Trails Economic Impact Assessment Report

School of Urban and Regional Planning

The University of Iowa
IOWA INITIATIVE
FOR SUSTAINABLE COMMUNITIES

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Winneshiek County Conservation

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Winneshiek County Trails

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Executive Summary

Winneshiek County, Iowa is home to small communities proud of their cultural heritage and unique landscape. The Winneshiek County Conservation Board and the Upper Explorerland Regional Planning Commission share the goal of connecting communities and natural amenities through a recreational trail network. In 2015, these organizations partnered with the Iowa Initiative for Sustainable Communities to make strides toward their goal. This report is a result of that partnership and was completed by graduate students enrolled in The University of Iowa School of Urban and Regional Planning. It achieves three objectives regarding the trail planning process in Northeastern Iowa.

First, this report quantifies the tourism value of Trout Run Trail in Decorah, Iowa through an economic impact assessment. Trout Run Trail's annual economic impact is estimated to be as much as $2.4 million.

Second, a housing sales price analysis was conducted. This analysis is intended to determine the Trout Run Trail's indirect impact on real estate values near the trail. Results from this analysis were inconclusive. The steps for the economic impact assessment and housing sales price analysis are summarized in handbooks for future use. Recommendations for improving these analyses focus on improved data collection through the use of surveys and trail user counts.

Lastly, a planning scenario examines the suitability of three possible trail routes and provides a system for prioritizing future trail development. Relevant criteria for trail development are included in a weighted scoring system based on the importance of specific criteria in local trail planning efforts. These three contributions will assist the decision-making process on future trail projects.

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INTRODUCTION

"Sometimes we need to dream a little, then work to make those visions a reality"

- Barbara Schroeder, Winneshiek County Conservation Board

Introduction

Problem Statement

In 2015, Winneshiek County renewed their partnership with the Iowa Initiative for Sustainable Communities. This report is a result of that partnership and was completed by graduate students enrolled in The University of Iowa School of Urban and Regional Planning. It provides information to aid the sustainable planning, implementation, and evaluation of Winneshiek County's network of non-motorized trails through quantitative analysis, pragmatic decision making, strategic implementation, and a guided improvement process.

This report is intended to assist Winneshiek County's trail planning process by addressing specific issues associated with the challenges of trail development. Three major issues are considered: 1) the economic impact of trails on the local economy, 2) a replicable methodology for economic assessment, and 3) connecting the existing trail system to various destinations within the county.

By addressing these issues, this report fulfills its commission: building Winneshiek County's capacity for the provision of a non-motorized trail system which promotes tourist activity while providing communities access to a wide range of recreational opportunities.

Benefits of Trails

Trails in Winneshiek County attract a variety of users and provide space for the public to exercise, commute, and explore. Individuals and communities benefit from increased physical activity, leading to better health outcomes for all. The accessibility of trails in Winneshiek County makes them safe for users of all abilities and inclination. Trails provide a connection to nature, showcase local attractions, and are a source of community pride. Users and residents experience a greater quality of life from the increase in active transportation, physical activity, and connectivity within the community.

From a community perspective, active transportation opportunities can alleviate congestion and

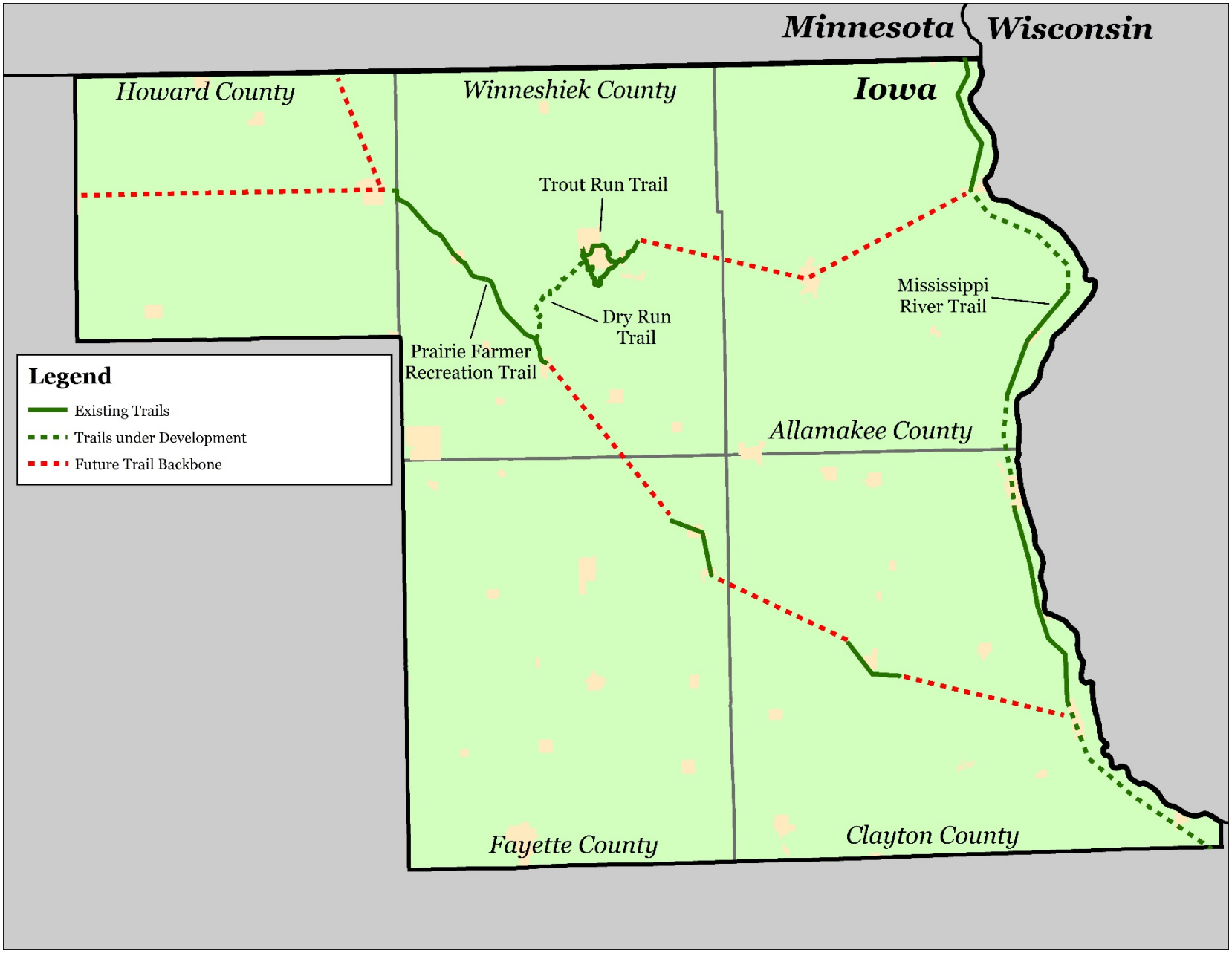
improve safety. They can also lead to environmental benefits such as energy conservation and lower vehicle emissions. These impacts can be categorized as intangible benefits (i.e. benefits that can be observed but are difficult to quantify). Economically, benefits include spending by non-local trail visitors and local residents purchasing goods specifically for trail use. Overall, trails can help contribute to a more competitive region characterized by a strong tourism industry and a diverse workforce.

Regional Trails Overview

The trail network in Winneshiek County crosses both urban and rural settings, showcasing the natural and social character of the region. Trail development efforts are working towards creating a regional "backbone" that will eventually extend beyond the five county region. This report focuses on two sections of the existing network in order to inform future development.

The analysis centers on Trout Run Trail (TRT) in Decorah, a 12.2 mile loop trail pictured in Figure 1 that crosses many popular destinations in the area. The planning scenario concentrates on an area in the southern portion of Winneshiek County at the junction of the Prairie Farmer Recreation Trail (PFRT) and the town of Calmar.

Figure 1: Regional Trail System Overview



Demographic Profile

Winneshiek County

Winneshiek County has an estimated population of 21,000.[1] The county's population has remained stable over the past decade.[2] Over a quarter, 26.8%, of the population are 18 years of age or younger, 56.3% are aged between 19 and 64, while people aged 65 and older make up 16.9% of the population.[3] Median age for the county is 40.6 years.[4] Nearly 94% of the population aged 18 years and older have at least completed high school, and 26.5% have a bachelor's degree or higher.[5]

Annual median household income for the county is slightly higher than the average for Iowa, at $53,122.[6] The homeownership rate is greater than 77%, and the median value of owner-occupied units is $151,500.[7] This value is more than $25,000 higher than the Iowa average for 2013.[8] The poverty rate for the county is 8.4% which is a third lower than the state average.[9]

City of Decorah

The City of Decorah is the largest population center in the county. The town is home to an estimated 8,109 people.[10] Luther College, located in Decorah, had a total student enrollment of 2,337 students in the Fall 2015 semester.[11] Similar to the county, 26.4% of the city population are 18 years or younger in age, 51.3% are between the ages 19 and 64, and 22.3% are 65 years or older.[12] Median age is a decade younger than the county at 30.7 years.[13] Mirroring the county again, almost 94% of the 18 years of age and over population have finished high school, while 38.3% have completed a bachelor's degree or higher.[14]

The median household income in 2013 for Decorah is a few thousand dollars below the state average at $47,619.[15] The homeownership rate is 12% lower than the county, and median home value of owner-occupied units is also lower than the county at $144,800, but still $20,000 higher than the 2013 state average.[16] The city's poverty rate of 11.3% is closer to the state average.[17]

Job Profile

Winneshiek County has nearly 10,000 jobs within its boundaries.[18] Figure 2 shows this jobs number has remained relatively stable over the last decade. Over half of the current employment total for the county, 56.6%, are jobs held by its residents.[19] More than 5,700 jobs, or

58.5% of total jobs in the county, are in the manufacturing, retail, educational services, healthcare, and social assistance industries.[20]

Figure 2: Annual Employment Averages for Winneshiek County 2005 - 2014

Year	Average
2005	10,447
2006	10,554
2007	10,481
2008	10,397
2009	10,055
2010	9,926
2011	9,984
2012	10,145
2013	10,177
2014	10,261

Winneshiek County Tourism

Winneshiek County has a reputation in Iowa for natural beauty. These natural qualities combine nicely with recreational tourism and add to the appeal of amenities such as Trout Run Trail. Trails also function as attractions with the potential to increase tourism in the county. Decorah is a charming small town destination with various shops, restaurants, breweries, hotels and bed and breakfasts. Nordic Fest is an annual celebration of the community's Scandinavian ancestry, and has been held in the town for fifty years.[21] Decorah also hosts annual charitable races along the TRT.[22] Luther College events play a role in drawing visitors as well, hosting multiple athletic, social and alumni events throughout the academic year.

The location quotient (LQ) and shift share analyses (located in the appendix) provide some insight into tourism's influence on employment in certain industries. The retail and accommodation and food services industries have LQ values near 1, while the arts, entertainment and recreation industry has a relatively low LQ of 0.35. An examination of the regional shift portion of the shift share analysis shows that the same three industries lack competitiveness relative to the state. This becomes an important factor in our economic impact assessment later in the report, because a larger local tourism industry would create a greater economic impact.

A 2014 study by the U.S. Travel Association (USTA) on the economic impact of tourism in Iowa offers more detail on the role of tourism in Winneshiek County. Full county impacts are available in Figure 3. They show that the county generated $29.52 million in total

expenditures related to travelers and tourists in 2014, which is inflation adjusted to $29.67 million for 2015.[23] Travel expenditures are defined in the study as tourist spending in transportation (public and private), lodging, food, entertainment and recreation, as well as general retail and trade.[24] The expenditure total places Winneshiek County 35th in total expenditures out of the ninety-nine Iowa counties, although per capita the county drops to 45th place.[25] Allamakee County, located directly east of Winneshiek, is the top performing county in Northeast Iowa according to the USTA report, generating $40.12 million in tourism expenditures in 2014.[26] Winneshiek County also employs 330 people in the tourism industry accounting for $2 million in state and local tax receipts.[27] Recreation, including the Trout Run Trail, is a central focus of Winneshiek County's tourist economy.

Figure 3: Winneshiek County Tourism Impacts

Tourism Impacts 2014 ($ in Millions)				
Total Expenditures	Payroll	Employment	State Tax Receipts	Local Tax Receipts
29.52	5.06	330	1.71	0.28

Report Structure

The report's remaining structure will be as follows: first, the analysis section contains the economic impact assessment, including a literature review, our survey method and results, the input-output model and the interpretation of those results, as well as the home sales price analysis. The next section covers our trail planning scenario reviewing three different route alternatives in Winneshiek County which are examined using multiple criteria. Next, our recommendations for the future use of the trail economic impact assessment are detailed, followed by a similar section focused on home sales price analysis. The report concludes with guiding principles for continued trail planning, as well as a series of appendices containing all writing, figures, tables and maps pertaining to the background information, economic impact assessment, housing sales price analysis, and planning scenario not shown in the main body of the report.

ANALYSIS

Analysis

Economic Impact Assessment

Overview

The primary purpose of this report was to conduct an economic impact study of the trails within Winneshiek County and to create a methodology for economic assessment that could be replicated for evaluation of future trails. A survey of trail users was necessary to gather data on spending habits. This undertaking required the team to narrow the scope of the assessment to the Trout Run Trail. The proximity of the trail to Decorah businesses and complimentary attractions lead us to believe that we would identify a greater economic impact than with the Prairie Farmer Recreational Trail (PFRT) which is more rural in setting. Also, our project partners had readily available data pertaining to the Trout Run Trail which formed a foundation for us to build our methodology. These methods could be used in the future to estimate the economic impact of the PFRT.

The Economic Impact Assessment was completed in two phases. First, necessary data was collected via a user survey built and conducted by the project team. Second, after supplementary data about the trail from WCCB and the Iowa Department of Transportation (DOT) was analyzed, an Input-Output model was used to determine the economic impact of the trail.

Survey

In order to quantify the impact that the TRT users have in Winneshiek County, characteristics of trail users and their trips must be comprehensively understood. Survey implementation is the most direct means by which to do so. In this report, the results of our survey create the basis for an economic impact analysis as well as for recommendations regarding trail improvements and future trail development.

Our survey form included elements from the Rails-to-Trails Conservancy's Trail User Survey Workbook[28] as well as past economic impact surveys by the Rails to Trails Conservancy[29] and Missouri State Parks[30] that were adapted to fit the local conditions of Winneshiek County. The survey consisted of the following four sections:

1. **Trip Information:** This section captured the characteristics of each user's current or most recent trip to gauge things like travel party size and frequency of trail use. These details are an important part of estimating annual trail traffic.
2. **Satisfaction:** Information was collected to quantify the level to which various attributes of the trail and the surrounding community were satisfactory in the eyes of each user.
3. **Spending:** Details on TRT user spending carry the most importance in an accurate and complete input-output model. Spending was reported in various categories for all "soft good" expenditures made in Winneshiek County as a part of the trip. "Hard good" purchases made in the county over the past year were also reported.
4. **Demographics:** Personal information on TRT users is important for understanding not only who is using the trail, but for cross-referencing our survey with past trail user surveys to assess the reliability of our results.

Soft goods, also referred to as non-durable goods, are consumer products that have a relatively short life of use not exceeding three years. In contrast, **hard goods,** also referred to as durable goods, have long useful lives and do not need to be purchased often.

Responses were collected in-person in October of 2015 from trail users at two trail access points, Dug Road and Bowstring Bridge. Forms and survey information were also made available at local hotels, campgrounds, bike shops, other downtown businesses, and the visitor center. Users were encouraged to take the survey after using the trail in order to more completely describe the details of their trip. Survey incentives were offered in the form of a drawing for various gift cards to encourage participation. Some respondents did not complete every question, thus the percentages presented in the following section reflect the total number of responses to each question.

Results

We gathered 121 surveys representing 273 total trail users. This captures approximately 16% of the 1712

weekend trail users observed in previous fall 2015 counts. These results were compared with one another to identify statistical similarities or differences. The comparison confirmed that our results are not statistically different from past surveys with respect to trail user demographics. In the following pages, survey results pertinent to the economic impact assessment are presented with a brief discussion on the reliability of these results. A long-form copy of the survey and complete results can be found in Appendix.

Trip Information:

Average travel party size
2.25 people
Reason for the trail visit
77.7% Visit TRT primarily
19.8% TRT was a secondary stop
1.7% Commute to or from work

Frequency of trail use by season
(1=rarely or never, 2=once a month, 3=2-3 times a month, 4=once a week, 5=2-3 times a week, 6=4-5 times a week, 7=daily)
Spring = 3.95
Summer = 4.27
Fall = 4.12
Winter = 2.44

Social/business activities undertaken the trip
(Respondents could choose multiple options)
Top four:
23.1% Visited a restaurant/bar/brewery
18.2% Visited the Decorah Fish Hatchery
17.4% Went shopping
15.7% Visited friends or relatives

Spending Information:

Figure 4: Spending Category Results from Survey

Soft good spending in Winneshiek County per person for the trip	Local	Non-Local
Restaurants and bars (including breweries / wineries)	$ 1.43	$ 30.42
Groceries / snacks / beverages	$ 4.53	$ 6.96
Gas or diesel fuel	$ 0.14	$ 9.01
Entertainment, museums, attractions, special events, etc.	$ 0.82	$ 4.37
Equipment rental (bike rental, gear, etc.)	$ -	$ 1.47
Hard good spending purchases in Winneshiek County over the last 12 months	**Local**	**Non-Local**
Bicycles	$ 50.83	$ 0.20
Bicycle supplies / equipment	$ 19.72	$ 0.67
Clothing / shoes	$ 50.67	$ 6.32
Other-trail related expenses (excluding rentals)	$ 2.90	$ 0.60

Accommodation details for the trip
73.9% Day trip
26% Overnight trip
2.3 Average number of nights
$105.29 Average cost per night
30% Hotel/motel
26.7% Campground
20% Bed and breakfast
20% Stayed with friends/relatives
3.3% Stayed overnight out of area

Demographic Information:

Home Zip Code
58% Local zip code
42% Non-Local zip code

The trip information and spending sections provide the foundation for an economic impact assessment. The satisfaction section will guide recommendations for trail improvement on existing trails as well as on the future alternatives.

Because of the previously mentioned time and resource constraints, a random sampling was not attainable. This requires us to do further testing to establish confidence in the results. In order to assess the representativeness of our sample, demographic results were compared to those of the most recent trail counts collected during the summer and fall of 2015 during the Northeast Iowa Trail Count and Survey. The variables that were tested were age, gender, and whether or not the user is from the local 52101 zip code. Our results from that testing confirm that the survey results are not significantly different from one another. This conclusion is crucial for us to confidently move forward with an accurate economic impact assessment. The comparisons are graphically shown in the Appendix.

In the future, the surveying process should be carried out over the course of a year to better capture the changes in trail use across seasons, rather than collecting data from a two-week period in the fall. This helps to control for special events such as Luther College home football games that may alter the short-term demographic profile of the trail.

Input-Output Model

An input-output (IO) model is our mechanism for assessing the economic impact of the TRT. The IO model is used to follow the spending of visitors to the trail as it generates additional economic activity in Decorah. IO is a powerful tool for analysis because it takes into account all transactions between industries and institutions in an economy.[31] From these transactions we can determine the linkages between industries, which informs us of the importance of an industry in the economy and the effect that a change in that industry will have on the rest of the economy. The effect is expressed as a multiplier that we can utilize to measure economic impact. In this assessment we work with multipliers from IMPLAN (Impact Analysis for Planning), Inc. specific to Winneshiek County.

The National Cooperative Highway Research Program suggests that benefits relating to bicycle infrastructure meet the following standards:[32] First, benefits should be measured at the municipal or regional scale. The IO model and hedonic pricing model are each for Winneshiek County. Second, benefits should be central to assisting decision-makers. This project is being done at the request of those responsible for the development of trails, the economic impact and property value impact will be useful. Third, benefits should be estimated via existing data or other survey means. Our methodology explains our use of existing data and results from our trail user survey. Four, benefits should be converted to measures comparable to one another. This consideration is applicable to measures of the intangible benefits of trails. Fifth, benefits should be described in terms of users and non-users. Spending generated by the trail benefits the Winneshiek County community as a whole. Property value increases from proximity to the trail occur regardless of the resident's use of it.

This assessment focuses on several economic measures: industrial output, labor income, and employment. Industrial output is the value of goods and services provided, also called 'cash register' sales. Labor income is all wages, salaries, and benefits paid to workers. Employment is the number of jobs in the economy, but does not strictly reflect individual people employed. In addition to these measures, IO models can determine the value added of an industry. Value added reflects the income and wealth generated by an activity It is similar to the measure of Gross Domestic Product.

The assessment separates the economic impact of TRT into direct, indirect, and induced values for each of the economic measures. Our Winneshiek County model is comprised of 74 industries which each have a set of multipliers that breakdown the economic measures into these three rounds of spending. The direct values are the observed change in the economy. In this assessment the direct values correspond to cash register sales. Indirect spending is the additional economic activity generated by the direct industries as they purchase goods and services locally. Induced spending is comprised of the purchases of household goods and services made by workers of the

direct and indirect industries. The sum of direct, indirect, and induced outputs is the economic contribution.

While the IO model can measure the full 'ripple effect' of spending, this assessment is limited to measuring the economic impacts of TRT. Economic impacts are the economic contributions with cause and effect established. In other words, an economic impact is the spending that would not have occurred if not for the existence of TRT. To illustrate this differentiation, we consider the spending by Decorah resident versus the spending by an Iowa City resident. A Decorah resident stops for lunch during every trip on the trail. While this spending may be substantial over time, this money was already present in the Winneshiek County economy and does not represent new activity. Now assume an Iowa City resident hears about TRT and decides to visit Decorah to use the trail and stops for lunch. This money would not otherwise have been spent in the county if not for TRT. Thus, for economic impact we only consider spending by visitors from outside Winneshiek County. In order to increase the level of certainty in causality in our assessment, we also only consider spending by visitors that stated that TRT was their primary reason for the trip.

Methods

The necessary input to the IO model is the total primary purpose visitor spending by industry. To arrive at this input we use data from our user survey, the Northeast Iowa Trail User Survey, the Iowa DOT, and the National Weather Service (La Crosse Forecast Office).

Our survey collected essential data on group spending within various categories. We use the data collected from our sample to estimate the average spending per adult per trip. With our sample size and estimated population (total annual trail users) we have determined that our results have a 19.3% margin of error at the 95% confidence level. The low and high spending and impacts represent +/- 19.3% from the mean values.

Since our survey was formatted to accommodate both groups and individuals, reported spending was divided by the number of adults in the party. Further, since soft good purchases were reported for the most recent trip, this value was ready for extrapolation. Durable good purchases were reported for the past 12

months, so after the per capita spending was determined, the value was then divided by the number of annual trips. Lodging was the final category of spending on the survey. After adjusting for per capita spending the value was divided by the number of nights stayed. This accounts for the difference between a visit and a trip. For day users, visits and trips are assumed to be equal, but for overnight users there are likely multiple trips per visit (one trip per day was assumed).

Users were delineated by local (ZIP codes: 52101, 52132, 52133, 52144, 52161, 52165) or non-local, and primary or secondary purpose. To be certain in causality, only the spending by primary purpose non-locals was considered economic impact. Our trail use estimates and total spending were calculated for all groups.

To extrapolate the average per capita per trip spending to the trail user population we need to make an estimate of the annual trips on TRT. The Iowa DOT placed a rubber tube and traffic counter at a location along Dug Road on TRT. This location was also used for the WCCB counts, Northeast Iowa Trail User Survey, and our survey. The counter recorded from May to mid-September, with minor gaps in data collection. In all, 91 complete days were recorded. The main constraint was that the piezo strips can only record bicycle traffic, so an estimate was made based off the WCCB trail counts that for every bike there are .75 pedestrians. The WCCB trail count was completed on a Friday and Saturday in summer and fall 2015. Type of use, age, and gender are all noted in the count.

Using 91 days of counts, we determined the average daily use on weekdays and weekends for bikes and pedestrians. These counts were based on summer use, so adjustments had to be made to account for seasonal usage changes. By applying the user survey, we determined the seasonal adjustment factors based on the difference in the means of reported frequency of use for each season. This process resulted in the factors displayed in Figure 5. It is also assumed that not every day of the year is suitable for trail use. Using historical data from the National Weather Service the team estimated that, on average, 32 days have weather conditions that are unsuitable for trail use. This left 333

days of trail use and 94,589 trips expected on TRT (Figure 6).

Figure 5: Seasonal Factors for Annual Trip Estimates

Seasonal Factors			
Spring	Summer	Fall	Winter
0.92	1.00	0.96	0.17

Figure 6: Total Trips to the Trout Run Trail

Trips	Spring		Summer	
	Weekday	Weekend	Weekday	Weekend
Daily	381	539	412	584
Annual	15,779	12,822	17,088	13,886
	Fall		Winter	
	Weekday	Weekend	Weekday	Weekend
Daily	396	561	70	99
Annual	16,427	13,349	2,890	2,349
Total	**94,589**			

The Northeast Iowa Trail User Survey sample was used to allocate trips as local or non-local. Our trail user survey was then used to allocate these trips as primary or secondary purpose trips. This results in approximately 31% of trips being made by primary purpose visitors (Figure 7). The total trip count was then multiplied through the per capita per trip spending averages to arrive at total spending.

Figure 7: User Type Distribution

User Type Distribution			
Local		Non-Local	
58%		42%	
Primary Purpose User	Secondary Purpose User	Primary Purpose User	Secondary Purpose User
89%	11%	73%	27%

Total direct spending was allocated to the industry that most closely matched the categories in our survey. When multiple industries were related, total spending was divided equally into each industry. The spending was allocated to 11 total industries in our model. When allocating direct spending to industries in the retail sector, we marginalize the cash register sales to remove the cost the retailer paid for the good. When a good is purchased, a part of the sale is covering costs associated with production and distribution of that good from outside our local economy. There is a unique marginalization rate for each retail industry; each retail industry operates with different 'mark-up' rates.

Figure 8: Total Spending Results from Survey

Total Spending	Primary Purpose Visitor
Restaurants and bars (including breweries / wineries)	$685,186 - $820,717
Groceries / snacks / beverages	$177,623 - $212,757
Gas or diesel fuel	$247,129 - $296,012
Entertainment, museums, attractions, special events, etc.	$95,554 - $114,454
Equipment rental (bike rental, gear, etc.)	$50,530 - $60,525
Bicycles	$7,774 - $9,312
Bicycle supplies / equipment	$20,730 - $24,831
Clothing / shoes	$90,371 - $108,247
Other-trail related expenses (excluding rentals)	$7,774 - $9,312
Lodging	$412,074 - $493,584
Total Soft Good Spending	**$1,256,022 - $1,504,466**
Total Durable Good Spending	**$126,649 - $151,701**
Total Accommodation Spending	**$412,074 - $493,584**

Results

The following impacts were determined using spending numbers reported by survey respondents and an annual trips number of 94,589. The 19.3% margin of error is included to create a spending range. Both high and low estimates are displayed in Figure 8. Output numbers represent the goods and services produced in the Winneshiek County economy related to trail tourism. Employment numbers and labor income are the estimated jobs and income gains in the county resulting from trail tourism. Direct impacts are output, jobs and income connected to the management and operation of the Trout Run Trail. Indirect impacts represent businesses in the county meeting the demand that would not transpire if the trail did not exist. Induced impacts result from household level purchases of goods and services by the job holders in the direct category. Impacts will also be considered by their share of the Winneshiek County tourism expenditure impacts reported by the U.S. Travel Association (USTA) Study discussed in the economic profile of this report.

The high estimate in Figure 9 shows a total annual output of nearly $2.38 million, representing 8.1% of the inflation adjusted total annual tourism expenditure impacts reported for Winneshiek County in the USTA Study. Further, a total of 33 jobs accrue to the county, 9.1% of the jobs impact the USTA report. Total labor income is just over $682,000, 12.31% of the impact reported by the USTA. The labor income averages out to an annual income of $20,667 per job.

Figure 9: Final Economic Impact Results

Indicator	Round of Impact	Range of Impact	
		Low	High
Output	Total	**$ 1,613,098**	**$ 2,384,666**
	Direct	*$ 1,193,095*	*$ 1,763,770*
	Indirect	*$ 229,121*	*$ 338,713*
	Induced	*$ 190,882*	*$ 282,183*
Jobs	Total	**22**	**33**
	Direct	*19*	*28*
	Indirect	*2*	*3*
	Induced	*2*	*3*
Labor Income	Total	**$ 461,349**	**$ 682,019**
	Direct	*$ 351,607*	*$ 519,786*
	Indirect	*$ 56,492*	*$ 83,513*
	Induced	*$ 53,250*	*$ 78,720*

Low estimates indicate a total annual output of nearly $1.61 million, accounting for 5.4% of the annual impact reported by the USTA study. A total of 22 jobs, 7.58% of the USTA estimate. Total labor income is about $461,000, 10.28% of the USTA estimate. Average annual income is $20,970 per job. The majority of the output, jobs and income for both the high and low estimates are in the direct category of impacts, while the jobs with higher labor income fall into the indirect and induced categories.

The Sustainable Tourism and Environment Program at the University of Northern Iowa determined that the economic impact of recreational bike riders in the state of Iowa is nearly $387 million after inflation adjustment. At the high end, the TRT accounts for .6% of this statewide impact.

To build greater confidence in our results, we found economic measures of trails similar to TRT. The total economic impact for the Virginia Creeper Trail (Damascus, Virginia) was estimated at $2,053,086. Direct spending (in 2015 dollars) by trail users of the Heritage Trail (Dyersville, Iowa) was estimated at

$1,091,702; St. Mark's Trail (Tallahassee, Florida) $692,832; Lafayette-Moraga Trail (Lafayette, California) at $509,406.[33]

Discussion and Improvements to Methodology

The Trout Run Trail has a tangible economic impact on the Winneshiek County economy. These results support the statements made by local stakeholders and the overwhelming conclusion by respondents of the Northeast Iowa Trail User Survey that the Trout Run Trail economically benefits the community (92%).

Since primary purpose visitors to the trail generate an economic impact, the County should focus on attracting these types of users. This can be achieved by hosting events of regional significance that utilize the existing trails.

There are several alterations in our economic impact assessment methodology that could be explored. Seasonal factors could be improved by adding data from future surveys and determining factors from specific user types. A substantial portion of direct spending went towards accommodations, which has a relatively high multiplier effect compared to retail industries. We could restructure user types by day users or overnight users to reveal the importance of attracting overnight users. Making the distinction between day and overnight users has precedence in other trail economic impact studies.[34] To allocate direct spending, assumptions were made on what industries best applied to categories reported in our survey. Survey questions could be altered to better reflect the industries of the IO model (The North American Industry Classification System, or NAICS), but possibly at the expense of clarity of the survey question. IMPLAN also provides a set of multipliers for the measure of value added. The inclusion of value added multipliers would capture the trail's impact on county productivity, income, and wealth.

This assessment would also be possible using RIMS II (Regional Input Output Modeling System) multipliers, which are provided by the BEA (Bureau of Economic Analysis). These multipliers, available at the national, state, and county-level, are substantially more affordable, making them more accessible to local governments and organizations. A drawback of using

RIMS II multipliers is that the economic data is no longer updated annually due to federal budget sequestration. Another drawback is that the multipliers do not separate indirect and induced impacts, making it more difficult to ascertain how spending flows through the local economy.

The overall multiplier effect of TRT is 1.01; for every dollar in trail related spending there is an additional 1 cent in output generated in Winneshiek County. The IO model approach is very thorough and the results are our best estimates of the total economic impact of the trail, but the approach does not yield much impact beyond direct spending.

Housing Sales Price Analysis

Many studies suggest that proximity to a trail is associated with an increase in home sale price.[35] However, opponents of trail programs nationwide contest that trail development may be a detriment to property owners.[36] A housing sales price model can be employed to test these theories empirically as well as the real estate cliché "location, location, location." The model operates on the assumption that markets place value on a range of characteristics that, when combined, reflect a home's sale price.[37] The objective of our model is to estimate the contributory value of each of those characteristics, specific to Winneshiek County.[38]

Methods

We performed an analysis of residential real estate transactions within a quarter mile of TRT. Because the Freeport trail extension was completed in 2015, it was excluded from the analysis. Home sales price was selected as the response (dependent) variable over other possible measurements, such as assessed values, because of its superior responsiveness to market influences over time. Additionally, home sale price represents a buyer's actual willingness to pay for an individual property.

The power of the model hinges on the quality of the explanatory (independent) variables in its dataset.

Based on a review of housing sales price models, valued characteristics can be broken into five groups:

1. **Structural features**: lot size, total living space area, number of bedrooms and/or bathrooms
2. **Internal and external features**: fireplaces, air conditioning, garage and deck/porch area
3. **Attributes of neighborhood and location**: crime, recreational options
4. **Public services**: school quality and district characteristics
5. **Marketing, occupancy, selling factors**: assessed quality and condition, vacancy status, time on the market[39]

The model should not be limited to these factors alone and analysts should be mindful of real estate trends that may be unique to the local market. Many of these characteristics are kept in the Winneshiek County Assessor records. The Assessor's database also contains all real estate sale events that have occurred in the county. Despite the high level of detail of our model's dataset, the valuation of residential properties is so complex that even the best models can only roughly approximate true market behaviors. This analysis includes sakes from the beginning of 2009 to mid-October 2015.

Sales are measured by the dollar value of a property's purchase price on the date of the transaction. Since the value of a dollar is not constant over time, it is necessary to adjust the sales price using a housing price index. We used the Federal Housing Finance Agency's (Seasonally Adjusted) Quarterly Purchase-Only House Price Index at the state-level. [40] While the index provides an imperfect adjustment, it does account for the relationship between sale price and time. Use of this particular index assumes that Winneshiek County's housing market is relatively similar to that of the State of Iowa. The index adjusts each sale into fourth quarter 2015 dollars, measuring only single-family house prices. The third and fourth quarter index values were extrapolated from the second quarter by projecting the average change of the previous four quarters.

Due to the model's reliance on spatial data, it was necessary to utilize geographic information software

(GIS). ArcGIS was used to join data from different sources based on a common spatial attribute, the parcel identification number. This allows us to append influential spatial characteristics to the dataset. We calculated each parcel's distance to Decorah's central business district and to TRT. Educational statistics by school district were provided by the Iowa Department of Education (IDE). Geographic data sources such as jurisdictional boundaries, trail alignments, residential parcels, and others used in the model were provided by Winneshiek County's GIS/IT Director.

In assessing the effects of trail proximity over time, "dummy variables" were created to classify data into two distinct groups. To denote whether a transaction took place after the completion of TRT, sale records occurring after August 31st, 2012 were recoded as "1" while transactions occurring prior to this date were coded "0." Likewise, parcel centroids within a quarter mile of the trail were coded as "1," and those falling outside this range were coded as "0."

Using the statistical analysis software, Stata, an interaction term between distance and time was created to signify homes that sold within one-quarter mile of the trail after its completion, coded "1", and all other sales, coded "0." This is necessary to isolate homes that meet both the time and distance conditions in question. Stata was also used to calculate composite fourth grade math and reading scores as reported by the National Assessment of Educational Progress using data from the IDE's Adequate Yearly Progress Assessment. [41] A natural log transformation was performed on sale price to provide the model a more normal distribution.

Since a nonexistent trail cannot have an impact on housing sale price, a subset model containing only sales occurring prior to the completion of the TRT loop was created. This subset was used to test if, even before the trail was built, there was a significant impact of proximity to the trail's present-day alignment on home sale price. Significant results in the subset model would decrease the full model's validity. Our findings were not significant.

However, if distance to downtown is omitted from the model, distance to the TRT becomes significant at the 95% confidence level. These results are presented in Figures 7 & 8.

Interpreting Model Results

Coefficient(β): represents the mean change the response variable for a one-unit change in the predictor variable, holding all else constant. With a logged response variable, "a one unit change explanatory variable results in a (100 x β)% change in the response variable.[1]

P-value: a value less than .05 confirms that changes in the response variable are significantly linked to changes in an explanatory variables and not due to chance.[1]

Adjusted R-squared: measures the explanatory power of the regression model that is adjusted for the number of explanatory variables included. Values range from zero to one with higher values representing more explanatory power.[1] It can be interpreted as (100 x R)% variance in the response variable is explained by the model.

Constant: Represents all explanatory variables not included in the regression.

Figure 10: Hedonic Model of pre-TRT sales including distance to downtown and TRT

**Significant result at the 95% confidence level*

***Significant result at the 99% confidence level*

	Coefficient (β)
quartermile	-0.0979
milesdwntwn	-0.0552**
age	-0.0049**
totallivingarea	0.0004**
deckporcharea	0.0004**
garagearea	0.0004**
PctFRL	0.0081**
grade4pctproficient	0.0027
constant	10.8500**
Adjusted R-squared	0.5968

Figure 11: Hedonic Model of pre-TRT sales excluding distance to downtown Decorah

	Coefficient (β)
quartermile	0.1236**
age	-0.0051**
totallivingarea	0.0004**
deckporcharea	0.0004**
garagearea	0.0004**
PctFRL	0.0046
grade4pctproficient	0.0392**
constant	7.6444**
Adjusted R-squared	0.5188

The dynamic between proximity to downtown and proximity to TRT suggests covariance in the model which can invalidate the final model's results. Covariance makes it difficult to determine which explanatory variable is truly responsible for the change in sales price. Figure 12 on the next page demonstrates that clusters of homes sold in or near Decorah tend to be close to both the trail and to downtown. This covariance makes it difficult to have confidence in causal inferences regarding TRT proximity on home sale price. In an attempt to solve this problem, many versions of the model were tested with different variables included or omitted. Because distance to downtown Decorah has proven to be a significant predictor in every scenario, and because its inclusion significantly raises the explanatory power of the model, the full hedonic model contains both variables.

Results

For both the subset and full models, a multiple linear regression was used on sales price with a combination of explanatory variables describing the parcel features mentioned earlier. These variables are defined in the following box.

Hedonic Variables defined:

Response variable:
lnsalesprice = natural log of home sales price

Explanatory variables:
age = Building age (years)
totallivingarea = Total living area (square feet)
deckporcharea = Deck/porch area (square feet)
garagearea = Garage area (square feet)
PctFRL = Percentage of district students on free or reduced lunch
grade4pctproficient = Composite percentage of 4th graders that are grade proficient in math and reading
milesdwntwn = Distance to downtown Decorah (miles)
quartermile = Whether or not a property is within ¼ mile of TRT (1,0)
aftertrt = Whether or not a the sale took place after TRT completion (1,0)
aftertrailXquartermile = Interaction term for whether or not a home is within 1/4 mile of TRT and was sold after its completion (1,0)

Figure 12: Location of properties sold in relation to downtown and TRT

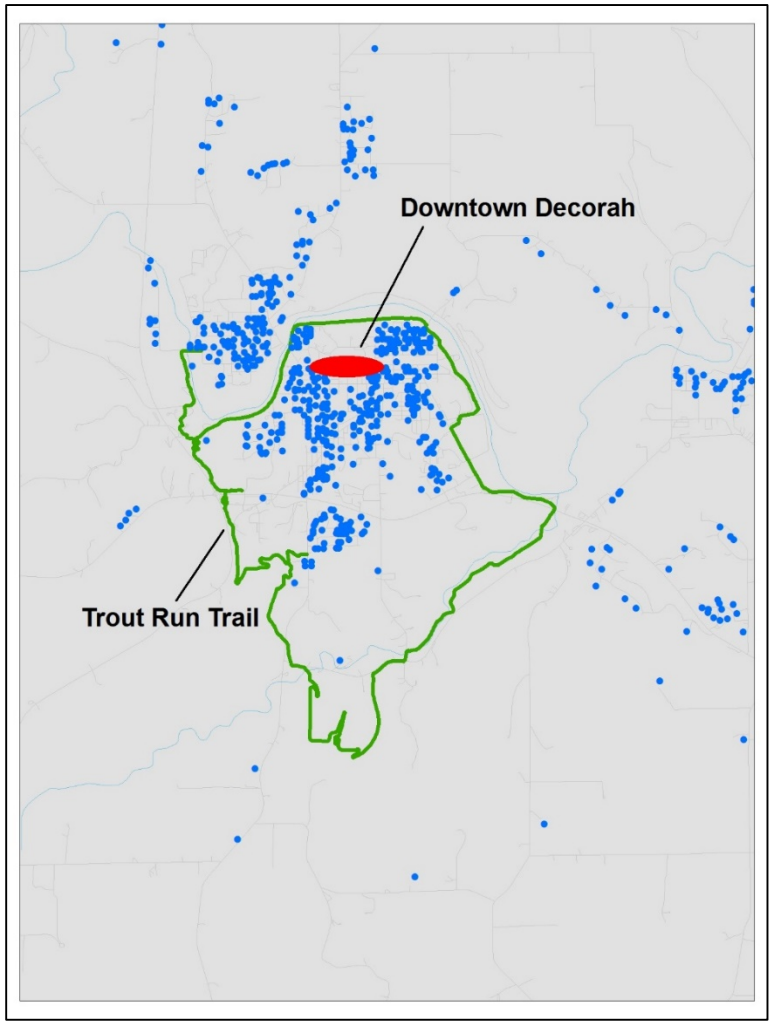


Figure 13: Full Hedonic Model Results

	Coefficient (β)
aftertrailXquartermile	0.0714
aftertrt	0.0478
quartermile	-0.0084
milesdwntwn	-0.0454**
age	-0.0053**
totallivingarea	0.0004**
deckporcharea	0.0004**
garagearea	0.0003**
grade4pctproficient	0.0095*
PctFRL	0.0027
constant	10.6081**
Adjusted R-squared	0.6126

Figure 13 shows the results of the full hedonic model. The mode l's adjusted R-squared is fairly high at .6126, signifying that the model explains 61% of the variability in home sale prices. The explanatory variable of greatest interest is the interaction term listed first (i.e. aftertrailXquartermile). However, the coefficient for this variable is not significant according to our model. This means that proximity to TRT is not associated to changes in home sale price.

The model indicates that increased living area, garage area, deck/porch area and higher rates of grade-level proficiency are all associated with higher sales prices. The same can be said for homes closer to downtown. We also find that older homes are associated with lower sales prices. These results are consistent with similar pricing models.

Discussion

As mentioned previously, our model suggests a covariant relationship between distance to TRT and distance to downtown Decorah that hinders our ability to draw a conclusion from the results. Testing reveals that these two variables are correlated at a rate of 42.4%. Although this value is not alarmingly high, it does suggest a connection that is troubling for the model. In the Decorah area, these variables may be proxies for one another, making it difficult to delineate whether housing price impacts are attributable to TRT proximity or downtown proximity. This trend will likely persist unless there is a significant shift in residential development patterns over many years.

The current model can be improved to more accurately isolate TRT's influence by expanding the model's inputs. Gaining access to, or creating a more complete housing characteristics database at the parcel level would enable a more robust analysis. Data availability is limited, but additional variables such as assessed housing condition, presence of air-conditioning, number of fireplaces, building quality, basement presence, and distance to other amenities may more fully explain the relationship of sale price and trails. Lengthening the dataset's timespan would also increase the model's explanatory power. However, these kinds of adjustments do not guarantee the resolution of covariation.

Holding all else constant, housing sales prices since the completion of TRT have been 4.7% higher than those prior to its completion. This may allude to underlying housing market trends in Winneshiek County that we do not fully understand. Investigation into a more localized index may prove beneficial as the state's housing price index may be dominated by the market behavior of its largest metropolitan areas.

It is currently unknown how long of a lag there is from the time a trail is constructed to the time its economic effects are seen in real estate valuations. For instance, some home values may increase when the trail is first announced while other home values may only react months or years after the trail's construction. Gathering qualitative information from local housing market experts may provide insight from which to form assumptions in future applications of the model. Another aspect of delay not accounted for in the model is the staggered completion dates of each section of TRT. The trail was constructed in segments between 1996 and 2012. By considering these phases in future models, it may be possible to identify the timing of the trail's impact.

The obstacle of distance covariation might be addressed by summarizing attractions with a greater level of detail. This includes potentially measuring distances along networks to designated access points rather than straight line distances. Also, the model may better approximate the housing market surrounding TRT if the geographic extent of housing records were limited to an influential distance of Decorah as opposed to including all records within the county. Additionally, there is not conclusive literature regarding the distance relationship between a trail and a home. Depending on local conditions, models typically include anything from neighboring properties only to all properties within a half mile.

Supplementary analysis was performed to isolate only properties that sold both before and after the trail's completion. In theory, this analysis is a more direct measure of the trail's value because it measures the impacts over time for a select group of parcels with respect to an intervention (the trail's completion date). However, due to small sample size, this analysis yielded insignificant results and may be worth reinvestigating in the future as the value of the trail has more time to work its way into the housing market. The details of this alternative analysis are included in the Appendix.

The results of our model ought to be compared to other studies of similar scope, circumstance, and purpose. The goal of this process is to reveal unknown trends and deepen our understanding of the county's

housing market behavior as it relates to TRT. Because of geographical differences, similar analyses of other trails in the region would not encounter covariation issues to the extent that TRT did. However, because they are more rural in setting, the sample of housing sales may be very limited in size.

PLANNING SCENARIO

Planning Scenario

"The (Transportation Enhancement) Committee meets to review and recommend projects for transportation alternatives funding and also works to build a sustainable and feasible trail system to provide non-vehicular travel options."[42]

Transportation Enhancement Committee members attest that the trail development process is strongest when community leaders from across the region work together on a common project. Cohesive efforts allow communities to compete for larger sources of funding, maintain political support for trails, and overcome the incremental nature of local decision-making. In order to do these things consistently, it is important that leaders employ a solidified process for evaluating trail alternatives that reflects stakeholder values. The planning scenario is an application of evaluation criteria built on the trail development priorities of individual committee members.

Each member was asked to rank sixteen development criteria in order of their importance to a typical trail project. The rankings reflect the amount of consideration that a member gives to a certain criterion in relation to all others. These rankings were then turned into weights that could be used in evaluating three alternative routes. After scoring the sixteen attributes for each route, the weights were applied. The results of the planning scenario demonstrate how the evaluation system can be used on future projects.

Figure 14: Evaluation criteria in rank order (from highest priority to lowest)

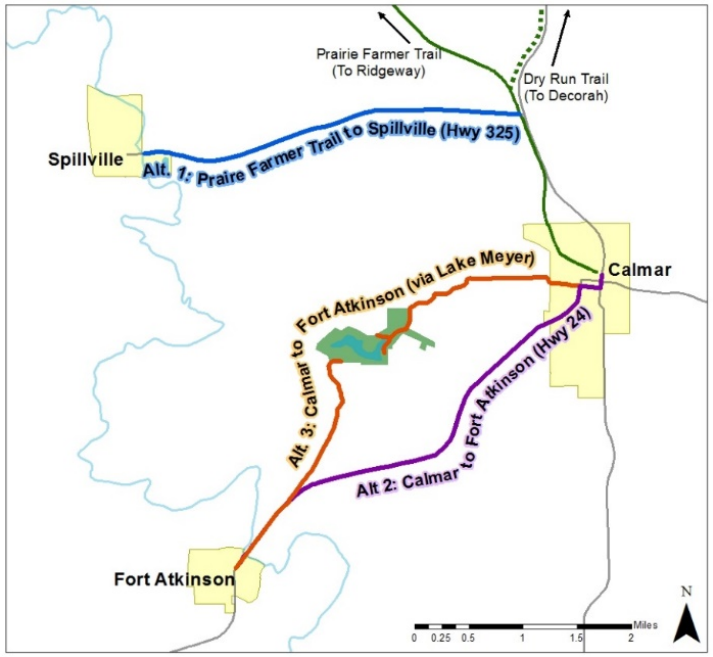
Criteria	
Community support	Highest Priority
Scenic views	
Fills gap in the regional trail network	
Natural attractions near trail	
Minimizing environmental impacts	
Proximity to streams, rivers, and/or lakes	
Tourism-oriented activity near trail	
Land acquisition challenges	
Separation from vehicle traffic	
Initial construction cost	
Potential for commuting	
Projected maintenance cost	
Population living near trail	
Avoiding geographical/topographical challenges	
Number of businesses near trail	Lowest Priority
Provides significant riding distance	

Three Alternatives

The alternatives presented in this planning scenario, visible in Figure 15, were chosen due to their consistency with the goals of the County Comprehensive Plan and the Regional Long Range Transportation Plan (LRTP). They each exhibit varying levels of physical characteristics and technical feasibility. In the recommendations section, the alternatives will be evaluated on various criteria weighted to reflect the values of regional stakeholders.

This theoretical scenario assumes that one of the three alternatives will be chosen above the others based on a total route score. A map of the scenario is included, followed by a brief description of each alternative.

Figure 15: An overview of the three route alternatives



Alternative 1: Prairie Farmer Trail to Spillville (State Highway 325)

This route connects the Prairie Farmer Trail north of Calmar to the bridge crossing Turkey River on the eastern edge of Spillville. The route takes the form of a four-foot-wide extended shoulder on either side of State Highway 325. This requires improved wayfinding and lane designation markings for cyclists. Construction of

this route would likely come as part of the next scheduled pavement replacement project for State Highway 325.

Alternative 2: Calmar to Fort Atkinson (State Highway 24)

Similar to Alternative 1, this route is also characterized by two four-foot-wide extended shoulders along State Highway 24 leading to the eastern edge of Fort Atkinson. However, this route also includes an on-street portion in Calmar in order to connect the route to the southernmost trailhead of PFRT. This portion consists of improved wayfinding and resurfacing of roads to create a shared lane for cyclists and motorists alike. Completion of this route is also contingent on the pavement replacement schedule for Highway 24.

Alternative 3: Calmar to Fort Atkinson (via Lake Meyer)

Unlike Alternatives 1 and 2, the majority of this route is new trail construction, although roughly 42% of the route would be on-street. These segments extend from the PFRT trailhead to the junction of 170th and 248th Streets and a brief segment on Highway 24 leading into Fort Atkinson. Between these sections is a stretch of trail that follows the countryside to Lake Meyer County Park where it connects the northern and southern campground access road segments to create a loop trail around the lake. It then roughly follows the alignment of The Dakota, Minnesota and Eastern (DM&E) Rail Line before joining the highway into town.

Evaluation Criteria

Involving and Serving Local Populations

While one intention in building a trail network is to build a tourist economy and bring new revenue sources into northeast Iowa, local populations are also an important consideration in the development process. Their support bolsters the political viability of costly development projects and locals will be the primary users of any trail even if the measurable economic impacts come from primary purpose visitors, as stated earlier in the EIA. The criteria for involving and serving local populations as it relates to our pilot scenario is detailed below.

There are two components to this section: population living near the trail and public support for trail development. Population living near the trail is defined as the number of residential parcels within ¼

mile of any of the three route alternatives. Community support is a more subjective area. If a route alternative is mentioned in the LRTP, it is considered to have public support. Scoring methods are discussed next.

The first step to determine the population living near the trail is to separate residential parcels from other land uses in the available data. Next, residential parcels that fall within ¼ mile of any point on the route alternatives are separated. These households were selected by their location to differentiate them from households further away from the routes. Routes with fewer than 250 residential parcels within ¼ mile are awarded 1 point, 250-500 receives 2 points, 500-750 receives 3 points, 750-1,000 receives 4 points, and anything greater than 1,000 receives 5 points.

Community support, as stated earlier, is not a quantitative measure but instead has the simple scoring criteria: a mention in the LRTP (which assumes public support was considered at the writing of the plan). No mention is 1 point, a mention is 3 points, and if community support has influenced the development process then a route is awarded 5 points.

Regarding population living near the trail, Alternative 1 has fewer than 100 residential parcels within its buffer (all in Spillville) and receives 1 point. Alternatives 2 and 3 each have more than 500 parcels within their buffers and were each awarded 3 points. All residential parcels for these routes were located in or between Calmar and Fort Atkinson. These results are viewable in the expanded criteria content section of the Appendix. Community support for each route was scored as follows. Two of the proposed routes (Alternatives 1 and 3) are mentioned in the transportation plan, while Alternative 2 is not.[43] So, two routes were awarded 3 points while Alternative 2 receives 1 point.

Physical Trail Characteristics

Avoiding Geographical and Topographical Challenges

This criteria item awards route alternatives whose topography requires the least amount of engineering to comply with American with Disabilities Act Accessibility Guidelines (ADAAG). Based on these the guidelines, the maximum running slope for an unlimited distance is 5% or less. Accordingly, our measure is the percentage of the route exceeding a 5% grade. Routes that must traverse

slopes greater than a 5% grade may require rerouting which entails cost-increasing solutions such as bridges, tunnels, switchbacks, or circumvention.

Slope calculations rely heavily on the capabilities of ArcMap's 3D analysis extension. The primary data source for this analysis is the Iowa Department of Natural Resources' "Digital Elevation Model (DEM) of the State of Iowa as a Three Meter Integer Raster Dataset Derived from LiDAR." The outputs of this tool were three different point layers each representing one route alternative. At intervals of 10 feet along each route, the layers contain attribute data points for both distance and elevation. The actual calculations performed on this data were completed using Excel.

The next step was to put both length and elevation into a common unit. In this case, both attributes were converted into feet. The slope between each point was then calculated. The slope formula consists of the distance traversed between consecutive points divided by the change in elevation between consecutive points, multiplied by one-hundred. Points were counted in excel if the absolute value of slope was greater than five. This count was divided by the total number of points along the route and multiplied by one-hundred. This results in an estimated percentage of the route lying upon steep terrain (i.e. greater than 5% grade).

There are limitations to this method. For example, it is possible that one route may have a smaller percentage of the trail exceeding a 5% grade than another, but the costs associated with its slopes may be larger than a route with the larger percentage. Despite these kinds of limitations, a more thorough analysis may be unnecessary for this criteria item. First, the relationship between project costs and percent grade are unknown for recreational trails in Winneshiek County. Second, because of the precision of the DEM, small spatial adjustments to a route may drastically alter its score. Third, excessively steep sections of trail are likely to be avoided altogether as the final trail path aligns.

This criteria item could be further enhanced by incorporating the Bluffland Protection Overlay District (BPOD) layer in the analysis. This BPOD layer will illustrate its associated county ordinance and is being created by a separate IISC project. The ordinance's

purpose is to "preserve the scenic qualities of bluffs, protect sensitive natural features and groundwater and prevent the process of erosion."[44] Routes intersecting BPODs would need to consider how to appropriately navigate or avoid these topographical challenges. An analysis of BPOD conflicts along route alternatives may provide the grounds for a new criteria item.

The two outputs of this analysis are a summary of each alternative's slope conditions and their elevation profiles. These are provided in Figures 16 to 19. The estimated percent of the trail with a slope greater than 5% is the only output included as a criteria item within the decision matrix. The other analysis results included in the table are for descriptive purposes only. Alternatives with greater than 20 percent of the route with a vertical slope >5% are awarded 1 point, >10% 2 points, >5% 3 points, >1% 4 points, and >=0% 5 points.

Figure 16: Summary of Alternatives Vertical Slope

Route Alternative Slope Summary			
	Alt 1: PFRT to Spillville	Alt 2: Calmar to Ft. Atkinson	Alt 3: Calmar to Ft. Atkinson via Lake Meyer
Max	11.41	34.76	41.57
Min	-39.06	-25.58	-51.97
Median	-0.99	-0.55	-0.51
Mean	-1.25	-0.94	-0.80
Standard Deviation	2.89	2.50	7.76
Estimated % of Trial with vertical slope >5%	1.15%	0.28%	13.24%

Figure 17: Alternative 1 Elevation Cross Section

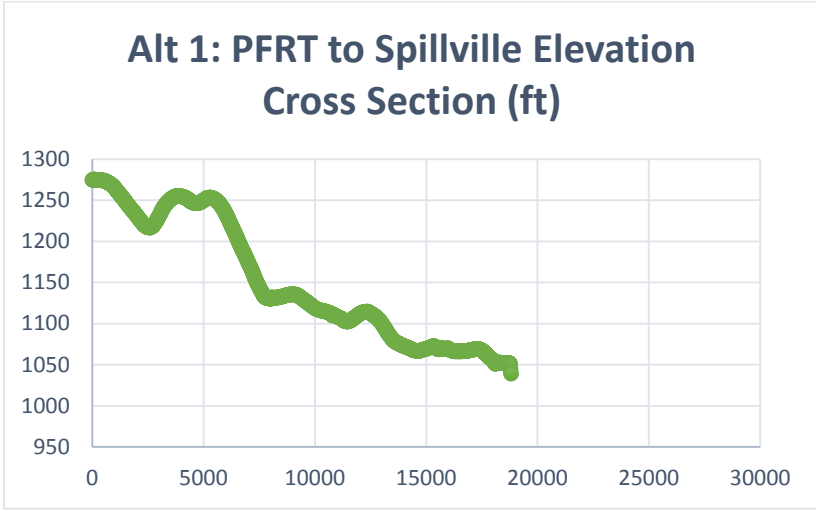


Figure 18: Alternative 2 Elevation Cross Section

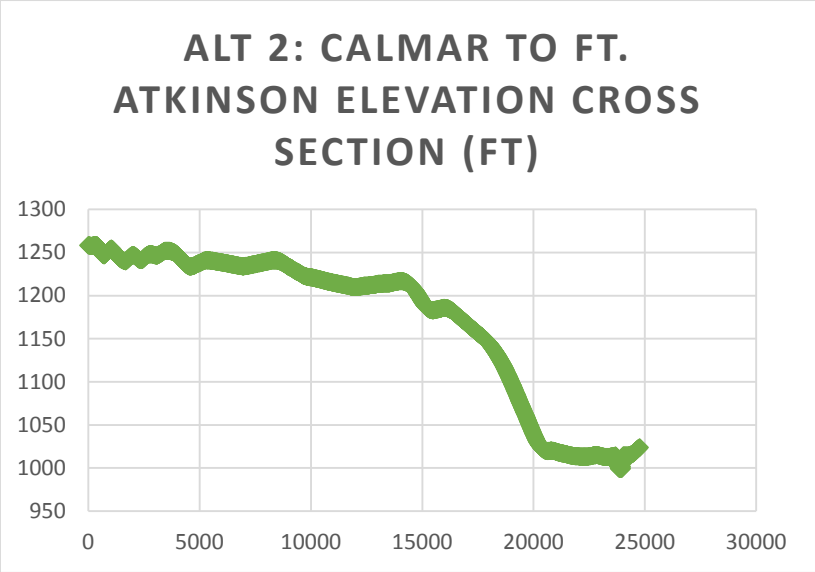
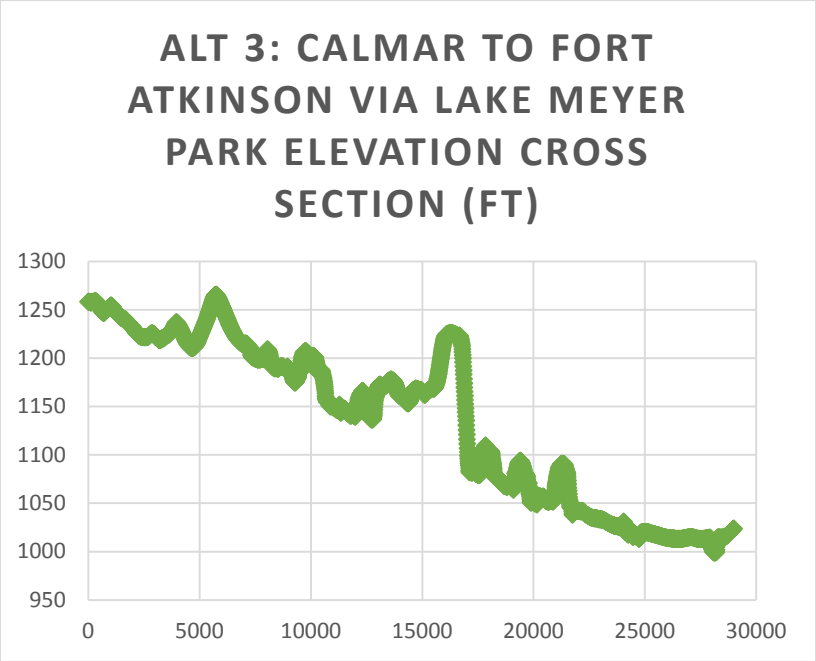


Figure 19: Alternative 3 Elevation Cross Sections



Separation from Vehicle Traffic

Separation from vehicle traffic is a valid safety concern for pedestrians and bicyclists and should be considered in the development process. As mentioned earlier, two of the proposed routes follow state highways, while the third is a mix of countryside, rural road, and some highway.

Separation from vehicle traffic is represented as a percentage of a given route alternative that does not follow a road. In creating each route using Geographic Information Systems software, trail segments were classified as either on-road or off-road. Total mileage for each was then determined allowing the total on-road percentage to be calculated. Less than 25% off-road is awarded 1 point, 25-49% is awarded 2 points, 50-75% is awarded 3 points, 75-99% is awarded 4 points, and 100% is awarded 5 points.

Route Alternative 1 follows State Highway 325 west from the PFRT into the town of Spillville, with no segments off-road. This route received 1 point. Similarly, Alternative 2 follows State Highway 24 southwest from Calmar into Fort Atkinson, and is also awarded 1 point. Alternative 3 pushes west out of Calmar along 170th Street before cutting cross-country to Lake Meyer, then linking up with State Highway 24 northeast of Fort Atkinson. Only 42% of Alternative 3 is on-road (36% on-highway), so it is awarded 3 points. These results are displayed in the expanded evaluation criteria section in the Appendix.

Fill Gaps in Regional Trail Network

Another criteria considered in this planning scenario is whether a trail fills a gap in the overall network, helping achieve the region's ultimate goal of an integrated recreational trail system, as stated in the LRTP. Consistency with the LRTP has a logical importance for this set of criteria, and imparts a degree of predictability to the development process.

Filling a gap in the trail network is scored similarly to the community support criteria. If a route alternative is mentioned in the LRTP, it is considered to fill a gap. No mention receives 1 point and a mention receives 3 points. A route that exceeds the LRTP fills more than one gap mentioned in the LRTP and receives 5 points.

Alternative 1 is a future route mentioned in the LRTP and is awarded 3 points. Alternative 2 is not mentioned in the plan, so receives 1 point. Alternative 3 is essentially two routes combined, one from Calmar to Lake Meyer and another from Lake Meyer to Fort Atkinson, both of which are mentioned in the LRTP. Alternative 3 receives 5 points.

Provide Significant Riding Distance

Some of the utility that users derive from a new trail segment is related to the additional distance that it adds to the network. Trail projects that add only a fraction of a mile do not add much immediate value to the network unless they serve as a connecting link, as did the Highway 9 Bridge in Decorah, which is part of the Trout Run Trail. In this evaluation, larger scores are given to longer routes up to a distance of 7 miles. Scoring distance this way somewhat offsets the higher cost associated with longer routes, bringing in some of the utility that trail users receive.

For most bike riders, the length of a ride is twice as long as the length of the actual trail segment they ride. Routes less than a mile long do not make a meaningful contribution to the network, and are awarded 1 point. Routes between 1 and 3 miles in length are given just two points. Routes between 3 and 5 miles in length are given 3 points. As routes exceed 5 miles, they become long enough to connect most adjacent towns within the county, and are given 4 points up to 7 miles in length. As routes exceed 7 miles in length, they are adding significant distance to the network and are awarded 5 points.

Trail Finance

When expanding a regional trail system, continual construction of new trails can be cost prohibitive. The reduced cost of using the existing network is the main reason such routes are considered. In the case of Winneshiek County, the two lane rural highways that would serve this purpose do not allow for safe shared use due to the limited space and high speeds.

Where it is feasible, many jurisdictions will opt to add bike lanes through a resurfacing project that involves a lane reduction or road diet. On low- to moderate-speed urban streets in Calmar, Spillville, or Fort Atkinson, this is a cost effective option. On most rural highways, the existing pavement and shoulder conditions do not allow for a full bike lane as part of a resurfacing project.[45] In the cases of State Highways 24 and 235, the best opportunity for adding a four-foot extended shoulder would come as part of a pavement replacement project in which everything but the underlying base is reconstructed. For this type of project, the jurisdiction

must adhere to the replacement schedule for the road, possibly resulting in long-term delays.

Because of the direct highway routes between the small communities, there is opportunity to improve the trail network alongside existing road infrastructure. Our analysis will demonstrate that although extended shoulder routes may be more cost effective, they may sacrifice some of the flexibility and distinctive traits associated with traditional multi-use trails.

For the purpose of this scenario, trail finance criteria is broken into three major components: initial construction costs, annual maintenance costs, and right-of-way acquisition costs. Each of these major components are then broken into specific costs.

Initial Construction Costs

Because costs of vary widely based on location, estimates were obtained from case studies and resources that are most applicable to Iowa. The costs and their sources are detailed in the Appendix. Most costs were obtained from a study conducted by students in the Department of Civil and Environmental Engineering at The University of Iowa in Spring of 2015.

Beyond pavement type, there is significant variation in design elements that are required in new trail construction when compared with an extended shoulder. Individual elements such as benches, signs, bridge components, and bicycle markings were calculated on a linear basis depending on state or federal spacing standards, or as needed based on the characteristics of the route. Continuous elements such as grading, concrete, and sub base were calculated on a square footage or acreage per mile basis. These calculations are performed in ArcMap to measure the necessary spatial dimensions related to the width and length of trail, shoulder, and right-of-way.

Clearing and grubbing cost calculation is the only element that requires slightly more advanced analysis in ArcMap. The High Resolution Land Cover (HRLC) raster dataset from the Iowa DNR must be clipped down to a width of fourteen feet spanning the length of the trail segment. This data is at a 1-meter resolution and is based on aerial imagery, four band imagery, and LiDAR

elevation data collected from 2007 to 2010. The clipped area represents the acreage of land cover that could potentially require clear cutting. These rasters can then be converted to polygons and any land cover type that will not require clearing can be disregarded. From here, we are left with the area inside the buffer that will require clearing. The acreage can be calculated along the length of the route and multiplied by the estimated clearing and grubbing cost per acre.

A route that exceeds $1,100,000 in construction costs receives 1 point. This would typically be a route between 6 and 9 miles in length depending on other considerations. A route between $800,000 and $1,100,000 for construction receive 2 points. A route between $500,000 and $800,000 receives 3 points. A route between $200,000 and $500,000 receives 4 points. Lastly, a route that costs $200,000 receives the full 5 points. This route would likely be less than 2 miles in length regardless of other considerations

Annual Maintenance Costs

All transportation infrastructure requires regular maintenance, especially in Midwestern climates. Multi-use trails are susceptible to both the freeze/thaw cycles and intense heat that that are characteristic of Iowa. Concrete is the preferred pavement material due to its longer anticipated life span when compared with asphalt.[46] Extended road shoulders are subject to these same elements along with added vehicle traffic, snow plow activity, and road salt application during the winter months. It is important that these costs are understood specific to the State of Iowa.

Cost estimates are based on the average life-cycle of various elements as documented by the Iowa Department of Transportation (DOT) or the Federal Highway Administration (FHWA). They are then annualized for the three alternatives from linear unit estimates. Any replacement costs that are not anticipated to occur in the short-term are not included. Costs are then calculated per mile of trail specific to on-road or trail segment types.

The cost of maintenance for a route depends heavily on whether it is on-road versus separated. A route that would cost more than $7,000 to maintain annually receive 1 point. A route costing between $5,000 and

$7,000 to maintain receives 2 points. 3 points are awarded to routes that cost between $3,000 and $5,000 to maintain. 4 points are awarded when the cost is between $1,000 and $3,000. Lastly, a route that can be maintained for less than $1,000 per year receives the full five points. This would likely be a separated trail route of less than 1 mile in length or an on-road route not exceeding 2.5 miles in length.

Land Acquisition Costs

Securing land for trail right-of-way can be a delicate process. Private landowner sentiment towards trails can be unpredictable and may change over time. Typically, the trail easement is acquired by a trail group from a private landowner through an agreement that determines how that easement will be created and maintained. The easement is either donated to the trail group or the rights to use the land are purchased. In this analysis, it is assumed that all land will be purchased at the assessed land value per acre, using a standard 30-foot right-of-way width over the length of the segment that intersects the private parcel. In determining the route, we made an attempt to minimize the number of landowners involved.

Costs associated with land acquisition are likely to vary widely between projects. Estimates can be very speculative based on relationships with landowners. The possibility of land donation can change a route's score drastically. For this planning scenario, a route that requires more than $15,000 for land acquisition receives just 1 point. This type of route would require negotiations with a handful of landowners. A route requiring between $11,000 and $15,000 for land acquisition receives 2 points. 3 points are awarded to routes requiring between $6,000 and $11,000. 4 points are awarded to routes requiring between $1,000 and $6,000. Lastly, a route that requires less than $1,000 receives the full five points. This type of route would likely deal with just one or two landowners, possibly combined with some donated land.

Surrounding Land Uses

Natural Attractions Near the Trail

Physical or visual access to natural attractions adds to the appeal to recreational trails. Northeast Iowa's geography, as emphasized earlier in this report, is a

marketable resource for trail development and tourism. Taking advantage of the natural capital is important in building a recreation economy and giving people a reason to return to the trails.

In this analysis, natural attractions are defined as simply connecting with a river, lake or park. Scoring for this criteria is as follows: connecting with no natural amenities is awarded 1 point, and linking with one natural feature is awarded 3 points. Linking with two or more amenities is awarded 5 points. Alternative 1 connects with the Turkey River in Spillville, and is awarded 3 points. Alternative 2 also intersects with the Turkey River, in Fort Atkinson, so is awarded 3 points. Alternative 3 links up with Lake Meyer and the surrounding park as well as connecting with the Turkey River in Fort Atkinson, receiving 5 points. The map for this criteria is available in expanded evaluation criteria in the Appendix.

Number of Tourism Related Businesses near Trail

This criteria item awards points to route alternatives that provide access to businesses in industries likely to be visited by trail users. The industries included match those in this report's IO model such as: restaurants, bars, hotels, gas stations, grocers, attractions, clothing, and recreational equipment supply. This criteria item's measurement is the number of businesses located within the incorporated limits of trail destinations or otherwise lying within a quarter-mile of the trail. One purpose of building recreational trails is to boost local economic activity, so the presence of certain businesses should play a role in the decision making process.

The primary data source for identifying businesses was exported from the Reference USA database. Reference USA's database can be accessed with a subscription available at many public libraries. On the website, an "advanced search" for U.S. businesses created the dataset which can be exported as a spreadsheet. The dataset contained 1,079 "phone verified & quality checked" business records located within Winneshiek County. Unverified businesses also included in the analysis totaled 937. The businesses listed in the dataset were geocoded by address into geographic coordinates.

Figure 20 contains a summary of the results. The table's data communicates several possible measurements for this criteria item. Reference USA data contains annual local sales volume for each business. This data can be used to calculate total sales volume or average sales volume per business. The advantage of these measurements is that they award more points to destinations based on the scale of their economic activity. There are two reasons not to use these measurements for this criteria item. First, the reported annual sales volume is subject to error which may inaccurately indicate the true scale of economic activity at trail destinations. Second, awarding points to destinations with a higher economic activity may conflict with the goal of boosting economic activity within smaller communities.

In light of these considerations, the raw number of businesses near the trail is the most appropriate measurement and is the one used in the decision matrix. For the scoring criteria, The number of businesses greater than or equal to 10 earns a 5, between 8 and 10 earns a 4, between 6 to 8 earns a 3, between 6 to 4 earns a 2, and between 0 to 4 earns a 1.

Figure 20: Tourism and Businesses Near Alternatives

Summary of Businesses Serviced By Route Alternatives	Trail Related Businesses Near Trail	Annual "Location Sales Volume Actual"	Average Sales Volume per Business
Alternative 1: PFRT to Spillville	4	$2,137,000	$534,250
Alternative 2: Calmar to Ft. Atkinson	10	$6,305,000	$630,500
Alternative 3: Calmar to Ft. Atkinson via Lake Meyer	11	$6,501,000	$591,000
Fort Atkinson	4	$571,000	$142,750
Spillville	4	$2,137,000	$534,250
Calmar	6	$5,734,000	$955,667
Ridgeway	4	$3,731,000	$932,750

Scenic Views

The scenic views criteria expresses the quality of the view from each proposed route. To use scenic views as a decision-making factor is difficult because personal preferences determine whether a view is scenic or not. We assume that when using a trail, natural land cover is preferred over land cover that is overtly manmade.

During the summer and fall seasons agricultural land offers scenic views, however, agricultural land is ubiquitous in the Iowa rural landscape so it does not aid decision-making. The unit of this criterion is the percentage of the view from a route that is natural land cover. Using a percentage allows for comparisons across routes of different lengths.

This criteria item was ranked among the highest priorities by the Enhancement Committee. Trails offer recreation and natural experiences that they may be possible. Not all users require that a trail provide scenic views, but a wider group of users can be attracted by offering easily accessible natural experiences. Scenic views can attract users from outside of the county, which may generate spending in communities near the trail. A community can't change their landscape easily, but they can select routes that showcase the best of it.

The proposed routes each have a unique elevation profile that make different parts of the landscape visible. A viewshed is an area that is visible from a specific observer point. The viewshed tool in ArcMap was used to determine the viewsheds from the routes.

To identify the land cover for the areas that are visible we use the HRLC dataset again. The land cover is in 15 classes; these classes can be seen in Figure 21. The raster of visible areas is used to mask the HRLC and create a final raster file. The viewshed with land cover is then summarized to determine the percentage of scenic view. The following land cover classes are considered scenic for this analysis: water, wetland, coniferous forest, deciduous forest short, deciduous forest medium, deciduous forest tall, and grass.

Calmar to Fort Atkinson (Alt 2) offers the largest viewshed at 610 acres, but Calmar to Fort Atkinson via Lake Meyer (Alt 3) has a larger percentage of scenic views at 54%. The viewshed does not include the loop that will be accessible at Lake Meyer. For the scoring criteria, a percentage greater than 75% earns a 5, greater than 50% a 4, greater than 25% a 3, greater than 15% a 2, and greater than 10% earns a 1.

Figure 21: Viewshed Land Cover by Alternative

Viewshed Land Cover	Acres		
	PFRT to Spillville	Calmar to Fort Atkinson	Calmar to FA via Lake Meyer
Water	0.92	1.34	2.51
Wetland	3.16	5.15	3.00
Coniferous Forest	3.62	6.02	4.94
Deciduous Short	49.81	54.21	61.73
Deciduous Medium	6.59	6.89	8.31
Deciduous Tall	2.37	2.14	2.47
Grass 1	48.70	116.04	94.86
Grass 2	30.37	132.25	88.33
Cut Hay	2.57	13.73	5.20
Corn	170.26	51.75	35.25
Soybeans	134.67	170.68	143.56
Barren / Fallow	1.29	13.56	13.02
Structures	1.08	4.65	4.37
Roads / Impervious	9.25	32.26	24.26
Shadow / No Data	1.84	3.13	3.05
Visible	464.66	610.66	491.82
Scenic Visible	145.54	324.03	266.16
Percentage Scenic	31.3%	53.1%	54.1%

Environmental Stewardship

Minimizing Environmental Impacts

This criteria item scores the environmental impact of each proposed route. Wetlands are the greatest concern, followed by the removal of trees. Trail construction creates additional impacts such as runoff, materials use, and energy use, but these are not commonly quantified and most likely marginal. Wetlands were considered when creating the route alignment and no wetlands are impacted. This consideration should be expected in the future and are included in this criteria to account for the possibility. Removal of trees and brush is applicable to off-road routes only. The Prairie Farmer Recreation Trail to Spillville and Calmar to Fort Atkinson alternatives utilize existing right-of-way that has already been cleared.

This criteria was ranked third by the Enhancement Committee, and a small group of outside experts ranked environmental stewardship as the top priority. It is our responsibility to minimize harm, especially when our intent is to bring people to nature. Once a trail is constructed, it is the responsibility of each user to minimize their impact to the surrounding land uses. Regardless of the construction impact, a trail may be introducing humans to a previously isolated area. This concern does not apply to any of the proposed alternatives.

A map of wetlands was reviewed to ensure that none of the proposed routes intersected or came within close proximity of a wetland. This wetlands data was from

the National Wetlands Inventory created in 1996. The estimation of grubbing area assumes the trail will require 14 feet of clearing. The process for calculating the acres of grubbing can be found in the Initial Construction Costs criteria.

The scoring reflects the high priority on wetlands and lower priority on grubbing. A score of 5 represents no marginal impact, 4 represents an acre or more of grubbing, 3 represents the impact of one wetland, and a 1 is warranted if two or more wetlands are impacted. Since the Prairie Farmer Recreation Trail to Spillville (Alt 1) and Calmar to Fort Atkinson (Alt 2) are on-road routes, the construction would produce marginal environmental impacts. Since the Calmar to Fort Atkinson via Lake Meyer will require 1.78 acres of grubbing, the route receives a 4.

Potential for Commuting

Trails can provide a more comfortable route for active commuters than on-road routes. On-road routes, especially in rural areas, are typically only used by experienced bicyclists. A trail offers a route for less experienced bicyclists to travel to their destination. This criteria item indicates the potential for commuting along the route. It is a stated priority of the LRTP to increase opportunities for active transportation, but it acknowledges the challenge of establishing the connectivity needed between communities.

The potential for commuting is difficult to identify without understanding the individual preferences of residents. This project has focused primarily on recreation users and those from outside the county. The U.S. Census estimates the means to transportation to work in the American Community Survey. The smallest possible geographic unit of analysis for this statistic is Census Block Group. This statistic is not used for scoring, but is shown in Figure 22.

Figure 22: A Summary of Commuting Patterns in the Study Area

	PFRT to Spillville	Calmar to Fort Atkinson	Calmar to FA via Lake Meyer
Active commuters in neighboring Block Groups (2009-2014 ACS)	60	104	104
Workers commuting between the communities (2014 LEHD)	17	17	17

The U.S. Census maintains the Longitudinal Employer-Household Dynamics (LEHD) program and makes the data available through its OnTheMap interface. Using this data, we can identify the number of workers traveling between the communities connected by the trail. These individuals live at one end of a proposed trail and work at the other end, so the proposed route could be used for commuting. The Calmar to Fort Atkinson route is also the shortest route by personal vehicle because it follows Highway 24. The other alternatives connect communities, but they are not the shortest routes.

The number of commuters between Calmar and Spillville is equal to the number of commuters between Calmar and Fort Atkinson. Each alternative scored a 3 for greater than 15 potential commuters. A score of 5 represents a commuting potential of 25 or more. This scoring range reflects the potential in the rural areas of Winneshiek County, these numbers should be increased if evaluating a trail near the City of Decorah.

Application to Planning Scenario

Index and Weighting Criteria

The purpose of the planning scenario's criteria is to form a composite score for each route alternative. Each route's combined score was subjected to the same criteria weighting. The criteria weighting relies on a composite measurement that consist of: 1) selecting possible items, 2) examining their empirical relationships, and 3) combining some items into an index.[47]

In step one, only items that logically measure aspects of trail development were included in the index. In step two, members of the UERPC's Transportation Enhancement Committee were asked to rank the criteria items by their importance to trail development. Eighteen members of the committee (86% response rate) participated in the survey. The survey's results are summarized in the Appendix. These results were then subjected to a correlation analysis in Excel which produced a spreadsheet listing the strength of relationship existing between every criteria item. Assuming that respondent's will rank related items

similarly, the correlation coefficients can be used to form criteria groups that generally measure the same thing. Following this rationale, groups were formed by placing items exhibiting a positive relationship together while keeping items exhibiting a negative relationship apart. Each of the five resulting groups were assigned a measurement 'theme' based on the commonalities of the criteria items within them. For step three, all but two criteria items were combined into an index. "Proximity to streams, rivers, and/or lakes" and "Number of Businesses Near Trail" were respectively redundant with "Natural Attractions Near Trail" and "Tourism-oriented Activity Near Trail".

The relative importance between the groups was determined by taking the average rank of criteria items in each criteria group and dividing them by the sum of every group's average. The weights assigned to each criteria group are depicted in Figure 23.

Figure 23: Criteria Weighting Calculations

CRITERIA	Rating Average (1-16, Low is Ranked Higher)	Group Average Ranking	Transformation of Numerator (1-16, High is Ranked Higher)	Group Weights	Ranking
INVOLVING & SERVING LOCAL POPULATIONS					
Population Living Near Trail	12.33	8.58	7.42	19.0%	3
Community Support	4.83				
PHYSICAL TRAIL CHARACTERISTICS					
Avoiding Geographical/Topographical challenges	11.61	8.97	7.03	18.0%	4
Provides Significant Riding Distance	12.28				
Separation from Vehicle Traffic	7.83				
Fills Gap in the Regional Trail Network	4.17				
TRAIL FINANCE					
Initial Construction Cost	9.50	9.19	6.81	17.5%	5
Land Acquisition Challenges	7.39				
Projected Maintenance Cost	10.67				
SUROUNDING LAND USES					
Natural Attractions Near Trail	4.89	5.87	10.13	26.0%	1
Scenic Views	5.39				
Tourism-oriented Activity Near Trail	7.33				
ENVIROMENTAL STEWARDSHIP					
Minimizing Environmental Impacts	7.00	8.36	7.64	19.6%	2
Potential for Commuting	9.72				
			Sum of Group Average Weight	Total	
			39.03	100.00%	

Index Limitations

This index lacks sophistication in several ways, and could be improved to become a more reliable indicator for what we are trying to measure. For one, a composite measure should represent only one dimension of a concept. In contrast, this planning scenario's index score summarizes many dimensions of a concept. This reality decreased the index's overall validity. This limitation could be resolved by forming several indexes (rather than just one) that each describe only one dimension of trail development and then subsequently calculating a grand index score from them. Another limitation of the index is that it only analyzes the empirical relationship between criteria items through a bivariate analysis. Including a multivariate analysis could identify the presence of unnecessary items within the criteria as well as the overall power of the index in measuring the variable under consideration.

Despite these limitations, it is reassuring that the weights applied to the index only slightly deviated from default 'flat' weighting. Because of this, it appears unlikely that any criteria items have been unduly rewarded or penalized by the planning scenario's current weighting scheme.

Scoring and Findings

The scoring values are based on the weights described above. The weight for a particular group was divided by the number of criteria items and by the range of scores that the user can enter. The user may enter a score between 1 and 5. 1 representing the least desirable value of the criteria and 5 representing the most desirable.

Figure 24 shows the values that have been assigned for each criteria. Most of these values are transferable to project alternatives across Winneshiek County. These values were assigned based on the analysis completed for each criteria, the justification for each criteria can be found in the respective section above.

The Calmar to Fort Atkinson via Lake Meyer route scored the highest in this planning scenario. This alternative scored 72 out of 100, outscoring the Calmar to Fort Atkinson route by three points and Prairie Farmer Recreation Trail to Spillville route by eight points. The Calmar to Fort Atkinson via Lake Meyer route had

strengths in surrounding land uses, which was the most heavily weighted criteria group. This planning scenario demonstrates the importance of clarifying priorities among stakeholders.

Figure 24: Scoring Ranges

CRITERIA	Score				
	1	2	3	4	5
INVOLVING & SERVING LOCAL POPULATIONS					
Population Living Near Trail	<250 households	<500 households	<750 households	<1000 households	>=1000 households
Community Support	Route not mentioned in LRTP	N/A	Route mentioned in LRTP	N/A	Effort where community input influences decisions
PHYSICAL TRAIL CHARACTERISTICS					
Avoiding Geographical/Topographical challenges	>.2% w/ slope over 5%	>.1% w/ slope over 5%	>.05% w/ slope over 5%	>.01% w/ slope over 5%	0% w/ slope over 5%
Provides Significant Riding Distance	<1mi	1-3mi	3-5mi	5-7mi	>7mi
Separation from Vehicle Traffic	<25%	<50%	<75%	<100%	100%
Fills Gap in the Regional Trail Network	Route not mentioned in LRTP		Route mentioned in LRTP		Exceeds mention in LRTP
TRAIL FINANCE					
Initial Construction Cost	>$1,100,000 per mile	$800,000 to $1,100,000 per mile	$500,000 to $800,000 per mile	$200,000 to $500,000 per mile	<$200,000 per mile
Land Acquisition Challenges	>$15,000	$11k-$15k	$6k-$11k	$1k-$6k	<$1,000
Projected Maintenance Cost (Annual)	>$7,000 per mile	$5k-$7k per mile	$3k-$5k per mile	$1k-$3k per mile	<$1,000 per mile
SUROUNDING LAND USES					
Natural Attractions Near Trail	None	N/A	Access to water or public open space	N/A	Access to water and public open space
Tourism Activity	>=0	>=4	>=6	>=8	>=10
Scenic Views	>0% scenic	<25% scenic	<50% scenic	<75% scenic	>75% scenic
ENVIROMENTAL STEWARDSHIP					
Minimizing Environmental Impacts	2 or more wetlands impacted	N/A	1 wetland impacted	>1 acre grubbing	Marginal impact
Potential for Commuting	>0 workers	>10 workers	>15 workers	>20 workers	>25 workers

RECOMMENDATIONS

Recommendations

Future Use of Economic Impact Assessment

The EIA quantified the economic impact of Trout Run Trail and will be an influential piece of information for trail advocates. The multiplier according to the direct spending input into the model is 1.35. This multiplier warrants a continue use of the EIA approach. We recommend that the collection of spending data and trail usage continue in order to increase confidence in results. The EIA Handbook elaborates on the use IO models and survey methods. We've included a shortened version of the TRT User Survey that collects only the necessary data for the IO model. This should allow for a better survey process.

Future Use of Home Sales Price Analysis

We only advise performing a housing sales price analysis under specific conditions. For the sake of accuracy, the regression model should only be pursued if it includes a large number of sales across time. Absent largescale residential development along any existing or proposed routes, sample size will not be adequate anywhere besides TRT for many years. However, the issues of covariation that we encountered in the TRT analysis will persist over time, making it difficult to draw meaningful conclusions along this route as well.

Additionally, future trail routes will encroach mainly on agricultural land and homesteads. For these types of properties, the relationship between sale price and proximity to trails is poorly understood and is more difficult to quantify than models with traditional residential properties. Other factors mentioned in the housing sales price analysis discussion section introduce further complications for future implementation.

Overall, the technical barriers to a housing sales price analysis for Winneshiek County trails will presumably outweigh the benefits of undertaking such a data intensive process in the short-term. This analysis should be revisited in due time as the value of recently completed trails has more opportunity to be accurately reflected in the housing market.

Guiding Principles for Continued Planning

Engage Coalition

When it comes to expanding trail network, there are few efforts more valuable than strengthening and engaging the county's trail project coalition. Previous trail development successes can largely be attributed to the partnerships formed between local citizens, non-governmental organizations, and governmental agencies. Each of these partners have a shared desire for and stake in expanding and improving the county's trail system. Most recently, the county coalition has been engaged in preparing for the Neste Valley Recreational Area and Dry Run Trail. It is essential that expanding and maintaining these partnerships remains a priority. This is especially true given that future trail development is likely to occur in more rural parts of the county. Rural projects are at a greater risk for garnering less coalition attention than their higher profile counterparts. In addition, current coalition partners will experience turnover over time. For these reasons, the county should consistently reach out to coalition members to keep them appraised of the latest trail development activity. This can prevent coalition members from losing interest in the long-term vision for county trails.

Involve Public

Public involvement in the trail development process is essential for many reasons. Bringing disparate voices together in dialogue allows groups to either reinforce an existing vision or formulate a new one that is grounded in community values. It also gives government representatives from across the region an improved understanding of public sentiment towards past, present, and future projects. This knowledge can be used to solidify a more efficient trail planning process, improve competitiveness for external funding, and ensure community readiness. Additionally, the act of pursuing public input in itself bolsters perceived government transparency. WCCB and UERPC should take advantage of two public engagement tools.

Survey Questionnaires

Winneshiek County already conduct surveys on its trails and should continue to do so. When possible, the Northeast Iowa Trail User Survey should be combined

with a survey that gets the data necessary for carrying out an economic impact assessment.

Surveys are also an inexpensive way to collect satisfaction and preference data on existing and proposed routes. It would also be useful for the public to engage in the same criteria prioritization exercise that UERPC members completed in order to bring insight into the differences that exist between citizens. In doing these things, the county should fully leverage its online and social media presence to reach trail users.

Public Workshops

Much of the same data can be collected at public workshops, with the added benefit of fostering community dialogue. Workshops are a setting in which UERPC members can brief the public on the planning process and introduce the rationale that guide trail development. The active nature of the workshop can also introduce new perspectives, leading to novel ideas.

Data Collection and Monitoring

Systematically performing trail counts throughout the county is a worthwhile investment and is a key component of demonstrating the success of existing and proposed trails. Trail counts do not always need to be taken manually by county staffers as there are traffic counting products able to do so independently. Infrared trails counters are a low cost method of rolling out a trail monitoring program. These temporary devices have been implemented reliably to obtain accurate measurements of trail user volumes in other parts of Iowa. Efforts to keep track of trail user volumes produce a resource that is useful when predicting trail usage patterns on proposed trail segments.

Ongoing Process

Building a regional trail network is a process that has and will take years to complete. The methods and procedures presented in this report are intended to be reused, adapted or altered to fit varying conditions. The economic impact assessment tools and information provided will be allow communities to assess the effect of trails on their economy, and build public and political support for recreational trail development.

A natural assumption is that as the regional trail network comes together it will draw more outside visitors

into northeast Iowa. Conducting future economic impact assessments on previously assessed trails will indicate changes over time in a given trail's effect on the economy as the overall network is realized. The housing sales price analysis resources also provided in this report offer another important potential tool in building public and private support for the regional trails vision. Returning to this method once a substantial amount of time has passed since the completion of a trail will allow proper analysis of the before and after effects of trails on the assessed value of a home.

Having a method of determining future trail routes will provide consistency and predictability to the process for those actually working toward the trail network, and contribute a measure of transparency for community members on the outside of the planning and development process. Strengthening the regional trails coalition and encouraging public involvement arguably reinforce one another. The coalition will grow as the public becomes engaged and interested. Finally, continued data collection and monitoring will serve any forthcoming economic impact or housing analyses.

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APPENDIX

Appendix

Figure 25: Full Economic Impact Results

Total Spending	Primary Purpose Visitor	Secondary Purpose Visitor	Primary Purpose Local	Secondary Purpose Local
Restaurants and bars (including breweries / wineries)	$685,186 - $820,717	$393,196 - $470,971	$70,312 - $84,220	-
Groceries / snacks / beverages	$177,623 - $212,757	$74,354 - $89,061	$222,890 - $266,978	-
Gas or diesel fuel	$247,129 - $296,012	$83,159 - $99,608	$7,031 - $8,422	-
Entertainment, museums, attractions, special events, etc.	$95,554 - $114,454	$58,701 - $70,312	$35,156 - $42,110	$5,753 - $6,891
Equipment rental (bike rental, gear, etc.)	$50,530 - $60,525	$5,870 - $7,031	-	-
Bicycles	$7,774 - $9,312	-	$45,001 - $53,903	-
Bicycle supplies / equipment	$20,730 - $24,831	$4,403 - $5,273	$11,800 - $14,134	-
Clothing / shoes	$90,371 - $108,247	$57,233 - $68,554	$48,920 - $58,596	$8,949 - $10,719
Other-trail related expenses (excluding rentals)	$7,774 - $9,312	$9,099 - $10,898	$2,663 - $3,189	-
Lodging	$412,074 - $493,584	$569,787 - $682,492	-	-
Total Soft Good Spending	**$1,256,022 - $1,504,466**	**$615,280 - $736,984**	**$335,389 - $401,730**	**$5,753 - $6,891**
Total Durable Good Spending	**$126,649 - $151,701**	**$70,734 - $84,726**	**$108,384 - $129,822**	**$8,949 - $10,719**
Total Accommodation Spending	**$412,074 - $$493,584**	**$569,787 - $682,492**	**-**	**-**

Per Trip Spending	Primary Purpose Visitor	Secondary Purpose Visitor	Primary Purpose Local	Secondary Purpose Local
Restaurants and bars (including breweries / wineries)	**$23.59 - $28.26**	$35.86 - $42.95	$1.44 - $1.73	-
Groceries / snacks / beverages	**$6.12 - $7.33**	$6.78 - $8.12	$4.58 - $5.48	-
Gas or diesel fuel	**$8.51 - $10.19**	$7.58 - $9.08	$0.14 - $0.17	-
Entertainment, museums, attractions, special events, etc.	**$3.29 - $3.94**	$5.35 - $6.41	$0.72 - $0.87	$0.98 - $1.17
Equipment rental (bike rental, gear, etc.)	**$1.74 - $2.08**	$0.54 - $0.64	-	-
Bicycles	**$0.27 - $0.32**	-	$0.92 - $1.11	-
Bicycle supplies / equipment	**$0.71 - $0.85**	$0.40 - $0.48	$0.24 - $0.29	-
Clothing / shoes	**$3.11 - $3.73**	$5.22 - $6.25	$1.00 - $1.20	$1.52 - $1.82
Other-trail related expenses (excluding rentals)	**$0.27 - $0.32**	$0.83 - $0.99	$0.05 - $0.07	-
Lodging	**$14.19 - $16.99**	$51.96 - $62.24	-	-

Figure 26: Per Trip Spending

Survey Document

Trout Run Trail User Survey

Your responses are contributing to an Economic Impact Assessment being conducted by graduate students from the University of Iowa. The assessment will help Winneshiek County understand the economic value of recreational trails.

Q1: What is your home zip code? _____

Q2: How many people are in your travel party?

Adults: _____ Children: _____

Q3: Please list the primary purpose of today's trail trip. (choose one)

◯ Recreation/exercise on the Trout Run Trail
◯ Use of the Trout Run Trail was secondary
My primary activity was (e.g. Commuting to work):
_____

Q4: Is today your first visit to the Trout Run Trail?

◯ Yes (Skip to Q7) ◯ No →
How many visits have you made to the Trout Run Trail in the past year?
_____

Q5: How often did you visit the Trout Run Trail during the following seasons in the past year?

Season	Daily	4-5 times/ week	2-3 times/ week	Once a week	2-3 times/ month	Once a month	Rarely /Never
Spring	◯	◯	◯	◯	◯	◯	◯
Summer	◯	◯	◯	◯	◯	◯	◯
Fall	◯	◯	◯	◯	◯	◯	◯
Winter	◯	◯	◯	◯	◯	◯	◯

Q6: Which access points have you used most often to visit the Trout Run Trail? (select up to three)

- ◻ Will Baker Park (Pulpit Park Campground)
- ◻ Dug Road (Visitors Center)
- ◻ Wold Park
- ◻ Trout Run Park (Bowstring Bridge)
- ◻ Fish Hatchery
- ◻ Highway 9 Bridge
- ◻ Other (Please specify or describe):
_____

Q7: What activities have you engaged in (or will engage in) during this trip?

Recreation (check all that apply)	**Social/Business** (check all that apply)
◻ Biking	◻ Commuting to work
◻ Mountain Biking	◻ Shopping
◻ Running / Walking	◻ Visit a restaurant/bar/brewery
◻ Fishing	◻ Visit friends or relatives in the area
◻ Dog walking	◻ Business trip
◻ Birdwatching	◻ Attend a Luther College Event
◻ Skating (roller or board)	◻ Attend a special event in Decorah or Winneshiek County (please specify): _____
◻ Geocaching	Visit local attractions: ◻ Prairie Farmer Trail ◻ Fish Hatchery ◻ Eagles Nest ◻ Dunning Springs ◻ Seed Savers Exchange ◻Other (please specify): _____
◻ Canoeing / Kayaking	
◻ Other recreation (please specify): _____	◻ Other social activity or business (please specify): _____

Q8: Please report all trip expenses made by you or your travel party within Winneshiek County on this trip.

Spending is being reported for (circle one): ONLY ME ENTIRE TRAVEL PARTY

Spending Category	Spending
Restaurants and bars (including breweries / wineries)	$ _____
Groceries / snacks / beverages	$ _____
Gas or diesel fuel	$ _____
Entertainment, museums, attractions, special events, etc.	$ _____
Equipment rental (bike rental, gear, etc.)	$ _____

Q9: Did you make any of the following purchases in Winneshiek County in the past year?

Spending is being reported for (circle one): ONLY ME ENTIRE TRAVEL PARTY

Spending Category	Spending
Bicycles	$ _____
Bicycle supplies / equipment	$ _____
Clothing / shoes	$ _____
Other-trail related expenses (excluding rentals)	$ _____

Q10: Was today's visit part of a day trip or overnight trip?

Lodging is being reported for (circle one): ONLY ME ENTIRE TRAVEL PARTY

◯ Day trip
◯ Overnight Trip --> Number of nights:_____ Cost per night: $ _____
Type of lodging:
◯ Hotel/Motel
◯ Bed & breakfast
◯ Campground
◯ Stayed with friends or relatives in the area

Q11: Comments and suggestions: What do you enjoy most about the trail? What problems have you encountered? Any other comments are welcome.

Responses below are optional:

This demographic data will be used to compare this survey group to past and future surveys.

Q12: What is your gender?
◯ Male ◯ Female

Q13: What is your age? _____

Q14: What was your approximate household income in the past year?

◯ $0 - $24,999	◯ $50,000- $74,999	◯ $100,000 - $199,999
◯ $25,000 - $49,999	◯ $75,000 - $99,999	◯ $200,0000 or up

Q15: What is the highest level of education that you have completed?

◯ Less than high school	◯ Four-year undergraduate degree
◯ High school graduate or equivalent	◯ Master's degree
◯ Some college or two-year associate's degree	◯ Doctorate / Professional degree

If you have questions regarding trails in Winneshiek County, use the following contact information:
Winneshiek County Conservation Board
Email: conservation@winneshiekwild.com
Phone: (563) 534-7145

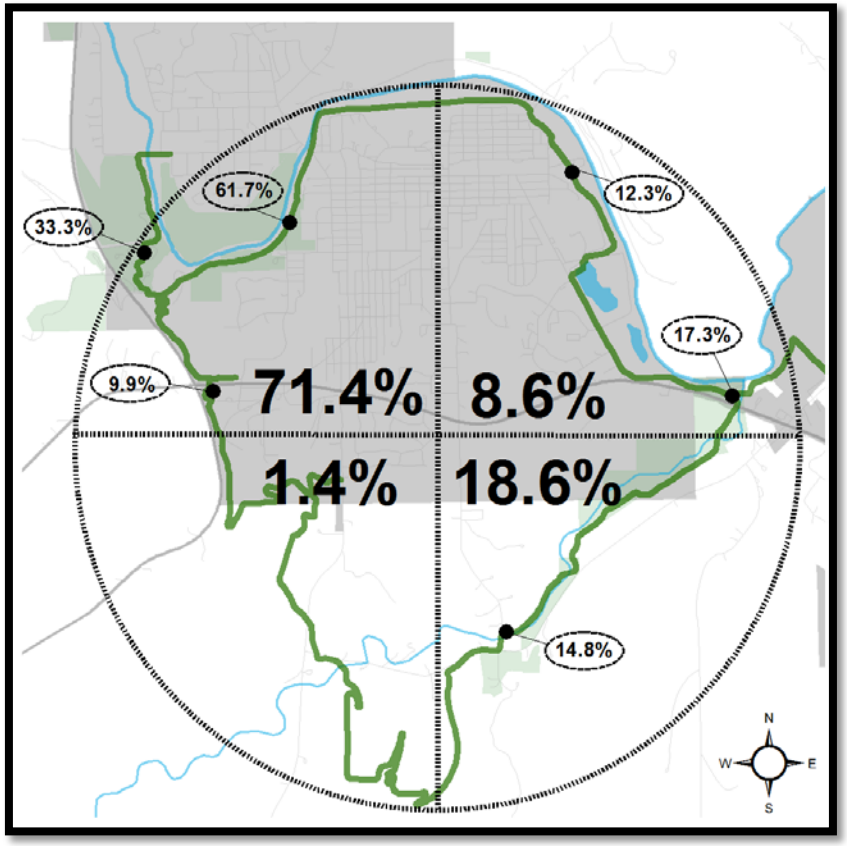
Full Survey Results

Trip Information:

Average travel party size
2.25 people
Physical disabilities within the travel party
6.6% of travel parties had a physically disabled member
93.4% of travel parties had no physically disabled member
Reason for the trail visit
77.7% Visit the TRT primarily
19.8% TRT was a secondary stop
1.7% Commute to or from work
Familiarity with the trail
20.7% First time users
79.3% Have used the trail before
Average number of visits to the trail in the last year
98.3 trips for Winneshiek County users
11.8 trips for outside Winneshiek County users
Frequency of trail use by season
(1=rarely or never, 2=once a month, 3=2-3 times a month, 4=once a week, 5=2-3 times a week, 6=4-5 times a week, 7=daily)
Spring = 3.95
Summer = 4.27
Fall = 4.12
Winter = 2.44
Segments of the trail explored most often
71.4% Segment 1
8.6% Segment 2
18.6% Segment 3
1.4% Segment 4

Points of access to the trail used most often
(Respondents could choose up to three options)

61.7% Dug Road
33.3% Will Baker Park (Pulpit Rock Campground)
17.3% Trout Run Park (Bowstring Bridge)
14.8% Fish Hatchery
12.3% Wold Park
11.1 % Other, not listed
9.9% Highway 9 Bridge



Recreation activities undertaken on the trip
(Respondents could choose multiple options)
Top four:
65.2% Run/Jog/Walk
50.4% Bicycling
17.4% Hiking (on unpaved path)
12.4% Dog walking

Social/business activities undertaken the trip
(Respondents could choose multiple options)
Top four:
23.1% Visited a restaurant/bar/brewery
18.2% Visited the Decorah Fish Hatchery
17.4% Went Shopping
15.7% Visited friends or relatives in the area

Figure 27: Satisfaction Information

Satisfaction details for the trip (1=very unsatisfied, 2=unsatisfied, 3=neutral, 4=satisfied, 5=very satisfied)	Average Score
Cleanliness of trail corridor	4.60
Condition of the trail surface	4.56
Ease of getting around	4.52
Trail signage	4.48
Maintenance / Upkeep of trail facilities	4.48
Information posted at trailheads	4.47
Trail safety	4.44
Restaurants and bars (including breweries)	4.43
Campgrounds	4.42
Exhibits / Interpretive panels	4.34
Food / groceries	4.33
Bicycle repair / maintenance	4.31
Shopping	4.20
Restroom cleanliness	4.19
Hotels, motels, B&B or other lodging	4.12
Information center	4.12

Figure 28: Spending Information

Soft good spending in Winneshiek County per person for the trip	Local	Non-Local
Restaurants and bars (including breweries / wineries)	$ 1.43	$ 30.42
Groceries / snacks / beverages	$ 4.53	$ 6.96
Gas or diesel fuel	$ 0.14	$ 9.01
Entertainment, museums, attractions, special events, etc.	$ 0.82	$ 4.37
Equipment rental (bike rental, gear, etc.)	$ -	$ 1.47
Hard good spending purchases in Winneshiek County over the last 12 months	**Local**	**Non-Local**
Bicycles	$ 50.83	$ 0.20
Bicycle supplies / equipment	$ 19.72	$ 0.67
Clothing / shoes	$ 50.67	$ 6.32
Other-trail related expenses (excluding rentals)	$ 2.90	$ 0.60

Accommodation details for the trip

- 73.9% Day trip
- 26% Overnight trip
  - 2.3 average number of nights
  - $105.29 average cost per night
    - 30% Hotel/motel
    - 26.7% Campground
    - 20% Bed and Breakfast
    - 20% Stayed with friends/relatives in the area
    - 3.3% Stayed overnight outside of the area

Demographic Information:

Zip Code

55.4% Decorah Area
2.5% Waverly Area
2.5% St. Paul, MN
39.7% Other

Gender

- 42.2% Male
- 57.8% Female

Median age

- 52 years old

Approximate household income

$50,000 - $99,000

Educational Attainment

- 77.8% of trail users have a four-year undergraduate degree or higher

Figure 29: Evaluation Criteria Survey to Enhancement Committee

Criteria Ranking Survey																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Score (Higher is Better)
Population living near trail	0.0%	0.0%	0.0%	0.0%	5.6%	0.0%	5.6%	5.6%	0.0%	5.6%	16.7%	11.1%	5.6%	11.1%	11.1%	22.2%		
	0	0	0	0	1	0	1	1	0	1	3	2	1	2	2	4	18	4.67
Number of businesses near trail	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%	0.0%	5.6%	5.6%	5.6%	16.7%	33.3%	11.1%	11.1%		
	0	0	0	0	0	0	0	2	0	1	1	1	3	6	2	2	18	4
Natural attractions near trail	5.6%	5.6%	22.2%	11.1%	22.2%	11.1%	11.1%	5.6%	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%		
	1	1	4	2	4	2	2	1	0	0	1	0	0	0	0	0	18	12.11
Tourism-oriented activity near trail	0.0%	16.7%	11.1%	5.6%	11.1%	5.6%	5.6%	0.0%	11.1%	5.6%	5.6%	0.0%	11.1%	11.1%	0.0%	0.0%		
	0	3	2	1	2	1	1	0	2	1	1	0	2	2	0	0	18	9.67
Land acquisition challenges	5.6%	5.6%	0.0%	22.2%	11.1%	0.0%	11.1%	5.6%	5.6%	5.6%	5.6%	11.1%	5.6%	0.0%	5.6%	0.0%		
	1	1	0	4	2	0	2	1	1	1	1	2	1	0	1	0	18	9.61
Minimizing environmental impacts	5.6%	0.0%	11.1%	11.1%	16.7%	11.1%	11.1%	5.6%	0.0%	5.6%	5.6%	5.6%	5.6%	0.0%	0.0%	5.6%		
	1	0	2	2	3	2	2	1	0	1	1	1	1	0	0	1	18	10
Avoiding geographical/topographical challenges	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.6%	5.6%	11.1%	16.7%	16.7%	11.1%	5.6%	5.6%	11.1%	11.1%		
	0	0	0	0	0	0	1	1	2	3	3	2	1	1	2	2	18	5.39
Initial construction cost	0.0%	0.0%	5.6%	5.6%	5.6%	0.0%	11.1%	16.7%	0.0%	11.1%	22.2%	5.6%	5.6%	0.0%	0.0%	11.1%		
	0	0	1	1	1	0	2	3	0	2	4	1	1	0	0	2	18	7.5
Projected maintenance cost	5.6%	5.6%	0.0%	0.0%	0.0%	0.0%	11.1%	5.6%	5.6%	16.7%	0.0%	5.6%	16.7%	0.0%	16.7%	11.1%		
	1	1	0	0	0	0	2	1	1	3	0	1	3	0	3	2	18	6.33
Scenic views	27.8%	11.1%	11.1%	0.0%	5.6%	5.6%	11.1%	5.6%	0.0%	11.1%	0.0%	0.0%	5.6%	0.0%	0.0%	5.6%		
	5	2	2	0	1	1	2	1	0	2	0	0	1	0	0	1	18	11.61
Proximity to streams, rivers, and/or lakes	0.0%	16.7%	5.6%	5.6%	5.6%	0.0%	5.6%	0.0%	27.8%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	0.0%		
	0	3	1	1	1	0	1	0	5	1	1	1	1	1	1	0	18	8.94
Potential for commuting	0.0%	5.6%	11.1%	0.0%	0.0%	0.0%	11.1%	11.1%	16.7%	5.6%	5.6%	0.0%	5.6%	0.0%	22.2%	5.6%		
	0	1	2	0	0	0	2	2	3	1	1	0	1	0	4	1	18	7.28
Fills gap in the regional trail network	38.9%	22.2%	0.0%	11.1%	0.0%	5.6%	0.0%	5.6%	0.0%	0.0%	0.0%	11.1%	0.0%	5.6%	0.0%	0.0%		
	7	4	0	2	0	1	0	1	0	0	0	2	0	1	0	0	18	12.83
Community support	11.1%	0.0%	16.7%	16.7%	11.1%	33.3%	0.0%	0.0%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		
	2	0	3	3	2	6	0	0	2	0	0	0	0	0	0	0	18	12.17
Provides significant riding distance	0.0%	0.0%	0.0%	5.6%	0.0%	11.1%	0.0%	0.0%	5.6%	5.6%	0.0%	5.6%	11.1%	27.8%	11.1%	16.7%		
	0	0	0	1	0	2	0	0	1	1	0	1	2	5	2	3	18	4.72
Separation from vehicle traffic	0.0%	11.1%	5.6%	5.6%	5.6%	16.7%	0.0%	16.7%	5.6%	0.0%	5.6%	22.2%	0.0%	0.0%	5.6%	0.0%		
	0	2	1	1	1	3	0	3	1	0	1	4	0	0	1	0	18	9.17

Evaluation Criteria Maps

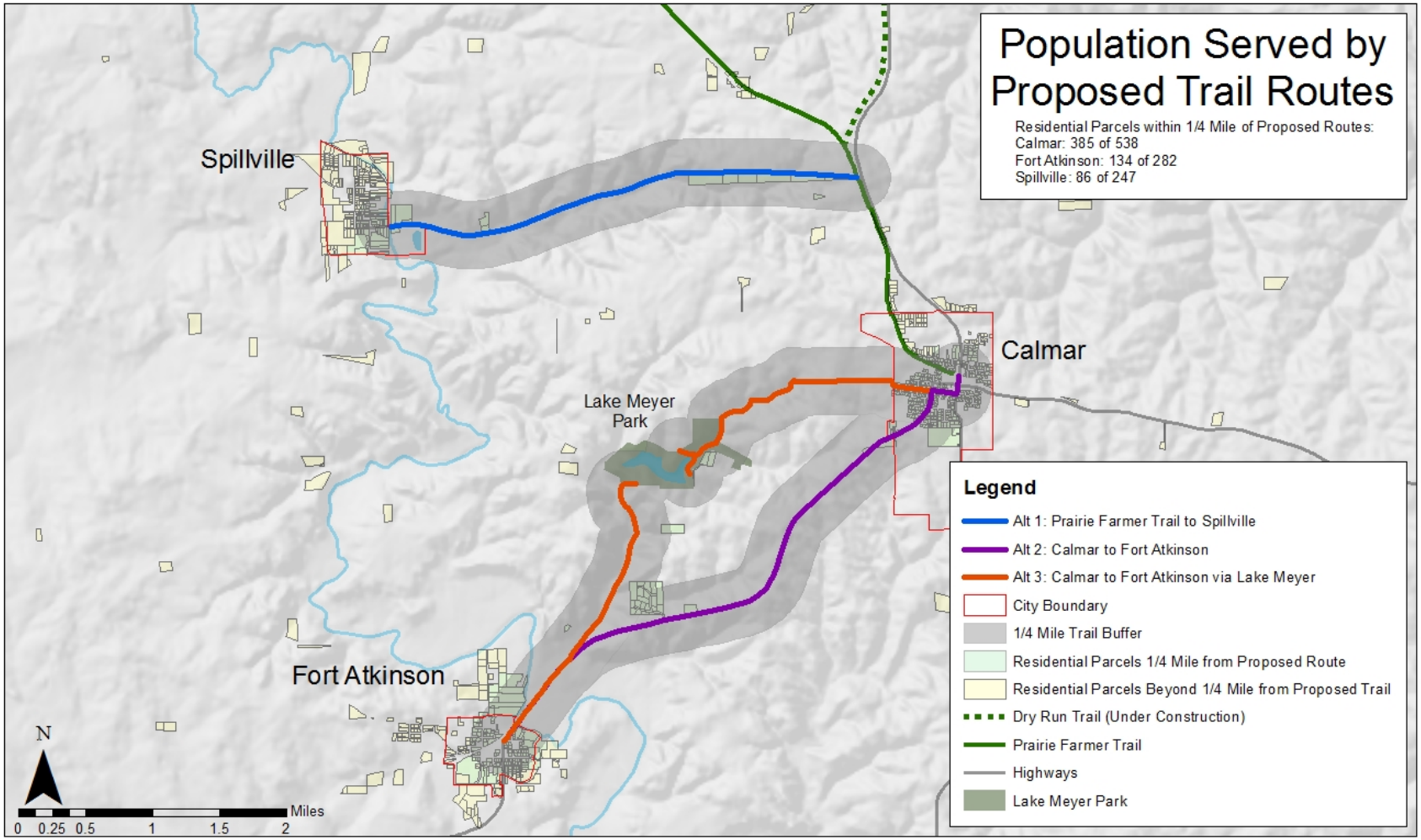


Figure 30: Population Served by Proposed Trail Routes

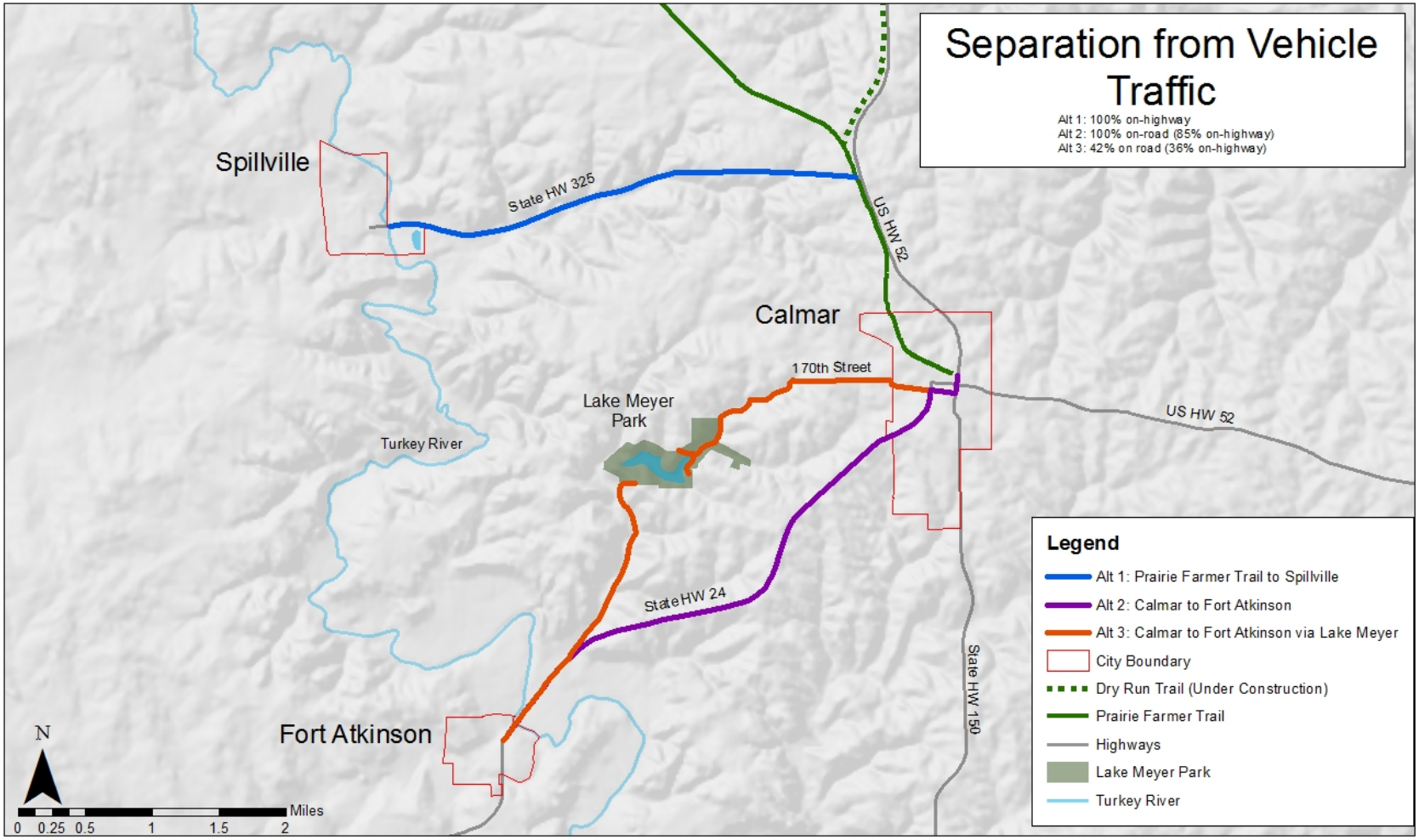


Figure 31: Separation from Vehicle Traffic

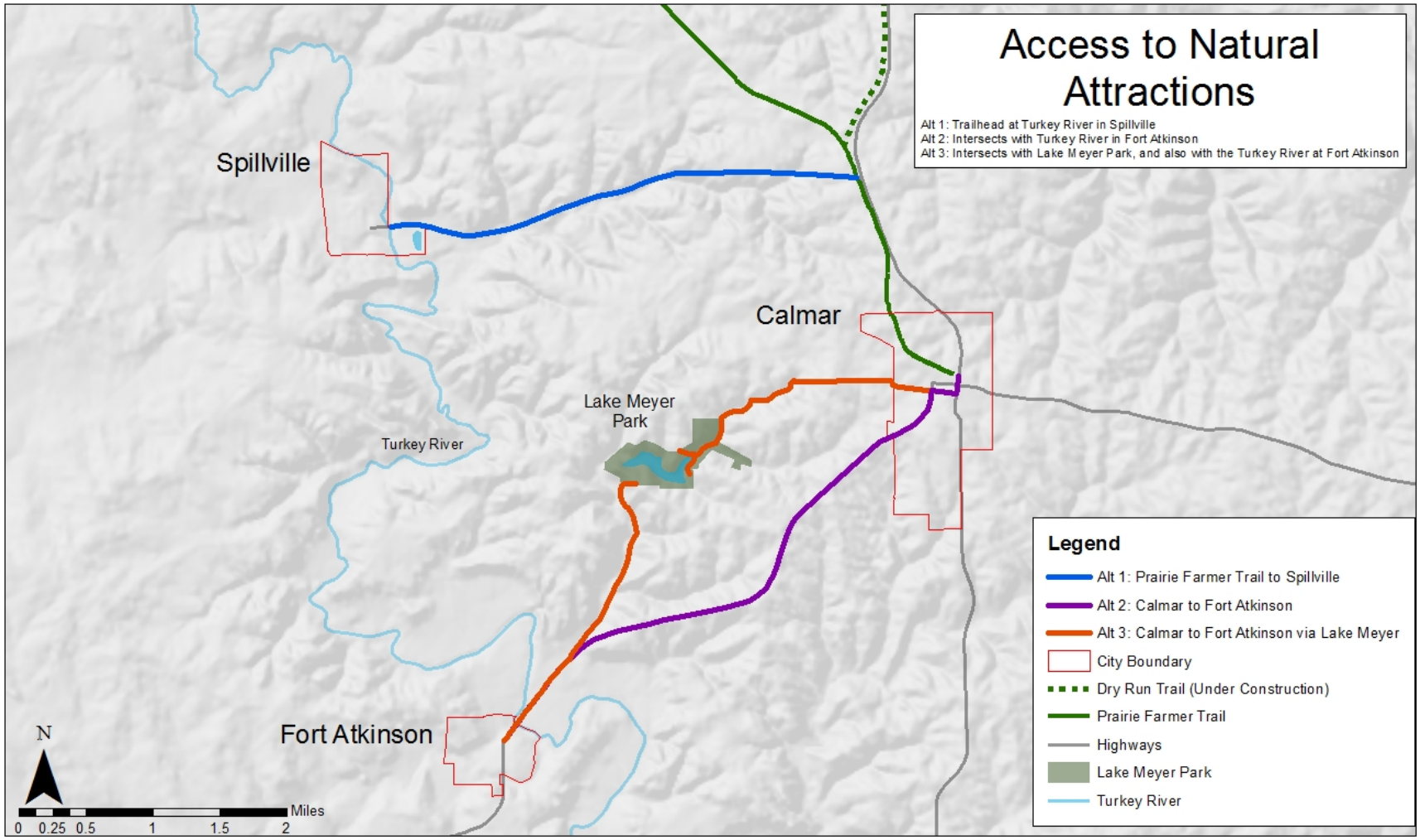


Figure 32: Access to Natural Attractions

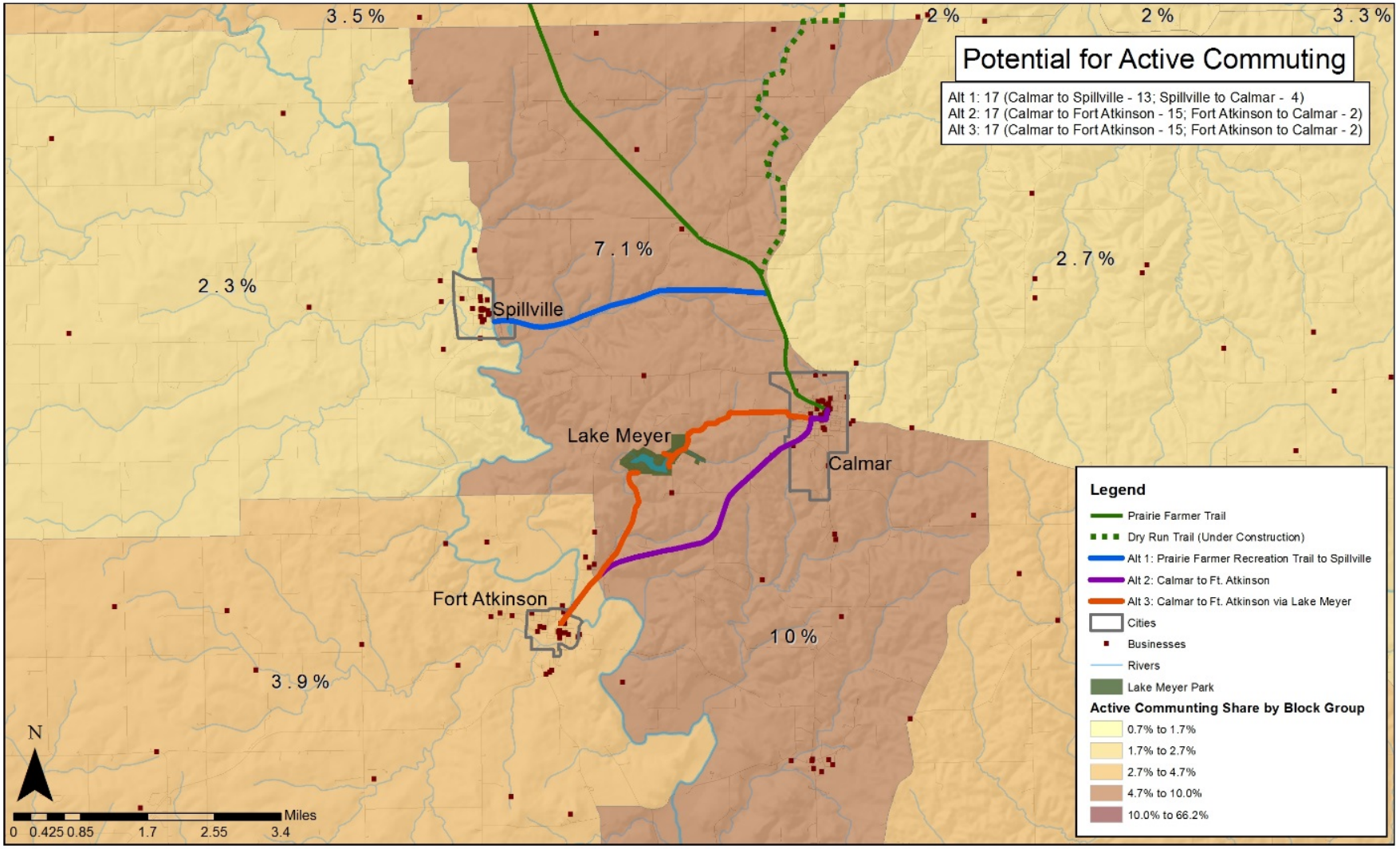


Figure 33: Potential for Active Commuting

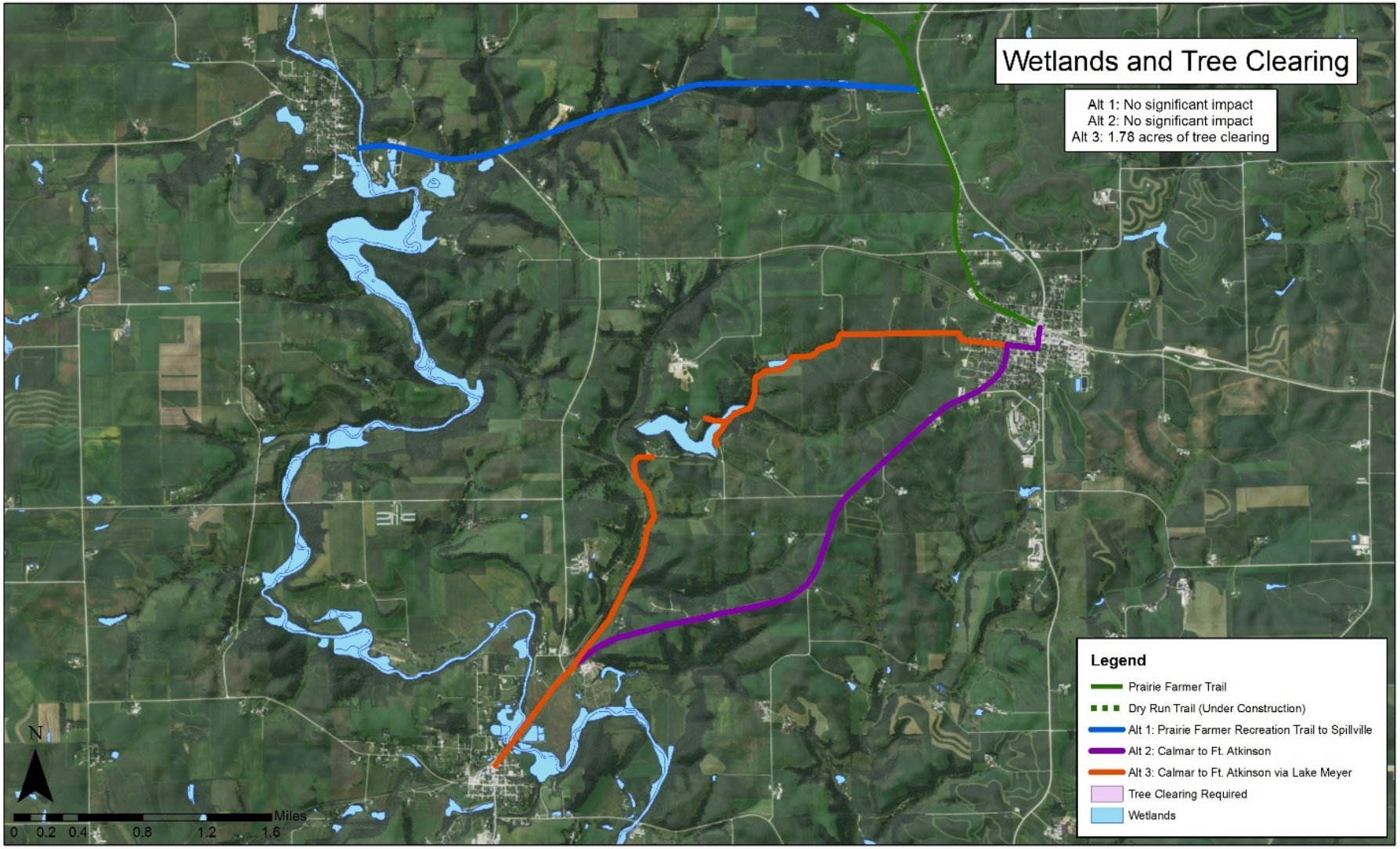


Figure 34: Wetlands and Tree Clearing

Figure 35: Cost Estimates for Alternatives

		Item	Unit Cost	Unit	Alternative 1: Prairie Farmer Trail to Spillville (Hwy 325)	Alternative 2: Calmar to Fort Atkinson (Hwy 24)	Alternative 3: Calmar to Fort Atkinson (via Lake Meyer)
CONSTRUCTION COSTS	TRAIL DESIGN ELEMENTS	CONSTRUCTION					
		Clearing, grubbing	$ 2,960.00	Acre	$ -	$ -	$ 5,258.31
		Grading	$ 4,440.00	Mile	$ -	$ -	$ 12,756.28
		Granular sub base	$ 0.60	Square Feet	$ -	$ -	$ 91,845.18
		Concrete	$ 3.33	Square Feet	$ -	$ -	$ 509,740.80
		Seeding, mulching	$ 2,368.00	Acre	$ -	$ -	$ 3,330.59
		Other Costs	10% of trail cost	Percent of Total	$ -	$ -	$ 62,293.12
		Construction Services	5% of trail cost	Percent of Total	$ 21,374.30	$ 24,060.45	$ 31,146.56
		STRUCTURES					
		Bridge	$ 35,200.00	Bridge	$ -	$ -	$ 35,200.00
		Bridge foundation	$ 90.00	Square Yards	$ -	$ -	$ 1,773.00
		Riprap	$ 25.00	Square Yards	$ -	$ -	$ 246.00
		Bench	$ 664.00	1/4 Mile	$ 9,461.68	$ 12,448.37	$ 13,426.19
		TRAIL SIGNAGE					
		Kiosk	$ 2,743.00	1 per Trail	$ -	$ -	$ 2,743.00
		Trail posts	$ 221.00	Mile	$ -	$ -	$ 1,117.16
		Informative pedestal	$ 162.00	1 per Trail	$ -	$ -	$ 162.00
	ROAD DESIGN ELEMENTS	PAVEMENT					
		4 Foot Paved Shoulders (4" deep) (inclusive cost)	$ 120,000.00	Mile	$ 427,486.00	$ 481,209.00	$ 93,900.30
		Road Diet Bike Lanes and Marking	$ 27,000.00	Mile	$ -	$ 18,274.00	$ 37,081.40
		Bicycle Marking (on shoulder segment)	$ 160.00	1,000 Feet	$ 3,009.50	$ 3,387.71	$ 661.06
		ROAD SIGNAGE					
		Foundation	$ 250.00	1/4 Mile	$ 3,562.38	$ 4,686.89	$ -
		Sign Post (aprox. 10 feet tall)	$ 200.00	1/4 Mile	$ 2,849.90	$ 3,749.51	$ -
		Sign panel	$ 25.00	1/4 Mile	$ 356.24	$ 468.69	$ -
				TOTAL CONSTRUCTION COST	**$ 468,100.01**	**$ 548,284.61**	**$ 902,680.96**
				PER MILE CONSTRUCTION COST	**$ 131,400.88**	**$ 116,982.73**	**$ 178,570.38**
MAINT.		ANNUAL MAINTENANCE					
		Bicycle and Lane Markings	$ 80.00	1,000 Feet	**$ 1,504.75**	**$ 1,693.86**	**$ -**
		General Trail Maintenance	$ 1,500.00	Mile	**$ -**	**$ -**	**$ 4,348.73**
R.O.W.		RIGHT-OF-WAY ACQUISITON					
		Assessed Land Value	Assessed Land Value	Acre	**$ -**	**$ -**	**$ 11,400.00**

		Item	Unit Cost	Unit	Source
CONSTRUCTION COSTS	TRAIL DESIGN ELEMENTS	**CONSTRUCTION**			
		Clearing, grubbing	$ 2,960.00	Acre	Garrone, Kevin, Haley Jindrich, Robert Rogers, and Bradley Weaverling. Neste Park Recreational Trails. Report. May 1, 2015. Accessed April 14, 2016. http://iisc.uiowa.edu/sites/iisc/files/project-files/Neste Park Trail_Report_iisclogo.pdf.
		Grading	$ 4,440.00	Mile	Same as above
		Granular sub base	$ 0.60	Square Feet	Same as above
		Concrete	$ 3.33	Square Feet	Same as above
		Seeding, mulching	$ 2,368.00	Acre	Same as above
		Other Costs	10% of trail cost	Percent of Total	Same as above
		Construction Services	5% of trail cost	Percent of Total	Same as above
		STRUCTURES			
		Bridge	$ 35,200.00	Bridge	Same as above
		Bridge foundation	$ 90.00	Square Yards	Same as above
		Riprap	$ 25.00	Square Yards	Same as above
		Bench	$ 664.00	1/4 Mile	Cost: Same as above Spacing: "Designing Sidewalks and Trails for Access." FHWA Bicycle and Pedestrian Program. February 10, 2014. Accessed April 14, 2016. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap5a.cfm.
		TRAIL SIGNAGE			
		Kiosk	$ 2,743.00	1 per Trail	Same as "Riprap" above
		Trail posts	$ 221.00	Mile	Same as "Riprap" above
		Informative pedestal	$ 162.00	1 per Trail	Same as "Riprap" above
	ROAD DESIGN ELEMENTS	**PAVEMENT**			
		4 Foot Paved Shoulders (4" deep) (inclusive cost)	$120,000.00	Mile	"Incorporating On-Road Bicycle Networks into Resurfacing Projects." FHWA Bicycle and Pedestrian Program. March 4, 2016. Accessed April 14, 2016. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/page04.cfm.
		Road Diet Bike Lanes and Marking	$ 27,000.00	Mile	Center for Transportation Research and Education, Iowa State University. Paved Shoulders on Primary Highways in Iowa: An Analysis of Shoulder Surfacing Criteria, Costs, and Benefits.Report. November 2001. Accessed April 14, 2016. http://www.intrans.iastate.edu/reports/pavedshoulder.pdf.
		Bicycle Marking (on shoulder segment)	$ 160.00	1,000 Feet	**Cost:** Bushell, Max A., Bryan W. Poole, Charles V. Zegger, and Daniel A. Rodriguez. Costs for Pedestrian and Bicyclist Infrastructure Improvements. Report. October 2013. Accessed April 14, 2016. http://c.ymcdn.com/sites/www.apbp.org/resource/resmgr/Docs/Costs_for_Pedestrian_and_Bic.pdf. **Spacing:** "2009 Edition Chapter 3D. Markings For Preferential Lanes." FHWA Manual on Uniform Traffic Control Devices (MUTCD). July 8, 2015. Accessed April 14, 2016. http://mutcd.fhwa.dot.gov/htm/2009/part3/part3d.htm.
		ROAD SIGNAGE			
		Foundation	$ 250.00	1/4 Mile	Virginia Department of Transportation. U.S. Bicycle Route 1 Estimated Signage Costs. Report. November 25, 2014. Accessed April 14, 2016. http://www.virginiadot.org/programs/resources/bike/USBR_1_Signage_Cost_Estimate_112514.pdf.
		Sign Post (aprox. 10 feet tall)	$ 200.00	1/4 Mile	Same as above
		Sign panel	$ 25.00	1/4 Mile	Same as above
MAINT.		**ANNUAL MAINTENANCE**			
		Bicycle and Lane Markings	$ 80.00	1,000 Feet	Same as "Bicycle Marking (on shoulder segment)" above
		General Trail Maintenance	$ 1,500.00	Mile	Milwaukee County Dept. of Parks. "Trail Maintenance and Management." National Trails Training Partnership. 2007. Accessed April 14, 2016. http://www.americantrails.org/resources/ManageMaintain/MilwMaintcost.html.
R.O.W.		**RIGHT-OF-WAY ACQUISITON**			
		Assessed Land Value	Assessed Land Value	Acre	"Beacon: Winneshiek County, IA." The Schneider Corporation. Accessed April 14, 2016. https://beaconbeta.schneidercorp.com/Application.aspx?AppID=110&LayerID=1180&PageTypeID=2&PageID=664.

Figure 36: Cost Data Sources

Detailed Trail Finance Estimation Steps

1. If a cost is determined using linear measurement for the length of the trail, simply multiply the unit cost by the length in ArcMap
    a. This includes: Grading, structural amenities, paved shoulders, road/lane markings, signage
2. If cost is determined using area measurement for the length of the trail, create a buffer around the trail of the desired width. Then multiply the unit cost by the area of the polygon in ArcMap
    a. This includes: concrete, granular sub base, seeding and mulching
3. If cost is determined using area measurement only for specified portions of the trail, multiply the unit cost by the combined area of the segments involved in
    a. This includes:
        i. Clearing grubbing: Using the land cover raster layer, calculate the area that is classified under any sort of tree or shrubbery cover
        ii. Land Acquisition: Using county parcels layer with assessed land value, intersect the parcel layers with the trail right-of-way layer. For privately owned land, multiply the assessed land value per acre by the acreage of the intersecting shapes
        iii. Pavement or lane treatment: Because trails and different road types require different treatments, it is important to split route segments at points where the treatment type changes (i.e. bike lane markings can substitute for a paved shoulder when speed limit drops to a certain level).

LQ/Shift-Share Analysis

Location Quotient

Location quotient (LQ) is an economic instrument that is useful for determining basic industries in a local, regional, or state economy.[48] A basic industry produces goods and services for export; a non-basic industry produces goods and services that are mostly consumed locally. Winneshiek County was compared to the State of Iowa in this analysis. A county industry which exports its goods and services more efficiently than the corresponding industry average at the state-level is a basic industry.[49] LQ is calculated by dividing employment numbers in a county-level industry by total state-level employment, then dividing that result by the state-level employment in the same industry. An LQ value greater than 1 signifies a basic industry, while a value close or equal to 1 is an industry operating at or near the state average.

The sectors in Figure 36 were chosen due to their high employment numbers and their possible relevance to the tourism industry. County employment data was estimated for the following aggregated industries: agriculture, forestry, fishing and hunting; mining, quarrying, and oil and gas extraction; utilities; real estate; management of companies and enterprises; and educational services. Winneshiek County is home to nineteen of the twenty industries determined by the North American Industry Classification System (NAICS). Of those, educational services hold an LQ of 7.13, indicating a relatively strong county specialization in that industry. The mining, quarrying, and oil and gas extraction industry has an LQ of 2, the next highest LQ in the county. Eight industries have an LQ at or near 1, suggesting those industries are performing close to their corresponding industries at the state-level. Nine industries fall into the non-basic category.

Educational services not only possess the highest LQ but is also the largest employer in the county, accounting for more than 2,400 jobs and a quarter of the county's total employment. Relative the size of Winneshiek County, Luther College and Northeast Iowa Community College provide goods and services that extend beyond the county line. The

manufacturing, retail and healthcare industries are the next highest employers. Their LQs indicate that they are operating close to state industrial performance.

Figure 37: Select Location Quotient Results

Location Quotient Results		County (2013)	Share of County (%)	State (2013)	Share of State (%)	LQ
NAICS	Total for all sectors	9,585		1,305,216		
31	Manufacturing	1,390	0.15	208,190	0.16	0.91
44	Retail Trade	1,220	0.13	178,668	0.14	0.93
61	Educational Services	2,432	0.25	46,470	0.04	7.13
62	Health Care and Social Assistance	1,389	0.14	215,820	0.17	0.88
71	Arts, Entertainment, and Recreation	52	0.01	20,346	0.02	0.35
72	Accommodation and Food Services	759	0.08	115,365	0.09	0.90

Shift Share Analysis

Shift share analysis identifies changes in employment in a study area over time compared to a baseline economy.[50] This type of analysis reinforces location quotient, highlighting strong and weak industries in a local economy. Usually the national economy is the foundation for comparison, but in this case it is more suitable to analyze Winneshiek County next to the State of Iowa due to its small population. The years 2010 and 2013 are used to determine change over time. Shift share contains three elements: national share (NS), industry mix (IM), and regional shift (RS).

NS, which may be thought of as state share in this analysis, examines what job growth or loss in a county industry is due to total state job growth in all industries.[51] In this case NS is determined by multiplying employment in a county

industry for 2010 by the total change in employment at the state-level between 2010 and 2013. IM indicates what job growth in a county industry is the result of the growth rate in the same industry at the state-level, as opposed to NS which looks at all state-level industries.[52] To calculate IM, a county industry's 2010 employment number is multiplied by the state-level change in employment from 2010-2013 in the same industry. The last component of shift share is regional shift (RS), more properly thought of as county shift in this analysis. RS highlights the industries in which Winneshiek County holds a competitive advantage in relation to the state.[53] To determine RS, 2010 county employment in an industry is multiplied by the difference in employment in the same state-level industry between 2010 and 2013.

The results for NS show that if the county industries experienced growth at the state rate, Winneshiek County's economy would have added 402 jobs over the period of analysis. On an individual level, educational services performed better compared to the industry at the state-level, growing by over 400 jobs in the period instead of 83 jobs. Five other industries performed better compared to the state: agriculture, utilities, construction, wholesale trade, and professional, scientific and technical services. The remaining industries performed the same or worse than if they were identical to the state. Further, industry mix (IM) results indicate nine of the twenty industries have positive IM values. Overall, the IM calculations show that Winneshiek County has 286 more jobs than it would if its economy were composed like the state.

Regional shift (RS) is the most telling component of shift share. The outcome of this analysis shows that the net loss of 771 jobs in the county are attributable to the uncompetitive position of the local economy compared to the state. Educational services have the largest growth of the county's industries, with 92 jobs attributable to its competitive advantage over the state. Construction and other services follow educational services for the most competitive industries relative to the state. Mining, administrative and support and remediation services, and accommodation and food services have the least competitive industries in the RS analysis. Location quotient and shift share together show that educational services is the most consistently strong industry in the county. The next portion of the economic profile will examine tourism in the county.

Figure 38: Select Shift Share Results

Shift Share Results		County Employment		State Employment		Shift Share		
		2010	2013	2010	2013	NS	IM	RS
NAICS	Total for all sectors	9,668	9,585	1,253,095	1,305,216	402	286	-771
31	Manufacturing	1,388	1,390	195,635	208,190	58	31	-87
44	Retail Trade	1,273	1,220	174,080	178,668	53	-19	-87
61	Educational Services	1,993	2,432	39,576	46,470	83	264	92
62	Health Care and Social Assistance	1,425	1,389	207,653	215,820	59	-3	-92
71	Arts, Entertainment, and Recreation	98	52	20,758	20,346	4	-6	-44
72	Accommodation and Food Services	826	759	110,969	115,365	34	-2	-100

Figure 39: Full Location Quotient Results

Location Quotient for Winneshiek County		County (2013)	Share of County (%)	State (2013)	Share of State (%)	LQ
NAICS	Total for all sectors	9,585		1,305,216		
11	Agriculture, Forestry, Fishing and Hunting	17	0.002	2,526	0.002	0.92
21	Mining, Quarrying, and Oil and Gas Extraction	28	0.003	1,904	0.001	2.00
22	Utilities	68	0.007	7,913	0.006	1.17
23	Construction	376	0.04	56,983	0.04	0.90
31	Manufacturing	1,390	0.15	208,190	0.16	0.91
42	Wholesale Trade	291	0.03	66,659	0.05	0.59
44	Retail Trade	1,220	0.13	178,668	0.14	0.93
48	Transportation and Warehousing	215	0.02	55,443	0.04	0.53
51	Information	120	0.01	30,432	0.02	0.54
52	Finance and Insurance	259	0.03	91,984	0.07	0.38
53	Real Estate and Rental and Leasing	51	0.01	12,298	0.01	0.56
54	Professional, Scientific, and Technical Services	174	0.02	49,897	0.04	0.47
55	Management of Companies and Enterprises	23	0.002	18,880	0.01	0.17
56	Administrative and Support and Waste Management and Remediation Services	352	.04	75,407	0.06	0.64
61	Educational Services	2,432	0.25	46,470	0.04	7.13
62	Health Care and Social Assistance	1,389	0.14	215,820	0.17	0.88
71	Arts, Entertainment, and Recreation	52	0.01	20,346	0.02	0.35
72	Accommodation and Food Services	759	0.08	115,365	0.09	0.90
81	Other Services (except Public Administration)	369	0.04	49,910	0.04	1.01

Figure 40: Full Shift Share Results

Shift Share for Winneshiek County and the State of Iowa		County Employment		State Employment		Shift Share		
		2010	2013	2010	2013	NS	IM	RS
NAICS	Total for all sectors	9,668	9,585	1,253,095	1,305,216	402	286	-771
11	Agriculture, Forestry, Fishing and Hunting	11	17	1,897	2,526	0	3	2
21	Mining, Quarrying, and Oil and Gas Extraction	307	28	1,661	1,904	13	32	-324
22	Utilities	53	68	7,328	7,913	2	2	11
23	Construction	323	376	55,283	56,983	13	-4	43
31	Manufacturing	1,388	1,390	195,635	208,190	58	31	-87
42	Wholesale Trade	255	291	64,370	66,659	11	-2	27
44	Retail Trade	1,273	1,220	174,080	178,668	53	-19	-87
48	Transportation and Warehousing	259	215	53,447	55,443	11	-1	-54
51	Information	159	120	33,046	30,432	7	-19	-26
52	Finance and Insurance	251	259	92,105	91,984	10	-11	8
53	Real Estate and Rental and Leasing	68	51	13,786	12,298	3	-10	-10
54	Professional, Scientific, and Technical Services	151	174	46,355	49,897	6	5	11
55	Management of Companies and Enterprises	23	23	17,442	18,880	1	1	-2
56	Administrative and Support and Waste Management and Remediation Services	444	352	64,600	75,407	18	56	-166
61	Educational Services	1,993	2,432	39,576	46,470	83	264	92
62	Health Care and Social Assistance	1,425	1,389	207,653	215,820	59	-3	-92
71	Arts, Entertainment, and Recreation	98	52	20,758	20,346	4	-6	-44
72	Accommodation and Food Services	826	759	110,969	115,365	34	-2	-100
81	Other Services (except Public Administration)	361	369	52,449	49,910	15	-32	25

Literature Review of Economic Impact Assessment

The Input-Output (IO) model dates back to 1941 with Wassily Leontief's national-level multipliers.[54] Many regional models were then developed in the 1960s and 1970s using adjustments for local conditions. [55] IO models became more widely available with the development of models by the Bureau of Economic Analysis (RIMS II), Minnesota IMPLAN Group, Inc. (IMPLAN), and Regional Economics Model, Inc. (REMI). These products are used by economists and planners to measure the effect of economic events and investments. The ease of use also meant more misuse of IO models. There is extensive literature available on the use and misuse of this tool,[56] including the use of IO models for tourism impacts.[57]

Percy Harris discusses the limitations of using IO models for economic impact studies relating to tourism.[58] The first consideration is that the increase in visitors to the region must be permanent. The trail attracts users throughout the year and has the potential to progressively increase tourism to Winneshiek County if it grows in popularity and additional trails are developed. Another consideration is that impacts do not occur continuously, as suggested in statements such as, "for every additional 1,000 trips there is .5 jobs generated." Instead impacts tend to only accrue if a certain threshold is met and even then the impacts may accrue sporadically. Harris suggests that economic impact be only one form of analysis for decision-makers and advocates for a comprehensive benefit-cost analysis.

The IMPLAN (Impact Analyses and Planning) model was first developed by the U.S. Forest Service to assist with land management planning and then privatized in 1993 under the Minnesota IMPLAN Group.[59] The model is built on data from a variety of government sources including County Business Patterns (U.S. Census) and the Bureau of Economic Analysis. It can be specified for national-level, state-level, or county-level analysis. These scales are constructed from the top down, meaning national data is the control for state data, and state data is a control for county data.[60]

While the model is built on actual collected data down to the county-level, to project the impact of an activity that has not happened, some assumptions must be made.[61] An important component in determining the multipliers is estimating the portion of indirect and induced spending that will leave the local economy. This will vary based on the local concentration of the business to the national concentration, and this assumes that all industries are behaving the same. The model assumes there are no supply constraints in the market. No matter the initial change you input into the model, there will be no diminishing returns.[62]

Having a model specific to Winneshiek County allows us to account for any users of the trail from outside the county to constitute an economic impact. However, the IO model cannot measure interregional feedback, so if a Winneshiek County business purchases an input from a business in a Fayette County and then this business purchases financial services from a bank in Decorah, the financial services are not included.

The IO model is based on 2015 data but the relationships and values of input in the model stay constant, this means the predictions of the model do not change over time and cannot respond to any significant technological or market changes.[63]

Economic impact studies of trails vary greatly in depth of analysis. Many studies report the total direct spending without using an IO model. The depth of analysis in these studies generally meet the needs of decision-makers. The disadvantage of this approach is that the direct employment, direct labor income, indirect effects, and induced effects are left unknown, resulting in an underestimation of economic impact. In its handbook for Iowa communities, Iowa DOT recommends using an IO model.[64] The handbook provides best practices and guiding principles for developing trails to meet community goals. The DOT recommends the use of economic impact assessment for measuring the impact of new trail construction (one-time events) and user spending associated with the trail.

The 2007 study of the Virginia Creeper Rail Trail is an example of using an IO model to assess the economic impact of a trail.[65] This study was unique in the thoroughness of its methodology and utilized IMPLAN multipliers to determine the net economic impact of the trail. After an estimation of trail usage based on demand, they determined the average per person expenditures on the trail and input this into an IO model. The results of this study and comparative trails are included in the results section.

Full Home Sales Price Analysis Results

Detailed hedonic model results of pre-TRT completion sales including both distance to downtown and distance to TRT

Source	SS	df	MS
Model	263.378341	10	26.3378341
Residual	164.236127	1169	.140492837
Total	427.614468	1179	.362692509

Number of obs =	1180
F(10, 1169) =	187.47
Prob > F =	0.0000
R-squared =	0.6159
Adj R-squared =	0.6126
Root MSE =	.37482

lnsalesprice	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
aftertrailXquartermile	.0714237	.051836	1.38	0.169	-.0302784	.1731257
aftertrt	.0478745	.0250153	1.91	0.056	-.0012053	.0969544
quartermile	-.0084096	.0400668	-0.21	0.834	-.0870205	.0702012
milesdwntwn	-.0454169	.0033686	-13.48	0.000	-.0520261	-.0388077
age	-.0053828	.000268	-20.09	0.000	-.0059086	-.0048571
totallivingarea	.0004039	.0000214	18.86	0.000	.0003619	.000446
deckporcharea	.0004202	.0000675	6.23	0.000	.0002878	.0005525
garagearea	.0003624	.0000402	9.01	0.000	.0002836	.0004413
grade4pctproficient	.0095277	.0042398	2.25	0.025	.0012093	.0178461
PctFRL	.0027427	.0018086	1.52	0.130	-.0008057	.0062911
_cons	10.60809	.3930323	26.99	0.000	9.836962	11.37922

Detailed hedonic model results of pre-TRT completion sales excluding distance to downtown

Source	SS	df	MS
Model	107.758677	7	15.3940968
Residual	97.5249094	546	.17861705
Total	205.283587	553	.371218059

Number of obs =	554
F(7, 546) =	86.18
Prob > F =	0.0000
R-squared =	0.5249
Adj R-squared =	0.5188
Root MSE =	.42263

lnsalesprice	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
quartermile	.1235818	.0450588	2.74	0.006	.0350721	.2120916
age	-.0050808	.0004407	-11.53	0.000	-.0059465	-.0042151
totallivingarea	.0004446	.0000356	12.47	0.000	.0003746	.0005146
deckporcharea	.0004095	.0001076	3.80	0.000	.0001981	.0006209
garagearea	.0003724	.0000674	5.53	0.000	.00024	.0005047
PctFRL	.0045512	.0031852	1.43	0.154	-.0017057	.010808
grade4pctproficient	.0392004	.0062889	6.23	0.000	.0268471	.0515537
_cons	7.644428	.5973913	12.80	0.000	6.470961	8.817894

Figure 42: Housing Sales Price Analysis Continued

Detailed hedonic model results of all sales

Source	SS	df	MS
Model	263.378341	10	26.3378341
Residual	164.236127	1169	.140492837
Total	427.614468	1179	.362692509

Number of obs =	1180
F(10, 1169) =	187.47
Prob > F =	0.0000
R-squared =	0.6159
Adj R-squared =	0.6126
Root MSE =	.37482

lnsalesprice	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
aftertrailXquartermile	.0714237	.051836	1.38	0.169	-.0302784	.1731257
aftertrt	.0478745	.0250153	1.91	0.056	-.0012053	.0969544
quartermile	-.0084096	.0400668	-0.21	0.834	-.0870205	.0702012
milesdwntwn	-.0454169	.0033686	-13.48	0.000	-.0520261	-.0388077
age	-.0053828	.000268	-20.09	0.000	-.0059086	-.0048571
totallivingarea	.0004039	.0000214	18.86	0.000	.0003619	.000446
deckporcharea	.0004202	.0000675	6.23	0.000	.0002878	.0005525
garagearea	.0003624	.0000402	9.01	0.000	.0002836	.0004413
grade4pctproficient	.0095277	.0042398	2.25	0.025	.0012093	.0178461
PctFRL	.0027427	.0018086	1.52	0.130	-.0008057	.0062911
_cons	10.60809	.3930323	26.99	0.000	9.836962	11.37922

Figure 43: Housing Sales Price Analysis Continued

Trailhead Suitability Analysis

The purpose of this analysis is to build on the economic impact assessment (EIA) that was performed in this report. One way in which to improve the economic impact of the trail is to bring more trail visitors to the doorsteps of nearby businesses. This can be done by making improvements at trailheads that are closest to businesses with the highest potential for economic impact.

Trout Run Trail (TRT) in Decorah, Iowa rivals the most notorious Midwest trails in scenic appeal. However, it never brings trail users closer than 0.45 miles from its historic central business district. Although it is infeasible to change the path of the trail, the strategic designation of a trailhead or access point along the trail, teamed with improved wayfinding, can bring the town and its visitors closer together. This suitability analysis identifies locations along TRT at which The City of Decorah and the Winneshiek County Conservation Board (WCCB) can make minor improvements better integrate the trail with community amenities.

Method

The analysis uses common tools used in urban network analysis to measure weighted distance along the road network from one location (a trailhead) to all other locations (nearby businesses) in the system. We specifically used closeness. "Closeness indicates how close each of these locations is to all other surrounding locations within a given distance threshold."[66] This measure allows the user to assign a weight to the distance between a trailhead and all businesses. In this case, our weight is reflective of the economic impact potential of a business. The economic weight is the product of the two following components:

1) $\boldsymbol{Economic\ Impact\ Share\ of\ Business\ i} = \frac{\boldsymbol{Economic\ Impact\ in\ Indsutry\ i}}{\boldsymbol{Total\ Economic\ Impact}}$

2) $\boldsymbol{Multiplier} = \boldsymbol{IMPLAN\ Type\ II\ Output\ Multiplier}\ (\boldsymbol{specific\ to\ Winneshiek\ County})$

The industry specific values are shown in Figure 42 below for each component and the weight are shown in the table below.

Industry Code	Industry Description	Share of EIA	Multiplier	Weight
400	Retail - Food and beverage stores	0.03	1.13	0.03
402	Retail - Gasoline stores	0.02	1.14	0.02
403	Retail - Clothing and clothing accessories stores	0.03	1.12	0.03
404	Retail - Sporting goods, hobby, musical instrument and book stores	0.02	1.13	0.02
405	Retail - General merchandise stores	0.00	1.12	0.00
492	Independent artists, writers, and performers	0.04	1.40	0.05
493	Museums, historical sites, zoos, and parks	0.04	1.49	0.06
499	Hotels and motels, including casino hotels	0.31	1.39	0.44
501	Full-service restaurants	0.17	1.38	0.24
502	Limited-service restaurants	0.17	1.34	0.23
503	All other food and drinking places	0.17	1.38	0.24

Figure 44: Industry Specific Values for EIA

Once this weight was devised, it could then be inserted into the closeness calculation for each trailhead. That equation is shown below.

$$Closeness[i]^r = \Sigma\left(\frac{1}{d_{i,j}} * W_j\right)$$

Where:

$r =$ *search radius*

$\Sigma =$ *The sum of the values for all O-D combinations from trailhead i*

$d_{i,j} =$ *Inverse distance (in miles) from trailhead i to business j*

$W_j =$ *Economic impact weight of business j*

The above calculation represents "the inverse cumulative distance required to reach from that [location] to all other [locations] in the system that fall within the search radius along the shortest paths."[67] This calculation is performed in the Urban Network Analysis Toolbox in ArcGIS. Specifically an origin-destination (O-D) table is created using county roads as the network, trailheads as the origins, and businesses as the destinations. An overview of the study area is shown in Figure 26.

Seventeen trailheads were evaluated in the analysis. Six of them are existing access points and eleven of them are locations at which a connection is feasible. 144 businesses were included as well.

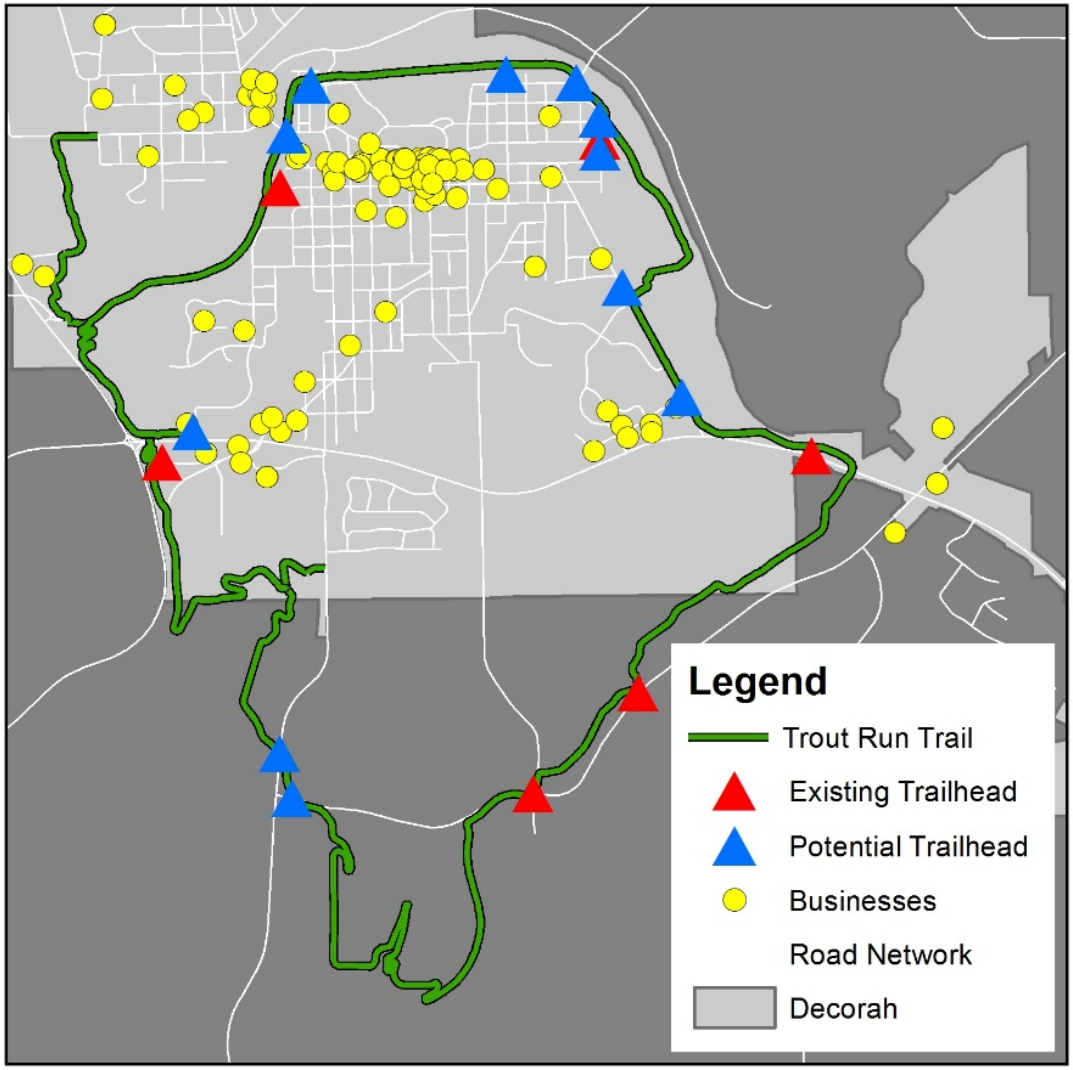


Figure 45: Overview of the Trail Suitability Study Area around TRT

Results and Analysis

#	Name	Type	Score
1	College Drive Bridge	Potential	55.7
2	Dug Road	Existing	38.6
3	Monroe Street	Potential	37.1
4	Commerce Street	Potential	35.5
5	Park Street	Potential	29.1
6	2nd Street	Potential	26.8
7	Winn Co-op	Potential	25.8
8	Wold Park	Existing	24.5
9	Decorah Avenue	Potential	22.9
10	Highway 9 Bridge	Existing	22
11	Quarry Pond	Potential	21.9
12	5th Street	Potential	21.5
13	East Highway 9	Existing	14.4
14	Middle Calmar Road	Potential	10.7
15	West Trout Run Road	Potential	9.8
16	Fish Hatchery	Existing	9.8
17	East Trout Run Road	Existing	8.3

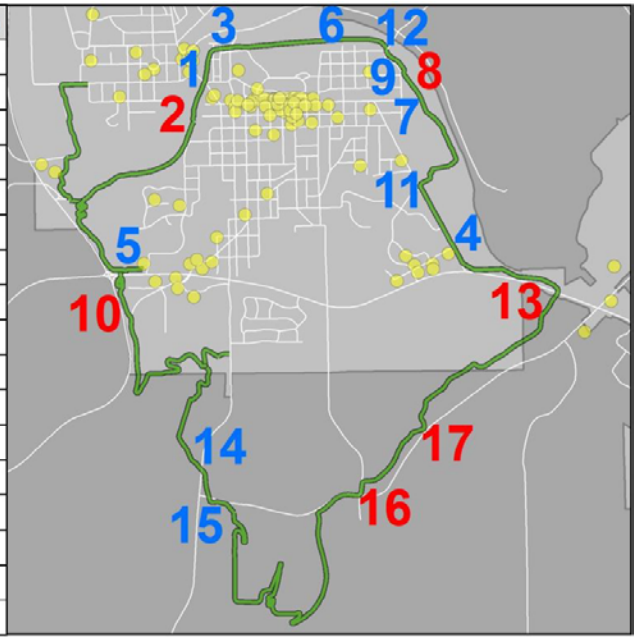


Figure 46: Analysis Results Shown in both Tabular and Spatial Formats

These figures illustrate that the highest scoring trailhead (Trailhead 1 - College Drive Bridge) outscores the second highest scoring trailhead (Trailhead 2 – Dug Road) by 17.1 points, despite being less than 1,000 feet apart from one another on the trail. The difference between Trailheads 1 and 2 is the same as the score between Trailhead 2 and Trailhead 12 (5th Street). This observation emphasizes the large gap by which Trailhead 1 leads all others. Additionally, Trailhead 1 is a total of 4.6 miles closer to all businesses than Trailhead 2.

Trailhead 3 (Monroe Street) is also located very close to Trailheads 1 and 2. Trailhead 4 also scored very high and is located an average of 1.5 miles from the top 3. Upon closer examination, Trailhead 3 scored high due to its close

proximity to two hotels and two full service restaurants. This illustrates the power of the economic impact weight of hotel/accommodation and full service restaurant industry businesses.

An unweighted analysis was performed to see if results would differ when only accounting for distance. This analysis produced fairly similar results. The main difference was that the disparity between Trailhead 1 and other trailheads. This demonstrates that the businesses in the secondary business district (west of the trail) have relatively large economic impact potential and are a major reason for the high closeness score at Trailhead 1.

Trailheads 1 and 2 represent the top two candidate locations for trailhead improvement. The potential improvements can be summarized into three distinct scenarios. Trailhead 1 currently does not exist and, under Scenario A, would require significant grading and paving to reach street level. The trail currently goes under the bridge at this location and would need to climb a flood levee to make a connection to the road network. Once at street level, signage would be necessary to inform users of the opportunities that exist in either direction. Lastly, because College Drive is heavily traveled, it may be necessary to include bicycle markings on the roadway so that cyclists feel safe leaving the trail and so motorists are aware of possible cyclists.

Under Scenario B, the trail could utilize the crest of the flood levee to connect Trailheads 1 and 2. Local joggers, walkers, and a limited number of cyclists already use the crest of the levee to reach the Trailhead 2 from the bridge because they are at equal elevation. This informal route has been weathered into a worn grass path and is not visually welcoming to most visitors using the paved trail. This path could be formalized by laying crushed aggregate to create a secondary route that runs parallel to TRT for several hundred feet. This project would also require improved wayfinding to signal to visitors the benefits of taking

Trailhead 2 is the most often used of the existing trailheads and would be the sole focus of Scenario C. This trailhead offers a short and direct route to downtown businesses for those who are familiar the community. However, it is

lacking adequate wayfinding for unfamiliar visitors and is in need of a more direct or more pronounced route to the secondary business district. This can be achieved through improved wayfinding teamed with the implementation of bicycle markings on the road.

A conceptual mapping of these scenarios is provided in Figure 3 along with summarized cost estimates and project components. More detailed costs are provided in the Appendix along with their source.

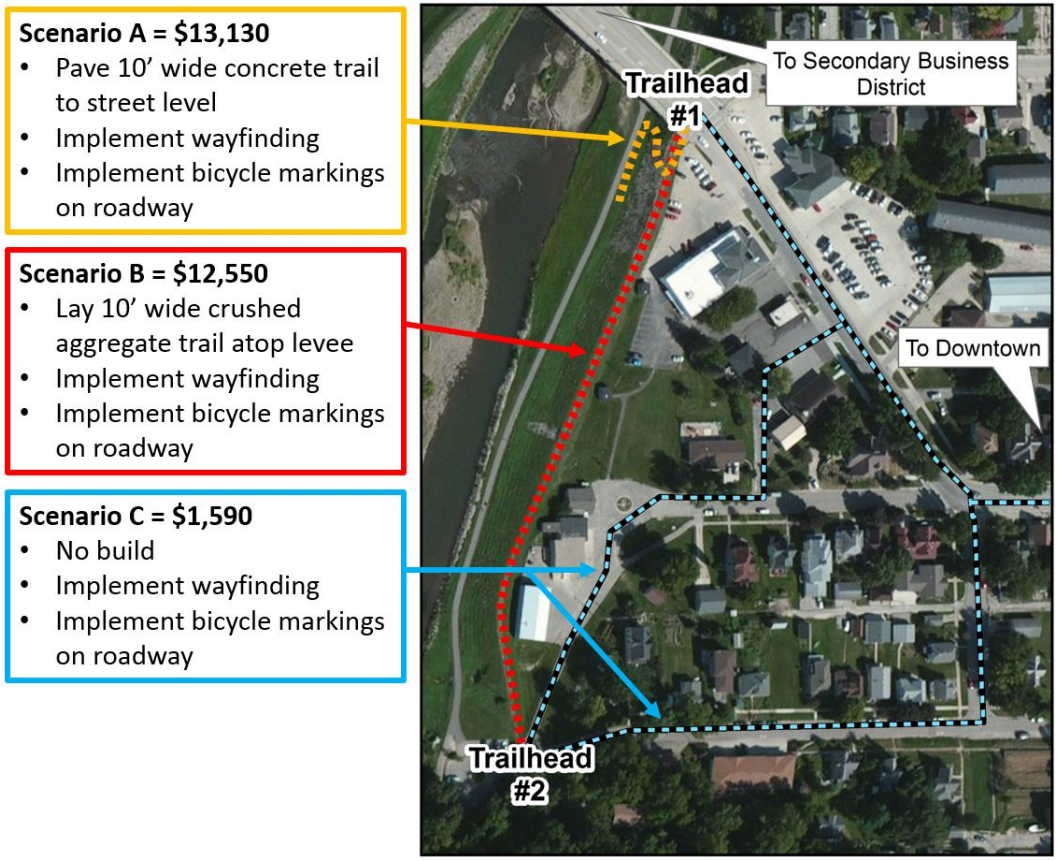


Figure 47: Summarized Costs for Three Different Trailhead Improvement Scenarios

To improve this analysis for TRT specifically, future surveys should be geared to capture more detailed business spending. Although it is not feasible to collect data on every business visited by a user, surveys could collect data specific to industries used by IMPLAN. Immediate survey improvements should focus on separating restaurant spending into full service and limited service. Likewise, entertainment can be separated into bowling centers, amusement parks and arcades, fitness and recreational sports centers, hotel and motel entertainment, racing and track operation, commercial sports, performing arts, and more. Hotel/motel accommodations can be further separated to segment out campgrounds, bed-and-breakfasts, cabins, and the like. These added details would allow for a more accurate economic impact weight.

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