



SIGNAGE INVENTORY DATABASE AND PLAN

Improving the signage system along the Sunset Bike
Route in Peninsula State Park

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Submitted: November 23, 2016

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Overview of problem and project

State parks function similarly to transportation systems, albeit on a slightly different scale. With important nodes, high and low density paths and seasonal barriers or important stopping points (landmarks, campsites, etc.) every element of the park's trail and road system is an asset that needs to be maintained at an efficient level of operation. It is common for asset management plans to fall under state level planning^{1,2}. This project was designed to provide data and resources for planning at the local park level with a specific focus on a park's signage.

In 2015, Wisconsin Governor, Scott Walker, proposed budget changes that would eliminate general purpose revenue for state parks and increase user fees³. This change was driven by the idea that parks should be paid for by the people who use them. With the budget passed it was only a matter of time before Wisconsin's parks would begin to see the strains on their resources due to a lack of state funding. Devil's Lake State Park, one of the state's most popular parks, posted a list of future issues parks will face with no more funding. The list focused mainly on a reduction of staff and resources that would lead to poor trail and facility maintenance, slower registration and an increased lack of safety⁴. With this decrease in funding it is more important than ever that Wisconsin's parks maintain an efficient level of operation with the limited resources and staff they have.

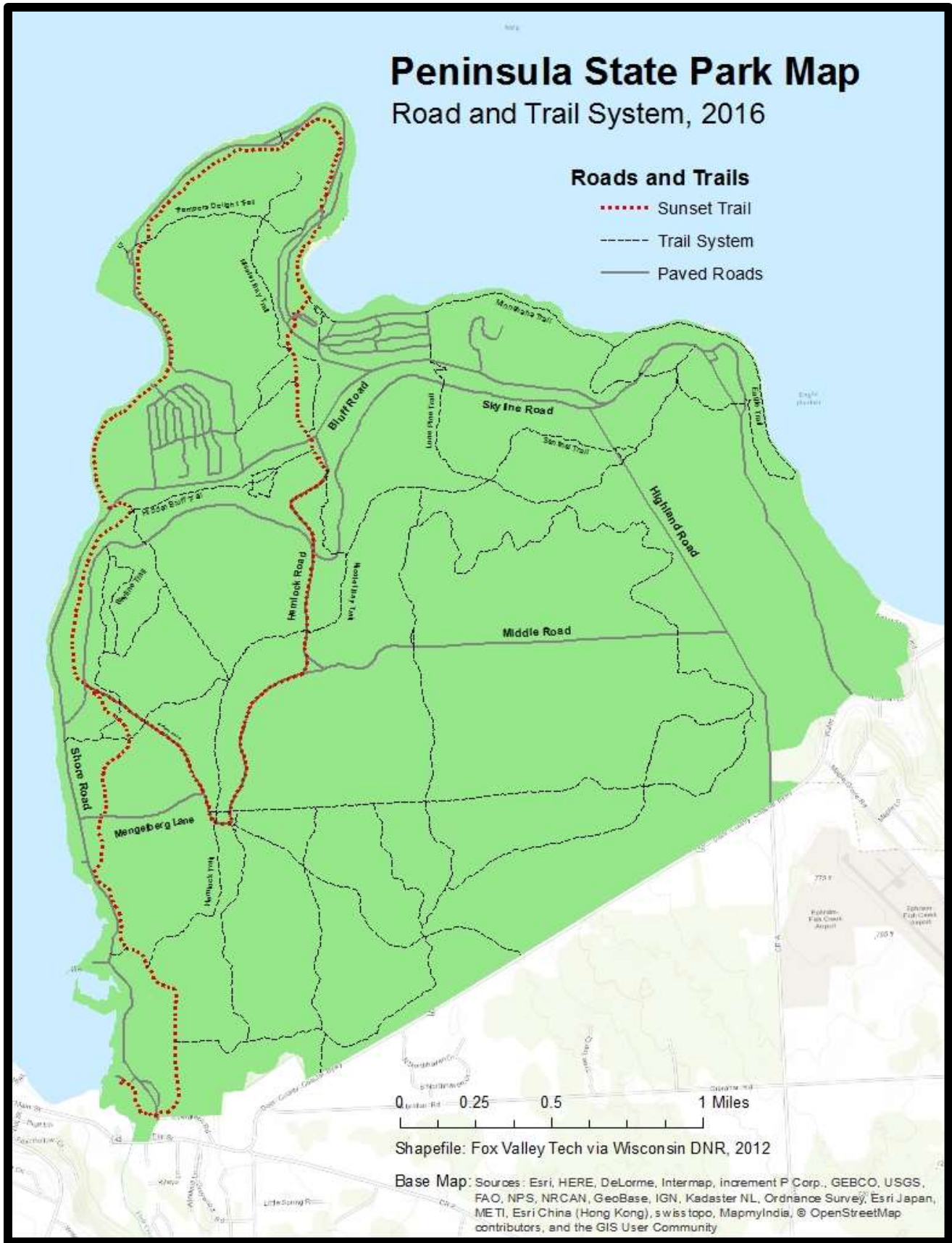
There are a multitude of park needs that will be affected by limited resources. In order to prioritize resources this project tackles the concept of creating a transportation asset management (TAM) program for Peninsula State Park in Door County, Wisconsin. The American Association of State Highway and Transportation Officials (AASHTO), acknowledged by the Federal Highway Administration, define transportation asset management as the following:

“Transportation Asset Management is a strategic and systematic process of operating, maintaining, upgrading and expanding physical assets effectively throughout their lifecycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and defined objectives” (FHWA, 4).

TAM will be detailed within this report's literature review however it is important to begin with a brief understanding of how TAM will be used in this project. Because, at a basic level, parks function similarly to larger transportation systems their assets can be organized and managed within a TAM. In Wisconsin, Peninsula State Park covers approximately 3,776 acres of land with over 15 miles of roadway and 20 miles of both hiking and mountain biking trails. Based on time and desired outcome, signage along the Sunset Bike Trail was identified as a first priority and pilot for the development of an asset management program for the park. The Sunset Bike Trail is one of the most traversed trails not only in Peninsula State Park but also in the state of Wisconsin. Covering just under 10 miles and consisting of both crushed limestone and paved surface types, the trail attracts hikers and cyclists as well as snowmobiles in the winter. While the length of the trail gives users an ample amount of exercise time, scenic view points and rest stops it also includes many areas of inefficient and confusing signage.

The result of this data collection will be inventory database for Sunset Bike Trail signage as well as recommendations for making improvements along the trail. The goal of this report is to provide Peninsula with insight into signage issues along Sunset Bike Route as well as a database providing information on sign maintenance and replacement. This understanding of when to address asset needs will lead to better prioritization of park resources. Additionally, the data collected will be projected into a map format providing a visual inventory. Using GIS software the data will be mapped and provided to the park using Esri's ArcOnline software where park staff can see and manipulate parts of the information. However, full interaction with the map will be limited unless the park decides to invest in GIS software.

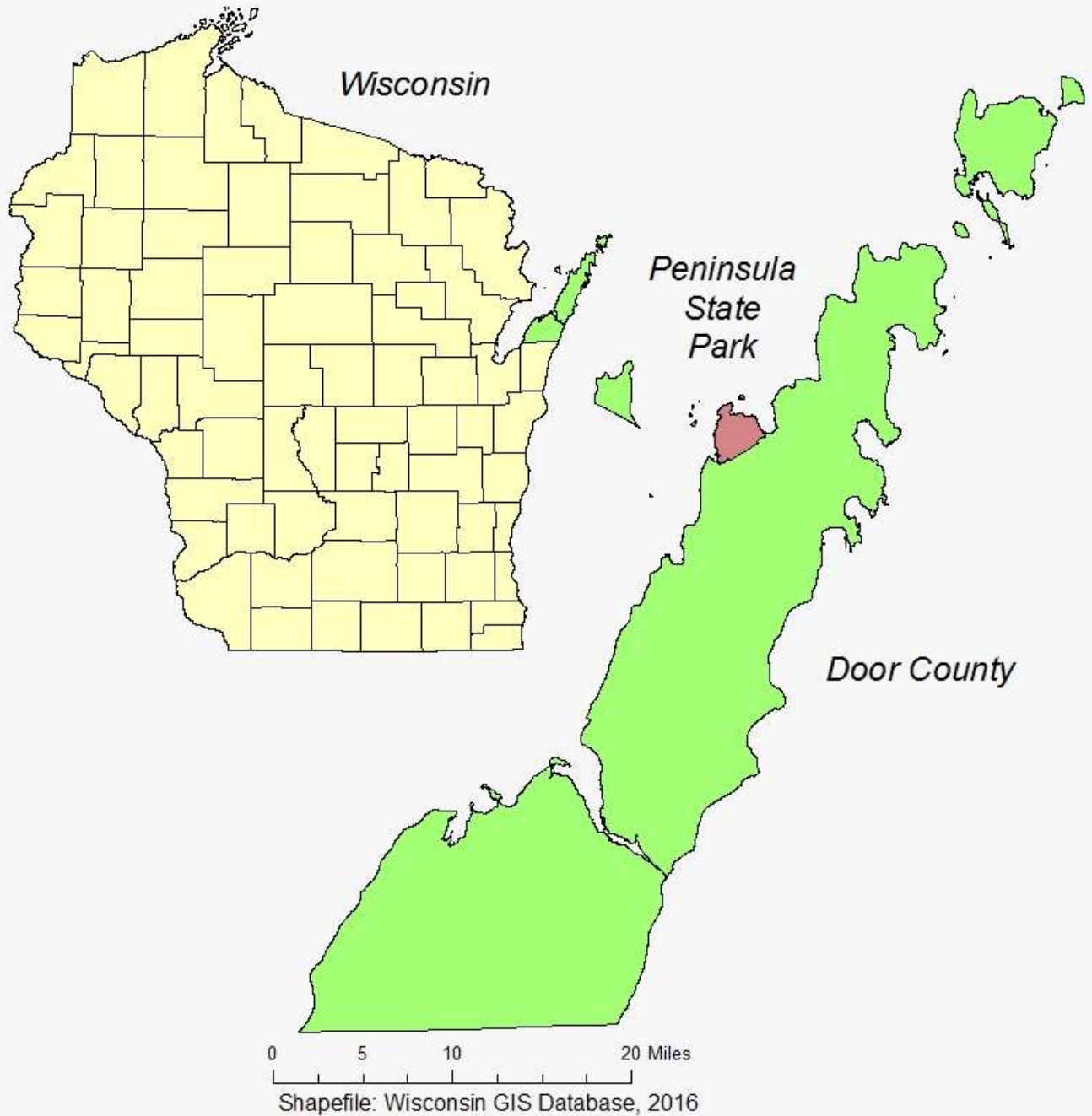
On the following pages, Map 1 depicts the park boundary and trails and roads. Map 2 shows the park's position in Door County, Wisconsin and the county's position in the state of Wisconsin.



Map 1: Park Base Map, Road and Trails System, ArcMap, 2016

Peninsula State Park located in Door County, Wisconsin

Park Location within County and State, 2016



Map 2: Park Location Map, ArcMap, 2016

Methodology

In obtaining a final product for this project the entire process was broken into three phases. From data collection to report preparation the work has spanned a time period of nine months with Phase 1 beginning in March of 2016. An overview of each phase is provided below.

March 2016

Phase 1: Project Setup

Work on this project began as a part of a GIS class project during the University of Chicago at Illinois' 2016 spring semester. The project required all trails and roads to be projected in ArcMap and then analyzed using the system's Network Analyst extension. The goal was to identify the amount of time it would take for someone to walk to a restroom facility from anywhere in the park. The results of the project led to an understanding of areas in the park that have limited access to facilities and could benefit from construction of new restrooms.

The data for the project was initially collected by students at Fox Valley Technical Institute who had mapped a majority of the trails and roads for use by the Wisconsin Department of Natural Resources (DNR). The resulting shapefile was obtained for use in this project through the Friends of the Park Association. While most of the park was included in the shapefile it was still necessary to do some manual data collection and "clean up" to ensure the validity of the data.

April 2016

May 2016

Phase 2: Data Collection

During the summer and fall of 2016 coordinates and images were collected for all Sunset Bike Trail signage. The process was simple yet time consuming. Signs ranging from trail markers to maps were inventoried in a spreadsheet and then projected into ArcMap and added to the shapefile created during Phase 1. This resulted in an electronic map of the park with all signage showing along the Sunset Bike Trail.

June 2016

July 2016

Once data was collected a process of organizing the information and identifying conditions for each sign was also undertaken. Signs were assessed using a condition coding system that was developed using National Park Service standards. This helped bring to light some of the problems the trail was facing.

September 2016

Phase 3: Report Preparation

The third phase of the project began in September, 2016 and consisted mainly of a literature review in which the format and use of the data was identified based on case studies and best practices elsewhere. It was important to understand if the process of building a TAM for use in parks had been done before and how other organizations have organized their data and information. This literature review led to a reorganization of some of the initial data collected in a format that was consistent with some of the standards uncovered.

October 2016

November 2016

The final report includes all data collected, an analysis of the issues facing the Sunset Bike Trail and access to an online map.

What's next? The follow up to this project could include continuing with signage data collection and extending the project to address other transportation related assets within the park.

Literature Review

The National Park Service has made strides in managing their transportation assets and addresses TAM specifically on their website. However, this concept does not trickle down to the state and local level. In Peninsula State Park all facilities are managed through various spreadsheet data both in paper form and on the computer. Their signage inventory is currently out of date with many new signs not accounted for. It was important for the completion of this project to determine what, and if, other places in the United States or world-wide are taking a look at how to better manage transportation assets. The following literature review provides case studies and information that help to set the stage for the future of transportation asset management in parks and in the case of this report, specifically for signage.

CASE STUDIES

The Gandy Dancer Trail, a trail located on the border of Wisconsin and Minnesota was the focus of a 2009 trail study reporting on the economic impact of state trail systems⁵. Focus groups were conducted with various types of park users from non-motorized recreationists to trail commission members. The groups helped researchers understand the performance of different aspects of the park system related to their importance. All services along the trail were broken down into three categories, local community services, tourism amenities and trail services. Results of the focus group conversations were charted along two axes indicating how the performance of the service related to the importance of the service. Trail signage existed in the trail services category and was found in the lower right quadrant referring to “relative failures” (Trails Gateway Communities, 16). What this means is that users find signage to be important but underperforming along the Gandy Dancer Trail. Underperformance can mean a multitude of things including trail signage that is outdated, irrelative or simply missing. The information regarding signage was collected from participants in the non-motorized recreationists’ focus group. It was clear from the report that signage is an important part of a park user’s experience. While this report was completed for only one trail system it can be used as an important starting point in understanding the importance of trail signage to the people who are using the trails.

Safety was not an overarching theme of this project but is an important consideration in the maintenance of signage and what people’s perceptions are of parks with good and bad signage. The National Recreation and Parks Association developed a report on how to “create safe park environments to enhance community wellness.” (NRPA, 1). In the report they touch on all sorts of factors that have a role in creating safe parks. Signs are specifically mentioned in the following way:

- Clear and understandable signage helps enhance the feeling of safety because it allows people to orient themselves (NRPA, 2);
- Signage in the form of maps and descriptive text promotes a greater sense of safety because people feel safer when they know where they are and how to get to where they want to go (NRPA,2)

It is clear effective signage is a significant part of a park’s attractiveness and use as well as safety. With that said, it is important to understand how to maintain park signage in an efficient way that reduces cost and minimizes resources. Transportation Asset Management (TAM) programs were first put into place following the completion of the Interstate Highway System in the 1980s when DOTs realized that the infrastructure needed a plan for maintenance¹⁰. Traditionally, TAMs focus on assets that include the actual roads and pavement, bridges and transit facilities to name a few. However cities can manage their TAMs in different ways based on their priorities. The City of Redmond, Washington has created a TAM for their roadways that includes signs, curbs and gutters, and right-of-way. “These assets are tracked in the city’s geographic information system (GIS). Streetlights and traffic signals are reported in a separate asset listing. Hiking and biking trails are also included among the transportation assets the Public Works Department manages” (FHWA TAMs, 18).

Redmond contracts a third party to review their pavements every 2 years and assign a rating based on a simple “walking the streets” method. This process helps them prioritize projects and resources to maintain an efficient level of service on their roads. In Florida, signage falls under a Maintenance Rating Program “based on a sampling process that rates five primary categories of highway environment three times a year. Each category is rated, and the overall maintenance condition is calculated. A maintenance rating of 80 is considered acceptable” (FHWA TAM, 21). This concept of understanding when a sign should be assessed for repair or replacement is an important part of this project.

SIGNAGE INVENTORY MODELS

In 1988 the National Park Service put together a Sign Manual, specifically for park roads, with a policy stating roads are “intended to enhance the park experience while providing safe and efficient accommodation of park visitors” (NPS Sign Manual, 8). Based on what has already been uncovered it is clear that signage is key with regard to safety and efficiency and all signs within the NAPS system are based off of guidelines from the MUTCP and NPS sign manual. The guidelines are used by park superintendents as guidance for determining things like where signs will go, what they can look like and types of signage for different areas of the park. Originally in list form⁷, the plan for correct signage put together by the NPS has been translated into a flow chart form as seen below:

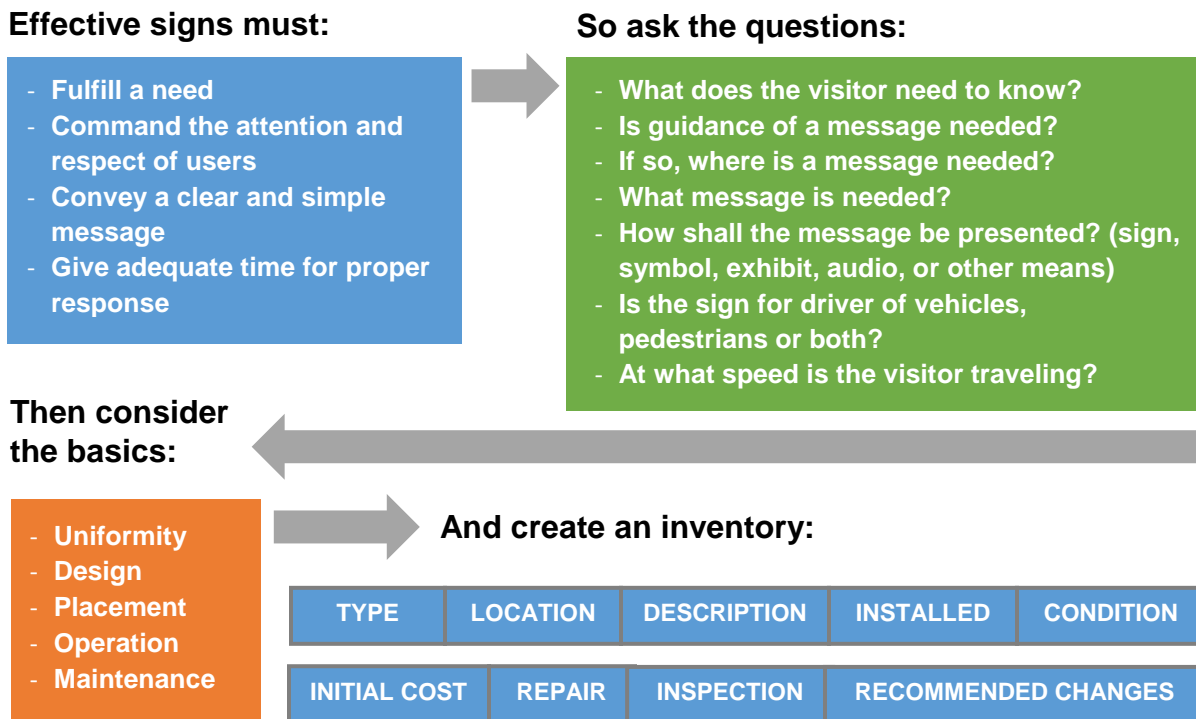


Image 1: Adapted from lists in NPS Sign Manual

New York State Park System prepared a set of guidelines for trail signage in 2010. Included in the guidelines are the types of trails found in New York State parks, specific design and appropriate placement of signs as well as maintenance objectives for all signage. The guidelines state the importance of maintaining good signage:

“Regular maintenance of signage should be part of any trail plan. Signs are highly visible and their maintenance or lack of maintenance leaves the visitor with a positive or negative impression about the trail and the park. Well-maintained signs convey a sense of pride and reduce vandalism while poorly maintained signs may contribute to a diminished visitor experience, including disorientation of trail users” (NYSP Trail Guidelines, 29).

The guidelines also provide a basic understanding of the types of signs that can be found within park systems. These include: trail markers and trail heads; directional; interpretive; kiosk; regulatory; and cautionary. The types of signs can differ between what is used on trails and what is used along paved roads within the park’s boundaries. State park systems typically follow sign guidelines set forth from the National Park Service but there can be times where the types of signs or detail in a park’s plan can differ from the broader ideas. The North Country Trail (NCT) is a nationally recognized trail system managed by the National Park Service and positioned throughout the Northeast and Midwest regions of the United States. In 1996, NPS and the NCT developed a “Handbook for Trail Design, Construction and Maintenance.” Touching on everything from the trail’s history to the layout and standards for trail construction the handbook includes a section on types of signage found along the trail. Table 1 provides a comparative view of New York, NPS and the NCT guidelines for signage in terms of sign identification.

Table 1: Comparison of Signage Type Categories

New York ⁶	NPS ⁷	NCT ⁸
Trail Markers	NPS Route Markers US and State Route Markers Trail Markers Backcountry	Reassurance markers/Blazes Confirmation/Identification
Trail Heads	Directional/Information Guide	Trailhead information/Kiosk
Directional	Travelers Information Bicycle and Pedestrian Trail NPS Arrowhead Emblem Logos Symbols Advance Notice Entrance	Highway information Entrance Directional change indicators Direction indicators Destination Connector
Interpretive	Concessions Interpretive Wayside Exhibits	Interpretation Identification Wayside exhibits
Kiosk	N/A	You-Are-Here
Regulatory	NPS Protection and Regulation Standard Traffic Control	Regulatory Boundary markers
Cautionary	Safety	Pedestrian crossing Road crossing “Crossing Private Land”

Compared to New York’s guidelines the NCT has broken down their types of signage into detailed groups that provide more accurate descriptions. For the NPS, they have to incorporate types at the national level leaving their guidelines open to a broader categorization mixed with some more detailed types. The drawback to the more specific application is that some signs may not fall within any category. Generalizing some types while specifying others can help capture all of the different signage in parks. This comparative look at the organization by type of sign is essential to this project as it helped in developing a system for Peninsula State Park. Parks at the state and national level across the country offer different types of recreation and geography. It is important to take into account how other systems are set up but equally important to address the needs of a specific park’s assets.

KEY CONCEPTS FOR SIGNAGE PLANS

Based on the previous review, five concepts were determined to be focus areas for this report. These concepts will drive the recommendations on improvement to signage along the Sunset Bike Trail.

- 1) **Uniformity:** The National Park Service considers uniformity to be an important part of a signage plan⁷. This means that signs are consistent in color and meaning, use the same type of font, material and post as well as follow standardized guidelines from the MUTCD.
- 2) **Placement:** A second key issue the National Park Service has identified in its signage guidelines is the importance of placement⁷. This means that maps are positioned in appropriate places as well as directional indicators that help guide trail users along the system.
- 3) **Pollution:** Sign pollution is considered in this report as the overuse of signage. In New York State's snowmobile manual they specifically note how to avoid overusing signs by making sure that all signage is in a standardized form consistent with guidelines¹⁶. In 2012, the state of Michigan revised their snowmobile policies to remove a large portion of signage from over 6,000 miles of trail¹². In an article from the Grand Rapids Press posted on MLive.com, Michigan snowmobile sign reduction aims to reduce crashes with the intention that users will need to pay attention to the trail as opposed to signage. Additionally, curves are an issue for snowmobilers and not every curve along the over 6,000 miles can be marked. Michigan was facing legal issues when there were accidents at curves that were not marked.
- 4) **System Changes:** Any changes to the system should be addressed immediately in signage. This includes changes to bike routes, trails or roads and is especially important for keeping map signage up to date. Out of date signage can cause confusion for park users.
- 5) **Maintenance:** Maintenance can be a simple process if a park has a complete inventory of all its signage⁷. Parks can use a sign's useful as a starting point for maintaining a system. Specifically, parks can budget resources each year based on what signs are nearing the end of their useful life. This is one of the most important concepts in relation to how Peninsula can streamline resources and more effectively address signage problems.

All of this information creates the baseline for how Peninsula's Sunset Bike Route signage inventory was built as well as the backbone for recommendations made on how to improve the system.

Database Overview

During Phase 1 of this project, data were obtained manually using a data logger and camera. Coordinates and images of each sign were logged on both devices and organized separately by the date the data was collected. Coordinates were then uploaded from the logger and converted for use in an excel spreadsheet file. The inventory database used for this project is based off of the NPS Sign Manual's guidelines for inventorying information on signage⁷. Table 2 shows a breakdown of the fields evaluated in the inventory and **Appendix A** provides the full layout of the spreadsheet.

Table 2: All Fields including in Inventory Database	
Field	Description
OID	For use in identifying records in ArcMap
Sign Number	Numbered from the beginning to the end of a trail
Area	Type of area the sign is located
Type	The type of sign, as defined by the park's sign identification system
Location	Coordinates and altitude
Path	Location of image
Description	Color and details of the sign including direction of travel and position on trail
Date Installed	Year sign was installed
Installation Cost	Cost of installing the sign
Condition Codes	Number system to identify conditions of signage
Materials	Type of material the sign is made of
Reflectivity Grade	Level of reflectivity that provides a useful life for each sign
Useful Life	The estimated life of the sign before needing replacement
Current Year	The year at time of analysis
Remaining Life	The amount of time left before the sign needs to be replaced
Replacement Year	The year the sign is scheduled to be replaced

Table 3 lists the codes and their relevant type that were used to categorize all signage along the Sunset Bike Trail in Peninsula State Park. Codes were created from a combination of items based off the signage comparison completed in the literature review section of this report and includes some customization:

Table 3: Categorization of Signage for Peninsula State Park			
Code	TYPE	LOCATION	USE
TH	Trail Heads	Start of trails	Inform users of where trails begin or end
TM	Trail Markers	Along trails	Inform users of what trail they are on
M	Maps	Along trails	Display map of different locations along trails
IF	Park Information	Various	Provide information about facilities
EN	Entrance	Park entrance	Inform users of where the Park begins
DI	Direction Indicator	Along trails/roads	Direct users along trails or roads
DM	Direction & Mileage	Along trails/roads	Inform users where specific park features are located
WE	Wayside Exhibits	Along trails/roads	Inform users of park history, facts, wildlife, etc.
K	Kiosk	Park entrance and waysides	Displays park information that can be updated on a regular basis
RG	Regulatory	Various	Speed limits, Stop signs, etc.
CA	Cautionary	Along trails/roads	Steep hill, curve, etc.

A full coding system was created based off of the National Park Service Sign Manual. All codes can be found in **Appendix B**.

BUILDING THE INVENTORY

The inventory database is essentially a spreadsheet with 372 records – each record representing one sign along the Sunset Bike Trail. Once the coordinates were uploaded in the spreadsheet the additional information could be filled in using the image taken of each sign. The following images are a selection of some of the signage found in the park with an example of how signs are coded. The example shows coding for one post with two signs:



Image 2: Sunset Mile Marker and Orange Blaze

OID	65/66
Sign Number	48.0/48.1
Area – Trail	SS
Code	TM/TM
Latitude	87.2409821
Longitude	45.1496544
Altitude	202.19
Path	IMG_0900
Color	MULTI/OR
Detail	Mile 2/Orange Blaze
Direction	NB
Position	RIGHT
Install	2010/2015
Cost	\$18/\$13
Post	01/01
Face	01/01
Letters	01/01
Reflectivity	02/01
Visibility	01/01
Material	Aluminum/Aluminum
Reflectivity Grade	Engineer Grade/Prismatic
Useful Life	12/10
Current Year	2016
Remaining Life	6/9
Replacement Year	2022/2025



Image 3: Park Map



Image 4: Stop Sign

The following process outlines the steps taken to complete the inventory:

- 1) Convert longitude/latitude data into CSV form
- 2) Identify sign type, color and detail, material and reflectivity grade
- 3) Record direction and position along path
- 4) Assess condition and record condition of post, face, lettering, reflectivity and visibility
- 5) Estimate installation year, cost and useful life based on reflectivity grade*
- 6) Evaluate remaining useful life using the equation*:

$$\text{Current Year} - \text{Installation Year} + \text{Useful Life}$$

INSTALLATION YEAR, COST AND USEFUL LIFE

The current sign inventory managed by the park is out of date and was of little help in determining when signs were installed along the Sunset Bike Trail. In a conversation with Park Superintendent, Kelli Bruns, it was determined that the Sunset Bike Route trail markers were some of the newest signs along the trail and installed within the last 6 six years. This was the start to identifying additional installation dates for other types of signs.

Using the images collected it was clear which signs (specifically in cautionary and trail markers – orange blazes) were newer. These signs were given an installation date of 2015 and all signage was back dated from that based on its condition and the number of its type in the park. For example, the orange blazes have 3 different installation dates based on the types of blazes found. Images 6-8 show the different types of blazes:



Image 5: 2005 Blaze

Image 6: 2011 Blaze

Image 7: 2015 Blaze

The installation dates were also based on the reflectivity grade of each blaze. All signs in the park were given a reflectivity grade based on the type of reflective material used to make the sign. Aside from wooden signage all signs were either engineer grade or prismatic. The prismatic (shown in Image 7) can be considered the newest reflectivity type in the park and has a useful life of 10 years (taken from an average life listed on multiple signage manufacturing sites)¹³. The engineer grade material used in images 6 and 7 can last 7 years or longer. While the prismatic signs are more expensive they do last longer and can be a good investment. Costs were identified by taking the size and reflectivity grade of each sign and obtaining a quote from park and recreation signage manufacturing companies. This information is readily available for those needing to order signage for anything from park trails, campsites, parking lots etc¹⁵. A full list of costs associated with reflectivity grade can be found in **Appendix C**.

**Estimating installation year, cost and useful life was a challenge because there was limited information available from the park.*

CHALLENGES

A few challenges were encountered during the process that have shifted the level of comprehensiveness in this report. Initially the project was set up to cover all transportation assets which includes paved roads, facilities, trails and signage. As the project progressed it was clear that the scope was too large to be accomplished before the final report was due. The following outlines the challenges encountered that resulted in a change of scope:

- 1) **Coordinate positions in ArcMap** – a data logger is not a perfect tool and some of the coordinates of the signs came up in slightly different areas of the trail than expected. This made it difficult to determine southbound and northbound signs. Multiple times the same data had to be collected in order to track direction and position – fields that were initially not deemed critical to understanding the layout of signage along the trail. This was an initial oversight and was fixed through trial and error so that all signage is tracked by direction and position which helps to identify where signage may be missing at certain intersections or waypoints.
- 2) **Matching Images and Coordinates:** During the first few days of data collection the data was used to practice attaching images within ArcMap. Because there is no other reference for where signage should be in the park this was a difficult task. If image numbers were off by one number images did not attach to the correct coordinate. This also led to a re-collection of much of the data to ensure that as waypoints were collected an image was taken. If images were deleted a manual review of all image numbers needed to be done to confirm that there were the same number of images and coordinates in each data set.
- 3) **Identifying installation years, costs and useful life** – As mentioned previously, the installation years, costs and useful life of each sign is an estimate based on conversations with park staff and research on general costs and uses of different signage. Initially it was perceived this information was already owned and managed by the park however the signage inventory is not fully updated and does not incorporate all of the information needed within this database in an organized and easy to identify way.

Interactive Map

An online map was created for the park to use to visually manage the inventory. The park does not have Esri software and using ArcOnline was the best way to deliver the visual component to the park. A screenshot of the map image is shown below and a link to the page is provided. Below the image is a table showing the legend and appropriate descriptions of each item within the legend.

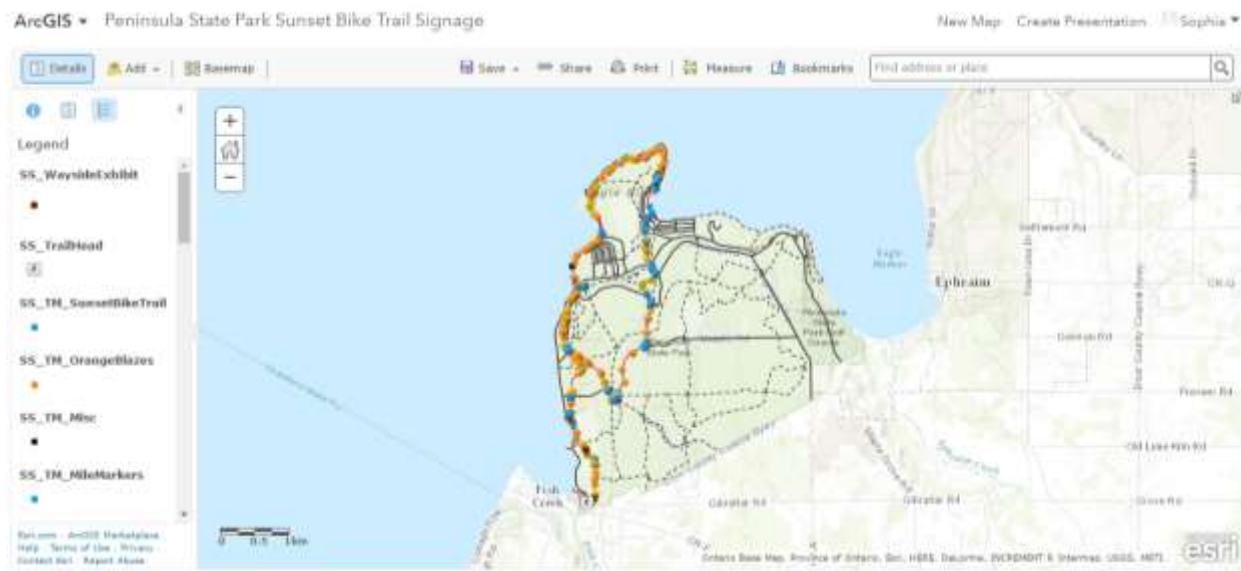


Image 8: Online Map of Inventory

Legend	Description	Color
SS_WaysideExhibit	Wayside Exhibits	Brown
SS_TrailHead	Trail Head	White/Cyclist
SS_TM_SunsetBikeTrail	Sunset Bike Trail Markers	Blue
SS_TM_OrangeBlazes	Snowmobile Orange Blazes	Orange
SS_TM_Misc	Miscellaneous Trail Markers	Black
SS_TM_MileMarkers	Sunset Bike Trail Mile Markers	Blue
SS_RG_StopSigns	Stop Signs	Red
SS_RG_Misc	Miscellaneous Regulatory Signs	Red
SS_ParkInformation	Park Information	Brown
SS_Maps	Maps	Purple
SS_Kiosks	Kiosks	Brown
SS_Donations	Donation Boxes	Brown
SS_DirectionallIndicators	Changes in Direction Indicators	Green
SS_Direction_Mileage	Destination Directions and Mileage	Black
SS_CA_ALL	Cautionary Signs	Yellow
Park_Trails	Park Trails	Black
Park_Roads	Park Roads	Gray
Sunset Bike Route	Sunset Bike Trail/Route	Red

Peninsula State Park's Sunset Bike Trail signage map is meant to be continuously updated and maintained when signs are replaced or repaired. Edits can be made directly onto each layer's attribute table. Layers are broken down into specific groups of signage that can be turned on and off depending on what the user would like to see. Additionally points (should new signs be added) can be created using the Edit feature for each layer. When a new point is added the attribute list will pop up for the user to fill out all appropriate information regarding that sign.

Link to the online map: <http://arcg.is/2eUjqgg>

Key Takeaways

Overall, signage along the trail is working, it gets riders from the start of the trail to the end. There are no critical areas where riders cannot identify what trail they are on or where they need to go. However, there are opportunities to improve rider experience along the trail. A set of key takeaways and recommendations has been prepared for the park to address issues and make improvements to signage along the Sunset Bike Trail. Takeaways are broken into sections addressing conditions of signage, useful life, uniformity and placement.

SIGNAGE CONDITIONS

- 1) There are a total of 36 wooden signs associated with the Sunset Bike Route. 6 of these signs are fading or have signs of deterioration and may eventually be illegible. The deterioration of wooden signs negatively affects the perception that the park is well taken care of. The following images show a few of these signs:



Sign # 6.0 & 6.1



Sign # 144.0



Sign # 278.0 & 278.1

- 2) 8 orange blazes and arrows marking the snowmobile route are hidden by tree limbs and in one case a curve in the road (Sign #292). No other signs other than those associated with the snowmobile trail are positioned where they cannot be seen. The following images show a few of these signs:



Sign # 18.0



Sign # 92.0



Sign # 292.0

- 3) Reflectivity in signage is improving and the park has made an investment in higher quality reflective materials. Higher quality reflective materials can last at least 3 years longer than signs of regular (engineer) grade reflectivity. An example of a higher quality reflective sign (Sign # 7.0) and regular grade (Sign # 129.0) is shown below.

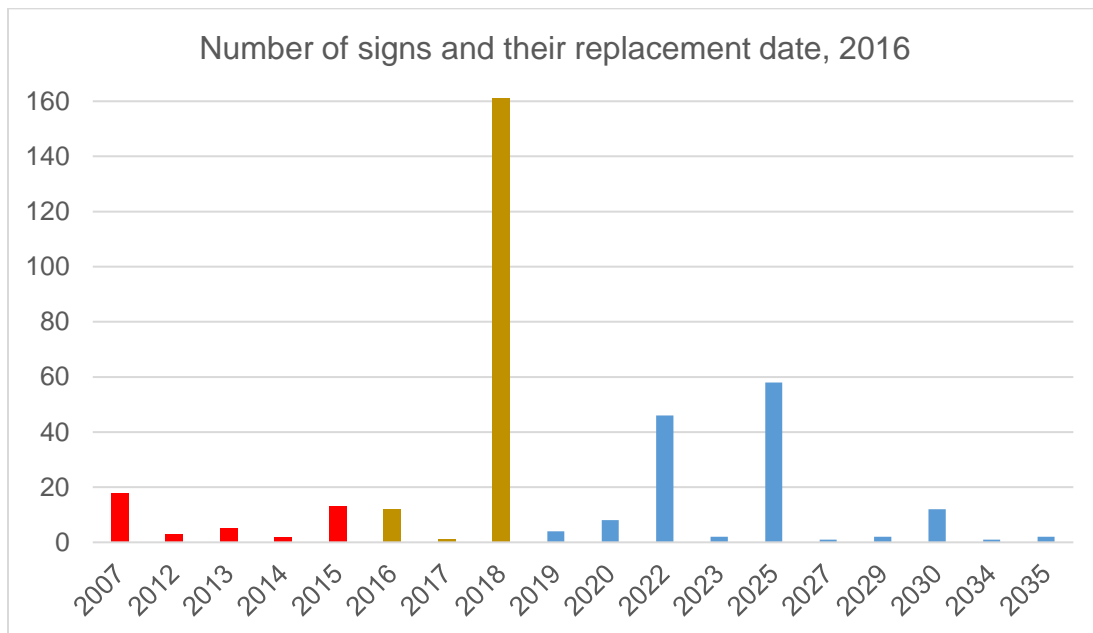


Sign # 7.0

Sign # 129.0

USEFUL LIFE

Using estimated installation dates and lifetimes of different reflectivity grades the useful life could be identified resulting in a projected replacement date. Chart 1 provides a breakdown of the number of signs and their replacement dates:



There are 41 signs with a lapsed replacement date, these are highlighted in red. Yellow represents signs that are scheduled for replacement within the next two years. A strong majority of signs should be scheduled to be replaced in 2018. This includes many of the engineer grade orange blazes that were installed in 2011.

UNIFORMITY AND PLACEMENT

- 1) Trail markers specific to the Sunset Bike Route are not uniform. Some are legacy signs that remain from the previous trail signage before the latest trail markers were installed. Below displays some of the inconsistencies:



Sign # 40.0

Sign # 30.0, 30.1, 30.2

Sign # 200.0

- 2) An intersection connecting the trail to a boat launch and campsite has one trail stop sign positioned for northbound riders but does not have a stop sign in the southbound position. Map 2 displays the intersection where there is no southbound stop sign. A full map of the area’s relative location in the park is provided in **Appendix D**.

Tennison Bay Boat Launch Intersection with the Sunset Bike Trail



Roads and Trails

- Sunset Trail
- Paved Roads

Signage

- Missing Stop Sign
- ◆ Orange Blaze

0 0.015 0.03 0.06 Miles

Shapefile: Fox Valley Tech via Wisconsin DNR, 2012

- 3) Some park maps display Sunset Bike Trail as turning left at the intersection of Middle Road and Mengelberg Lane while others show the bike path traversing down either Middle Road or Mengelberg Lane. When riders reach the intersection the signage directs them to take Middle Road. The images below show the inconsistencies in mapping.

○ Intersection of Middle Road and Mengelberg Lane



Map 4: Current trail route



Map 5: Outdated trail route

Signs Located at Intersection



Middle Road

Sign #: 161.1 & 294.0

The Middle Road and Sunset Bike Trail intersection also suffers from a poorly positioned map. The intersection is highlighted in **Appendix E**.

- 4) Orange blazes and arrows are noticeably the most used sign along the Sunset Bike Route, consisting of over 35% of all trail signage. These signs are specifically for snowmobile use but they can appear as markers to guide bicyclists which can result in confusion. A full map of orange blazes can be found in **Appendix F**.



Sign # 93.0



Sign # 123.0



Sign # 117.0 & 117.1

Recommendations

The key takeaways shed light on some of the changes the park can make to improve signage along Sunset Bike Trail. Additionally, the entire inventory can become a working document that should continue to be updated and maintained. These recommendations comprise of the next steps the park can take to make changes following this report.

1

Repaint deteriorating wooden signs

All fading wooden signs should be repainted. Peninsula should utilize the Friends of the Park Association to put together a volunteer day where people can help take down and repaint the signs. Completing this in the off season (winter) would have very little impact on trail users. All signs are shown in **Appendix H**.

2

Reduce orange blazes

Comprising of over 35% of all trail signage, the orange blazes are the most used sign – but fill the need of the least amount of users. Snowmobile trails are only open for a handful of days during the winter season and the abundance of orange blazes confuses the regular riders of the trail during the spring, summer and fall. It is recommended that the number of orange blazes be reduced to only accommodate signage every quarter mile.

***Future recommendation:** The park should consider removing snowmobile access along the trail to improve the use for cross country skiers, snowshoes and fat bikes. This would allow a reduction in overall signage along the trail, improving the trail users experience of being in the outdoors.*

3

Budget for the replacement of 2018 useful life signage

Over 160 signs are scheduled to be replaced in 2018. The park should begin budgeting in the replacement or at the very least the evaluation of these signs to be replaced in the next year's budget.

4

Remove all non-uniform Sunset Bike Trail markers

The park invested in new Sunset Bike Trail markers and these should be uniform throughout the trail. Any markers identifying the Sunset Bike Trail should be updated to the new marker or removed.

5

Install stop sign at Tennison Bay Boat Launch intersection

A stop sign should be installed on the right side of the southbound direction of travel at the intersection of the Tennison Bay Boat Launch and Sunset Bike Trail. This intersection not only provides cars access to the lake but also gives boats entry into the water.

6

Update all park maps

The Sunset Bike Trail route needs to be updated on a majority of park maps along the trail to ensure that users travel along Middle Road which is the road indicated by the on-trail markers. Additionally, there are some maps that are beginning to deteriorate and are illegible or laminated and nailed to the posts as quick fixes to updating trails – specifically for winter users. All maps that need to be replaced are included in **Appendix G**. Lastly, the map located at the intersection of Middle Road and Sunset Bike Route should be repositioned to better serve the intersection. Currently the map is located across Skyline Road after riders have reached the intersection of Sunset and Middle Road and turned left. The map should be relocated at the top of a small hill that riders would see as they approach the intersection. This location is shown in **Appendix E**.

Footnotes & Works Cited

FOOTNOTES

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- ⁶NYS Office of Parks, Recreation and Historic Preservation. Trail Signage Guidelines for the New York State Park System. Albany: n.p., 2010. Web.
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- ¹²Michigan Department of Natural Resources. Parks and Recreation. Michigan Motorized Trail Signage Handbook. n.p., 2012. Web.
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- ¹⁴Dornbos, Jeffrey. "How Long Do the Different Grades of Reflective Sheet Last?" Dornbos Sign & Safety Inc, n.d. Web. 20 Nov. 2016.
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Appendix A: Inventory Database

Due to the size of the inventory database it is attached to this report as an excel file and separate document titled:
PennPark_SSInventory_2016

Appendix B: Coding System

The coding system was adapted from the 1988 National Park Service Sign Manual with input from the New York State Parks Sign Guidelines and some customization to address specific conditions in Peninsula State Park. Not all fields are shown within this coding system as most are self-explanatory and do not use a code in the spreadsheet (Appendix A).

CODING SYSTEM		POST CONDITION	
AREA		Code	Description
Code	Description	01	Satisfactory
SS	Sunset Trail	02	Not Straight
MR	Middle Road	03	Needs Painting
SIGNAGE TYPE		04	Deteriorated
Code	Description	05	Needs Straightening & Painting
TH	Trail Heads	06	Warped
TM	Trail Markers	07	Other
M	Maps	FACE CONDITION	
IF	Park Information	Code	Description
EN	Entrance	01	Satisfactory
DI	Direction Indicator	02	Defaced
DM	Direction & Mileage	03	Corroded
WE	Wayside Exhibits	04	Mounting Loose
K	Kiosk	05	Faded
RG	Regulatory	06	Not Legible
CA	Cautionary	07	Warped
COLOR		08	Deteriorated
Code	Description	09	Peeling
BL	Blue	10	Other
BR	Brown	LETTERS	
GR	Green	Code	Description
MULTI	Multi-color	01	Satisfactory
OR	Orange	02	Defaced
RED	Red	03	Faded
WH	White	04	Not Legible
YEL	Yellow	05	Peeling
DIRECTION		06	Other
Code	Description	REFLECTIVITY	
NB	Northbound	Code	Description
SB	Southbound	01	Excellent
POSITION		02	Good
Code	Description	03	Fair
Left	Sign positioned on left	04	Poor
Right	Sign positioned on right	05	Non-reflective
INSTALLATION COST		VISIBILITY	
Code	Cost Range	Code	Description
1	\$0-25	01	Can be seen easily
2	\$26-50	02	Hidden by official sign
3	\$51-75	03	Hidden by advertising sign
4	\$76-100	04	Hidden by brush
5	\$101-200	05	Hidden tree limbs
6	\$201-300	06	Hidden by parked vehicles
7	\$301-400	07	Hidden because of curve
8	\$401-500	08	Hidden because of hill
9	\$500-1000	09	Hidden because of building
10	\$1000+		

Appendix C: Signage Cost List

Code	Sign Type	Description	Reflectivity	Approximate Cost
TM	Trail Marker	Orange Blaze	N/A	\$10
TM	Trail Marker	6" Orange Blaze I	Engineer Grade	\$10
TM	Trail Marker	6" Orange Blaze II	High Intensity Prismatic	\$13
TM	Trail Marker	6" Aluminum Custom	N/A	\$18
CA	Cautionary	12" Triangle I	Engineer Grade	\$15
CA	Cautionary	12" Triangle II	High Intensity Prismatic	\$18
CA	Cautionary	10" Rectangle	Engineer Grade	\$11
DI	Direction Indicator	12" Orange Arrow I	Engineer Grade	\$15
DI	Direction Indicator	12" Orange Arrow II	High Intensity Prismatic	\$18
DM	Direction/Mileage	Aluminum	Engineer Grade	\$275
DM	Direction/Mileage	Aluminum	High Intensity Prismatic	\$295
DM	Direction/Mileage	Wood	N/A	\$100
IF	Park Information	Wood	N/A	\$100
M	Map	Plastic	N/A	\$100
RG	Regulatory	24" Stop Sign	Engineer Grade	\$33
RG	Regulatory	24" Stop Sign	High Intensity Prismatic	\$38
RG	Regulatory	30" Stop Sign	Engineer Grade	\$42
RG	Regulatory	30" Stop Sign	High Intensity Prismatic	\$53
RG	Regulatory	30" Stop Sign	Engineer Grade	\$61
RG	Regulatory	30" Stop Sign	High Intensity Prismatic	\$76
RG	Regulatory	24" Yield	Engineer Grade	\$56
RG	Regulatory	24" Yield	High Intensity Prismatic	\$61
TH	Trail Head	Wood	N/A	\$500
RG	Speed Limit	12" Aluminum	Engineer Grade	\$23
RG	Speed Limit	12" Aluminum	High Intensity Prismatic	\$28
TM	GR Bike Route	18" Aluminum	Engineer Grade	\$20

Appendix D: Tension Bay Missing Sign



Intersection of Sunset Bike Route and Tension Bay Campsite Road to Boat Launch

Identification of missing south bound stop sign

Roads and Trails

- Sunset Trail
- Paved Roads

Signage

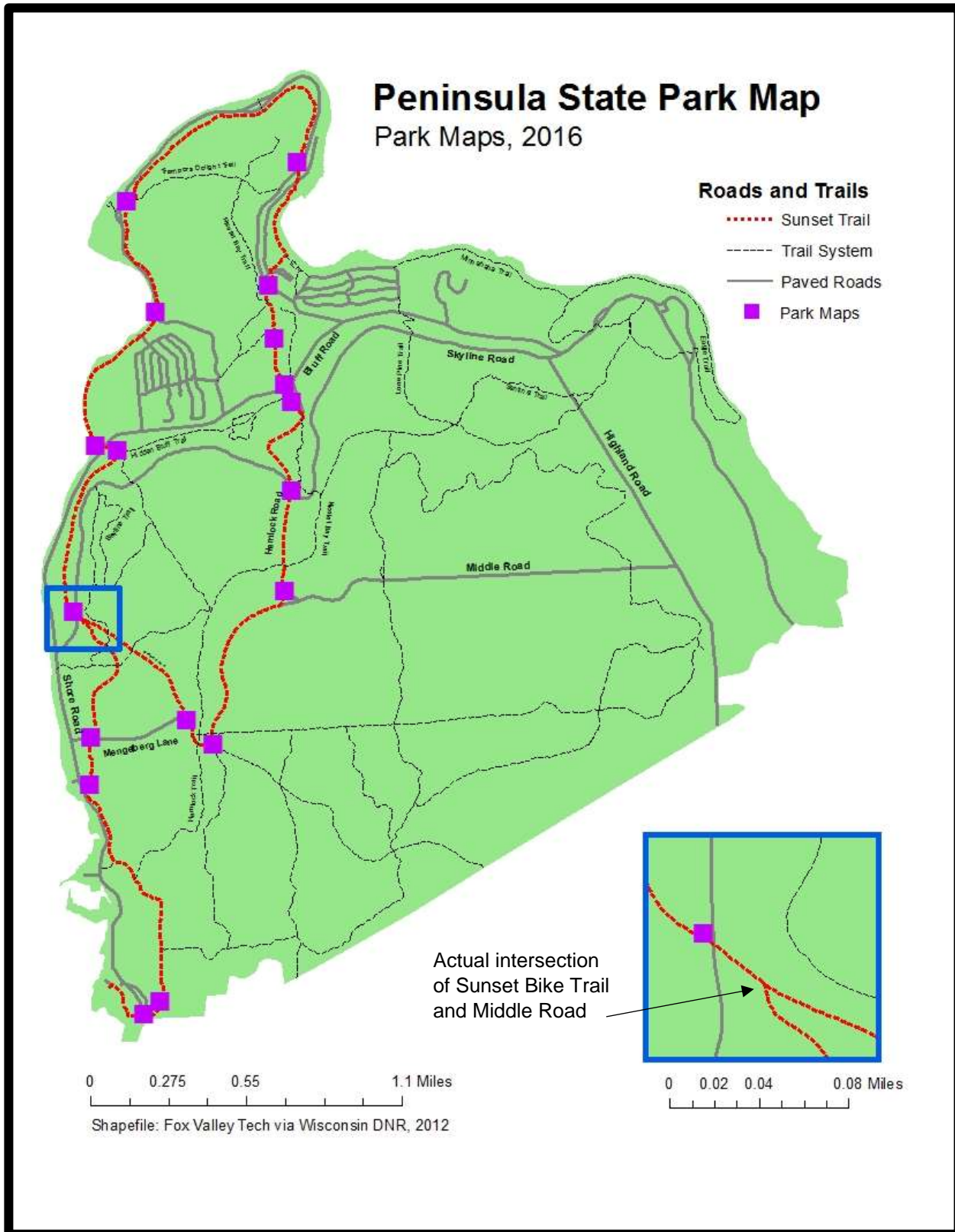
- Missing Stop Sign
- ◆ Orange Blaze

0 0.015 0.03 0.06 Miles

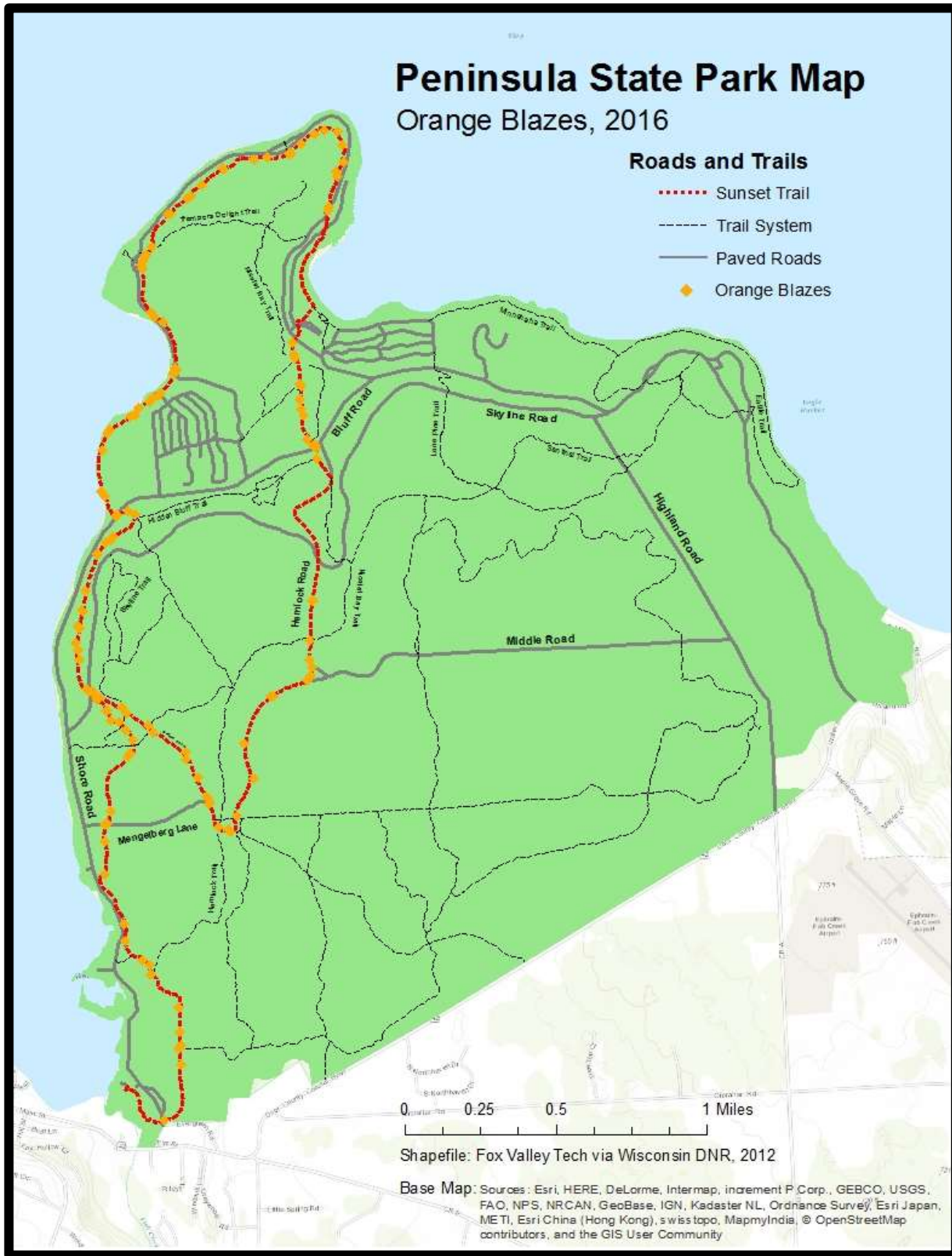
Shapefile: Fox Valley Tech via Wisconsin DNR, 2012



Appendix E: Park Maps



Appendix F: Orange Blazes



Appendix G: Maps to be replaced

Map signage that needs to be updated with the correct route of the Sunset Bike Trail:



Sign # 2.0 & 2.1



Sign # 26.0, 26.1, 26.2



Sign # 30.0, 30.1, 30.2



Sign # 44.0



Sign # 70.0



Sign # 187.0, 187.1, 187.2

Map signage that needs to be replaced due to illegibility or lamination:



Sign # 277.0



Sign # 62.0, 62.1, 62.2



Sign # 183.0

Appendix H: Wooden Signs for Repainting

The signs below are recommended to be repainted:



Sign # 6.0 & 6.1



Sign # 144.0



Sign # 195.0 & 195.1



Sign # 203.0, 203.1, 203.2



Sign # 257.0 & 257.1



Sign # 278.0 & 278.1