→	
22. Mile Marker 21 to Mile Marker 22	1.00	Excellent	28.6	26.2 - 30.8	→	
23. Mile Marker 22 to Mile Marker 23	1.04	Excellent	25.7	24 - 27.4	→	
24. Mile Marker 23 to Peterson	1.55	Excellent	29.6	28.5 - 30.6	→	
25. Peterson to Mile Marker 26	1.47	Excellent	26.3	22 - 30.6	↗	
26. Mile Marker 26 to Mile Marker 27	0.99	Excellent	28.9	26.1 - 31.6	↗	
27. Mile Marker 27 to Mile Marker 28	0.99	Excellent	25.2	22.3 - 27.9	↗↗	
28. Mile Marker 28 to Rushford	1.28	Excellent	24.8	22.8 - 26.8	↗↗	
29. Rushford to Mile Marker 30	0.73	Fair	58.5	53.8 - 63.2	↘	

Click on any segment description to see photos

Root River State Trail, con't

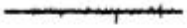
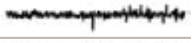
	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
30. Mile Marker 30 to Mile Marker 31	1.02	Good	39.9	35.4 - 44.3	→	
31. Mile Marker 31 to Mile Marker 32	1.00	Good	43.3	38.1 - 48.5	→	
32. Mile Marker 32 to Mile Marker 33	0.97	Good	35.7	33.6 - 37.7	↘	
33. Mile Marker 33 to Mile Marker 34	1.06	Good	35.0	27 - 43	→	
34. Mile Marker 34 to Mile Marker 35	0.93	Good	36.6	36.2 - 36.8	↘	
35. Mile Marker 35 to Mile Marker 36	0.97	Good	43.0	33.8 - 52.1	→	
36. Mile Marker 36 to Mile Marker 37	1.06	Good	31.2	29 - 33.4	→	
37. Mile Marker 37 to Mile Marker 38	0.97	Fair	47.5	45.4 - 49.4	↘	
38. Mile Marker 38 to Mile Marker 39	0.95	Good	35.6	29.4 - 41.7	→	
39. Mile Marker 39 to Mile Marker 40	1.00	Good	32.4	32.1 - 32.7	→	
40. Mile Marker 40 to Mile Marker 41	1.03	Good	36.6	35.7 - 37.3	→	
41. Mile Marker 41 to Houston	0.95	Good	34.8	29.9 - 39.6	→	

Sakatah Singing Hills State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. CenterPoint Energy to Line Valley Dr	0.67	Good	35.2	29.8 - 40.4	↘	
2. Line Valley Dr to Hwy 22	1.60	Good	39.2	31.9 - 46.4	→	
3. Hwy 22 to 589th Ave	1.60	Good	38.5	36.5 - 40.5	→	
4. 589th Ave to Hwy 27	3.37	Good	40.6	32.8 - 48.2	↘	
5. Hwy 27 to 612th Ave	1.56	Excellent	26.7	26.5 - 26.7	→	
6. 612th Ave to 1st St (Madison Lake)	1.37	Good	30.7	28.3 - 31.5	↘	
7. 1st St (Madison Lake) to T-310	1.43	Excellent	22.5	19.2 - 25.6	↗↗↗	
8. T-310 to 631st Ave	1.02	Excellent	24.7	19.5 - 29.9	↗↗↗	
9. 631st Ave to 241st Ave	1.11	Excellent	25.2	14.6 - 35.7	↗↗↗	
10. 241st Ave to 231st Ave	1.07	Excellent	25.8	11.4 - 40.2	↗↗↗	
11. 231st Ave to 221st Ave	1.03	Excellent	21.6	21.4 - 21.8	↗↗↗	
12. 221st Ave to 5th St SW (Elysian)	1.57	Excellent	25.6	14.6 - 36.4	↗↗↗	
13. 5th St SW (Elysian) to 516th St	1.54	Very Poor	82.9	72.6 - 93.2	→	
14. 516th St to Hwy 170	1.47	Very Poor	89.0	81.2 - 96.8	→	
15. Hwy 170 to S Reed St (Waterville)	2.39	Very Poor	102.3	90.7 - 113.9	→	
16. S Hamilton St (Waterville) to Leroy Ave	2.33	Good	42.4	28.5 - 56.1	→	
17. Leroy Ave to Kent Ave	1.04	Good	40.0	35.1 - 54.9	↘	
18. Kent Ave to Jackson Ave	1.53	Good	33.7	33 - 34.3	↘	
19. Jackson Ave to Holland Ave	1.29	Good	30.3	29.9 - 30.6	↘	
20. Holland Ave to Harris Trail	0.84	Good	39.4	35.3 - 43.4	→	
21. Harris Trail to Fosston Ave	1.31	Good	34.7	29.2 - 40.1	↘	
22. Fosston Ave to Elkton Trail	1.42	Good	33.2	30.5 - 35.8	↘	
23. Elkton Trail to Shager Park	1.45	Good	40.3	27.7 - 52.7	↘	
24. Shager Park to Wells Lake Dr	2.07	Good	34.8	33 - 36.5	→	
25. Wells Lake Dr to Lyndale Ave (Faribault)	2.06	Fair	51.9	39.2 - 64.6	↘	

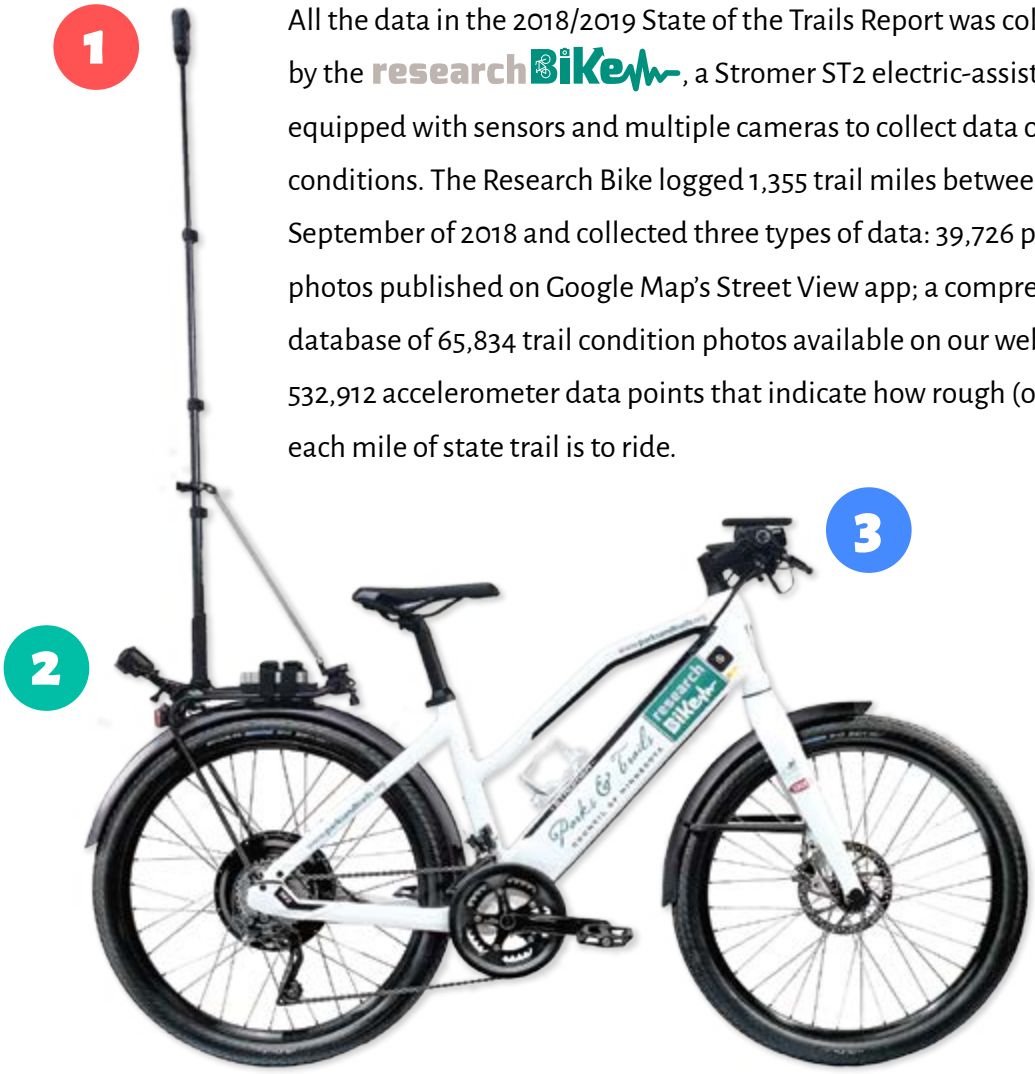
Click on any segment description to see photos

Shooting Star State Trail

	Miles	Rating	TRI	95% C.I.	Change	Accelerometer
1. 215th St to 205th St	1.00	Excellent	27.8	27.2 - 28.3	NA	
2. 205th St to 195th St	1.00	Excellent	27.7	22.6 - 32.6	NA	
3. 195th St to 185th St	1	Excellent	27.2	25.7 - 28.5	NA	
4. 185th St to Rose Creek	2.44	Excellent	25.4	24.4 - 26.4	→	
5. Rose Creek to 620th Ave	1.16	Good	30.5	28.3 - 31.2	↘	
6. 620th Ave to 630th Ave	1.15	Excellent	28.3	27.7 - 28.7	↗	
7. 630th Ave to 640th Ave	1.13	Good	31.6	30.8 - 32.3	↘	
8. 640th Ave to 650th Ave	1.14	Excellent	27.8	25.2 - 30.4	→	
9. 650th Ave to 660th Ave	1.04	Excellent	26.1	24.1 - 28	→	
10. 660th to 665th Ave (Adams)	0.50	Good	34.2	27.2 - 41	↘	
11. 665th Ave (Adams) to 680th Ave	1.54	Good	31.2	31 - 31.3	↘	
12. 680th Avt to 690th Ave	1.03	Good	33.9	33.5 - 34.2	↘	
13. 690th Ave to 700th Ave	1.00	Good	39.2	34.2 - 44.2	↘	
14. 700th Ave to 710th Ave	1.01	Fair	55.0	52.2 - 57.7	↘	
15. 710th Ave to 140th St	1.19	Fair	59.4	55.3 - 71.9	↘	
16. 140th St to 730th Ave	0.99	Poor	62.5	54.4 - 65	↘↘	
17. 730th Ave to 130th St	1.48	Poor	63.3	54.3 - 72.2	↘↘	
18. 130th St to 755th Ave	2.34	Fair	45.9	43.9 - 47.9	↘	
19. 755th Ave to 766th Ave (Lake Louis State Park)	1.16	Fair	57.9	49.2 - 66.5	↘	
20. 766th Ave (Lake Louis State Park) to Lowell St (LeRoy)	1.54	Fair	52.3	48.5 - 56.1	↘	

About the Research Bike

All the data in the 2018/2019 State of the Trails Report was collected by the researchBike, a Stromer ST2 electric-assist bicycle equipped with sensors and multiple cameras to collect data on trail conditions. The Research Bike logged 1,355 trail miles between July and September of 2018 and collected three types of data: 39,726 panoramic photos published on Google Map's Street View app; a comprehensive database of 65,834 trail condition photos available on our website; and 532,912 accelerometer data points that indicate how rough (or smooth) each mile of state trail is to ride.



1 An Insta360 One camera mounted above the rider's head takes 360° photos for Google Street View.

2 A rear-facing GoPro Hero 5 camera takes up-close, geo-located photos of trail conditions.

3 The SensorLog app on an iPhone SE records accelerometer data used to rate trail roughness.

www.parksandtrails.org

275 East 4th Street, Suite 250
St. Paul, MN 55101

info@parksandtrails.org
(651) 726-2457