All-Terrain Vehicle Use on the North Shore State Trail: A Feasibility Study

Prepared Pursuant to:
Minnesota Session Laws 2005,
First Special Session,
Chapter 1, Article 2, Section 3,
Subdivision 6

March 1, 2006

State of Minnesota
Department of
Natural Resources

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All photos by DNR staff, 2005.

EXECUTIVE SUMMARY

Scope. This study examines the physical capacity of the North Shore State Trail (hereafter NSST) to accommodate summer-season ATV use based upon a corridor inspection and technical analysis. This analysis, conducted in conjunction with county and federal land managers, describes surface water and wetland conditions, road and trail transportation systems, corridor use, and land ownership. The intent is to determine which segments of the existing trail are capable of sustaining ATV travel either as is, or with modification, and to estimate the cost of necessary modifications.

Certain development standards, or guidelines, are necessary in order to accommodate ATV use. Trail development standards have evolved, and continue to evolve, as the DNR gains experience with ATV trail development and maintenance. In this case, experience with the Moosewalk/Mooserun, and Red Dot GIA ATV trails located near Finland, Minnesota are particularly instructive.

Methodology. DNR staff conducted a detailed corridor inspection of the NSST during the summer and fall of 2005. Data collected in conjunction with the 2003-04 GIA proposal from the North Shore ATV Club was also used in this analysis. A Geographic Positioning System (GPS) unit was used to collect data points to record the location of specific features such as culverts; bridges; steep hills; intersections with other trails or roads; and spots requiring treadway stabilization in the form of added fill material or ditching in order to accommodate ATV use. A DNR interdisciplinary team has reviewed all of the data. Additional data was provided by cooperating agencies, including the United States Forest Service, St. Louis, Lake and Cook Counties.

For the purposes of this analysis, the entire trail (approximately 143 miles) was divided into 11 sections based primarily upon jurisdictional boundaries and existing access points, such as parking lots and road crossings. These sections, which are of varied lengths, are arbitrary distinctions and should not be viewed as independent or mutually exclusive, but simply as analysis units intended to facilitate review.

Findings. Land ownership is a critical factor concerning any change in trail use to the NSST, since the majority of the trail corridor is not presently state-owned. Affected landowners need to be informed, involved and included in any discussions concerning proposed use of their land. The DNR holds a variety of easements and landowner agreements to allow the NSST to cross non-DNR property. Each of these agreements would need to be revisited before ATV use could be added to the current recreational mix. Landowner support or opposition for ATV use would play a key role in future planning and decision making for the NSST.

The principal environmental concern regarding ATV use on the NSST is potential impacts to surface waters and wetlands, notably the many protected waters crossed by the trail. Of special concern are designated trout streams and their tributaries, and protected wetlands. Summer-season ATV impacts pose a greater risk to these sensitive resources than those generated by all current uses of the North Shore State Trail. This is because of unfrozen soil conditions, and due to the mechanical soil disturbance characteristic of vehicular travel over natural surfaces.

This study finds that the NSST could be capable of sustaining ATV traffic, but modifications would be required throughout the entire length of the trail. These projected modifications range from extraordinary measures to minor alterations. No significant portion of the trail corridor, aside from

the 6.4 miles already designated open to ATV use, could sustain ATV use in its current condition. Table 1, below, provides construction cost estimates for projected modifications. This cost summary does not include administrative costs.

Areas requiring 'extraordinary measures' to accommodate ATV traffic are those areas that would need lengthy reroutes and/or wetland mitigation measures, in addition to substantial treadway alterations. Although portions of the trail have been previously modified by adding fill in wetland areas, there are many other areas not previously modified, which would now require mitigation.

Table 1. Cost Estimate Summary for Projected Modifications.*

Section	Culvert Installation	Culvert Purchase	Hill Modifications	Treadway Stabilization	Wetland Mitigation-Cost	Estimated Total
1	15,300	7,200	5,300	75,100	$39,600 (approx. 3.0 Acres)	**$142,500**
2	4,500	2,100	20,900	8,100	-	**$35,600**
3	1,800	900	2,500	13,600	$1,400 (approx. 0.11 Acres)	**$20,200**
4	13,200	6,300	2,100	56,200	$42,700 (approx. 3.26 Acres)	**$120,500**
5	11,400	5,400	13,700	7,200	$3,500 (approx. 0.27 Acres)	**$41,200**
6	-	-	-	-	-	**0**
7	8,100	3,800	36,500	26,900	-	**$75,300**
8	9,000	4,300	9,100	32,900	-	**$55,300**
9	11,100	5,300	16,000	9,300	-	**$41,700**
10	6,000	2,800	6,300	7,100	-	**$22,200**
11	2,400	1,100	14,200	4,800	-	**$22,500**
Est. Sub Totals	**$82,800**	**$39,200**	**$126,600**	**$241,200**	**$87,200**	**$577,000**

* Cost estimates may change considerably depending on specifications of an actual project. Further cost analysis is included for each identified section of trail to provide a better understanding of how these costs are associated to the trail. Estimates have been rounded for reporting purposes.

Source: MN DNR, Unpublished data. February 2006.

The potential for conflict or unintended intrusion effects is greatest where the trail is located in close proximity to relatively high-density residential populations or sections of the trail that are more heavily used during the non-snow seasons, such as where the trail is shared by the Superior Hiking Trail. This analysis concludes that little trail user conflict would likely result from the addition of ATVs during the non-snow seasons, given current low-levels of summer use.

Any significant change in the current use profile, such as ATV use, will trigger various administrative steps, which take time to complete and involve substantial cost. For example, landowners would need to be notified, and many trail corridor easements and other agreements would need to be renegotiated for those trail segments that do not currently host ATV traffic. Project environmental review, permitting, and a North Shore State Trail Master Plan amendment would also need to be completed prior to authorizing ATV use, requiring substantial staffing resources. Increased annual maintenance, operations and enforcement costs must also be factored into the estimated costs of any future ATV project proposal.

Conclusion. Based upon this examination, it is clear that ATV traffic cannot be sustained on all or portions of the North Shore State Trail in its present condition, except for the 6.4-mile segment already designated for ATV use. Substantial improvement and modification would be necessary to avoid, minimize, and to mitigate environmental effects stemming from summer ATV use. Before such modifications could occur, however, additional planning and environmental review would be required. Consultation with landowners, local governments and cooperating land-managing agencies would also be in order.

All-Terrain Vehicle Use On the North Shore State Trail: A Feasibility Study

Prepared Pursuant to:
Minnesota Session Laws 2005,
First Special Session,
Chpt. 1, Art.2, Sect. 3, Subd. 6

State of Minnesota
Department of Natural Resources
March 1, 2006

I. FEASIBILITY STUDY PURPOSE & OBJECTIVES

Legislative Direction

In 2005, the Minnesota Legislature directed the DNR to examine the feasibility of All-Terrain Vehicle (ATV) use on the North Shore State Trail (NSST) and appropriated funds for this purpose:

> "$50,000 is appropriated from the all-terrain vehicle account in the natural resources fund to the commissioner of natural resources for fiscal year 2006 for a feasibility study on the use of all-terrain vehicles on the North Shore Trail. All data and information compiled for this study may be used in any future master trail plan revision. The study shall be reported back to the house and senate environment committee chairs by March 1, 2006." *[Minnesota Session Laws 2005, First Special Session, Chpt. 1, Art.2, Sect. 3, Subd. 6]*

Scope & Objectives

Study Purpose

This study is intended to determine the feasibility of adding ATV traffic to all or portions of the North Shore State Trail.

Scope

This study examines the physical capacity of the North Shore State Trail to accommodate summer-season ATV use based upon a detailed corridor inspection and natural resource analysis. This analysis, being conducted in coordination with county and federal land managers, describes surface water and wetland conditions, road and trail transportation systems, corridor use, and land ownership.

Objectives

1. Identify those segments of the NSST that are physically capable of sustaining ATV use, either as is, or with specified mitigation, improvement and/or reroute. Provide cost estimates for all specified modifications or improvements.

2. Identify those segments not physically capable of sustaining ATV use without extraordinary modification, mitigation or major reroute.

3. Describe current trail use, including but not limited to snowmobiling, hiking, horseback riding, mountain biking, and identify potential conflicts arising from summer-season ATV use.

4. Identify any practical, logistical, administrative or procedural issues or requirements that would need to be addressed prior to authorizing ATV use of selected trail sections (e.g., corridor use and ownership agreements, environmental review, master plan amendment).

Study Considerations

Several key factors must enter into any decision to add ATV use to all or portions of the North Shore State Trail. These factors include, but should not be limited to: corridor ownership; surface water crossings; wetland mitigation needs; treadway stabilization requirements; trail reroutes; trail intersections and connections; trail amenities; and anticipated user demand. Together, these variables shape a project 'footprint' and help define future or potential project need and cost, technical feasibility, administrative practicality, and probable environmental effects. Each of these considerations is described in more detail below.

Trail Corridor Ownership

The existing NSST has multiple landowners including St. Louis, Lake and Cook Counties, the U.S. Forest Service (Superior National Forest), the state (DNR and University of Minnesota), and private industries and individuals. Recreational uses on county administered or owned lands, USFS lands, and private lands are determined by the land owners or administrators. The DNR has negotiated surface-use access agreements with all of the land owners, who manage and use their lands for various purposes. Trail agreements would need to be revisited if a change in use is proposed. For instance, the agreement with the U.S. Forest Service (USFS) is a Memorandum of Understanding (MOU), stating that the state trail may be located within the Superior National Forest and the DNR is responsible for the trail's maintenance and management. The MOU outlines a number of conditions, including the mutually agreed upon understanding that motorized use (except snowmobiles) is prohibited except for administrative uses by either agency. Other agreements are more general and typically do not specify a types of trail use. Land owners have the authority to allow ATV use on their lands, consistent with laws and statutes regulating motorized use.

Summer-season ATV use may conflict with some adjacent land uses, or may be incompatible with land management plans or philosophies. Certainly, all current corridor owners would need to be contacted and notified of any proposed change in trail use, and given the opportunity to renegotiate and/or modify current use agreements. Where no agreement is possible, additional reroutes may need to be considered. This process would require additional staff time and planning and could, therefore, represent a substantial workload and cost factor that is loosely factored into the administration cost estimates in this study.

Surface Water Crossings

The NSST crosses 51 designated trout streams and 27 protected tributaries to designated trout streams. Of these crossings, 43 have bridges and 27 have a culvert or multiple culverts to allow for water flow. Eight crossings have neither a bridge nor culvert, six of which were identified as needing a culvert for summer ATV use. All existing crossing structures would be able to accommodate ATV traffic.

Trail approaches and orientation to stream crossings must also be evaluated in order to avoid potential crossing impacts, such as streamside erosion and sediment loading, resulting from ATV use. Additionally, installation of new culverts would be needed in order to prepare the trail for ATV use, some serving as replacements for existing deteriorating structures. The estimated costs for purchasing, transporting, designing and installing the necessary water crossings and drainage improvements are described for each section of trail in Chapter V, Trail Corridor Inventory Details, beginning on Page 29.

Wetland Mitigation Needs

The North Shore State Trail traverses numerous wetland areas. Certain areas were improved in the past in order to reduce trail maintenance costs and to provide an elevated treadway. This allowed for limited summer use, and for passage of year around maintenance vehicles such as trail groomers and mowers. Additional modifications included a number of trail reroutes, widening and straightening of the trail alignment to meet the changing safety conditions and needs of the faster snowmobiles being manufactured. This involved the filling of wetlands prior to the Wetland Conservation Act of 1991 (WCA). However, mitigation measures would be required if any new wetlands were to be filled or otherwise modified.

Treadway Stabilization Needs

Retrofitting the North Shore Trail to accommodate summer-season ATV use would require modification of some portion of the treadway. Because the trail was constructed primarily for winter snowmobile use, it was designed using a nearly flat cross-section with no elevated 'crown' in the center. This can inhibit runoff and lead to rutting and ponding on the treadway. Ditching and crowning of the corridor would be required in certain areas. Equipment access limitations and proximity to gravel fill materials may complicate construction in some remote locations.

This study identifies 190 locations where treadway alterations would be required. These vary in length from a minimum of 60 feet to a maximum of 3,200 feet. The longest section (3,200 feet) is located on and adjacent to a former railroad grade that would need additional gravel fill due to its deteriorating condition (the Alger-Smith Railroad was built in the late 1800's). The total estimated linear distance of fill needed is 63,125 feet, or 11.9 miles. Of this distance, 9,675 feet, or 1.8 miles, are identified as wetland fill that would require mitigation. Cost estimates for these modifications are contained in Appendix A-5. Major treadway improvements also heighten concerns for non-native invasive species introduction, and for rare and sensitive species habitat, in newly disturbed construction areas.

Trail Reroutes

The North Shore State Trail is located on highly varied terrain including 172 hills with a grade or grade of 10% or greater. Depending upon soil type, segments with over 15% grade are more susceptible to erosion (unfrozen soils) once ground cover is reduced or eliminated. Moreover, because the trail was constructed as a snowmobile trail, the trail alignment runs directly up the fall line of these hills, which greatly increases runoff and erosion potential from snowmelt and summer precipitation events. The fall line is the path of least resistance of water flow down the hill.

Natural erosion on a hill with an average grade of 20%.

In some cases, a reroute is the best solution. In this study, the 15% average percentage grade or trail grade figure was used as a rough guide for determining when a reroute might be more suitable for summer ATV use. Costs for constructing a reroute are highly variable depending upon location, length, topography, and soil type. Alternatively, some of the less steep hills could be graded to reduce the slope, while others can be shaped more effectively by crowning the center of the

corridor, by constructing swales to capture the runoff, directing it off the trail, or creating switchbacks that traverse the fall line.

Legal and administrative costs associated with siting and securing access to summer-season ATV (only) reroutes, outside of the existing trail corridor, may also prove substantial. These type of reroutes would require negotiating new access agreements with landowners, and may complicate project design and environmental review steps. Reroute specifics are unknown and not speculated in this study beyond noting the potential need.

Trail Intersections & Connections

The NSST is a primary snowmobiling trail travel corridor and is heavily used during the winter season. Thirteen different Grant-In-Aid (GIA) snowmobile trails intersect or cross the NSST 21 times. These trails, in turn connect to other snowmobile trail systems located throughout Minnesota's Arrowhead Region. Four of these snowmobile trail intersections are also ATV trails in the summer. The Moosewalk/Mooserun (intersects three times) and the Red Dot GIA ATV Trails cross the NSST where the NSST is open to ATV use for approximately six miles. Other trail intersections include four cross-country ski trail crossings, and three crossings of the Superior Hiking Trail (five intersections if you count the start and end points of the shared section described below).

The Superior Hiking Trail (SHT) is a 205-mile footpath that follows the ridgeline above Lake Superior. The SHT is not a state trail. However, the majority of the existing trail was constructed by the DNR using LCMR (Legislative Commission on Minnesota Resources) funds. Now, all new segments are being built and maintained by the Superior Hiking Trail Association (SHTA), a non-profit organization. Funding for new construction and maintenance projects may come from various trail grant programs. Campsites are located along the trail for long-distance hikers and many access points allow for day-use as well. Some local resorts and hotels offer shuttle services for hikers using the SHT. The SHT traverses several State Parks and offers many scenic views of Lake Superior. All SHT crossings are well marked with signs indicating their path and that it is for foot traffic only.

NSST intersection with the Superior Hiking Trail in Lake County.

In addition, 40 different public roads intersect with the North Shore Trail. These include local and township roads, county roads and highways, state highways, State Forest Roads, and National Forest Service System Roads. Seven of the National Forest System Roads that cross the NSST allow for ATV use. Also, three different railroads, all privately operated by mining companies, cross the NSST. Other timber management roads, logging haul roads and user-developed trails also intersect or cross the existing NSST alignment.

Study Process - Physical Data Inventory

DNR staff conducted a detailed corridor inspection of the NSST during the summer and fall of 2005. Data collected in conjunction with the 2003-04 GIA proposal from the North Shore ATV Club was also used in this analysis. A Geographic Positioning System (GPS) unit was used to collect data points to record the location of specific features such as culverts; bridges; steep hills; intersections with other trails or roads; and spots requiring treadway stabilization in the form of added fill material or ditching in order to accommodate ATV use. A DNR interdisciplinary team has reviewed all of the data. Additional data was provided by cooperating agencies, including the United States Forest Service, St. Louis, Lake and Cook Counties.

For the purposes of this analysis, the entire trail (approximately 143 miles) was divided into 11 sections based primarily upon jurisdictional boundaries and existing access points, such as parking lots and road crossings. These sections, which are of varied lengths, are arbitrary distinctions and should not be viewed as independent or mutually exclusive, but simply as analysis units intended to facilitate review.

Actual Cost of Study

The legislature appropriated $50,000 to the DNR to complete this study. The actual cost of completing this study is $52,000, based upon the total staff time and expenses.

NSST corridor, Lake County.

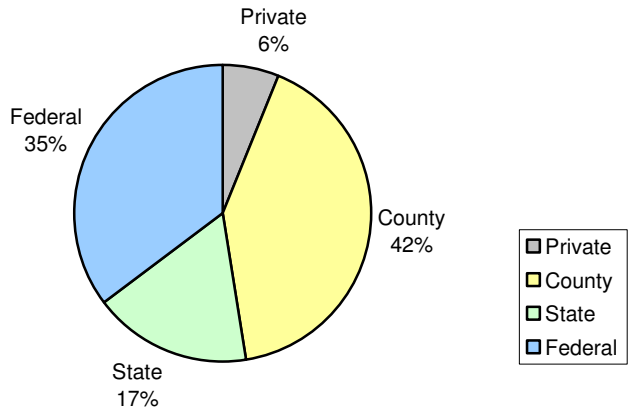
II. BACKGROUND OF THE NORTH SHORE STATE TRAIL

The North Shore State Trail (NSST), constructed and managed by the Minnesota Department of Natural Resources (DNR), extends approximately 143 miles from the Martin Road parking lot in northeast Duluth to the city of Grand Marais, Minnesota. (The total length of the trail based on the GPS data captured for this study indicates the trail length to be approximately 143 miles. Previous publications indicate the trail is 146 miles. This difference can be attributed to a combination of factors including recent reroutes of the trail and data collection errors.) The trail parallels the shoreline of Lake Superior, in a SW–NE direction, traveling along the north side (back side) of the bluffs, approximately five to seven miles inland from Lake Superior.

Ownership

The NSST corridor has multiple owners: counties own or administer approximately 42% (~59.3 miles) of the corridor; the USFS-Superior National Forest lands account for 35% (~50.7 miles); the State of Minnesota administers 17% (~24.3 miles); and privately-held parcels total about 6% (~8.6 miles). Private lands include a mixture of industrial timber and mining company lands, homesteads, hunting shacks and seasonal cabins. Several miles of the trail are also located on, within, and adjacent to County and Township roads and road rights-of-ways. State land ownership is primarily administered by the DNR and the University of Minnesota owns a small parcel. Ownership is highly variable for each section of trail and is discussed in more detail under each section in beginning on Page 29. (Also see Land Ownership Summary Table in Appendix A-1). Land ownership is also displayed on the section detail maps.

Figure II-1. North Shore State Trail Land Ownership Summary (by Trail Length in Miles)



Source: DNR, Unpublished data,.2006.

Current & Projected Use

Current Trail Use

The trail serves primarily as a snowmobile trail in winter, with some limited cross-country skiing and sled dog use along portions of the trail. Each winter, since 1985, most of the NSST is used for 3 days by the John Beargrease Sled Dog Race. However, snowmobile use is not restricted during the race. Summer use is light and infrequent, although segments of the trail are used by local hikers, mountain bikers and equestrians. The SHT currently uses approximately 2.5 miles of the NSST in Cook County to cross a major wetland. Fall hunting (i.e., grouse and deer) use is moderate along much of the trail.

All-terrain vehicle (ATV) use on the NSST is not allowed, as per the master plan for the trail adopted in August 1981, except for approximately 6.4 miles opened to seasonal ATV use in 2002. The trail's master plan was amended (in 2002) to permit travel along this portion of the trail from May 15 to November 30 each year. This link serves as part of the 32-mile Moosewalk/Mooserun ATV Trail, which connects to the 27.6-mile Red Dot grant-in-aid ATV trail near Silver Bay (See Map B-6, Appendix B). Together, this system of trails links Finland with Silver Bay, Beaver Bay, and the Palisade Valley Recreation Unit of Tettegouche State Park - the only one of Minnesota's 67 State Parks that allows ATV use. The DNR also administers a total of seven State Recreation Areas, one of which allows ATV use, the Iron Range Off-Highway Vehicle (OHV) Recreation Area at Gilbert, Minnesota.

In general, the master plan determines what uses are allowed on the trail. Decisions by land owners or administrators also determine if ATV use is allowed on the NSST. For example, some portions of the trail use forest or township road alignments, where ATV use may be allowed on these segments. In addition, private landowners may determine what uses are allowed on their land, consistent with state and federal rules and regulations.

No reliable ATV traffic estimates are currently available for this section of trail. Seasonal traffic counts have been attempted, but inaccuracies were apparent due to automated equipment failures and the inability to distinguish between different types of trail users (motorized and non-motorized). The most reliable estimates, although anecdotal, are those compiled from staff observations, such as from trail groomer logs, that record real-time 'encounters' with trail users.

Although specific demand for ATV use of the trail is unknown, ATV traffic would undoubtedly increase along those portions of the trail opened to ATVs, especially in areas most readily accessible (with vehicle access and parking), and on segments connecting popular destinations, such as from Finland to the Red Dot ATV Trail. Traffic levels would likely grow over time, particularly if new trails and/or new riding destinations were developed.

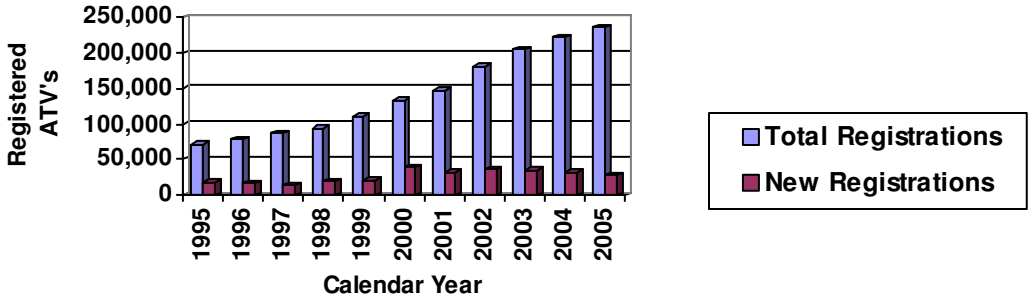
Any decision to designate portions of the NSST for ATV use will also likely influence county and federal land managing agencies, which also provide designated OHV routes across properties they manage. Every effort is being made to foster consistency in federal, state and county OHV trail planning and land management. A coordinated approach is hoped to aid public understanding of and increase compliance with OHV rules and regulations.

Projected Future Demand

Recent research reports, coupled with vehicle use and registration trend data, point to continued growth in All-terrain vehicle (ATV) recreation, at both the state and national levels. These reports detail the projected growth in OHV-related outdoor recreation - nationally, regionally, and locally, for Minnesota. Together, these reports provide a glimpse into activity participation rates and facility needs, as well as what can reasonably be expected in terms of future demand for off-road riding opportunities.

Figure II-2.

All-Terrain Vehicle Registrations, 1995-2005



Source: MN DNR, T&W, Dec. 2005. Unpublished data. Bureau of Info., Educ.& Licensing, St. Paul, MN 55155. Total does not include ATV's registered for solely agricultural or private land use.

Minnesota, like the rest of the nation, has experienced rapid growth in All-terrain Vehicle Off-Highway Vehicle (OHV) registration over the past decade. This growth has been particularly pronounced with regard to ATV registrations (Table II-A). National ATV retail sales data indicates that ATV sales are strong and growing, with nearly 800,000 new ATVs sold in 2003. According to manufacturers, that brings the national total to over 5.5 million vehicles sold since 1993.

Table II-A. Minnesota All-Terrain Vehicle Registration, 1995 – 2005.*

CALENDAR YEAR ENDING DEC. 31	FIRST-YEAR REGISTRATIONS	CUMULATIVE 3-YR REGISTRATIONS
1995	18,291	71,812
1996	16,223	78,992
1997	13,769	86,184
1998	19,729	93,824
1999	21,073	110,395
2000	38,813	132,994
2001	31,233	148,172
2002	35,776	181,755
2003	35,083	205,771
2004	31,606	222,594
2005	28,212	236,683

* Excludes Agricultural/Utility and official government registrations. Agricultural registrations totaled 42,569 at the end of calendar year 2004. Source: Unpublished Data, MN DNR, Bureau of Information, Education & Licensing, Dec. 2005. St. Paul, MN 55155

In the recently released *"2004 Outdoor Recreation Participation Survey of Minnesotans"* (MN DNR, 2005) and supporting documents, MN DNR projects a 252% increase in off-road ATV driving over the 10-year period of 2004-2014. The DNR found that while all other outdoor activities will experience participation declines of between 11 and 25 percent, ATV driving is expected to increase dramatically due to the steady, rapid rate at which off-road riding has grown over the past 10-years.

ATV registrations have doubled every five years during the past decade. It is unclear how long this trend will continue, or whether this huge projected increase will materialize or not.

According to the new report: *"Ten-Year Forecasts of Minnesota Adult Outdoor Recreation Participation, 2004-2014"* (MN DNR, 2005), just over 10 percent of the state's population 20 years or older participated in off-road ATV driving in 2004. Participation is projected to increase to 36 percent of the state's population by 2014. Numbers of ATV drivers and hours spent annually driving ATVs are projected to triple (305%) over the same period. This is remarkable, given that typical Minnesotans are expected to invest less time in outdoor recreation than in the past, as outdoor recreation participation rates stabilize and 'plateau' in Minnesota. If not for the increase in ATV activity, there would be no growth at all in aggregate statewide outdoor recreation use projections for the period 2004-2014.

In evaluating future recreation facility needs, the DNR also examined demographic and household income data by city/township, county and by region all across Minnesota. This data was supplemented by a direct mail survey of knowledgeable respondents to determine current and future needs and priorities. Respondents were asked to rate the adequacy of the supply of each type of recreation facility in current terms, and prioritize their needs for the coming five-year period. The results are summarized in a newly released report entitled: *"Outdoor Recreation Facility Survey of Minnesota Cities, Counties and School Districts"*, (MN DNR, 2005).

Survey results show that the trails category dominated the top ten facilities needed now and/or in the years to come. All three providers ranked the trails category higher than any of the other recreation categories. Facilities in the trails category comprised six of the top ten facilities. Moreover, cities and counties across Minnesota ranked motorized, off-highway vehicle trails among their highest trail priorities. They ranked other trail types, including cross-country ski and snowmobile trails, lower. In general, though, Northeastern Minnesota respondents saw the smallest need for new recreation facilities. None of the five reporting Northeast counties saw a current need for 27 of the 46 facility types (other than trails) that the DNR inquired about.

Past NSST Corridor Use Proposals

Motorized Proposals

In August 2003, a request was submitted by the North Shore ATV Club to the DNR asking that the agency authorize ATV use of a segment of the North Shore State Trail. The location of this segment is from the existing parking lot near the intersection of French River Road and Normanna Road, in St. Louis County, to the Moosewalk GIA Trail junction near Hockamin Creek, for a distance of approximately 55 miles (identified in this study as Sections 2-5). From that junction, the NSST is already open to ATV use for a distance of 6.4 miles north to a DNR parking lot located on Lake County Road 7 (identified in this study as Section 6).

The St. Louis County Board subsequently passed a resolution at its' December 23, 2003 meeting supporting ATV use on the trail. City of Duluth passed a resolution opposing ATV use within city limits on February 2, 2004. Then, the Normanna Town Board and the Alden Town Board, both in St. Louis County, passed resolutions expressing opposition to ATV use on the North Shore State Trail based on this request. Cook County sent a letter to the DNR expressing general support for the evaluation process indicating the need for more information before making any further

decisions. Prior to the GIA ATV proposal, Lake County passed a resolution, on July 26, 2001, expressing support of ATV use on the NSST.

On February 19, 2004, the North Shore ATV Club, along with the Cook County ATV Club and other supporters, including state and local elected officials, reiterated this request and their support for ATV use along the NSST. In July 2004, following a site-inspection, DNR officials responded to this request by indicating that, with certain engineering improvements and corridor reroutes, ATV use on portions of the NSST was indeed physically possible, but that a more detailed corridor assessment and a public comment period would both need to precede any change in trail use. The DNR further indicated that such an assessment would be unlikely in the near term.

Non-Motorized Proposals

In March 2004, the Sustainable Recreation Coalition (formerly the Responsible Recreation Coalition) submitted a request to the DNR to "permanently dedicate the North Shore State Trail, during non-frozen ground seasons, to a mix of hiking, bicycling, and birding trails for its entire length." The DNR response was similar to that in the previous case and indicated that it was not prepared to undertake work on this request, at that time, due to other competing priorities. Additionally, current state law does not specifically provide for bird watching along state trails, but hiking and biking are already permitted uses of the NSST.

More recently, the Superior Hiking Trail Association (SHTA) requested to use portions of the NSST near the City of Duluth. Currently, the Superior Hiking Trail (SHT) shares the NSST corridor for about 2.5 miles in order to get across wetlands in Cook County, roughly from County Road 6 north to just past Sawtooth Ski Hill Road, near Grand Marais. This portion of the trail is located on USFS land. (See Section Maps B-1 and B-11)

A letter from the DNR dated January 9, 2006, provides authorization for the SHTA to use the NSST corridor, pending landowner approval, for the 2.5 miles the SHT has been using in Cook County (mentioned above) and for approximately 13 miles, from the Martin Road parking lot north to the Normanna Road parking lot. St. Louis County, one of the major landowners along this portion of the trail, is also working with the SHTA regarding this request. The DNR is working with the SHTA and St. Louis County in determining what modifications would be necessary to accommodate reliable summer season hiking through low-lying and wet areas. The SHTA will be responsible for obtaining landowner approval for use of private land and for any needed improvements to those trail segments. The DNR also stipulated that any modifications to the trail must not interfere with winter snowmobile use. Since hiking is already a designated use along the NSST, changes to the Master Plan were not necessary in order to accommodate this request.

III. TRAIL MANAGEMENT

Resource Considerations

Water Management

- **Wetlands**

  The North Shore State Trail traverses many wetland areas. Certain segments of trail have been improved, including various reroutes, widening and straightening of the alignment, and the filling of wetlands prior to the Wetland Conservation Act of 1991 (WCA). These improvements were made to reduce trail maintenance costs and improve sustainability of the trail treadway for snowmobiling. Some previously filled wetlands would require additional fill in order to support ATV traffic. Other wetlands where no fill has previously been placed, but where fill would be necessary to accommodate summer ATV use, would require wetland mitigation. These areas have been identified as part of this study, and are shown in the section detail maps.

  Some wetlands along the trail corridor would need to be delineated and studied in more detail to identify potential impacts from ATV use along the trail. Wetland delineation would not be conducted unless a specific project proposal was being evaluated.

  A wetland along the NSST, St. Louis County

  In addition to any wetland losses caused directly by the placement of fill, adding fill to any location along the trail may potentially have an effect on adjacent wetlands or may interfere with or interrupt shallow or sub-surface water flow. Possible groundwater flow and associated surface water impacts are concerns that may require additional study if a proposal for ATV use on the NSST is received.

- **Trout Streams**

  The 78 designated trout streams and protected tributaries crossed by the NSST are listed in Appendix A-2 with bridge or culvert crossing structures noted. There are 43 bridges and 27 culverts across protected waters. Eight protected tributaries have neither a culvert nor bridge for the trail crossing. Six of these eight crossings are located along the former Alger-Smith Railroad grade, now a designated Lake County Road. Four of these are at locations where the railroad likely had wooden box culverts that have since collapsed, causing larger ponds to form upstream of the grade. On occasion, these ponds spill over the NSST treadway. These areas would require culverts to permit summer vehicular travel. The other two protected tributaries are located along a road occasionally used by logging trucks where there is no evidence of any water crossings. Culverts would be required only if or when evidence suggests some water seepage across the trail.

  Trout rely on loose, coarse gravel bottom material and clean, unimbedded rubble for spawning habitat and development of eggs. They rely on deep pools with overhead cover to provide habitat for adult fish. Erosion from roads, trails, and ditches can degrade spawning and nursery

habitat by releasing sediment that can smother developing eggs and imbed spawning gravels. Severe erosion can fill-in pools and smother riffle areas needed for production of invertebrates. A variety of techniques are available to limit erosion and runoff, including maintaining vegetative cover near streams. Vegetation is unlikely to remain on the treadway if the trail is opened to summer motorized use.

Trail approaches and orientation to stream crossings would need additional study to estimate potential impacts from summer ATV use. These crossings include the potential for additional erosion and sediment loading to these streams. Trout also require cool waters for their survival. Few trout streams along the North Shore have significant sources of spring water to keep them cool; instead, they rely on the cool climate and shade from their forested watersheds. It is very unlikely that conversion of the NSST trail to ATV use would result in a significant elevation of water temperatures, since a trail corridor already exists, and little, if any, additional clearing of canopy trees would be required.

- **Impaired Waters**

Currently, seven streams along the NSST are being closely monitored by the Minnesota Pollution Control Agency (MPCA), because they are designated as 'impaired' or at risk of becoming impaired in the near future due to accumulated impacts in the region. The MPCA is developing Total Maximum Daily Loads (TMDL) for these streams.

NSST crossing over East Branch Amity Creek, a Designated Trout Stream and impaired water downstream of the trail, St. Louis County.

According to the MPCA's 2006 draft list of impaired waters, seven impaired streams are either crossed by the NSST or located downstream of the NSST (see Appendix A-3). The Beaver River, Knife River, French River and Lester River are impaired by turbidity, including sediment loading, where the NSST crosses. The Lester, Beaver and Knife Rivers also have issues with mercury and the Beaver and Knife also are impaired by acidity, or pH. Amity Creek is impaired by turbidity approximately four miles downstream from the NSST. The Big Sucker Creek is being closely monitored approximately nine miles downstream from the NSST for turbidity and is expected to be on the 2006 list of impaired waters. The Poplar River is impaired by mercury and turbidity approximately six miles downstream from the NSST. It should be noted that where the NSST crosses the Poplar River, the trail is located on a forest service road and uses the road bridge to cross the river. Other vehicular traffic currently uses this bridge to cross the Poplar River. (Another stream, the Talmadge River, located in St. Louis County, is impaired by mercury and turbidity from its headwaters to Lake Superior. However, the NSST does not cross this stream or any of its tributaries.)

Currently, there are 140 road crossings downstream from the NSST and 72 road crossings upstream from the NSST, resulting in 212 other stream access points where potential impacts to these waters from motorized vehicles exist.

Impacts from trail development/rehabilitation or trail use may affect these already impaired waters. Trail construction or any work disturbing the soils in the vicinity of these sensitive resources require additional soil stabilization methods since erosion and runoff from trail construction could potentially increase the level of turbidity in the stream.

- **Stormwater Permit Requirements**
  The Minnesota Pollution Control Agency's (MPCA) Stormwater Program is designed to reduce the pollution and damage caused by stormwater runoff. The National Pollutant Discharge Elimination System (NPDES) Stormwater Program is a comprehensive national program for addressing polluted stormwater runoff as part of the national Clean Water Act. To help keep Minnesota's valuable water resources clean, the MPCA issues permits to construction site owners and their operators to prevent stormwater pollution during and after construction.

  A stormwater permit would be required for construction activities along the North Shore State Trail if the equivalent of one acre or more of soil were disturbed for construction or modifications. A permit may also be required for less than one acre of disturbed soil, if the MPCA determines that the activity poses a risk to water resources, such as particular waters impaired by turbidity.

Forest Management

The NSST is located within the statutory boundaries of the Cloquet Valley, Finland and Pat Bayle State Forest. However, little of the trail is actually located on state forest land. The trail is located primarily on county, federal and private parcels within the state forest statutory boundaries.

Existing use of the NSST as an access route for timber management sites.

Timber management and DNR timber sales commonly occur adjacent to the NSST. The trail right-of-way is sometimes used for vehicular access to the sale parcel. In cases where a timber sale or mining activity is conducted adjacent to or along an established state trail, GIA trail, park or forest trail, or any portion thereof, a DNR policy letter outlines guidelines, responsibilities and practices needed to minimize conflicts between timber harvesters and recreational trail users.

Currently, several sites along or adjacent to the NSST are included under existing timber sale or lease agreements with the DNR pending timber harvest. County Land Departments and the USFS may also have timber sales or leases active or pending along the NSST. Over the next ten years, management plans identify four timber harvest sites adjacent to the trail and 26 future sites within one-half mile of the trail. Five of these sites intersect the NSST. These identified stands are included in the *"North Shore Subsection Forest Resource Management Plan"* (DNR Division of Forestry, 2004) and have been evaluated by an interdisciplinary team.

Access to these sites may or may not require using the NSST. The treadway may be used as an access route for timber removal. In rare instances, the trail itself has been rerouted due to a timber sale. Timber harvest occurs both during summer and winter.

Also along the NSST are five designated and one candidate old-growth timber stands. The designated old growth sites occur in the same vicinity in the Finland State Forest and within George Crosby-Manitou State Park boundary (Sections 6 and 7). The NSST intersects two of these stands, both within the Finland State Forest boundary. These stands are protected from logging, but may not have any specific limitations for recreation. All of the designated old-growth stands along the NSST are characterized as white spruce forest types.

State Parks & Recreation Facilities
The North Shore State Trail crosses George Crosby-Manitou State Park in Lake County (Section 7). ATV use is not permitted within the State Park according to existing State Park Rules (Minnesota Rules, Chapter 6100.1900). ATV use would, therefore, need to be rerouted around this section of state park land or an alternative solution if ATV use was proposed in this area.

The Finland State Forest Campground and Day Use Area is located near the NSST. The DNR manages this campground and day use area. This campground is not physically connected to the NSST, and the nearest parking lot to access the trail is approximately 1.5 miles away. In order for ATVs to access the trail, they would need to be transported by trailer (or other means) to and from the campground.

Biodiversity
Approximately 86 miles of the NSST traverse Minnesota County Biological Survey (MCBS) sites of Outstanding, High, and Moderate Statewide Biodiversity Significance. This includes approximately 11 miles of sites of Outstanding, 40 miles of High, and approximately 35 miles of Sites of Moderate Statewide Biodiversity Significance. These sites represent ecologically contiguous assemblages of biological and physical features, which are most likely to exhibit intact ecological functioning at an intermediate (landform) scale.

In the North Shore Subsection, minimally fragmented, good to high-quality forested upland and wetland native plant communities of natural origin, (including native plant communities rare and unique to the state and/or the subsection), and rare plant and animal species populations characterize these MCBS sites.

Trail improvements, such as culvert installation and/or fill materials, can foster or introduce exotic species habitat in the areas of disturbed soil. Trail modifications, reroutes, and borrow pits may also directly affect rare plant species populations. Increased summer use along the NSST may promote creation and 'maintenance' of non-native invasive (exotic) species habitat by continued soil disturbances.

Native Plant Communities of natural origin traversed by, or immediately adjacent to the NSST within MCBS sites mapped to native plant community include:

- Forested wetlands in the Wet Forest, Forested and Open Rich Peatland, Acid Peatland, Wet meadow/Carr, and Marsh Systems. Including Poor Black Spruce Swamp; Rich Black Spruce

Swamp (Basin); White Cedar Swamp (Northeastern); Lowland White Cedar Forest (North Shore); Black Ash - Aspen - Balsam Poplar Swamp (Northeastern); Black Ash – Conifer Swamp (Northeastern); Alder Swamp; Alder - (Maple - Loosestrife) Swamp; Rich Tamarack - (Alder) Swamp; Willow - Dogwood Shrub Swamp; Leatherleaf - Sweet Gale Shore Fen Native Plant Community Types; and Beaver-influenced Wetland Complexes.

- Forested uplands in the Mesic Harwood and Fire-dependent System. Including Northern Mesic Mixed Forest; Northern Wet-Mesic Boreal Hardwood-Conifer Forest Native Plant Community Classes; and, Aspen - Birch Forest Balsam Fir; Paper Birch - Sugar Maple Forest (North Shore); Red Oak - Sugar Maple - Basswood - (Bluebead Lily) Forest; Sugar Maple Forest (North Shore); Upland White Cedar Forest; White Cedar - Yellow Birch Forest Native Plant Community Types

Wildlife

Wildlife in the vicinity of the NSST may be impacted by the addition of ATV use. In a literature review by Gaines et. al (2002) on the effects of linear recreation routes on wildlife, the most common interaction with motorized trails included displacement and avoidance where animals altered their use of habitats in response to motorized trails or trail networks. Disturbance at a specific site also was identified and was usually associated with wildlife breeding or rearing young. Gaines et. al (2002) also noted that the interactions of wildlife and motorized or non-motorized trails were quite similar. Depending on the wildlife species, some were more sensitive to motorized trail use, whereas others were more sensitive to non-motorized human presence. Based on their current understanding, motorized trails had a somewhat greater magnitude of effects, such as longer distances in which wildlife were displaced, for a greater number of the focal species that were reviewed.

Non-game wildlife species in the vicinity of the NSST may be impacted by trail construction, and spring through fall motorized use. Trail modifications could cause further fragmentation of existing habitats, especially for interior forest species such as the black-throated blue warblers (Holmes 1994), and salamanders (DeMaynadier and Hunter 1995), and may be a direct cause of mortality to some small vertebrate species such as salamanders, as well as create additional barriers to their movements (Maxell and Hokit 1999, DeMaynadier and Hunter 2000). The introduction of motorized use during the summer may also directly affect species sensitive to human activity, such as northern goshawk (Squires and Renolds 1997).

Enforcement

DNR Conservation Officers report few problems with illegal ATV riding on the NSST. Those areas where illegal ATV use has been reported are generally near population centers (e.g. Duluth and Grand Marais). Some past reports of illegal ATV use along or near the NSST were found to be false or inaccurate, such as observations of ATVs operating (legally) on adjacent Lake County lands, which are open to ATV use.

The DNR, county and USFS staff also routinely use trucks, ATVs or other motorized equipment for trail maintenance and enforcement purposes. Timber management activities may also include the use of motor vehicles and equipment along the trail to access harvest sites. While such uses of the trail are permitted and legal, tracks left by these vehicles are often misinterpreted as evidence of illegal activity along the trail.

County and Federal Land Management

County Land

- **St. Louis County –** St. Louis County lands are currently being managed for ATV use with the policy that routes are open unless posted closed. The County passed a resolution supporting ATV use on the NSST in December 2003. St. Louis County is currently working with the DNR, Native American Bands, USFS and other counties to review and evaluate existing motor access routes on lands they manage in an effort to designate specific trails and routes for motorized use.

- **Lake County –** Lake County lands are currently being managed for ATV use with the policy that routes are open unless posted closed. The County Board supports ATV use on public lands, and passed a resolution on July 26, 2001 stating their support for ATV use along the NSST. The County indicated that it prefers ATV use to be located along the existing corridor, rather than developing new corridors through the forest. Currently, Lake County sponsors the Moosewalk/Mooserun and Red Dot GIA ATV Trails, the only designated ATV trails within the county. These trails are located on shared treadways that were originally built (and are still used) for snowmobile use.

- **Cook –** Cook County is not a major NSST corridor landowner nor does the county administer any forest roads. ATVs are permitted to ride on county road right-of-ways, consistent with state laws. The county is currently working with the DNR, Native American Bands and the USFS to review and evaluate existing motor access routes on lands they manage in an effort to designate specific trails and routes for motorized use. Cook County intends to explore the potential for providing connections between state and federally-designated OHV trails. These connections, typically less than half a mile in length, would be along county road right-of-ways, and would connect other existing or designated OHV routes to create a loop system or trail network.

USFS – Superior National Forest

The USFS, Superior National Forest is currently working with the state (DNR), counties and Native American Bands on motor route access plans. The Superior National Forest Plan currently classifies the Superior National Forest as limited, with some areas designated as closed, to OHV use. Forest lands classified as limited allow motor vehicles to operate on forest roads, unless they are posted and designated closed and motor vehicles may operate only on forest trails or areas that are posted and designated open for OHV use.

Since approximately 52 miles of the NSST alignment is located on federal lands, the forest service would be an integral part of any proposed designation or change in designation of the state trail. The DNR and USFS currently have a written Memorandum of Understanding that allows the NSST to pass through the Superior National Forest. Under this agreement, the DNR is responsible for the management and maintenance of the trail, and for all improvements and support facilities such as culverts, parking lots, shelters and toilets.

An ATV trail proposal across federal lands would be subject to evaluation through the federal Environmental Assessment (EA) process, which would likely be conducted concurrently with a state Environmental Assessment Worksheet (EAW), if one were required. Both are public processes that

allows for public review and comment. Final decisions are required by both the DNR and USFS officials at the conclusion of these respective reviews.

The NSST also crosses an identified federal Candidate Research Natural Area (CRNA) south of Devil Track Lake (Section 10), and a Unique Biological Area just south of Grand Marais (Section 11). Both of these designations prohibit OHV use.

USFS currently is working to add a maximum of 90 miles of designated OHV trails within the Superior National Forest, pursuant to their Land and Resource Management Plan (USDA Forest Service - Superior National Forest, 2005). Any ATV designation along the NSST that occurs on USFS lands could count toward the target mileages identified in that plan. Cross-country travel by ATVs is prohibited in the Superior National Forest.

Potential Trail Use Conflicts

This study assumes that snowmobiling would continue to be the primary use on this multi-use state trail. Although ATV use need not be restricted to summer season only, it was assumed, for purposes of this study, that ATV use would likely be limited to summer due to the tremendous volume of winter snowmobile use. Therefore, potential conflicts arising from ATV use were presumed to occur during summer. Summer uses currently include hiking, mountain biking and horseback riding, as well as hunting and trapping activities during the fall.

Snowmobiling

Since snowmobiling is a winter-only seasonal use, the conflict with ATVs would only occur during those rare winters when early snow creates good snowmobile riding conditions prior to the ATV season end. Several area GIA Snowmobile trails also double as GIA ATV trails in the summer months (e.g. Moosewalk - Mooserun, Red Dot). Currently, there are 21 GIA snowmobile trail intersections with the NSST from Duluth to Grand Marais. A list of these trails is provided in Appendix A-7. Intersections may be an issue in certain areas for summer use since it may appear that another trail extends from the NSST, yet it is likely that most, if not all, of these connections would be closed to summer ATV use, until or unless otherwise designated.

NSST intersection with the Sugarbush GIA Cross-country Ski Trail located north of Tofte, in Cook County.

Cross-country Skiing/Dogsledding

Four cross-country ski trails intersect with the NSST. It can be anticipated that some illegal ATV use may occur on these ski trails during the non-snow months. Presently, there is minor use by dogsledders pulling ATVs or other vehicles during the training runs in the off-snow season. It can be expected that this use will continue and may increase slightly. These trail corridors also tend to be fairly wide in order to accommodate trail grooming and maintenance equipment. Tracks left by maintenance equipment, which includes ATVs, may cause confusion among other users if these

corridors are not well marked or signed as to their allowed uses and seasons.

Hiking
The NSST is not a popular hiking trail. Most long-distance hiking along the North Shore occurs along the Superior Hiking Trail, which is very popular and has more scenic vistas than the NSST. Popular hiking opportunities also exist nearby in the state and county forests, as well as in the many state parks along the North Shore. Additional hiking opportunities are available on other trails located closer to Lake Superior, including the Gitchi-Gami State Trail, which is currently being developed.

Hiking is generally incompatible with motorized use, but these activities can and do co-exist in many areas. Hikers may not see or hear fast approaching vehicles and, therefore be at increased risk for accidents or injury due to collisions. Conversely, ATV riders may be surprised by the presence of hikers on the trail and may be injured when attempting to avoid them. Direct interactions and noise generated from ATV activity are likely to diminish the overall trail recreation experience for hikers.

Mountain Biking
Mountain biking is generally incompatible with motorized use, for reasons similar to hiking. However, these two trail uses can co-exist and may be possible along the NSST due to the wide trail treadway. Mountain bike trails also exist in state and county forests in the area, as well as in the Superior National Forest. The number of mountain bike users, and their level of use along the NSST are unknown.

Equestrian Use
Horseback riding is generally incompatible with motorized use. However, ATV use and equestrians can co-exist under certain conditions, such as with a wide corridor or dual treadway. The potential exists for ATVs to scare horses as they are typically not familiar with them and do not recognize passengers as humans unless they remove their helmet. The NSST is not heavily used for horseback riding now since it is generally wet and very buggy during the summer months. Several horse farms are located near or adjacent to the NSST in St. Louis County, but it is not a popular destination trail for equestrians.

Trout Fishing
Many of the designated trout streams crossed by the NSST trail support wild brook trout populations in the vicinity of crossing sites, and those streams attract some fishing pressure. Anglers fishing trout streams often report that a sense of solitude and remoteness is an important part of their fishing experience. Motorized traffic at some of the more remote stream crossings on the NSST may impact anglers' sense of solitude.

Use of the existing trail to access trout streams for fishing is not well documented, but is believed to be light and infrequent. Trout anglers do not rely upon the NSST to access their fishing spots. Road crossings of these trout streams are more likely to be used as access points for fishing. Currently, there are 140 road crossings downstream from the NSST and 72 road crossings upstream from the NSST, resulting in 212 other stream access points besides the trail. Given the many crossings and access points already available along streams crossed by the NSST, it is unlikely that the opening of all or portions of the NSST to ATV use would significantly increase fishing pressure along those streams.

Hunting

Currently, hunting along and adjacent to the NSST is legal on trail segments that cross public and private lands open to hunting. Hunting is not legal on trail segments that cross public lands that are closed to hunting, or private lands posted 'closed' to hunting. ATV use by hunters along the NSST is illegal where use of ATVs is prohibited. On segments of the NSST that are not closed to ATV use, under current law, hunters may use ATVs to engage in hunting big game or constructing hunting stands during October, November, and December and retrieving big game during September. On segments that are open to ATV use, hunters may use ATVs to gain legal access to hunting locations.

Hunting activities may co-exist with recreational ATV riding, although recreational riding during hunting seasons may disturb those hunting along or near the trail, particularly non-motorized hunters. A segment of the hunting population, like anglers, report that a sense of solitude and remoteness is an important part of their hunting experience. The initial conflict would be between ATV riders (whether they hunt or not) and non-motorized hunters. The level of conflict between ATV riders and hunters (both non-motorized and motorized) is likely to increase proportionately with any increase in ATV activity.

State Parks

Currently, state parks prohibit the use of ATVs within park boundaries with the exception of Tettegouche State Park. This exception resulted from a land purchase in which the ATV trail, already well established, was located within a greater parcel of land that was sold to the DNR with the condition that the trail remain intact. An issue of conflict for potential ATV use occurs where the NSST crosses the George Crosby-Manitou State Park (Section 7 Map). Since ATV use in state parks remains prohibited by Minnesota Rules, Chapter 6100.1900, Subparts 1 and 2, this portion of the NSST would require a major reroute around state park land, or an alternative solution, if ATV use were proposed in this area. (Also see discussion on Page 16)

Logging and Mining Activities

Conflicts can be minimized due to cooperative management and communications between DNR and forest landowners, including the USFS and counties. As previously mentioned on Page 15, the DNR has guidelines and policies in place to minimize conflicts between timber harvesters and trail users. ATV use is not likely to have a significant impact on logging or mining activities along the trail.

Active logging occurring along the NSST. This timber management site is located in Cook County, near Pike Lake.

IV. Cost Estimates for Trail Modifications

CAUTION! Cost estimates may change considerably depending on specifications of an actual project. Further cost analysis is included for each section of trail, as identified for this study, to provide a better understanding of how these costs are associated to the trail.

The cost estimates included in this study are based upon general approximations along the entire length of the NSST. These estimations are not absolute, nor easily transferable to specific projects, but can provide useful guidance for the arbitrary sections described herein. Likewise, calculations for particular portions of the trail rely upon approximations, such as cost per culvert, cost of fill per foot, cost of wetland mitigation per square foot, etc. It is important to remember that individual features were not studied in great detail. There are also likely additional costs not included in these estimates. A specific project proposal is always necessary in order to generate a precise and reliable cost estimate.

The cost estimates below include labor, equipment and materials only. Administrative costs, and dollars for day-to-day trail operations and maintenance were not included in these estimates. These costs are discussed on Page 26-27.

Culverts

Culverts are an important water management feature along the existing trail. The current inventory indicates there are 270 culverts ranging in size from 8 to 48 inches in diameter; all are metal, with 37 of those in need of replacement. It is estimated that an additional 239 culverts would be required in order to accommodate sustainable ATV use.

Experience has shown that ATV traffic traveling through even minor water filled depressions can eventually lead to trail expansion as many riders opt to go around puddles. In many cases, however, simply filling such depressions can create a dam interrupting surface water flow and necessitating a new culvert.

A double culvert along the NSST, installed in 1982, that needs replacement. These culverts are too short for the current width of the trail and were improperly placed.

Detailed wetland delineation may be required in some low-lying or wet areas prior to construction or trail improvement. There may be other areas where minor trail reroutes would effectively reduce wetland impacts. However, in most cases, the existing trail alignment already minimizes most wetland crossings.

An estimated total of 276 new and replacement culverts would be needed in order to sustain ATV use along the entire 143-mile corridor. The breakdown of specific locations is discussed for each trail section, beginning on Page 29.

Culvert Cost Estimate Summary

Culvert cost estimates assume that a tracked excavator and a small bulldozer would be required for excavation, ditching, grading and shaping for a period of one and two hours respectively, per culvert. Since many culverts are located far from the nearest road, a delivery cost of $60 per culvert is

factored in. Using an average cost of $80 per hour, per machine for three hours totals $240 per culvert, or $300 per culvert including delivery. The cost of installing 276 culverts (at $300/culvert) is estimated to be $82,800. The cost to purchase the 276 culverts needed to upgrade the entire trail, is approximately $39,224 (2005 prices).

Treadway Stabilization

Because the NSST treadway was constructed for mainly snowmobile use, it was built with a fairly flat cross-section with no center crown. Managing water flow is the key to a long lasting, sustainable ATV trail corridor. Most of the NSST is in a clay-loam soil type with areas of gravelly glacial till and some exposed bedrock. The clay-loam soil is susceptible to rutting and ponding if water is allowed to stand in the treadway. It is important that water can flow off the treadway.

This can be accomplished in two ways. One is to use a bulldozer to blade a ditch along one or both edges of the trail placing the material in the center of the trail and smoothing it off. This is a quick and easy method when the trail is wide enough, the soil is not very rocky and there are not a lot of large tree roots. This is referred to as "ditching and crowning," or "D&C." The second method is to haul fill in and shape it with a bulldozer. Because of the remoteness of most of the NSST, there are only a few locations where it would be practical to haul in gravel from an established pit. In most cases where hauling fill in is the best method, a small borrow pit would need to be dug with a tracked excavator as near as possible to the fill site. This native soil would then be transported either by truck or a tracked hauler. A bulldozer would compact and crown the soil appropriately.

Treadway alterations would be required in at least 190 identified locations. These vary in length from a minimum of 60 feet to a maximum of 3,200 feet. The longest location is along a former railroad grade (Alger-Smith) that needs additional gravel fill since it is slowly sinking in a swamp. The original railroad grade was built in the late 1800s, and is now deteriorating. The total linear distance of fill needed is 63,125 feet, or approximately 11.9 miles. Of this distance, 9,675 feet, or 1.8 miles, are identified as wetland fill that would require mitigation.

The NSST was constructed prior to the passage of the Wetland Conservation Act of 1991 (WCA) and most of the wet areas crossed were filled to provide an elevated treadway. This would allow summer use plus the passage of maintenance vehicles such as mowers. Because constructing trail across wetlands is expensive, all measures to find the narrowest crossing were made during the original design of the trail. No effort has been made to identify all of the filled wetland areas during this study. Some of these previously filled wetlands would need to be upgraded with additional fill.

Cost Derivation

Several assumptions were made to reach a cost estimate for treadway stabilization. It is estimated that approximately 60% (32,070 feet) of the locations not identified as wetlands can use the ditch and crown method with a bulldozer. The remaining 40% (21,380 feet) would need fill moved by hauling.

Ditching and crowning with a mid-sized bulldozer would require approximately 2.5 hours per 100 feet of trail. Using the current cost of $80 per hour, this would equal $200 per 100 feet of trail, or $2.00 per foot. Therefore, the ditching and crowning portion of trail is estimated by multiplying 32,070 feet by $2.00 per foot.

Hauling fill to sites along the trail is more expensive than using the ditch and crown method since additional types of equipment are needed. To achieve adequate drainage on a level or only slightly depressed portion of ground would require fill of loose native soil one-foot deep placed eight feet wide. This would compact to approximately eight inches when packed and shaped with a bulldozer, leaving a 4% cross-section slope. For 100 feet of trail, it would require approximately 30 cubic yards of fill. Using a five cubic yards tracked hauler or a five cubic yards dump truck would require approximately two hours of hauling, averaging three round trips per hour. The bulldozer would require ¾-hour to compact and shape the treadway.

Therefore, for 100 feet of fill, two hours using a tracked hauler costs $50 per hour, or $100; the use of an excavator costs $80 per hour and is needed for two hours, producing a cost of $160; and a bulldozer would cost roughly $60 for the estimated ¾-hour ($80 per hour). Adding the three equipment costs produces the cost estimate of $320 per 100 feet or $3.20/foot.

Wetland Fill

Additional expenses are required for filling wetland areas. The fill must cover the entire trail width for snowmobile use, which is an average of 20 feet. Filter fabric must be placed under the fill to reduce the amount of fill needed and to keep the fill from washing away. If the wetland has spots of open water or very wet locations, corduroy consisting of brush and logs would need to be placed on the treadway. Also, the depth of fill needs to be approximately two feet deep at the center for a stable trail base. One hundred feet of wetland filling requires approximately 110 cubic yards of fill. The tracked hauler and excavator would need approximately 7.3 hours of use each and the bulldozer would need two hours. This cost is estimated to be $11.00 per foot.

Wetland Mitigation

Wetland mitigation is not required where wetland work has been completed prior to WCA, as these areas have been "grandfathered in" as long as the existing footprint remains unchanged. Otherwise, wetland mitigation will be required for those wetland areas that have not been previously filled or "hardened". Some areas will need additional hardening for summer use, and areas that have not had previous fill or hardening have been identified.

During the data collection phase, no effort was made to identify all the wetlands that had been filled during the construction phase of the trail prior to passage of WCA. However, 27 wetland areas were identified as having no evidence of prior filling. The approximate length of these wetlands is 9,675 feet. The average width of the NSST is roughly 20 feet. This would require an estimated 193,500 square feet of fill, or 4.44 acres. To purchase wetland mitigation credits for these areas would cost approximately $0.30 per square foot. The Army Corps of Engineers requires that if wetlands cannot be replaced in the same watershed where the filling has occurred, then wetlands must be replaced at a 1.5 to 1 ratio. To date, it has proven very difficult to find replacement locations in the north shore area. Therefore, the replacement acreage would likely increase to 6.66 acres.

Hills and Potential Reroutes

The NSST is located on varied terrain including 172 hills with a grade of 10% or greater. All the hills were measured using a clinometer. Many of the hills vary in steepness throughout their length and each is unique. The slope or grade was measured along the steepest portion of the hill and an average percentage was ascertained based on the estimated length of the hill. The 10% grade figure was used because experience that has shown erosion is minimal for hills with a grade less than 10%.

Nearly all of the hills on the NSST run on the fall line, or the path of least resistance for water flow, which encourages water to run down the trail and leads to erosion. For snowmobile use, this was desirable to keep snow on the trail. However, for summer use, this is not desirable. In some cases, a reroute would be the best solution. Reroutes that have worked in these situations consist of a narrow bench constructed off the trail, approximately 10 feet wide, at a grade of less than 10%. This facilitates effective water runoff control. Some hills could be slightly leveled using a bulldozer to lessen the grade. Where others would be shaped more effectively by crowning the center of the treadway, by constructing swales to capture the runoff, directing it off the trail.

An existing hill reroute on the portion of NSST open to ATV use. The orange snow fence is used to direct ATV traffic across the snowmobile trail route, which is along the fall line (hill grade is 23%). The bridge is located over the West Branch Baptism River.

For purposes of this study, several assumptions have been made to determine reasonable cost estimates. For the 72 hills with between 10% and 14% grade, it is estimated that 20%, or 14 hills, would require some modification. Of the 74 hills between 15% and 19% grade, an estimate of 50%, or approximately 37 hills, would need modification. Of those 37 hills, it is further estimated that half (18 or 19) would require a more extensive reroute around the hill. The 26 hills over 20% grade would all require either some type of modification, or reroutes to control soil erosion. Hills not requiring modifications include those with stable soils or bedrock, both of which are far less vulnerable to erosion.

To arrive at these cost estimates, it was necessary to calculate a cost per foot for this type of construction. It is important to realize that these estimates are based upon average hill lengths rather than on specific hills. Each hill was not independently evaluated for the extent to which it may or may not require modification. The total number of (hill) reroutes was estimated by determining those that would need reroutes based on their measured grade, then rounding to the nearest whole number. The cost approximations are described below for each section of trail.

Absolute numbers are difficult, since each hill is unique and presents its own challenges to creating a sustainable ATV route. It is also unknown whether suggested reroutes could be located entirely within the trail's existing corridor, or whether it would need to cross other ownerships, potentially incurring additional administrative or other costs. Given this lingering uncertainty, the following grade assessment is provided.

Grade 10-14%

Only 20% of these grades are thought to require modifications. Modifications would be needed in areas with active groundwater seeps, less stable soils and lengthy hills. The modification work required for these grades would be best accomplished using a bulldozer. A defined crown would be pushed up in the center of the trail leaving swales along the edges to capture runoff. The

water would then be directed off the side of the trail in intervals by ditching a short distance into the woods. This would be particularly effective on the longer hills to prevent erosion in the side swales. For a typical 100-foot hill, this would require an estimated four hours with a mid-sized bulldozer at the rate of $80 per hour, or $320. Using this calculation provides the estimated cost of $3.20 per foot for hill modification work. This base cost estimate will be used to calculate the cost of the hill modifications, except reroutes, as assessed in this study.

The estimated total length of hills with a 10-14% grade is 17,865 feet. It is estimated that 20% of these hills would need modification.

Grade 15-19%

This group if hills include 13,065 feet of hills where an estimated 25% would need modifications, but not necessarily reroutes. The earlier calculation of approximately $3.20 per foot would apply to these situations.

The other 25% of the hills in this group would require reroutes and take more effort. The reroutes would be constructed 10-feet wide and would need to loop around or switchback across the hill to decrease the average grade. Switchbacks typically require about twice the length of the straight-line trail alignment. Construction of these reroutes may also require removing trees, brush, stumps and rocks (with a bulldozer) and would take up to twice as long as other modification work. Therefore, the cost is estimated to be about $6.40 per foot.

NSST, looking down hill, 23% grade, near 6-mile ridge overlook.

Grade >20%

With steeper grades, the relatively short hills do not typically experience the same (high) rate of erosion, as do longer hills. On these sections, other means could be used to stabilize soils, thus reducing the need for reroute for some steep sections. The nine hills with estimated lengths under 105 feet could be modified for approximately $3.20 per foot.

The remaining 17 hills, which are all estimated to be longer than 105 feet, would require more extensive reroutes. The existing trail length for these hills is estimated to be 4,635 feet. The actual trail treadway length would also more than double with modifications and reroutes.

Administrative Costs

Additional expenditures would be incurred for DNR administrative costs relating to project oversight and to meet state planning and environmental review requirements, should a decision be made to allow ATVs on the NSST. These are one-time costs. County and Federal administrative costs are not included in these estimates.

Project oversight costs include; stormwater and wetland permitting, negotiations with landowners over easements or other agreements needed to allow ATV use, and day-to-day supervision and oversight of the trail modifications previously described. It is estimated that project oversight costs for the State (DNR) would be 10% of the trail modification costs, or approximately $57,000.

Minnesota Statute 86A.09 requires that a master plan be completed before the construction of new facilities or other development on the state trail. A master plan amendment would be required before any trail modifications, such as providing for ATV use, could be initiated. The master plan process is expected to take about six months, at a ½ full-time employee (FTE) level of effort. Anticipated costs for staffing and public meeting expenditures for the master plan amendment process are estimated to be $30,000.

Minnesota Rules 4410.4300 Subpart 37.B requires that an Environmental Assessment Worksheet be completed for any designation of at least 25 miles of an existing trail for a new motorized use. Whether or not this threshold would apply depends on the number of miles of trail that might be designated for ATV use. If an EAW is required, it is expected that the process would take six to nine months and a ½ FTE level of effort. Anticipated State (DNR) costs for staffing and public meeting expenditures for the EAW process are estimated to range from $30,000 to $40,000.

This study would provide valuable information for both the master planning and environmental review processes.

Operation, Maintenance and Monitoring Costs

In 2003, the DNR began to collect information relating to the operation, maintenance and monitoring costs associated with ATV trails. Two years of data have been collected relating to the operation, maintenance and monitoring costs on the 30-mile Thistledew trail in the George Washington State Forest. In the 2004 field season, the DNR expended just over $11,500 and in 2005 the DNR expended nearly $5,000 on operation, maintenance and monitoring on this trail. Based on two years of data it is anticipated that the operation, maintenance, and monitoring costs relating to ATV use on the NSST would be $167 to $385 per mile, per year; or $24,000 to $55,000 annually for the entire 143 mile NSST.

Enforcement Costs

DNR enforcement would re-evaluated priorities and adjust accordingly if ATVs were allowed on additional portions of the NSST. Completion of the statewide forest classification and trail designation process, required under Minnesota Laws 2003, Chapter 128, Article 1, Section 167 as amended, will reduce the number of routes available for ATV use statewide. If additional ATV use were allowed on the NSST, the DNR may shift enforcement resources to the trail from areas that will no longer need a focus on enforcement. It is important to remember that grants have been allocated to the DNR Enforcement Division by the legislature to be passed on to those sheriff's who have applied for state assistance to be used for off-highway vehicle enforcement.

Cost Summary Conclusion

Cost estimates would need to be recalculated for any specific project and evaluation of all of the unique features actually located within the limits of any particular proposed project. County and Federal administrative costs should also all be considered with any proposed project.

V. TRAIL CORRIDOR INVENTORY DETAILS

Trail Sections

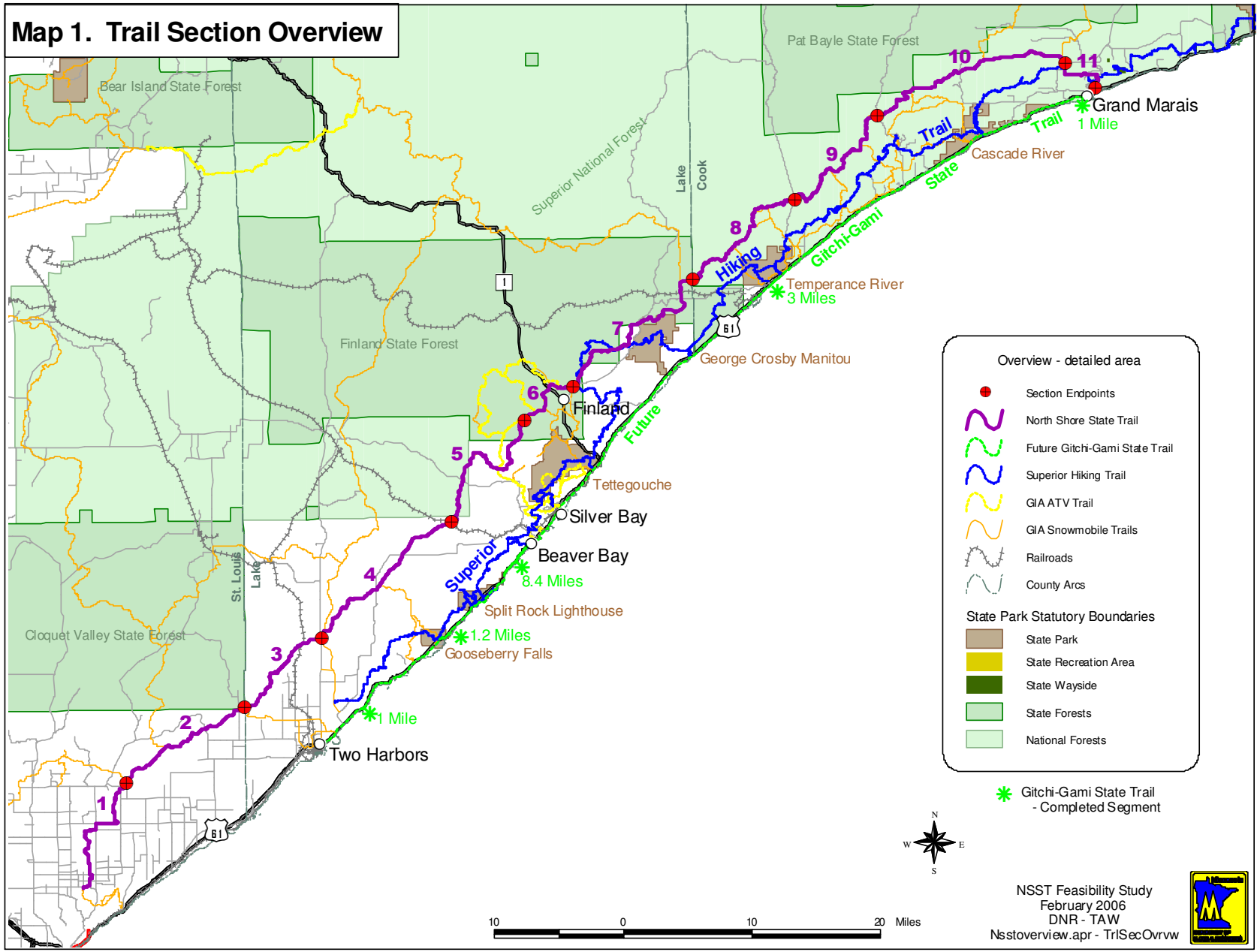
For purposes of this study, the NSST was divided into 11 somewhat arbitrary lengths or sections. These sections, numbered 1-11 from south to north, are based primarily upon jurisdictional boundaries and existing access points, such as parking lots and road crossings. These sections, which are of varied lengths, are arbitrary distinctions and should not be viewed as independent or mutually exclusive, but simply as analysis units intended to facilitate review. Information gleaned from this evaluation may be summarized or presented in most any manner deemed appropriate and useful for ensuing planning and policy discussions. The Overview Map on Page 30 indicates the section breaks along the trail.

The following topics are evaluated for each of the eleven trail sections identified:

- Section Description (unique features, details)
- Land Ownership
- Water Management (includes designated trout stream and protected tributary inventory with trail crossing structure; culverts; impaired waters data) with cost estimates
- Treadway Stabilization (wetland mitigation, fill) with cost estimates
- Trail Terrain (hill grades and lengths) with cost estimates
- Trail Intersections (roads and trails)
- Trail Amenities/Facilities (shelters, toilets, parking)
- Concluding Observations

Data summaries for the entire length of the trail are provided in Appendix A.

Detailed Section Maps are provided in Appendix B.


Map 1. Trail Section Overview
Bear Island State Forest
Superior National Forest
Pat Bayle State Forest
Lake
Cook
Finland State Forest
Cloquet Valley State Forest
St. Louis
Lake
Grand Marais
1 Mile
Cascade River
Temperance River
3 Miles
George Crosby Manitou
Finland
Tettegouche
Silver Bay
Beaver Bay
8.4 Miles
Split Rock Lighthouse
1.2 Miles
Gooseberry Falls
1 Mile
Two Harbors
1
2
3
4
5
6
7
8
9
10
11
Superior Hiking Trail
Gitchi-Gami State Trail
Future
61
1
Overview - detailed area
Section Endpoints
North Shore State Trail
Future Gitchi-Gami State Trail
Superior Hiking Trail
GIA ATV Trail
GIA Snowmobile Trails
Railroads
County Arcs
State Park Statutory Boundaries
State Park
State Recreation Area
State Wayside
State Forests
National Forests
Gitchi-Gami State Trail
- Completed Segment
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Miles
NSST Feasibility Study
February 2006
DNR - TAW
Nsstoverview.apr - TrlSecOvrvw

St. Louis County

Section 1: Martin Road parking lot (Duluth) to the French River Road/Normanna Road parking lot; a distance of 13.3 miles, in St. Louis County. (Map B-1 in Appendix B.)

The North Shore State Trail begins on the northern edge of the city limits of Duluth, at the trail parking lot along Martin Road. The NSST makes its way north through a series of mostly private parcels with a few portions crossing county tax forfeited and state lands. One portion of the trail crosses University of Minnesota property where the trail is twenty feet wide and flanked by a six-foot high fence on one side of the trail for approximately 3/8 of a mile. Many of the private parcels adjacent to the NSST have access trails of various widths emanating from the private property onto the state trail.

This section of trail is the most densely populated part of the trail with residential dwellings visible from the trail in multiple locations. This section also traverses sizable areas of swamp and wetland. Three-tenths of a mile of the trail is located on Wright Road, a Rice Lake Township road no longer used for regular motor vehicle traffic (it heads north off of W. Tischer Road). This road does not appear in digital data, but can be seen on the St. Louis County plat map.

During the trail inspection, evidence of horseback riding and ATV use was noted in this area. It should also be noted that the Superior Hiking Trail Association is interested in using this section of the NSST and the DNR has authorized their use, pending land owner approvals (also see Page 12).

Land Ownership

This segment of trail lies within high-density residential (private) parcels as well as some county tax forfeited land, University of Minnesota land and a small portion of state land administered by the DNR. A majority of the adjacent and surrounding lands are private.

Table 1.1. Land Ownership Summary – Section 1

Owner	Length (miles)	Percent of section (~13.3 miles)
Private	6.84	51%
County (St. Louis)	5.2	39%
State, University of MN	1.28	10%

Water management

Trout Streams and Tributaries

This section of trail includes five designated trout streams and four protected tributaries. All designated trout streams are bridged in this section. Two of the protected tributaries have culverts and two do not have any structure at the trail crossing. However, these two tributaries are very minor and intermittent drainages. Additional culverts along this portion of trail are detailed below in the Culverts summary.

Table 1.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 1

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
E. Br. Amity Cr	steel bridge, 60 ft	Designated Trout Stream	Hg*, Turbidity (5 mi. downstream of NSST)
Trib. to Amity	None	Protected Tributary	No
Trib. to Amity	None	Protected Tributary	No
Trib. to Amity	culvert, 36 inch diameter	Protected Tributary	No
S. Br. Lester R.	culverts, 24 and 36 inch diameters	Protected Tributary	No
Lester R.	steel bridge, 70 ft	Designated Trout Stream	Hg*, Turbidity
N. Br. Lester R.	wood bridge, 26 ft	Designated Trout Stream	No
W. Br. French R.	wood bridge, 24 ft	Designated Trout Stream	No
French R.	wood bridge, 24 ft	Designated Trout Stream	Turbidity

*HG = Mercury. Mercury impairment would not be affected by recreational trail use.

Culverts

Of the 43 existing culverts along this segment, two would need to be replaced for summer ATV use. An additional 49 culverts would also be needed to accommodate summer ATV use. This more than doubles the number of culverts that would be located along this stretch of trail. The cost estimate for culvert repair and installation is calculated for 51 culverts for Section 1.

Table 1.3. Culvert Summary – Section 1

Culverts	*8-inch*	*12-inch*	*18-inch*	*24-inch*	*30-inch*	*36-inch*	TOTAL
Existing	1	35	4	1	1	1	**43**
Existing, Needs replacement		2					**2**
New needed		48		1			**49**

The estimated cost to purchase 51 new culverts for this section of trail is approximately $7,200. Based on the installation cost average of $300 per culvert, this section is estimated to cost $15,300. The total estimated cost for culvert materials and installation along this section of trail is $22,500. This estimate does not include administrative costs. (Culvert cost calculations are discussed on Page 22.)

Treadway Stabilization

Wetland Mitigation

The trail alignment for this section is estimated to need a total of 4,395 feet of wetland mitigation, occurring at eight separate locations. The wetland mitigation estimated cost for section 1 is 4,395 linear feet x 20 feet average width = 87,900 square feet (or 2 Acres) x 1.5 = 131,850 sq. ft (or 3 Acres replacement) x $0.30 = $39,600. (Wetland Mitigation cost calculations are discussed on Page 24.)

NSST in St. Louis County, near a GIA snowmobile trail intersection.

Treadway Preparation

The treadway along this portion of the trail is in need of 15,210 linear feet (or approximately 2.9 miles) of fill in 39 different locations. The costs associated with treadway

preparation are broken into three categories, Ditch and Crown (D&C), Haul-in and Wetland Fill (cost calculations discussed on Pages 23-24). The cost estimates are summarized below in Table 1.4. (Wetland Mitigation costs are separate from wetland fill costs and discussed above.)

Table 1.4. Treadway Stabilization Summary – Section 1

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul (Ft)	Haul Cost: $3.20/Ft	Wetland Fill	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 1
1	6,489	$13,000	4,326	$13,800	4,395 Ft (2 Acres)	$48,300	15,210	$75,100

Trail Terrain - Hills

This section of the NSST consists of 14 hills with a grade greater than or equal to 10%, summarized below in Table 1.5.

Table 1.5. Hill Grade Summary – Section 1

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (Ft)	$3.20/ft Cost	Estimate Needing Reroute	Average Length of Hills (Ft)	$6.40/ft Cost
10-14% Grade	10	2	209	$1,300			
15-19% Grade	3	1	125	$400	1	250	$1,600
>20% Grade	1				1	300	$1,900
						Sub-Total	$5,300

Estimated number of reroutes has been rounded to the nearest whole number.

Cost estimate for Section 1 hill modifications is approximately $5,300; not including administrative costs. (Hill and reroute cost calculations are discussed on Pages 24-26.)

Trail Intersections

The NSST crosses seven public (county) roads in this first section of trail and has one intersection with another Grant-In-Aid (GIA) Snowmobile Trail at the start of the trail where the GIA snowmobile trail continues southward.

Amenities

Two parking lots, each with a toilet, are located at the beginning of trail in Duluth, just off of Martin Road, and near the French River Road - Normanna Road intersection. One trail shelter, with a pit toilet and fire ring, is located along this section of trail, near the Lester River.

Concluding Observations - Section 1

This is the most 'urbanized' trail section with over half of the section located on private lands (51%). This section is also the wettest segment of the trail, requiring considerable fill, culverts and wetland mitigation in order to stabilize the trail for ATV use. This section crosses three designated trout streams that have been declared as impaired waters by MPCA.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$142,500** (not including administrative costs).

Section 2. French River Road/Normanna Road parking lot to St. Louis - Lake County line; a distance of 13.3 miles in St. Louis County. (Map B-2 in Appendix B.)

This section is lightly populated and heavily forested. The DNR Division of Forestry originally built this section of trail in 1969-1970. This area has had extensive timber harvest activity adjacent to the trail over the years. A portion of this section sometimes doubles as a logging road, part of which has been gravel-hardened. St. Louis County frequently uses the trail treadway as a timber harvest haul road, typically for short periods of time. The county notifies the DNR in advance of planned timber harvests requiring trail access.

The DNR has made major improvements to this section, including two long reroutes in 1986 and 2000 to avoid wetlands. However, this section continues to have water-related issues stemming from beaver dams in the vicinity that have caused flooding in areas along the trail.

Land Ownership

This segment of trail occurs mainly on county tax forfeited lands, with approximately one-half a mile on private industrial parcels and just over two miles on state lands administered by the DNR..

Table 2.1. Land Ownership Summary – Section 2

Owner	Length (miles)	Percent of section (~13.3 miles)
Private (Industrial)	0.5	4%
County (St. Louis)	10.6	80%
State (DNR)	2.1	16%

Water management

Trout Streams and Tributaries

This section of trail includes three designated trout streams crossed by wood bridges, and one protected tributary, with a culvert under the trail. This culvert is located along a portion of the NSST that is coincident with a gravel logging road. Trail crossing features are also summarized in Table 2.2. Additional culverts needed along this portion of trail are detailed below in the Culverts summary.

Table 2.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 2

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Sucker R.	Wood bridge, 50 ft	Designated Trout Stream	No
Trib to Capt. Jacobsen	Culverts, two 24 inch diameter	Protected Tributary	No
W. Br. Knife R.	Wood bridge, 24 ft	Designated Trout Stream	No
Little W. Br. Knife R.	Wood bridge, 24 ft	Designated Trout Stream	No

Culverts

Of the 23 existing culverts along this section, one would need to be replaced for summer ATV use. An additional 14 culverts would also need to be installed to improve surface water management to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 15 culverts for Section 2.

Table 2.3. Culvert Summary – Section 2

Culverts	*8-inch*	*12-inch*	*18-inch*	*24-inch*	*30-inch*	*36-inch*	TOTAL
Existing	3	12	4	4			**23**
Existing, Needs replacement		1					**1**
New needed		13	1				**14**

The estimated cost to purchase 15 culverts for this section of trail is approximately $2,100. The installation cost is estimated at $4,500. The total estimated cost for culvert materials and installation along this section of trail is $6,600. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail is in need of 3,285 linear feet of fill in 12 different locations. Cost estimates are summarized below in Table 2.4.

Table 2.4. Treadway Stabilization Summary – Section 2

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul-in (Ft)	Haul-in Cost: $3.20/Ft	Wetland Fill	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 2
2	1,971	$3,900	1,314	$4,200	0	-	3,285	$8,100

Trail Terrain

Hills

This portion of trail consists of 36 hills with a grade greater than or equal to 10%, summarized below in Table 2.5.

Table 2.5. Hill Grade Summary – Section 2

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	7	1	261	$800			
15-19% Grade	20	5	129	$2,100	5	258	$8,300
>20% Grade	9	4	127	$1,600	5	254	$8,100
						Sub-Total	**$20,900**

Cost estimate for Section 2 hill modifications is approximately $20,900, not including administrative costs.

Trail Intersections

This section of the NSST crosses two public (St. Louis County) roads (Fox Farm Rd and Laine Rd) and a St. Louis County timber management road. There are also two intersections with Grant-In-Aid (GIA) Snowmobile Trails (Pequaywan-Hoyt Lakes Trail and Reservoir Riders Trail).

Amenities

Limited parking is available at the Fox Farm Road, but no designated parking lot is located along this portion of the trail (aside from the starting point of this section at French River Road – Normanna Road intersection as described in Section 1). A shelter, with a toilet and fire ring, is located near the Big Sucker River.

Concluding Observations -- Section 2

This area is less populated than the previous section, and the vast majority of the trail is located on county- administered lands. Relatively few designated trout streams and tributaries are crossed in this section. A moderate number of new culverts would be needed and a number of areas would need treadway stabilization work to accommodate ATV use. This section does not appear to need wetland mitigation.

Compared to the rest of the trail sections, this portion of trail is has many hills, with most of the hills in the range of 15-19% grade, and several with a grade in excess of 20%. This section would likely require more hill reroutes than any other.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$35,600** (not including administrative costs).

Lake County

Section 3. St. Louis/Lake County line to Highway 2 parking lot (a.k.a. Alger Road parking lot); a distance of approximately 10 miles in Lake County. (Map B-3 in Appendix B.)

This section of trail is lightly populated. The original NSST used the Alger-Smith railroad grade in this area. However, reroutes have since moved the trail off of the railroad grade in several locations to avoid conflicts between snowmobiles and vehicle traffic. The Alger-Smith railroad tracks were removed in 1923 and Lake County acquired the 100-foot right-of-way. Much of the abandoned grade is now used as a Lake County Forest road and a portion is also used as a Silver Creek Township road. The 2005 Lake County Plat map shows both the trail and the railroad grade, which is now labeled as Britton Pit Rd/Dufresne Rd., just off of County Road 2. Both trail and Alger Grade run through a County Demonstration Forest (dedicated in November 2005). Currently, it is legal for ATVs to ride on the county forest road, which the NSST shares for about three miles (Twp 53, R 11; Twp 54, R 10; Twp 54, R 10). Logging and gravel pit traffic on this road may be a concern to ATV riders. The NSST uses a section of this abandoned railroad grade to avoid extensive wetlands and to pass under the Canadian National railroad tracks (formerly DM&IR) through a concrete box culvert.

Land Ownership

This segment of trail is largely located on county lands with small portions on private land and state land administered by the DNR.

Table 3.1. Land Ownership Summary – Section 3

Owner	Length (miles)	Percent of section (~10.2 miles)
Private	0.14	1%
County (Lake)	9.62	95%
State (DNR)	.39	4%

Water management

Trout Streams and Tributaries

This section of trail includes three designated trout streams and three protected tributaries. Two of the designated trout streams have wooden bridges and one has a metal culvert. One of the protected tributaries has a wooden bridge and the other two have metal culverts under the trail. Additional culverts along this portion of trail are detailed below in the Culverts summary.

Table 3.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 3

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
E. Br. Knife R.	Wood bridge, 34 ft	Designated Trout Stream	Hg*, Turbidity
Trib to E. Br. Knife R.	Culvert, 12 inch diameter	Designated Trout Stream	No
Trib to Stewart R.	Culvert, 18 inch diameter	Protected Tributary	No
Trib to Stewart R.	Culvert, 12 inch diameter	Protected Tributary	No
Stewart R.	Wood bridge, 30 ft	Designated Trout Stream	No
Trib to Stewart R.	Wood bridge, 16 ft	Protected Tributary	No

*HG = Mercury. Mercury impairment would not be affected by recreational trail use.

Culverts

This section of trail consists of 34 culverts, none of which need replacing at this time. An additional six culverts would need to be installed in order to accommodate summer ATV use.

Table 3.3. Culvert Summary - Section 3

Culverts	*12-inch*	*15-inch*	*18-inch*	*24-inch*	TOTAL
Existing	17	1	13	3	**34**
Existing, Needs replacement					**0**
New needed	5			1	**6**

The estimated cost to purchase six culverts for this section of trail is $900. The installation cost is estimated at $1,800. The total estimated cost for culvert materials and installation along this section of trail is $2,700. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

The trail alignment for this section is estimated to need a 150 feet (approximately 0.07 Acres) of wetland mitigation, occurring at one location. The wetland mitigation estimated cost for this section is **$1,400** (0.10 Acres replacement).

Treadway Preparation

The treadway along this portion of the trail requires approximately 3,935 linear feet of fill in five different locations. One these locations would likely require wetland mitigation for 150 linear feet.

Approximately 3,200 feet of the Alger-Smith Railroad grade crosses a large beaver meadow between the Stewart River Tributary and the Canadian National Railroad underpass. The grade is deteriorating and would require additional gravel overlay. A gravel pit is located nearby and would be a logical source for the gravel. Cost estimates are summarized below in Table 3.4 below. (Wetland Mitigation costs are separate from wetland fill costs and discussed above.)

Table 3.4. Treadway Stabilization Summary - Section 3

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul-in (Ft)	Haul-in Cost: $3.20/Ft	Wetland Fill	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 3
3	441	$900	3,434	$11,000	150 Ft (0.07 Acre)	$1,700	3,935	$13,600

Trail Terrain

Hills

This portion of trail consists of seven hills with a grade greater than or equal to 10%, five of which are in the 15-19% range, summarized below in Table 3.5.

Table 3.5. Grade Summary - Section 3

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimated Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	1						
15-19% Grade	5	1	141	$400	1	282	$1,800
>20% Grade	1	1	90	$300			
						Sub-Total	$2,500

Cost estimate for Section 3 hill modifications is approximately $2,500, not including administrative costs.

Trail Intersections

This section crosses four public (county) roads and intersects the Two Harbors Corridor GIA Snowmobile Trail at two locations.

Amenities

The parking area on Alger Road accommodates approximately 25-30 vehicles with trailers and an overflow gravel pit parking area nearby accommodates another 20 vehicles. A toilet is located at the Alger Road parking lot. One trail shelter, with a toilet and fire ring, is located near the East Branch of the Knife River.

Concluding Observations - Section 3

It is sparsely populated along this section of trail, the majority of which is located on county-administered lands. This section of trail crosses relatively few designated trout streams and tributaries, with one of them impaired by turbidity. A small number of new culverts would be needed, and relatively little fill would be needed to accommodate ATV use. However, it is possible that one of these fill locations may also require wetland mitigation. The terrain along this portion of trail is somewhat varied, but there are fewer hills than in the other sections.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$20,200** (not including administrative costs).

Section 4. Highway 2 parking lot to North Shore Mining railroad tracks; a distance of approximately 15.5 miles in Lake County. (Map B-4 in Appendix B.)

The NSST is back on the Alger-Smith Railroad grade for 8.9 miles of this section, beginning at the south crossing of County Road 3, called London Crossing. As mentioned earlier, the Alger-Smith Railroad grade is a 100-foot right-of-way (ROW) that is owned in fee title by Lake County. Approximately 5.5 miles of the 8.9 miles is an improved gravel road.

To avoid winter conflicts with timber hauling operations, a parallel trail for snowmobiles was constructed off the graveled portion in the late 1980's. Where the grade passed through private parcels, it remains on county fee property. The graveled portion of this corridor would provide a better route for motor vehicle use, if this would prove workable.

The adjacent trail was constructed for winter use only and crosses through wetlands. Then, north of Beaver Crossing, the trail is adjacent to/parallel to the Alger-Smith grade, but still within the ROW. (Portions run through private land, but are completely within the ROW of the county road and former railroad grade. Lake County owns the land by fee title, so it is not tallied as a private parcel, as depicted on the map.)

Land Ownership

This section of the NSST is located almost entirely on county land. Those portions crossing private parcels, both residential and industrial, are crossed within the Alger grade ROW, which is owned by Lake County.

Table 4.1. Landownership Summary - Section 4

Owner	Length (miles)	Percent of section (~15.5 miles)
Private (Industrial/Mining)	-	-
County (Lake)	14.52	93.5%
State, (DNR)	1.01	6.5%

Water management

Trout Streams and Tributaries

This section of trail includes 11 designated trout streams and nine protected tributaries. Eight crossings have bridges, seven are wooden and one is of steel construction. The remaining stream crossings include four culverts and six crossings with no trail drainage structure. It should be noted that these six crossings are located along the former Alger-Smith railroad grade, a designated Lake County road, and are all protected tributaries. Two of these protected tributaries do not have any obvious signs of drainage. The 11 designated trout stream structures consist of six wood bridges, one steel bridge, and four culverts. The protected tributaries include one bridge and two culverts. Additional culverts along this portion of trail are detailed below in the Culverts summary.

Table 4.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 4

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Silver Cr.	wood bridge, 22 ft	Designated Trout Stream	No
Encampment R.	wood bridge, 24 ft	Designated Trout Stream	No
Gooseberry R.	steel bridge, 70 ft	Designated Trout Stream	No
Dago R.	wood bridge, 28 ft	Designated Trout Stream	No
Trib to Dago R.	none, Alger RR grade	Protected Tributary	No
Trib to Dago R.	none, Alger RR grade	Protected Tributary	No
Trib to Mink Cr.	none, Alger RR grade	Protected Tributary	No
Trib to Mink Cr.	none, Alger RR grade	Protected Tributary	No
Mink Cr.	culvert, 12 inch diameter	Designated Trout Stream	No
Trib to Mink Cr.	none, Alger RR grade	Protected Tributary	No
Trib to Mink Cr.	none, Alger RR grade	Protected Tributary	No
Stoney R.	wood bridge, 24 ft	Designated Trout Stream	No
Skunk Cr.	wood bridge, 30 ft	Designated Trout Stream	No
Trib to Skunk Cr.	wood bridge, 16 ft	Protected Tributary	No
Bud Cr.	culvert, 36 inch diameter (installed by Lake County)	Designated Trout Stream	No
Trib to Bud Cr.	culvert, 12 inch diameter	Protected Tributary	No
W. Br. Split Rock R.	culvert, 60 inch diameter (installed by Lake County)	Designated Trout Stream	No
Trib to E. Br. Split Rock R.	culvert, 12 inch diameter	Protected Tributary	No
E. Br. Split Rock R.	wood bridge, 40 ft (installed by Lake County)	Designated Trout Stream	No
W. Br. Beaver R.	culverts, two 48 inch diameter	Designated Trout Stream	No

Culverts

This section of the trail consists of 14 existing culverts. Three of the existing culverts would need to be replaced for summer ATV use. An additional 41 culverts would need to be installed to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 44 culverts for Section 4.

Table 4.3. Culvert Summary - Section 4

Culverts	*8-inch*	*12-inch*	*18-inch*	*24-inch*	*48-inch*	TOTAL
Existing	6	2	3	1	2	**14**
Existing, Needs replacement		2		1		**3**
New needed		34	3	4		**41**

The estimated cost to purchase culverts for this section of trail is $6,300. The installation cost is estimated at $13,200. The total estimated cost for culvert materials and installation along this section of trail is $19,500. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

This section is estimated to need a total of 4,740 linear feet (2.2 Acres) of wetland mitigation, occurring at 17 separate locations. Wetland mitigation estimated cost for this section is $42,700 (3.26 Acres replacement).

Treadway Preparation

This portion of the trail would require 6,390 linear feet (approximately 1.2 miles) of fill in 18 different locations, and 17 locations may require wetland mitigation. Cost estimates are summarized below in Table 4.4. (Wetland Mitigation costs are separate, discussed above.)

Table 4.4. Treadway Preparation Summary - Section 4

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul-in (Ft)	Haul-in Cost: $3.20/Ft	Wetland Fill	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 4
4	990	$1,980	660	$2,100	4,740 Ft (2.2 Acres)	$52,100	6,390	$56,200

Terrain

Hills

This portion of trail consists of five hills with a grade greater than or equal to 10%, summarized below in Table 4.5.

Table 4.5. Hill Grade Summary - Section 4

Hills	Number of hills	Estimated Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	2	1	150	$480			
15-19% Grade	3				1	260	$1,664
>20% Grade	0						
						Sub-Total	$2,144

Cost estimate for Section 4 hill modifications is approximately $2,100, not including administrative costs.

Trail Intersections

This section of the NSST crosses three township and county public roads and intersects two GIA Snowmobile Trails; the Gooseberry Spur Trail and the Yukon Trail.

Amenities

This section does not include any designated parking areas. However, numerous trail access locations exist. A large county/township gravel pit, located near the Gooseberry River, is located along the trail and some parking is available. The road crossings also offer limited off-street parking. Two trail shelters with toilets and fire rings are located near the Gooseberry River and the West Branch of the Split Rock River.

Concluding Observations - Section 4

This section is sparsely populated with most of the trail corridor located on county-administered lands. This section also has the greatest number of protected waters crossings relative to the other sections, although several crossings are along a former railroad grade. Still, the number of culverts along this portion of the trail would need to more than double, and some 17 sites may need some sort of wetland mitigation in order to accommodate ATV use.

The wetland locations are concentrated along a relatively short segment of trail. This part of the trail was constructed in 1969-1970 and relatively little work has been done on it since that time. Rerouting a trail around the wetlands has not been explored, but may be an option to consider, especially for summer ATV use. The terrain is less varied than the previous section with only five hills greater than 10% grade.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$120,500** (not including administrative costs).

Section 5. North Shore Mining railroad tracks to Hockamin Creek; a distance of approximately 16 miles in Lake County. (Map B-5 in Appendix B.)

This section of trail begins at the Superior National Forest boundary, although the majority of the trail is located on county lands. A private mining company now owns one portion of the trail that was originally built on county land. The NSST has since been rerouted north and west to go around a taconite tailings disposal site (milepost 7). The adjacent lands to the trail in this location have been heavily logged and the NSST served as a significant haul road about 12-15 years ago. A number of gravel pits also exist in the vicinity of the trail. Newer county and forest roads now serve as access routes to the active gravel pits and logging areas.

Land Ownership

This segment of trail is entirely located on public lands administered by Lake County, the state (DNR) and the United States Forest Service (USFS), Superior National Forest.

Table 5.1. Landownership Summary - Section 5

Owner	Length (miles)	Percent of section (~15.76 miles)
County (Lake)	7.68	49%
State (DNR)	4.4	28%
Federal, USFS	3.68	23%

Water management

Trout Streams and Tributaries

This section of trail includes six designated trout streams and four protected tributaries. These stream crossings consist of six bridges, five are wooden and one is steel; and four culverts. Three of the designated trout streams have wooden bridges, one has a steel bridge and two have culverts. Two of the protected tributaries have wooden bridges and two have culverts. Additional culverts along this portion of trail are detailed below in the Culverts summary.

Table 5.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 5

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Trib to Kit Cr.	culvert, 24 inch diameter	Protected Tributary	No
Trib to Kit Cr.	culverts, two 24 inch diameter	Protected Tributary	No
Kit Cr.	wood bridge, 30 ft	Protected Tributary	No
Beaver R.	wood bridge, 38 ft	Designated Trout Stream	Hg*, Turbidity
Trib to Big 39 (Little Big 39)	wood bridge, 24 ft	Protected Tributary	No
Big 39 R.	wood bridge, 40 ft	Designated Trout Stream	No
Little 39 R.	wood bridge, 24 ft	Designated Trout Stream	No
E. Br. Beaver R.	steel bridge, 55 ft	Designated Trout Stream	No
Little 43 Cr.	culvert, 24 inch diameter	Designated Trout Stream	No
Nicado Cr.	culvert, 18 inch diameter	Designated Trout Stream	No

*HG = Mercury. Mercury impairment would not be affected by recreational trail use.

Culverts

Of the 19 existing culverts along this segment, seven would need to be replaced for summer ATV use. An additional 31 culverts would also need to be installed to improve surface water management to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 38 culverts for Section 5.

Table 5.3. Culvert Summary - Section 5

Culverts	*12-inch*	*18-inch*	*24-inch*	*30-inch*	*36-inch*	TOTAL
Existing	7	6	5		1	**19**
Existing, Needs replacement	3	2		2		**7**
New needed	28	3				**31**

The estimated cost to purchase culverts for this section of trail is $5,400. The installation cost is estimated at $11,400. The total estimated cost for culvert materials and installation along this section of trail is $16,800. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

The trail alignment for this section is estimated to need a total of 390 linear feet (0.18 Acres) of wetland mitigation, occurring at one location. Wetland mitigation estimated cost for this section is $3,500 (0.27 Acres replacement). This does not include administrative costs associated with wetland mitigation.

Treadway Preparation

The treadway along this portion of the trail requires 1,560 linear feet (approximately three-tenths of a mile) of fill in seven different locations. One of these locations would likely require wetland mitigation for 390 linear feet. Cost estimates are summarized below in Table 5.4. (Wetland Mitigation costs are separate, discussed above.)

Table 5.4. Treadway Preparation Summary - Section 5

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul-in (Ft)	Haul-in Cost: $3.20/Ft	Wetland Fill Length (Ft)	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 5
5	702	$1,400	468	$1,500	390 Ft (0.18 Acres)	$4,300	1,560	$7,200

Terrain

Hills

This portion of trail consists of 21 hills with a grade greater than or equal to 10%, summarized below in Table 5.5.

Table 5.5. Hill Grade Summary - Section 5

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	8	2	396	$2,500			
15-19% Grade	13	3	184	$1,800	4	368	$9,400
>20% Grade	0						
						Sub-Total	**$13,700**

Cost estimate for Section 5 hill modifications is approximately $13,700, not including administrative costs.

Trail Intersections

The NSST in this section consists of one county road intersection and two GIA Snowmobile Trail intersections (Moosewalk Trail and Red Dot Trail). Both of these trails are also GIA ATV trails, which are open from May 15 to November 30, conditions permitting.

Amenities

A parking area on Forest Highway 11 can accommodate eight vehicles with trailers and does not have a toilet. One trail shelter, with a toilet and fire ring, is located near the East Branch Beaver River and the intersection with the Red Dot GIA Snowmobile/ATV Trail.

Concluding Observations - Section 5

This section is within the boundary of the Superior National Forest and partly within the Finland State Forest, with the trail corridor mostly on county lands. Significant portions of the trail are on USFS lands. For sustainable ATV use, this section would require a moderate to high number of new culverts relative to the other sections and would also require one section of wetland mitigation.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$41,200** (not including administrative costs).

Section 6. Hockamin Creek to Finland parking lot (Moosewalk ATV Trail); a distance of 6.4 miles in Lake County. (Map B-6 in Appendix B.)

This section opened to ATV use in the spring of 2004 and connects with the GIA Moosewalk ATV Trail. Recent improvements to this section were completed in 2005.

Land Ownership

This segment of trail is mostly on public lands administered by the state (DNR) and Lake County. One small portion is located on private land.

Table 6.1. Landownership Summary - Section 6

Owner	Length (miles)	Percent of section (6.4 miles)
Private	0.3	5%
County (Lake)	2.0	31%
State (DNR)	4.1	64%

Water management

Trout Streams and Tributaries

This section of trail includes three designated trout streams and two protected tributaries. These stream crossings consist of one steel bridge and four culverts. The bridge crosses the West Branch of the Baptism River, a designated trout stream. The other two designated trout streams have two large culverts at each crossing and the protected tributaries each have one culvert. Additional culverts along this portion of trail are detailed below in the Culverts summary.

Table 6.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 6

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Hockamin Cr.	culverts, two 72 inch diameter (installed in 1960s prior to NSST use)	Designated Trout Stream	No
Trib to Hockamin	culvert, 24 inch diameter	Protected Tributary	No
Trib to Hockamin	culvert, 24 inch diameter	Protected Tributary	No
W. Br. Baptism R.	steel bridge, 100 ft	Designated Trout Stream	No
Tikkanen Cr. (Sec 8)	culverts, two 24 inch diameter	Designated Trout Stream	No

Culverts

In this relatively short section of trail, there are 25 existing culverts. In 2005, nine new culverts were installed. A very wet spring established the need for these new culverts. As ATV use is still on the rise along this portion of the trail, effective maintenance and management continues to evolve to create a sustainable ATV trail.

Table 6.3. Section 6 Culvert Summary

Culverts	*12-inch*	*18-inch*	*24-inch*	TOTAL
Existing	21	1	3	**25**
Existing, Needs replacement	-	-	-	**-**
New needed	-	-	-	**-**

A cost estimate for Section 6 is not applicable here since this section has already been modified for ATV use.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no unfilled wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail has already been hardened and improved for ATV use. However, with the increasing number and amount of use the trail has received each year, additional improvements continue to be made. No additional treadway preparation estimates were determined during this evaluation.

Terrain

Hills

This portion of trail consists of five hills with a grade greater than or equal to 10%. In 2003, two of the hills were modified by crowning with a bulldozer. In 2005, a reroute was constructed around a portion of the longest hill.

Trail Intersections

The NSST in this section consists of three road intersections, one state highway, one county road, and one state forest road. This portion of trail also intersects three GIA Snowmobile trails, two of which are also GIA ATV trails (Moosewalk (also ATV), Mooserun (also ATV), and Sawtooth).

Amenities

An eight-vehicle with trail parking area, with toilets, is available on Lake County Road 7, near Finland. Additional summer parking is available on the Heffelfinger Road west of Finland. One trail shelter, with a toilet and fire ring, is located near the West Branch Baptism River.

Concluding Observations - Section 6

ATV use is designated as a trail use for this section of the NSST. Improvements have been made to the corridor for sustainable ATV use. On-going, minor improvements, such as fill, may still be necessary depending on use levels and weather conditions.

Section 7. Finland parking lot to Lake - Cook County line (also, statutory boundary of the Superior National Forest; closest road is Lake County Road 8, a.k.a. Cramer Road); a distance of 18 miles in Lake County. (Map B-7 in Appendix B.)

This section of trail is primarily located on state and county lands. Approximately one and a half miles of a county logging/timber haul road, known locally as Egge Lake Road, is used near the beginning of this section (not shown on plat map as a road). The NSST once used two CSAH 7 road bridges to cross the Manitou and Nine Mile Rivers. As the road was improved and traffic increased, the trail was routed off the road and a new bridge was constructed across the Manitou River, below the confluence with the Nine Mile River, within the boundary of George Crosby-Manitou State Park. This section of trail is on varied terrain with numerous hills, some quite long. A scenic overlook (Kowalski Overlook) of a broad valley is located along a maple ridge. The NSST uses an old township road, the Town Line Road, beginning at Lake County Road 8 and proceeding north for approximately one mile. The trail crosses the LTV Steel Railroad tracks using this old road crossing. This road has also been used for timber hauling, and is likely to continue being used for such activities in the future.

View from the Kowalski Overlook, located along the NSST, north of Finland, in Lake County.

Land Ownership

Land ownership along this section of trail is primarily county and state lands, with small portions on private (industry) parcels. The DNR administers the state lands in this section. State Park rules currently prohibit the use of ATVs within state park lands. This issue would need to be addressed if ATV use is proposed for this portion of the trail (as discussed above on Pages 16 and 21). The private parcels are private mining industry owners, which includes one private railroad crossing.

Table 7.1. Landownership Summary - Section 7

Owner	Length (miles)	Percent of section (~17.82 miles)
Private (Industry)	0.5	3%
County (Lake)	8.9	50%
State (DNR)	8.4	47%

Water management

Trout Streams and Tributaries

This section of trail includes nine designated trout streams and one protected tributary. These stream crossings consist of eight bridges, six wood and two steel, and two culverts. Two of the designated trout streams have culverts and a wood bridge is used to cross the protected tributary. Additional culverts along this portion of trail are detailed below in the Culvert data summary.

Table 7.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 7

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Trib to E. Baptism	culvert, 30 inch diameter	Designated Trout Stream	No
Egge Cr.	wood bridge, 24 ft	Designated Trout Stream	No
Schoolhouse Cr.	culverts, two 24 inch diameter	Designated Trout Stream	No
E. Br. Baptism R.	steel bridge, 80 ft	Designated Trout Stream	No
Rock Cut Cr. (Manitou Trib)	wood bridge, 24 ft	Designated Trout Stream	No
Manitou R.	steel bridge, 110 ft	Designated Trout Stream	No
Kowalski Cr.	wood bridge, 24 ft	Protected Tributary	No
S. Caribou R.	wood bridge, 45 ft	Designated Trout Stream	No
Middle Caribou R.	wood bridge, 30 ft	Designated Trout Stream	No
N. Caribou R.	wood bridge, 24 ft	Designated Trout Stream	No

Culverts

This section of trail has 31 existing culverts; seven of which need to be replaced for summer ATV use. An additional 20 culverts would need to be installed for effective water management to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 27 culverts for Section 7.

Table 7.3. Culvert Summary - Section 7

Culverts	*8-inch*	*12-inch*	*15-inch*	*18-inch*	*24-inch*	*30-inch*	TOTAL
Existing	2	15	1	9	3	1	**31**
Existing, Needs replacement		4			3		**7**
New needed		20					**20**

The estimated cost to purchase culverts for this section of trail is $3,800. The installation cost is estimated at $8,100. The total estimated cost for culvert materials and installation along this section of trail is $11,900. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no unfilled wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail is in need of 10,890 linear feet (approximately 2.1 miles) of fill in 31 different locations. Cost estimates are summarized below in the Table 7.4.

Table 7.4. Treadway Preparation Summary - Section 7

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul (Ft)	Haul Cost: $3.20/Ft	Wetland Fill Length (Ft)	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 7
7	6534	$13,000	4356	$13,900	0	-	10,890	$26,900

Terrain

Hills

This portion of trail consists of 25 hills with a grade greater than or equal to 10%, summarized below in Table 7.5.

Table 7.5. Hill Grade Summary - Section 7

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	16	3	259	$2,500			
15-19% Grade	7	2	343	$2,200	2	686	$8,800
>20% Grade	2				2	1800	$23,000
						Sub-Total	**$36,500**

Cost estimate for Section 7 hill modifications is approximately $36,500, not including administrative costs.

Trail Intersections

The NSST in this section crosses three Lake County forest roads, one private development road and two county roads. This section of trail also has one intersection with a GIA Snowmobile Trail (Tomahawk Trail), and crosses one railroad track, owned by LTV Steel. The NSST also intersects with the Superior Hiking Trail at two locations along this section.

Amenities

A small summer only off road parking area is maintained by Lake County on County Road 7, near the Manitou River and limited parking is available on County Road 8. Two shelters, with toilets and fire rings, are located along the trail near the East Branch Baptism River and the Caribou River.

Concluding Observations - Section 7

This section of trail is mostly on county lands, but also crosses the statutory boundaries of the Finland State Forest and George Crosby-Manitou State Park. A lengthy reroute would likely be required to avoid the State Park lands since current park rules do not allow for motorized use. A moderate number of trout streams and tributaries are located along this section and a fairly high number of new culverts would be needed to accommodate ATV use. A relatively high number of areas are in need of additional fill for trail stabilization along this section of the trail. The terrain is quite variable with a large number of hills, although most hills are under 14% grade.

NSST located along a portion of Egge Lake Road, a Lake County Forest Road.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$75,300** (not including administrative costs).

Cook County

Section 8. Lake - Cook County line to Sawbill Trail (Cook County Highway 2); a distance of approximately 13.6 miles in Cook County. (Map B-8 in Appendix B.)

This section begins at the Cook – Lake County border and the trail is entirely located on USFS land.

Land Ownership

The entire section of trail is located on lands owned by the USFS, Superior National Forest.

Table 8.1. Landownership Summary - Section 8

Owner	Length (miles)	Percent of section (~13.62 miles)
Federal, USFS	13.62	100%

Water management

Trout Streams and Tributaries

This section of trail includes six designated trout streams and one protected tributary. Three of the designated trout streams are crossed using USFS roads. Two of these USFS crossings use concrete box culverts and one has a steel bridge. The remaining designated trout streams have DNR structures (bridge or culverts). Additional culverts along this portion of trail are detailed below in the Culvert Data Summary.

Table 8.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 8

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Amenda Cr.	wood bridge, 24 ft	Protected Tributary	No
Two Island R.	wood bridge, 34 ft	Designated Trout Stream	No
Stumble Cr.	culverts, 24, 36 inch diameters	Designated Trout Stream	No
Cross R.	steel bridge, 120 ft	Designated Trout Stream	No
Heartbreak R.	USFS Culvert	Designated Trout Stream	No
Blind Temperance R.	USFS Culvert	Designated Trout Stream	No
Temperance R.	USFS Bridge	Designated Trout Stream	No

Culverts

Of the 26 existing culverts along this segment, eight need to be replaced for summer ATV use. An additional 22 culverts would need to be installed to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 30 culverts for Section 8.

Table 8.3. Culvert Summary - Section 8

Culverts	*8-inch*	*12-inch*	*15-inch*	*18-inch*	*24-inch*	*36-inch*	TOTAL
Existing	2	16	1	2	4	1	**26**
Existing, Needs replacement		7			1		**8**
New needed		21		1			**22**

The estimated cost to purchase culverts for this section of trail is $4,300. The installation cost is estimated at $9,000. The total estimated cost for culvert materials and installation along this section of trail is $13,300. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no unfilled wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail is in need of 13,260 linear feet (approximately 2.5 miles) of fill in 38 different locations. Although this section consists of portions of roads and former roads, it still would need considerable fill for trail stabilization for sustainable ATV use. Cost estimates are summarized below in Table 8.4.

Table 8.4. Treadway Preparation Summary - Section 8

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul (Ft)	Haul Cost: $3.20/Ft	Wetland Fill Length (Ft)	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 8
8	7,956	$15,900	5,304	$17,000	0	-	13,260	$32,900

Trail Terrain

Hills

This portion of trail consists of 16 hills with a grade greater than or equal to 10%, summarized below in Table 8.5.

Table 8.5. Hill Grade Summary - Section 8

Hills	Number of hills	Estimated Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	9	2	188	$1,200			
15-19% Grade	5	2	132	$800	1	264	$1,700
>20% Grade	2				2	420	$5,400
						Total Cost	$9,100

Cost estimate for Section 8 hill modifications is approximately $9,100, not including administrative costs.

Trail Intersections

This section of the NSST crosses six national forest roads, one of which (FR 166, 600 Road) is used three times to cross rivers. Another of the national forest roads is used by the Tofte GIA snowmobile club and ATVs are currently allowed on this road. ATVs are also allowed on one other forest road that intersects the NSST along this section. A second Tofte GIA snowmobile trail also intersects the NSST in this section.

Amenities

No formal parking areas are located in this section of the trail. However, limited parking is available on several of the roads that intersect the NSST. At the Sawbill Trail (Cook County Hwy 2), there is a small pull-off, not plowed in the winter, which would accommodate several vehicles. The USFS maintains a toilet at this location. One shelter, with a toilet and fire ring, is located along the trail near the Blind Temperance River.

Concluding Observations - Section 8

This section of the trail is entirely located on USFS lands. The number of water crossings are less than the average number compared to the other sections. However, the number of culverts would more than double for effective water management. A considerable amount of treadway stabilization work would be needed to sustain motorized use along this section of the trail.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$55,300** (not including administrative costs).

The NSST uses a USFS bridge to cross the Temperance River, a designated trout stream.

Section 9. Sawbill Trail to Caribou Trail parking lot (Cook County Road 4); a distance of approximately 13 miles in Cook County. (Map B-9 in Appendix B.)

This section of the trail is primarily on USFS, Superior National Forest lands with only three-tenths of a mile located on state land administered by the DNR Forestry. This section begins at the Sawbill Trail (Cook County 2) and quickly climbs to the top of "Six Mile Ridge." This section of trail also includes three intersections with the Sugarbush GIA cross-country ski trail. These ski trail intersections with the snowmobile trail have not been a problem or reported as a problem or concern. The NSST crosses the Poplar River, a designated trout stream, which runs into Lutsen Resort. This river is currently being studied by a local group, the Poplar River Management Board, comprised of local businesses whose intent is to have the river removed from the MPCA's list of impaired waters. The river is currently listed as impaired water by the MPCA for turbidity and mercury levels. The impaired waters are identified from the Superior Hiking Trail bridge, which is located approximately 6.5 miles downstream of the NSST, to Lake Superior.

Land Ownership

This segment of trail is entirely on public lands, mostly administered by the USFS, Superior National Forest and a small portion owned by the state administered by the DNR.

Table 9.1. Landownership Summary - Section 9

Owner	Length (miles)	Percent of section (~13.15 miles)
State (DNR)	0.3	2%
Federal, USFS	12.85	98%

Water management

Trout Streams and Tributaries

This section of trail includes two designated trout streams and one protected tributary. These stream crossings include a forest service bridge and culvert crossing the designated trout streams and a DNR double culvert used for the protected tributary. Additional culverts along this portion of trail are detailed below in the Culvert data summary.

Table 9.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 9

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Poplar R.	USFS Bridge	Designated Trout Stream	Hg*, Turbidity
Tait R.	USFS Culvert	Designated Trout Stream	No
Trib toTait R.	culverts, two 24 inch diameter	Protected Tributary	No

*HG = Mercury. Mercury impairment would not be affected by recreational trail use.

Culverts

This section of trail has 24 existing culverts, five need to be replaced for summer ATV use. An additional 32 culverts would need to be installed to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 37 culverts for Section 9.

Table 9.3. Culvert Summary - Section 9

Culverts	*8-inch*	*12-inch*	*15-inch*	*18-inch*	*24-inch*	*36-inch*	TOTAL
Existing	2	8	4	6	4		**24**
Existing, Needs replacement		5					**5**
New needed		31		1			**32**

The estimated cost to purchase culverts for this section of trail is $5,300. The installation cost is estimated at $11,100. The total estimated cost for culvert materials and installation along this section of trail is $16,400. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no unfilled wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail is in need of 3,780 linear feet (approximately seven tenths of a mile) of fill in 21 different locations. Cost estimates are summarized below in Table 9.4.

Table 9.4. Treadway Preparation Summary - Section 9

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul (Ft)	Haul Cost: $3.20/Ft	Wetland Fill Length (Ft)	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 9
9	2,268	$4,500	1,512	$4,800	0	-	3,780	$9,300

Trail Terrain

Hills

This portion of trail consists of 27 hills with a grade greater than or equal to 10%, summarized below in Table 9.5.

Table 9.5. Hill Grade Summary - Section 9

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	9	2	260	$1,600			
15-19% Grade	11	3	134	$1,300	2	268	$3,400
>20% Grade	7	2	137	$900	5	274	$8,800
						Total Cost	**$16,000**

Cost estimate for Section 9 hill modifications is approximately $16,000, not including administrative costs.

Trail Intersections

The NSST in this section crosses one county road (Caribou Trail, Cook County 4), three USFS roads, and one privately maintained road. One of the very short national forest service roads (Tait River Gravel Pit Road), currently allows ATV use. The Lutsen Access GIA Snowmobile trail intersects the NSST in two separate locations.

Amenities

One designated parking area, with a toilet, is located on Cook County 4 that accommodates 10 vehicles with trailers. A smaller, summer-use only parking area for the Barker Lake carry-in access is also located near the trail. One trail shelter, with a toilet and fire ring, is located near Barker Lake.

Concluding Observations - Section 9

The majority of this section of trail is located on USFS land. Only a small portion of this trail section is located on state land. An average number of culverts and amount of fill are needed for this section of trail. However, the area needing most modification is with the steep terrain. This section has a considerably high number of hills greater than 20% grade, which would likely require reroutes.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$41,700** (not including administrative costs).

Section 10. Caribou Trail parking lot to Cook County Road 6; a distance of approximately 19 miles, Cook County. (Map B-10 in Appendix B.)

This section of trail is entirely located on national forest lands, with the exception of a small portion on state lands, administered by the DNR. This section of trail features Pike Lake, where the trail offers a shelter along the shore. Approximately five miles of the NSST is located on a section of land that has been identified by the USFS as Candidate Research Natural Area (CRNA). CRNA lands prohibit motorized recreation, excluding the existing snowmobile use.

Land Ownership

This section of trail is located entirely on public lands administered by the USFS and DNR.

Table 10.1. Landownership Summary - Section 10

Owner	Length (miles)	Percent of section (~19.2 miles)
State (DNR)	1.5	8%
Federal, USFS	17.7	92%

Water management

Trout Streams and Tributaries

This section of trail includes two designated trout streams and one protected tributary. These stream crossings all have bridges, two are USFS bridges, which cross the designated trout streams, and a wood DNR bridge crosses the protected tributary.

Table 10.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 10

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Vat Cr.	wood bridge, 24 ft	Protected Tributary	No
Mistletoe Cr.	USFS Bridge	Designated Trout Stream	No
Cascade R.	USFS Bridge	Designated Trout Stream	No

Culverts

This section of trail has 32 existing culverts, three of which would need to be replaced for summer ATV use. An additional 17 culverts would need to be installed for effective water management to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for 20 culverts for Section 10.

Table 10.3. Culvert Summary - Section 10

Culverts	*8-inch*	*12-inch*	*18-inch*	*24-inch*	*30-inch*	*36-inch*	TOTAL
Existing	2	3	3	2	2		**12**
Existing, Needs replacement		3					**3**
New needed		17					**17**

The estimated cost to purchase culverts for this section of trail is $2,800. The installation cost is estimated at $6,000. The total estimated cost for culvert materials and installation along this section of trail is $8,800. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no unfilled wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail is in need of 1,950 linear feet (approximately one half of a mile) of fill in 12 different locations. Cost estimates are summarized below in Table 10.4.

Table 10.4. Treadway Preparation Summary - Section 10

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul (Ft)	Haul Cost: $3.20/Ft	Wetland Fill Length (Ft)	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 10
10	1,719	$3,400	1,146	$3,700	0	-	2,865	$7,100

Trail Terrain

Hills

This portion of trail consists of 15 hills with a grade greater than or equal to 10%, summarized below in Table 10.5.

Table 10.5. Hill Grade Summary - Section 10

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	7	1	139	$400			
15-19% Grade	5	1	198	$600	1	396	$2,500
>20% Grade	3	2	140	$900	1	280	$1,800
						Total Cost	$6,300

Cost estimate for Section 10 hill modifications is approximately $6,300, not including administrative costs.

Trail Intersections

The NSST in this section crosses five USFS roads. The NSST also uses about six-tenths of a mile of another USFS road. Three of the national forest roads that intersect the state trail allow ATV use. Also, the NSST has three intersections with GIA Snowmobile Trails (two with the Gunflint Trail and Spurs and one with the Lutsen Access Trail).

Amenities

No designated parking areas are located along this section of the NSST. However, limited, informal parking is available on several of the roads that intersect the trail. One trail shelter, with a toilet and fire ring, is located near Blueberry Lake.

Concluding Observations - Section 10

The majority of this section of trail is on USFS land, with small a portion on state land. This section has a relatively few water crossings with an average number of new culverts needed and minimal amount of fill needed. The terrain is quite varied with an average number of hills in each grade range. This section has the greatest number or road and trail intersections. A lengthy reroute around the federally managed CRNA would likely be required if motorized use were considered on that portion of the trail.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$22,200** (not including administrative costs).

Trail shelter located on the shore of Pike Lake, in Cook County.

Section 11. Cook County Road 6 to Grand Marais; a distance of approximately 5 miles in Cook County. ((Map B-11 in Appendix B.)

This section of the NSST crosses a large wetland. A hard surface trail was built across the narrowest point of the wetland in the late 1980's with the cooperation of the USFS. The Superior Hiking Trail uses approximately 2.5 miles of the NSST as it crosses this wetland and then also intersects the NSST again as it nears the City of Grand Marais. Approximately 1.6 miles of the trail crosses a USFS designated Unique Biological Area (UBA), which prohibits motorized recreation.

This section of trail also features steep terrain near the Gunflint Trail. This area experiences ice problems during the winter and snowmobile trail groomers have a difficult time navigating this area. A local cross-country ski trail connecting the Cook County High School to the Pincushion GIA Cross-country Ski Trail intersects the NSST below the Gunflint Trail.

Land Ownership

This shortest section of trail traverses a variety of land owners including the USFS, the state (DNR Forestry), Cook County and private.

Table 11.1. Land Ownership Summary - Section 11

Owner	Length (miles)	Percent of section (~4.9 miles)
Private	0.31	6%
County (Cook)	0.8	16%
State (DNR)	1.0	20%
Federal, USFS	2.8	57%

Water management

Trout Streams and Tributaries

This final section of trail includes one designated trout stream, which has a wooden bridge over the stream.

Table 11.2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary - Section 11

Stream	Trail Crossing Feature	Trout Stream Designation	Impaired Waters
Little Devil Track River	Wood bridge, 24 ft	Designated trout stream	No

Culverts

This short section of trail includes 19 existing culverts, one of which is need of replacement for summer ATV use. An additional seven culverts would need to be installed for effective water management to accommodate summer ATV use. The cost estimate for culvert repair and installation is calculated for eight culverts for Section 11.

Table 11.3. Culvert Summary - Section 11

Culverts	*8-inch*	*12-inch*	*18-inch*	*24-inch*	*30-inch*	*36-inch*	TOTAL
Existing	7	5	7				**19**
Existing, Needs replacement		1					**1**
New needed		6	1				**7**

The estimated cost to purchase culverts for this section of trail is $1,100. The installation cost is estimated at $2,400. The total estimated cost for culvert materials and installation along this section of trail is $3,500. This estimate does not include administrative costs.

Treadway Stabilization

Wetland Mitigation

Preliminary evaluation found no unfilled wetland locations requiring mitigation along this section of the trail.

Treadway Preparation

The treadway along this portion of the trail is in need of 2,865 linear feet (approximately four-tenths of a mile) of fill in 12 different locations. The cost estimates are summarized in the table below.

Table 11.4. Treadway Preparation Summary - Section 11

Section	Length D&C (Ft)	D&C Cost: $2/Ft	Length Haul (Ft)	Haul Cost: $3.20/Ft	Wetland Fill Length (Ft)	Wetland Cost $11/Ft	Total Length (Ft)	Sub-Total Section 11
11	1,170	$2,300	780	$2,500	0	-	1,950	$4,800

Terrain

Hills

This portion of trail consists of six hills with a grade greater than or equal to 10%, summarized below in Table 11.5.

Table 11.5. Hill Grade Summary - Section 11

Hills	Number of hills	Estimate Needing Modification	Average Length of Hills (feet)	$4.00/ft Cost	Estimate Needing Reroute	Average Length of Hills (feet)	$12.00/ft Cost
10-14% Grade	3	1	410	$1,300			
15-19% Grade	2				1	1,110	$7,100
>20% Grade	1				1	900	$5,800
						Sub-Total	$14,200

Cost estimate for Section 11 hill modifications is approximately $14,200, not including administrative costs.

Trail Intersections

This section of the NSST crosses three county roads and intersects with the Gunflint GIA snowmobile trail before it terminates near the City of Grand Marais.

Amenities

No designated parking areas are located along this section of the trail. Limited parking is available on Ski Hill Road.

Concluding Observations - Section 11

The majority of the trail in this section is located on USFS land, with small portions on a mixture of private, county and state lands. The trail terminates within the city limits of Grand Marais. A

relatively low number of new culverts would be needed for this section of the trail and it crosses only one designated trout stream, which has a wooden bridge. The Superior Hiking Trail currently uses a portion of this section of trail where the trail also crosses the federally designated UBA, which prohibits motorized use. A lengthy reroute around the UBA would likely be required if this portion of the trail were considered for ATV use.

The total cost estimate for the projected trail modifications needed to support ATV use along this section of the NSST is **$22,500** (not including administrative costs).

VI. CONCLUSION

Based upon this examination, it is clear that ATV traffic cannot be sustained on all or portions of the North Shore State Trail in its present condition, except for the 6.4 mile segment already designated for ATV use. Substantial improvement and modification would be necessary to avoid, minimize, and to mitigate environmental effects stemming from summer ATV use. Before such modifications could occur, however, additional planning and environmental review would be required. Consultation with landowners, local governments and cooperating land-managing agencies would also be in order.

View of Halls Pond from the NSST, Cook County.

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APPENDICES

A. Data Summaries

1. Land Ownership Summary, by Trail Length in Miles
2. Protected Waters and Crossing Structures Summary
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APPENDIX A – DATA SUMMARIES

A-1. Land Ownership Summary, by Trail Length in Miles

A-2. Designated Trout Streams and Protected Tributaries with Crossing Structure Summary

A-3. Impaired Waters in the Vicinity of the NSST (Map)

A-4. Culvert Data Summary

A-5. Projected Trail Stabilization Summary Including Wetland Mitigation Needs

A-6a. Hill Grade and Projected Reroute Data Summary

A-6b. Hill Length Data Summary

A-7. Road and Trail Intersections with the NSST

A-8. Projected Trail Modifications - Estimated Cost Summary

NSST in Cook County.

Appendix A-1: Land Ownership Summary, by Trail Length in Miles

DNR, February 2006

SECTION	1	2	3	4	5	6	7	8	9	10	11	TOTAL
Private	6.84		0.14			0.30					0.31	**7.59**
Private - Industry		0.50					0.50					**1.00**
County	5.20	10.60	9.62	14.52	7.68	2.00	8.90				0.80	**59.32**
State	1.28	2.10	0.39	1.01	4.40	4.10	8.40		0.30	1.50	1.00	**24.48**
Federal					3.68			13.62	12.85	17.70	2.80	**50.65**
TOTAL MILES	**13.32**	**13.20**	**10.15**	**15.53**	**15.76**	**6.40**	**17.80**	**13.62**	**13.15**	**19.20**	**4.91**	**143.04**

Private	7.59
Private Industry	1
Sum	**8.59**

6%

County	
St. Louis	15.8
Lake	42.72
Cook	0.8
Sum	**59.32**

42%

State	**24.48**

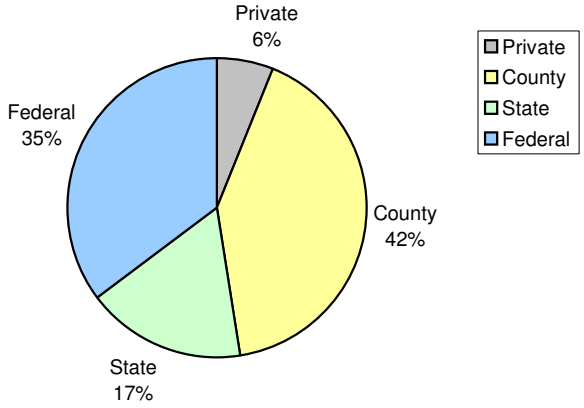
17%

Federal	**50.65**
(USFS)	

35%

Figure II-1. North Shore State Trail Land Ownership Summary (by Trail Length in Miles)

	Trail Length, Mi	Percent
Private	**8.59**	6%
County	**59.32**	42%
State	**24.48**	17%
Federal	**50.65**	35%
Total	**143.04**	100%



Source: DNR, Unpublished Data, 2006.

Appendix A-2: Designated Trout Streams and Protected Tributaries with Crossing Structure Summary

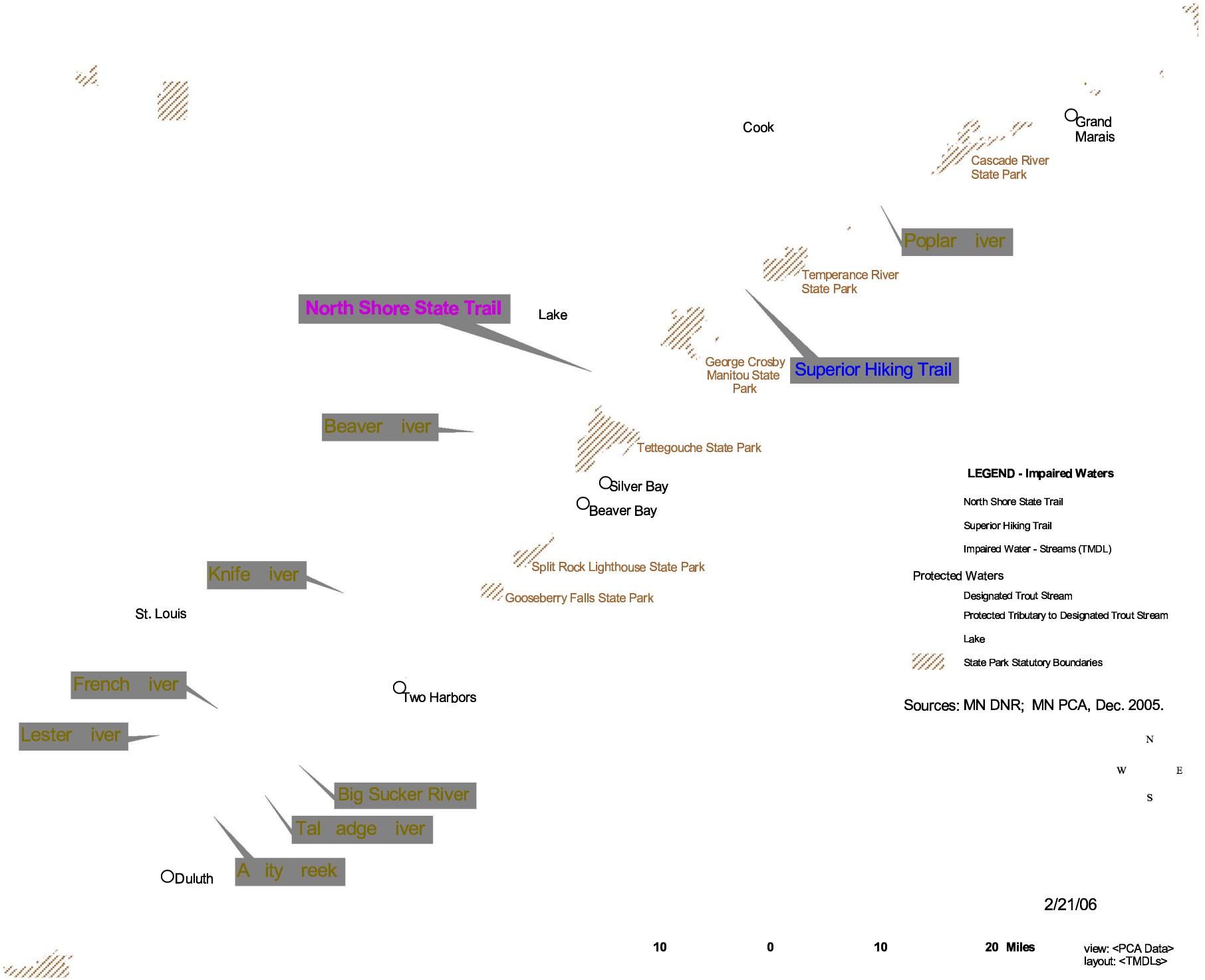
DNR, February 2006

Count of TRL_XING			SECTION												
ID	NAME	TRL_XING	1	2	3	4	5	6	7	8	9	10	11	Grand Total	TMDL Pollutant
1	E. Br. Amity Cr *	steel bridge, 60 ft	1											1	Turbidity
2	Trib. to Amity	none	1											1	
3	Trib. to Amity	none	1											1	
4	Trib. to Amity	culvert, 36" diameter	1											1	
5	S. Br. Lester R.	culverts, 24" and 30" diameters	1											1	
6	Lester R. *	steel bridge, 70 ft	1											1	Turbidity, Hg
7	N. Br. Lester R.	wood bridge, 26 ft	1											1	
8	W. Br. French R. (Harvey's)	wood bridge, 24 ft	1											1	
9	French R. *	wood bridge, 24 ft	1											1	Turbidity
10	Big Sucker R. *	wood bridge, 50 ft		1										1	Turbidity
11	Trib to Capt. Jacobsen	culverts, two 24" diameter		1										1	
12	W. Br. Knife R.	wood bridge, 24 ft		1										1	
13	Little W. Br. Knife R.	wood bridge, 24 ft		1										1	
14	E. Br. Knife R. *	wood bridge, 34 ft			1									1	Turbidity, Hg, pH
15	Trib to E. Br. Knife R.	culvert, 12" diameter			1									1	
16	Trib to Stewart R.	culvert, 18" diameter			1									1	
17	Trib to Stewart R.	culvert, 12" diameter			1									1	
18	Stewart R.	wood bridge, 30 ft			1									1	
19	Trib. to Stewart R.	wood bridge, 16 ft			1									1	
20	Silver Cr.	wood bridge, 22 ft				1								1	
21	Encampment R.	wood bridge, 24 ft				1								1	
22	Gooseberry R.	steel bridge, 70 ft				1								1	
23	Dago R.	wood bridge, 28 ft				1								1	
24	Trib to Dago R.	none, Lake Co. Forest Rd				1								1	
25	Trib to Dago R.	none, Lake Co. Forest Rd				1								1	
26	Trib to Mink Cr.	none, Alger RR grade				1								1	
27	Trib to Mink Cr.	none, Alger RR grade				1								1	
28	Mink Cr.	culvert, 12" diameter				1								1	
29	Trib to Mink Cr.	none, Alger RR grade				1								1	
30	Trib to Mink Cr.	none, Alger RR grade				1								1	
31	Stoney R.	wood bridge, 24 ft				1								1	
32	Skunk Cr.	wood bridge, 30 ft				1								1	
33	Trib to Skunk Cr.	wood bridge, 16 ft				1								1	
34	Bud Cr.	culvert, 36" diameter				1								1	
35	Trib to Bud Cr.	culvert, 12" diameter				1								1	
36	W. Br. Split Rock R.	culvert, 60" diameter				1								1	
37	Trib to E. Br. Split Rock R.	culvert, 12" diameter				1								1	
38	E. Br. Split Rock R.	wood bridge, 40 ft				1								1	
39	W. Br. Beaver R.	culverts, two 48" diameter				1								1	
40	Trib to Kit Cr.	culvert, 24" diameter					1							1	
41	Trib to Kit Cr.	culverts, two 24" diameter					1							1	
42	Kit Cr.	wood bridge, 30 ft					1							1	
43	Beaver R. *	wood bridge, 38 ft					1							1	Turbidity, Hg, pH
44	Trib to Big 39 (Little Big 39)	wood bridge, 24 ft					1							1	
45	Big 39 R.	wood bridge, 40 ft					1							1	
46	Little 39 R.	wood bridge, 24 ft					1							1	
47	E. Br. Beaver R.	steel bridge, 55 ft					1							1	
48	Little 43 Cr.	culvert, 24" diameter					1							1	
49	Nicado Cr.	culvert, 18" diameter					1							1	
50	Hockamin Cr.	culvert, two 72" diameter						1						1	
51	Trib to Hockamin	culvert, 24" diameter						1						1	
52	Trib to Hockamin	culvert, 24" diameter						1						1	
53	W. Br. Baptism R.	steel bridge, 100 ft						1						1	
54	Tikkanen Cr. (Sec 8)	culvert, two 24" diameter						1						1	
55	Trib to E. Baptism	culvert, 30" diameter							1					1	
56	Egge Cr.	wood bridge, 24 ft							1					1	
57	Schoolhouse Cr.	culverts, two 24" diameter							1					1	
58	E. Br. Baptism R.	steel bridge, 80 ft							1					1	
59	Rock Cut Cr. (Manitou Trib)	wood bridge, 24 ft							1					1	
60	Manitou R.	steel bridge, 110 ft							1					1	
61	Kowolski Cr.	wood bridge, 24 ft							1					1	
62	S. Caribou R.	wood bridge, 45 ft							1					1	
63	Middle Caribou R.	wood bridge, 30 ft							1					1	
64	N. Caribou R.	wood bridge, 24 ft							1					1	
65	Amenda Cr.	wood bridge, 24 ft								1				1	
66	Two Island R.	wood bridge, 34 ft								1				1	
67	Stumble Cr.	culverts, 24" and 36" diameter								1				1	
68	Cross R.	steel bridge, 120 ft								1				1	
69	Heartbreak R.	USFS Culvert								1				1	
70	Blind Temperance R.	USFS Culvert								1				1	
71	Temperance R.	USFS Bridge								1				1	
72	Poplar R. *	USFS Bridge									1			1	Turbidity, Hg
73	Tait R.	USFS Culvert									1			1	
74	Trib toTait R.	culverts, two 24" diameter									1			1	
75	Vat Cr.	wood bridge, 24 ft										1		1	
76	Mistletoe Cr.	USFS Bridge										1		1	
77	Cascade R.	USFS Bridge										1		1	
78	Little Devil Track R.	wood bridge, 24 ft											1	1	
Grand Total			**9**	**4**	**6**	**20**	**10**	**5**	**10**	**7**	**3**	**3**	**1**	**78**	

* = Impaired water

Designated Trout Stream
Protected Tributary

Sources: DNR, 2006; and MPCA, Draft 2006 TMDL List, TMDL Pollutant Data, Lake Superior Basin.


Cook
Grand Marais
Cascade River State Park
Poplar iver
Temperance River State Park
North Shore State Trail
Lake
George Crosby Manitou State Park
Superior Hiking Trail
Beaver iver
Tettegouche State Park
Silver Bay
Beaver Bay
Split Rock Lighthouse State Park
Knife iver
Gooseberry Falls State Park
St. Louis
French iver
Two Harbors
Lester iver
Big Sucker River
Tal adge iver
A ity reek
Duluth
LEGEND - Impaired Waters
North Shore State Trail
Superior Hiking Trail
Impaired Water - Streams (TMDL)
Protected Waters
Designated Trout Stream
Protected Tributary to Designated Trout Stream
Lake
State Park Statutory Boundaries
Sources: MN DNR; MN PCA, Dec. 2005.
N
W
E
S
2/21/06
10 0 10 20 Miles
view: <PCA Data>
layout: <TMDLs>

Appendix A-4: Culvert Data Summary

DNR, February 2006

Total Culvert Counts												
	SECTION											
Data	1	2	3	4	5	6	7	8	9	10	11	Grand Total
Count of EXISTING_C	43	23	34	14	19	25	31	26	24	12	19	**270**
Count of NEEDS_REPL	2	1		3	7		7	8	5	3	1	**37**
Count of CULVERT_RE	49	14	6	41	31		20	22	32	17	7	**239**
Total per Section	**94**	**38**	**40**	**58**	**57**	**25**	**58**	**56**	**61**	**32**	**27**	**546**

Existing Culverts per Section												
Count of EXISTING_C	SECTION											
EXISTING_C	1	2	3	4	5	6	7	8	9	10	11	Grand Total
12	35	12	17	2	7	21	15	16	8	3	5	141
15			1				1	1	4			7
18	4	4	13	3	6	1	9	2	6	3	7	58
24	1	4	3	1	5	3	3	4	4	2		30
30	1						1			2		4
36	1				1			1				3
48				2								2
8	1	3		6			2	2	2	2	7	25
Grand Total	**43**	**23**	**34**	**14**	**19**	**25**	**31**	**26**	**24**	**12**	**19**	**270**

Existing Culverts, Needs Replacemer										
Count of NEEDS_REPL	SECTION									
NEEDS_REPL	1	2	4	5	7	8	9	10	11	Grand Total
12	2	1	2	3	4	7	5	3	1	28
18				2						2
24			1		3	1				5
30				2						2
Grand Total	**2**	**1**	**3**	**7**	**7**	**8**	**5**	**3**	**1**	**37**
*Sections 3 and 6 - no culverts need replacement										

New Culvert Needed											
Count of CULVERT_RE	SECTION										
CULVERT_RE	1	2	3	4	5	7	8	9	10	11	Grand Total
12	48	13	5	34	28	20	21	31	17	6	223
18		1		3	3		1	1		1	10
24	1		1	4							6
Grand Total	**49**	**14**	**6**	**41**	**31**	**20**	**22**	**32**	**17**	**7**	**239**
*Section 6 - no new culverts needed											

Culverts needed (New + replacements)												
TOTAL	**51**	**15**	**6**	**44**	**38**	**0**	**27**	**30**	**37**	**20**	**8**	**276**

Source: DNR, Unpublished Data, 2006.

Appendix A-5: Projected Trail Stabilization Summary Including Wetland Mitigation Needs

DNR, February 2006

Sum of FILL_FEET		SECTION										
LEGEND	COMMENTS	1	2	3	4	5	7	8	9	10	11	Grand Total
Culvert Required	Dago to #3				1,650							1,650
	Old Corduroy Road						210					210
	Wetland, Mitigation Required	3,195			4,365							7,560
	Wetland, Mitigation Required, Encampment R.				375							375
	Wetland, Mitigation Required, old RR tie brid			150								150
	(blank)	4,665	1,125	525		225	1,215	4,065	3,030	1,350	1,425	17,625
	Wetland, Mitigation Required, needs 3 Culverts					390						390
Existing Culvert	43 cr., holes in trail					60						60
	(blank)	2,250	855	60		210	3,675	1,155				8,205
Hill	South Kowolski hill, reroute needed						150					150
	(blank)	225	90				300			90		705
(blank)	Adjacent to beaver pond	600										600
	Wetland, Mitigation Required	1,200										1,200
	(blank)	3,075	1,215			675	5,340	8,040	750	1,425	525	21,045
Grand Total		**15,210**	**3,285**	**735**	**6,390**	**1,560**	**10,890**	**13,260**	**3,780**	**2,865**	**1,950**	**59,925**
Mitigation Required	Sum of linear feet	4,395	0	150	4,740	390	0	0	0	0	0	9,675
	Acres (approximate, based on avg 20 ft width)	2		0.07	2.2	0.18						4.4
	Acres Replacement (ratio 1:1.5)	3		0.1	3.26	0.27						6.6
	Count of sites	8	0	1	17	1	0	0	0	0	0	27

Source: DNR, Unpublished Data, 2006.

Wetland Mitigation Costs
Sect. 1 $39,600
Sect. 3 $ 1,400
Sect. 4 $42,700
Sect. 5 $ 3,500
Estimated Total: $87,200

Estimated Cost Summaries for Treadway Stabilization (Fill)								
Section	**Length D&C (Ft)**	**D&C Cost: $2/Ft**	**Length Haul (Ft)**	**Haul Cost: $3.20/Ft**	**Wetland Fill***	**Wetland Cost $11/Ft**	Total Length (Ft)	**Sub-Total**
1	6,489	$13,000	4,326	$13,800	4395 Ft (2.0 Acres)	$48,300	15,210	$75,100
2	1,971	$3,900	1,314	$4,200	0	0	3,285	$8,100
3	441	$900	3,434	$11,000	150 Ft (0.07 Acres)	$1,700	4,025	$13,600
4	990	$2,000	660	$2,100	4740 Ft (2.2 Acres)	$52,100	6,390	$56,200
5	702	$1,400	468	$1,500	390 Ft (0.18 Acres)	$4,300	1,560	$7,200
7	6,534	$13,000	4,356	$13,900	0	0	10,890	$26,900
8	7,956	$15,900	5,304	$17,000	0	0	13,260	$32,900
9	2,268	$4,500	1,512	$4,800	0	0	3,780	$9,300
10	1,719	$3,400	1,146	$3,700	0	0	2,865	$7,100
11	1,170	$2,300	780	$2,500	0	0	1,950	$4,800
Totals	**30,240**	**$60,300**	**23,300**	**$74,500**	**9675 Ft (4.4 Acres)**	**$106,400**	**63,215**	**$241,200**

* Wetland Acres estimated using average trail width of 20 Ft. Cost estimates rounded for reporting purposes.

Source: DNR, Unpublished Data, 2006.

Appendix A-6a: Hill Grade and Projected Reroute Data Summary

DNR, February 2006

Count of HILL_FT	SECTION											
HILL_GRADE	1	2	3	4	5	6	7	8	9	10	11	Grand Total
10	1				2		2			1		6
11	5	2					2	3	1		1	14
12	1	1	1		3	1	4	4	3	1		19
13	1	1		1	2	1	4		2		1	13
14	2	3		1	1	1	4	2	3	5	1	23
15	1	4	1		2		2		3	4		17
16	1	3	2	1	2		1	1	3			14
17		5	1		4		2	1	4		2	19
18	1	8		1	2		1	3		1		17
19			1	1	3		1		1			7
20		4	1			1	2			1		9
21	1								3			4
22		3						1	1	2		7
23		1				1			1			3
24								1	1			2
25											1	1
26		1							1			2
Grand Total	**14**	**36**	**7**	**5**	**21**	**5**	**25**	**16**	**27**	**15**	**6**	**177**

	Section											
Grade Range totals (count):	1	2	3	4	5	6	7	8	9	10	11	Count of hills
10-14%	10	7	1	2	8	3	16	9	9	7	3	**75**
15-19%	3	20	5	3	13	0	7	5	11	5	2	**74**
>20%	1	9	1	0	0	2	2	2	7	3	1	**28**
TOTAL per Section	**14**	**36**	**7**	**5**	**21**	**5**	**25**	**16**	**27**	**15**	**6**	**177**

Potential reroutes estimated by percentage:												Reroute estima
10-14% (20% reroute)	2	1.4	0.2	0.4	1.6	0.6	3.2	1.8	1.8	1.4	0.6	**15**
15-19% (50% reroute)	1.5	10	2.5	1.5	6.5	0	3.5	2.5	5.5	2.5	1	**37**
>20% (80% reroute)	0.8	7.2	0.8	0	0	1.6	1.6	1.6	5.6	2.4	0.8	**22.4**
TOTAL per Section	**4.3**	**18.6**	**3.5**	**1.9**	**8.1**	**2.2**	**8.3**	**5.9**	**12.9**	**6.3**	**2.4**	**74.4**

Source: DNR, Unpublished Data, 2006.

Appendix A-6b: Hill Length Data Summary

DNR, February 2006

		SECTION											
HILL_SLO	Data	1	2	3	4	5	6	7	8	9	10	11	Grand Total
10	Count of HILL_FT	1				2		2			1		6
	Sum of HILL_FT	105				1200		375			60		1740
11	Count of HILL_FT	5	2					2	3	1		1	14
	Sum of HILL_FT	1005	675					390	990	75		600	3735
12	Count of HILL_FT	1	1	1		3	1	4	4	3	1		19
	Sum of HILL_FT	90	75	105		975	150	1365	510	555	90		3915
13	Count of HILL_FT	1	1		1	2	1	4		2		1	13
	Sum of HILL_FT	180	600		225	390	250	780		240		270	2935
14	Count of HILL_FT	2	3		1	1	1	4	2	3	5	1	23
	Sum of HILL_FT	705	480		75	600	850	1230	195	1470	825	360	6790
15	Count of HILL_FT	1	4	1		2		2		3	4		17
	Sum of HILL_FT	90	420	90		330		600		540	915		2985
16	Count of HILL_FT	1	3	2	1	2		1	1	3			14
	Sum of HILL_FT	225	330	390	225	300		1200	75	345			3090
17	Count of HILL_FT		5	1		4		2	1	4		2	19
	Sum of HILL_FT		825	105		780		270	150	435		1110	3675
18	Count of HILL_FT	1	8		1	2		1	3		1		17
	Sum of HILL_FT	60	1005		90	450		90	435		75		2205
19	Count of HILL_FT			1	1	3		1		1			7
	Sum of HILL_FT			120	75	525		240		150			1110
20	Count of HILL_FT		4	1			1	2			1		9
	Sum of HILL_FT		420	90			1000	1800			90		3400
21	Count of HILL_FT	1								3			4
	Sum of HILL_FT	150								450			600
22	Count of HILL_FT		3						1	1	2		7
	Sum of HILL_FT		390						300	90	330		1110
23	Count of HILL_FT		1				1			1			3
	Sum of HILL_FT		105				500			180			785
24	Count of HILL_FT								1	1			2
	Sum of HILL_FT								120	150			270
25	Count of HILL_FT											1	1
	Sum of HILL_FT											450	450
26	Count of HILL_FT		1							1			2
	Sum of HILL_FT		225							90			315
Total Count of HILL_FT		14	36	7	5	21	5	25	16	27	15	6	177
Total Sum of HILL_FT		2610	5550	900	690	5550	2750	8340	2775	4770	2385	2790	39110

	SECTION											
Grade Range, Sum of Hill Length (Feet)	1	2	3	4	5	6	7	8	9	10	11	Sum (ft)
10-14%	2085	1830	105	300	3165	1250	4140	1695	2340	975	1230	19115
15-19%	375	2580	705	390	2385	0	2400	660	1470	990	1110	13065
>20%	150	1140	90	0	0	1500	1800	420	960	420	450	6930
	2610	5550	900	690	5550	2750	8340	2775	4770	2385	2790	39110

Grade Range, Average Hill Length (Feet)	1	2	3	4	5	6	7	8	9	10	11	Sum (ft)	Avg. Length (ft)
10-14%	208.5	261.4	105	150	395.6	417	258.8	188.3	260	139.3	410	2793.9	237.6
15-19%	125	129	141	130	183.5	0	342.9	132	133.6	198	555	2070	207
>20%	150	126.6	90	0	0	750	900	210	137.1	140	450	2953.7	220.37
Length avg sum per segment:	483.5	517	336	280	579.1	1167	1501.7	530.3	530.7	477.3	1415		
Average Hill Length (ft):	*186*	*154*	*129*	*138*	*264*	*550*	*333*	*173*	*177*	*159*	*465*	*221*	

Source: DNR, Unpublished Data, 2006.

Appendix A-7. Road and Trail Intersections with the NSST

DNR, February 2006

MnDOT Road Coverage		St. Louis	Lake	Cook	Intersections
Martin Rd		1			1
W Tischer Rd		1			1
Jean Duluth Rd		1			1
N Tischer Rd		1			1
Normanna Rd		1			1
Fox Farm Rd		1			1
Laine Rd		1			1
Riley Rd		1			1
Westover Rd			1		1
County 131			1		1
County Rd 302			1		1
County Hwy 2			1		1
County Hwy 3			2		2
County Hwy 4			1		1
National Forest Hwy 15			1		1
Heffelfinger Rd			1		1
County Hwy 6			1		1
County Hwy 7			1		1
County Hwy 8			1		1
County Rd 45				1	1
County Rd 64				1	1
Gunflint Trail				1	1
					23
USFS Road Coverage	**Allows OHV**				
FH 11 SPUR 1109			1		1
CARIBOU RIVER	yes		1		1
BLIND CREEK				1	1
MUNKER LAKE	yes			1	1
PIKE LAKE				1	1
PIKE LAKE SPUR A	yes			1	1
PIKE LAKE SPUR D	yes			1	1
BALLY CREEK				1	1
HONEYMOON TRAIL				1	1
TAIT RIVER GRAVEL PIT	yes			1	1
CROSS RIVER 600				1	1
MISTLETOE				1	1
BARKER LAKE				1	1
SCHROEDER TOTE ROAD	yes			1	1
TWO ISLAND RIVER				1	1
TEMPERANCE RIVER				1	1
WRINGER LAKE	yes			1	1
					17
Trails - GIA Snowmobile Trails					
Duluth East		1			1
Gooseberry Spur			1		1
Gunflint Trail and Spurs				2	2
Lutsen Access				3	3
Mooserun	(GIA ATV)		1		1
Moosewalk	(GIA ATV)		2		2
Pequaywan-Hoyt Lakes		1			1
Red Dot	(GIA ATV)		1		1
Reservoir Riders		1			1
Sawtooth			2		2
Tofte Lynx			2		2
Tomahawk				1	1
Two Harbors Corridor			3		3
					21
Cross Country Ski Trails					
Sugarbush GIA Trail				1	1
Non-GIA XC Ski Trail (Cook County)				3	3
					4

Sources: USFS - Superior National Forest digital road and trail data; MnDOT public road data; DNR trail data, 2006.

Appendix A-8. Projected Trail Modifiactions Estimated Cost Summary

DNR, February 2006

Section	Culvert Installation Est.	Culvert Purchase Est.	Hills - Est. Cost	Treadway Stabilization Est.	Wetland Mitigation Est.	Construction Estimated Cost
1	15,300	7,200	5,300	75,100	39,600	**$142,500**
2	4,500	2,100	20,900	8,100	0	**$35,600**
3	1,800	900	2,500	13,600	1,400	**$20,200**
4	13,200	6,300	2,100	56,200	42,700	**$120,500**
5	11,400	5,400	13,700	7,200	3,500	**$41,200**
6	0	0	0	0	0	**$0**
7	8,100	3,800	36,500	26,900	0	**$75,300**
8	9,000	4,300	9,100	32,900	0	**$55,300**
9	11,100	5,300	16,000	9,300	0	**$41,700**
10	6,000	2,800	6,300	7,100	0	**$22,200**
11	2,400	1,100	14,200	4,800	0	**$22,500**
TOTALS	**$82,800**	**$39,200**	**$126,600**	**$241,200**	**$87,200**	**$577,000**

Treadway Stabilization includes ditch and crown fill, haul-in fill and wetland fill.

* Cost estimates may change considerably depending on specifications of an actual project. Further cost analysis is included for each identified section of trail to provide a better understanding of how these costs are associated to the trail.

Source: DNR, Unpublished Data, 2006.

APPENDIX B – SECTION DETAIL MAPS

Legend

B-1. Section 1 Details

B-2. Section 2 Details

B-3. Section 3 Details

B-4. Section 4 Details

B-5. Section 5 Details

B-6. Section 6 Details

B-7. Section 7 Details

B-8. Section 8 Details

B-9. Section 9 Details

B-10. Section 10 Details

B-11. Section 11 Details

NSST in Cook County, hill with a grade of 21%.

North Shore State Trail

Section endpoint

GIA Snowmobile Trail

GIA ATV Trail

Superior Hiking Trail

Fill needed

Fill - Wetland Mitigation Required

ulverts - equired

Culvert Required

Culvert Required, Replace

ill/Slopes

10 - 14%

15 - 19%

20 - 26%

Protected aters rossing

Designated Trout Stream

Protected Tributary

Lake

Protected aters

Designated Trout Stream

Protected Tributary to Designated Trout Stream

Wetlands

Interstate/ igh ay (T)

Interstate

Federal Trunk

State Trunk

County Road (MNDOT)

Township Road (MNDOT)

State Forest Road

National Forest System Roads (USFS)

USFS Road Open to ATVs

Railroads

National Forest Boundary

State Forest Boundary

USFS Management Area

State Park Statutory Boundary

Land nership

U.S. Forest Service

Department of Natural Resource

Department of Military Affairs

University of MN

Department of Transportation

Private Industrial (undifferentiated)

County

Private

County Boundary

Recreation Sy bols

Parking Lot

Parking available, no lot

Scenic overlook

Shelter with camp site

Shelter

Campground

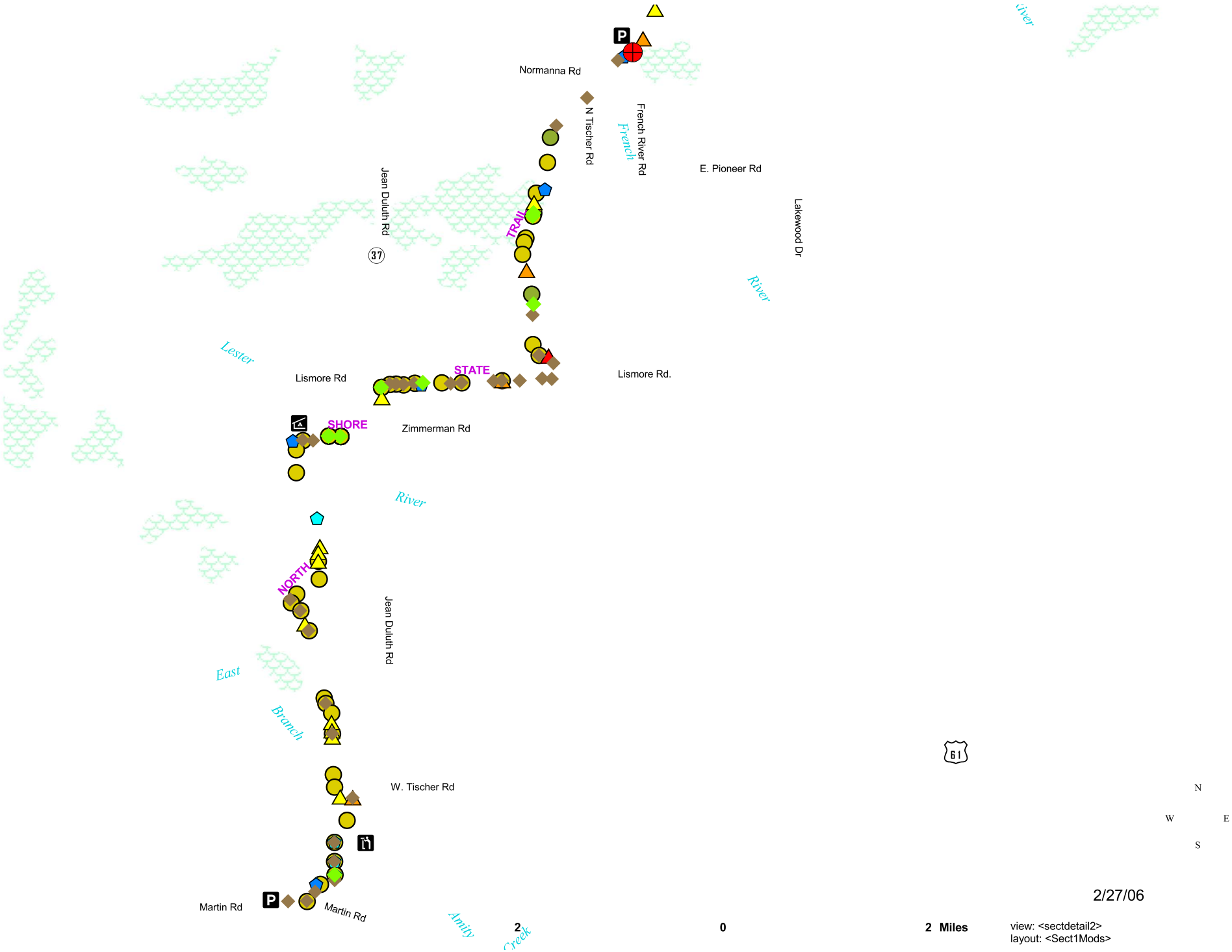
Scales vary for each map.

The following maps are not intended for navigational purposes. Data sets may include inaccuracies and approximations.

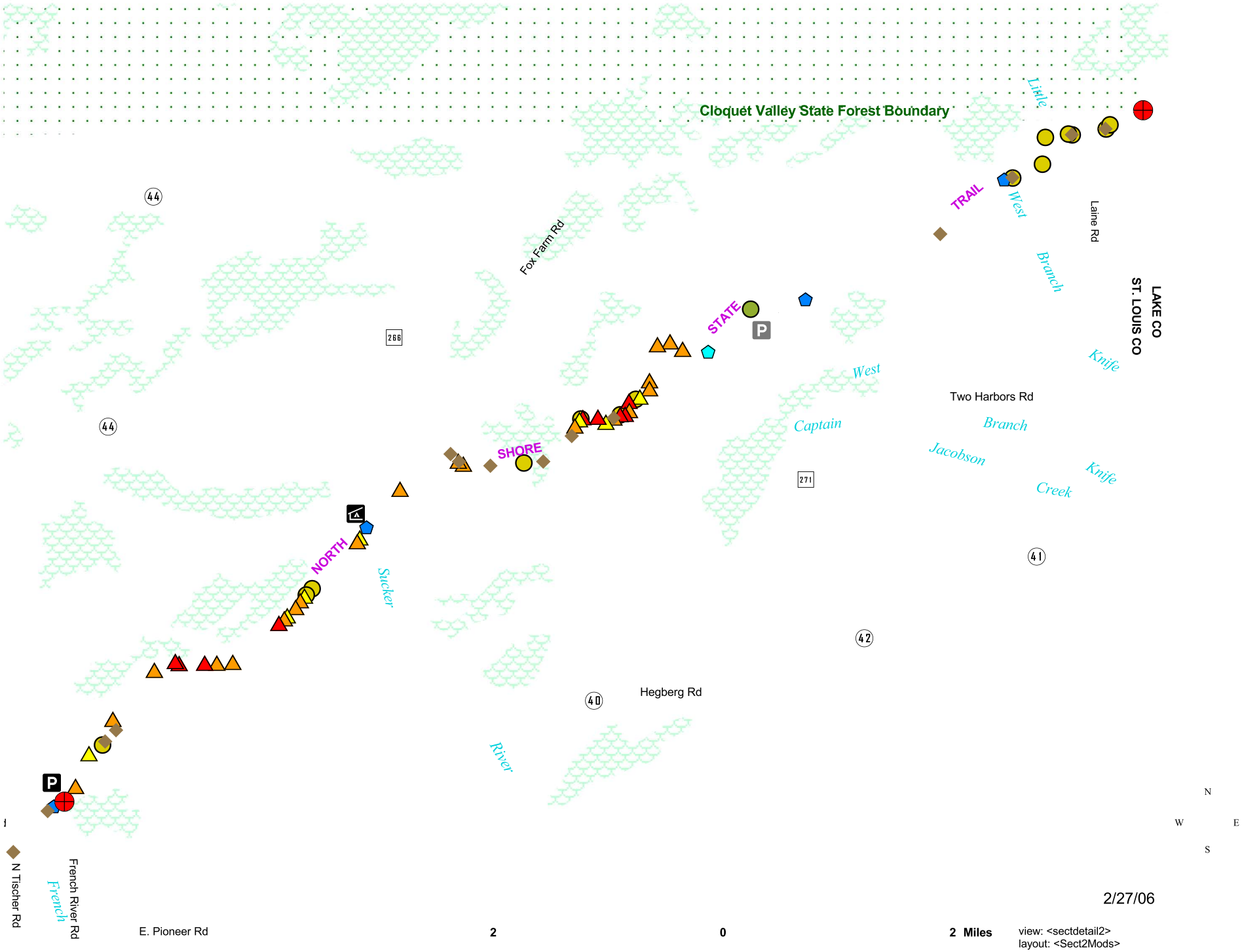
Data Sources:
MN Department of Natural Resources
MN Pollution Control Agency
MN Department of Transportation
United States Forest Service -Superior National Forest
St. Louis, Lake and Cook Counties

Department of Natural Resources
Division of Trails and Waterways
February, 2006

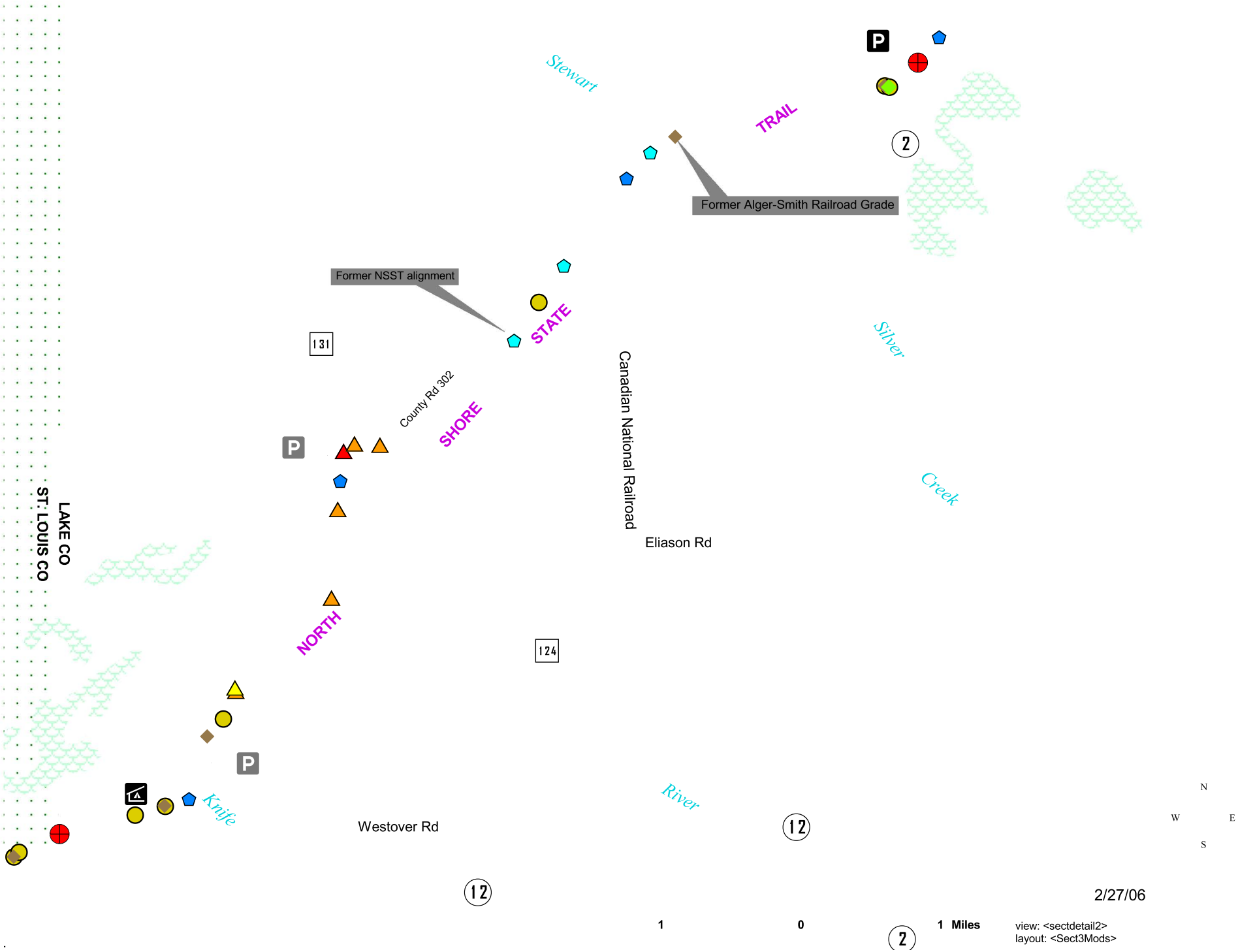
Map B-1. Section 1 Details



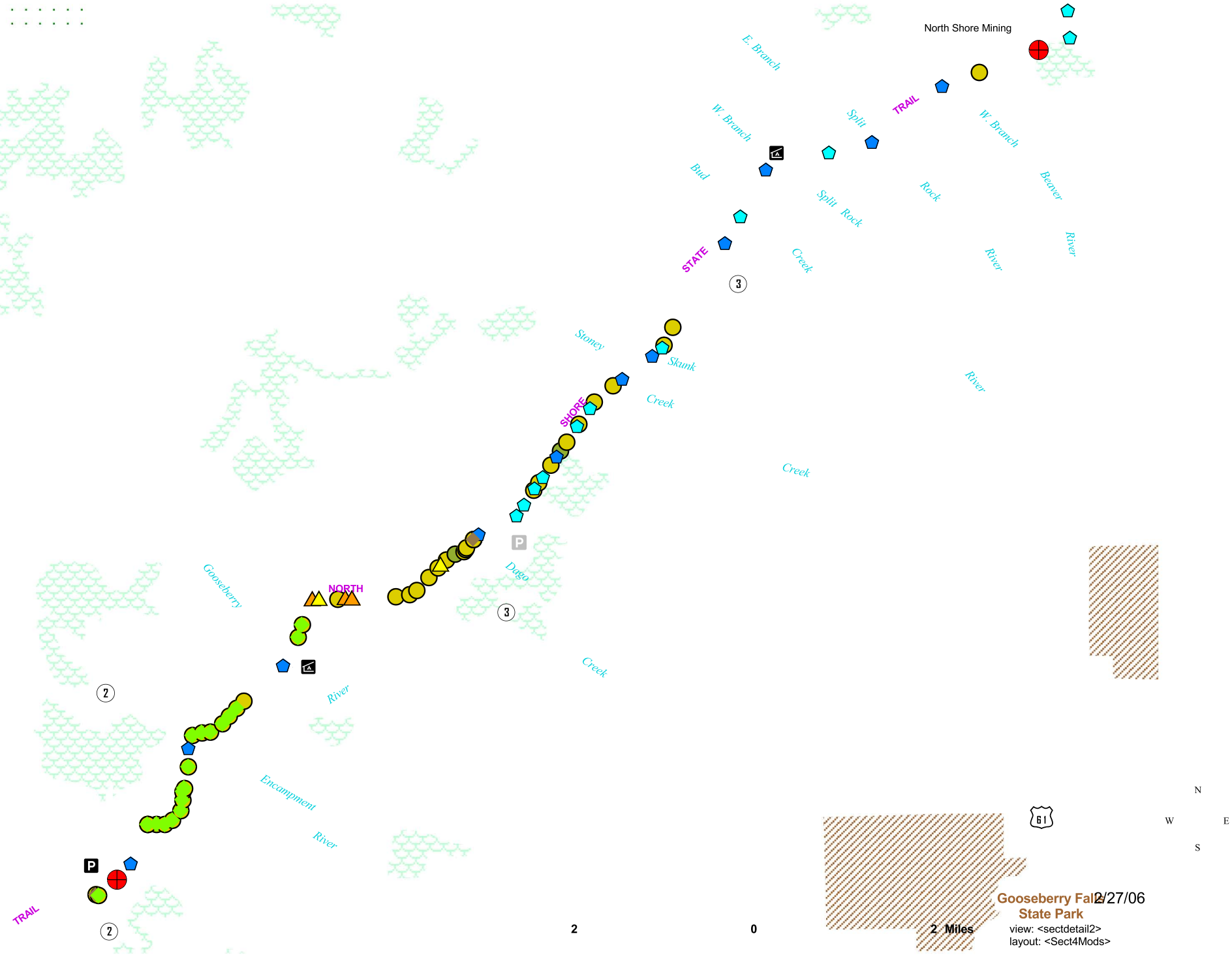
Map B-2. Section 2 Details



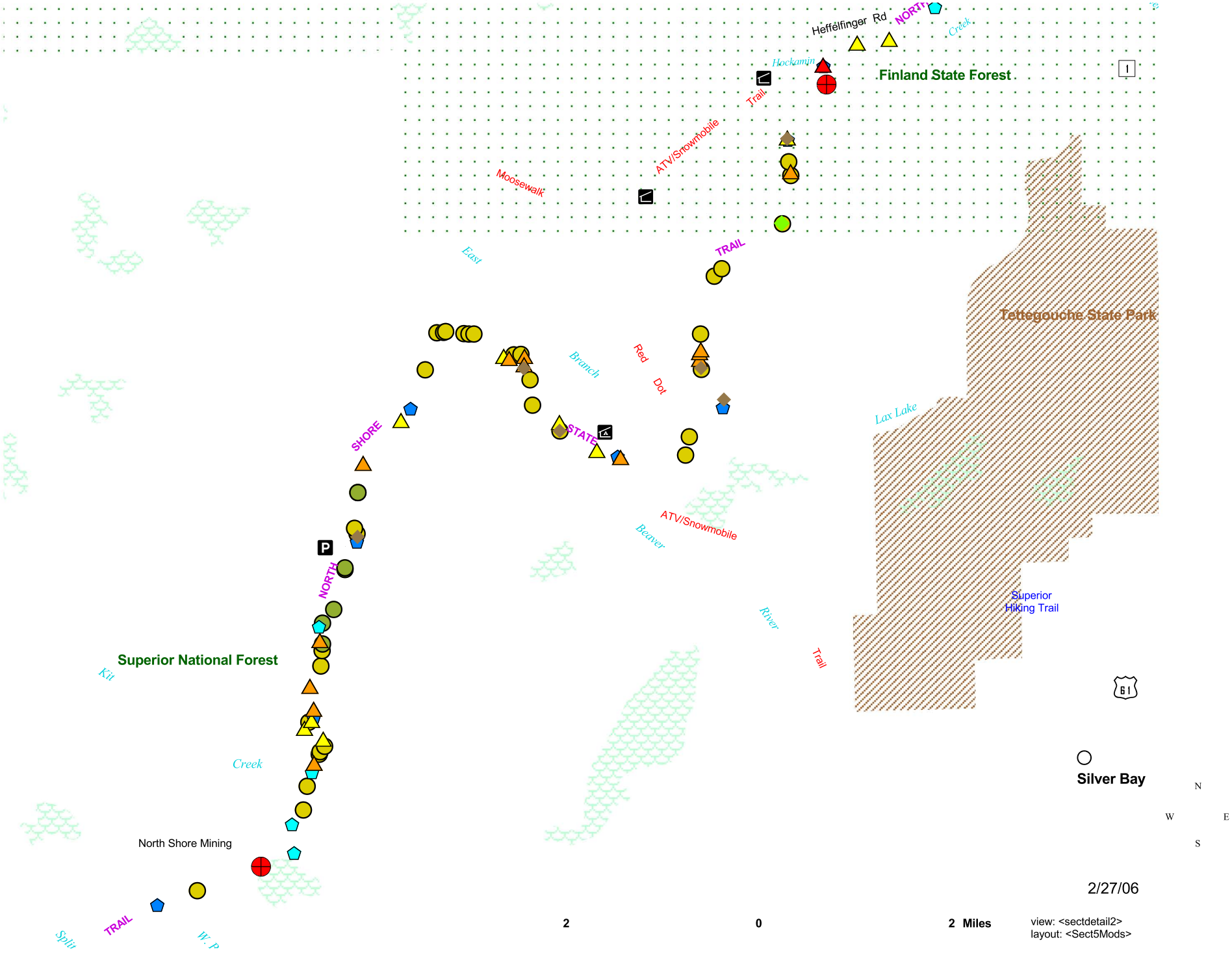
Map B-3. Section 3 Details



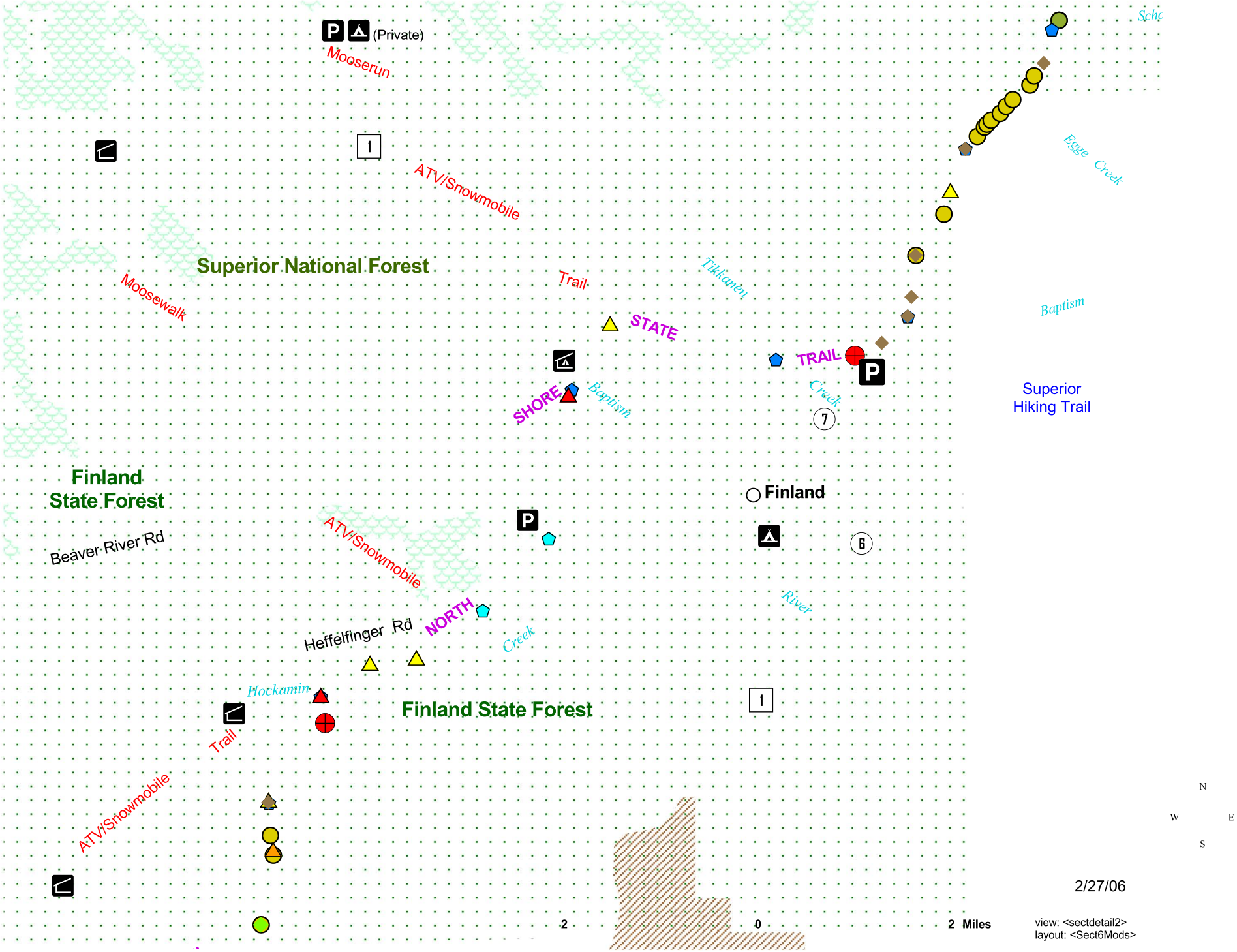
Map B-4. Section 4 Details



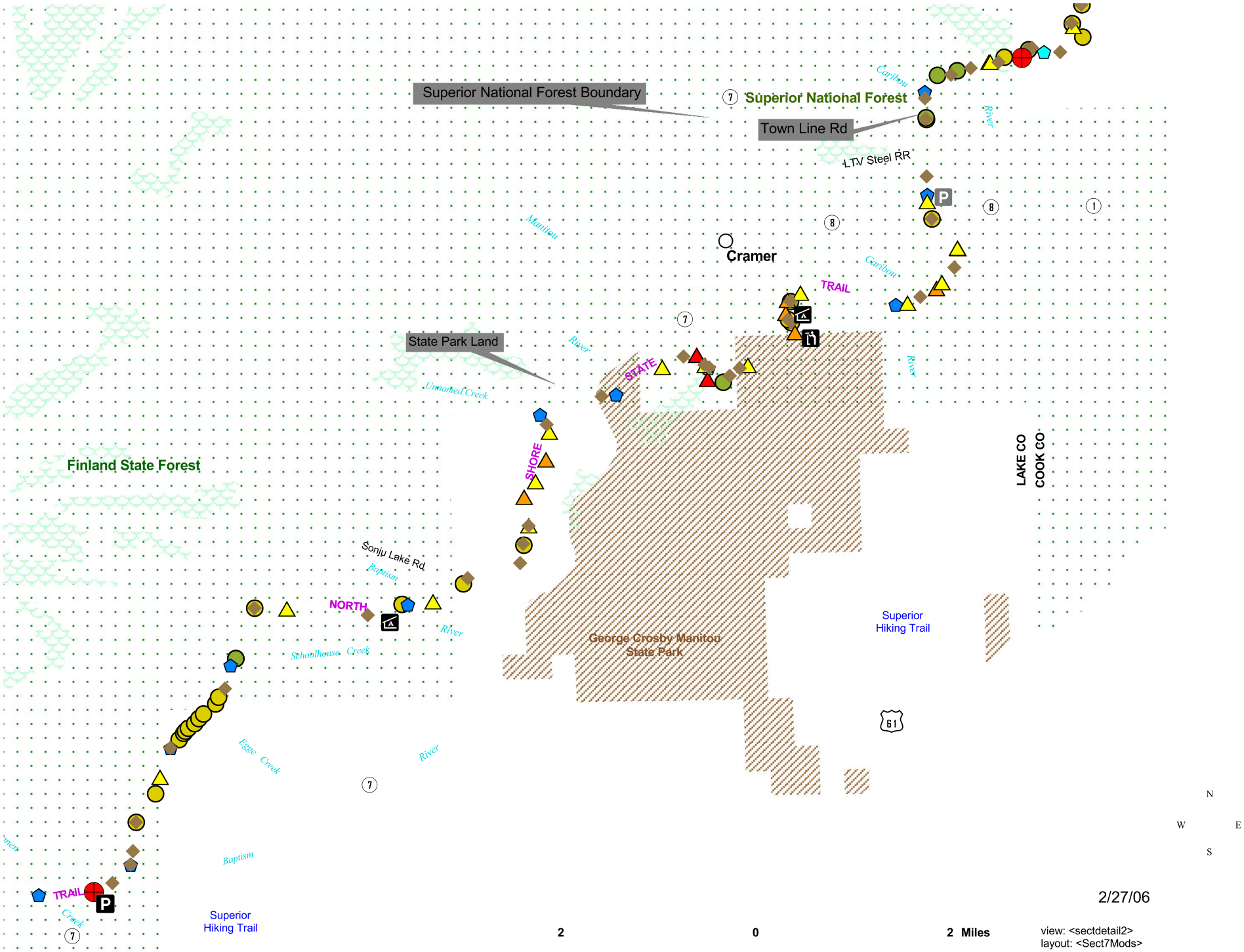
Map B-5. Section 5 Details



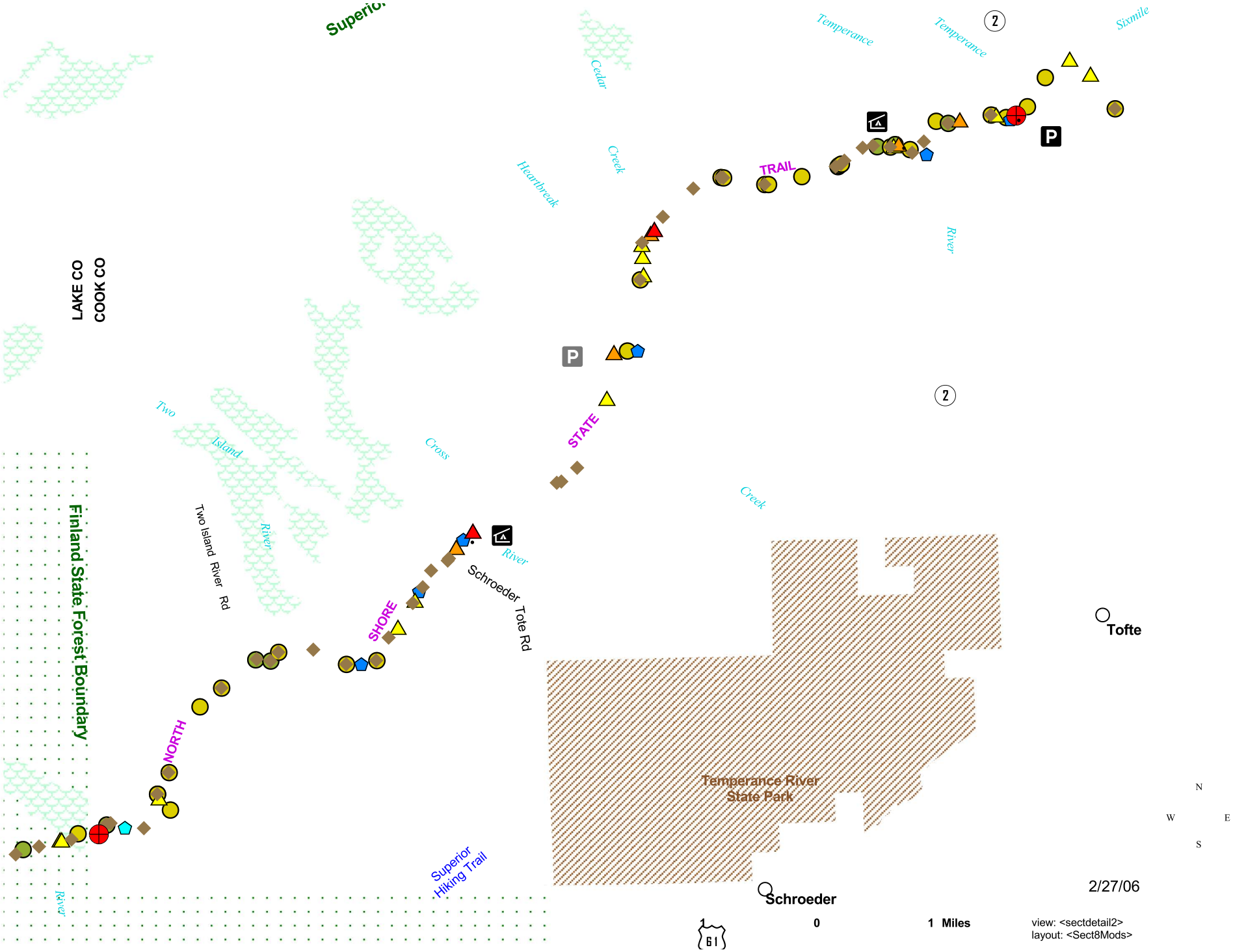
Map B-6. Section 6 Details



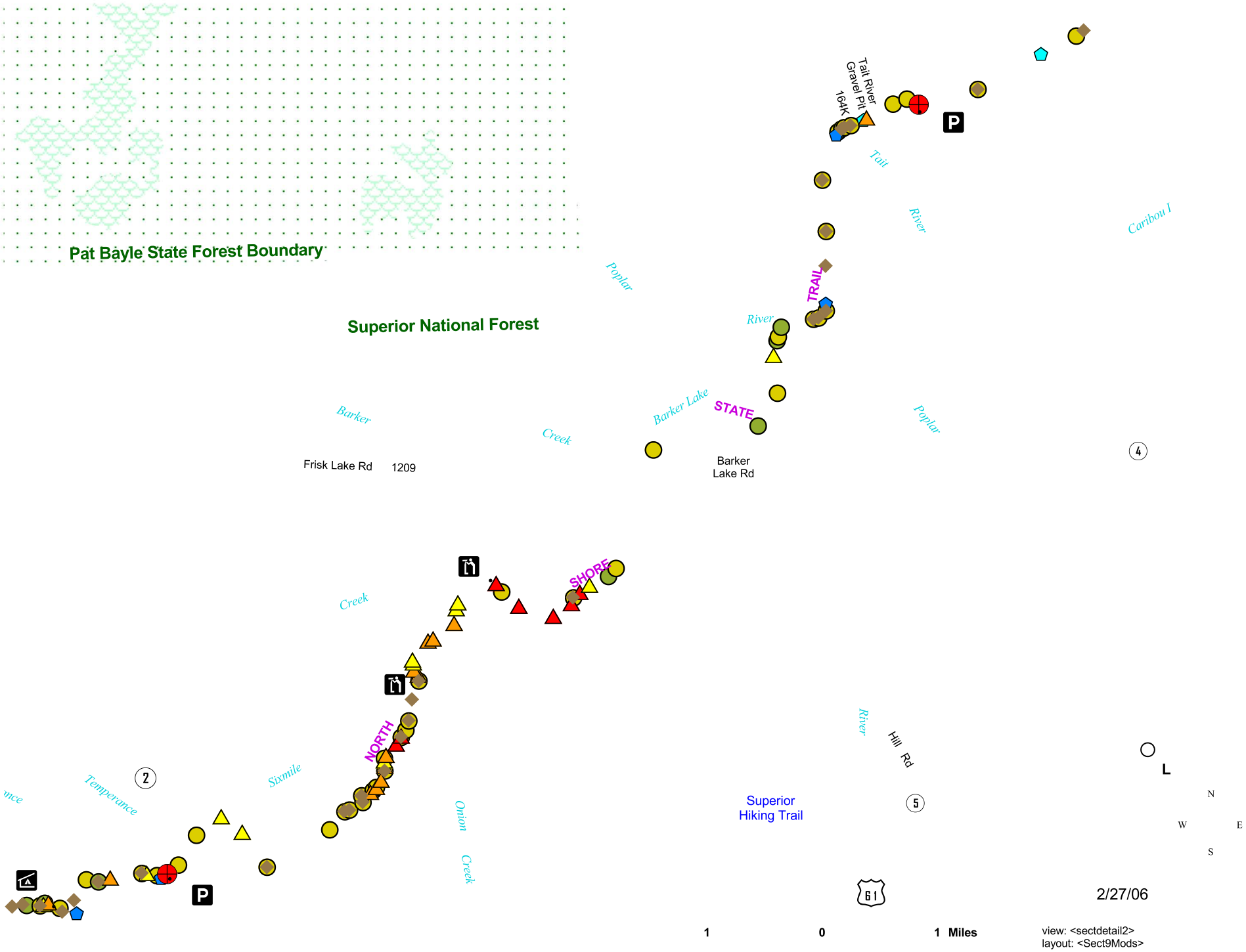
Map B-7. Section 7 Details

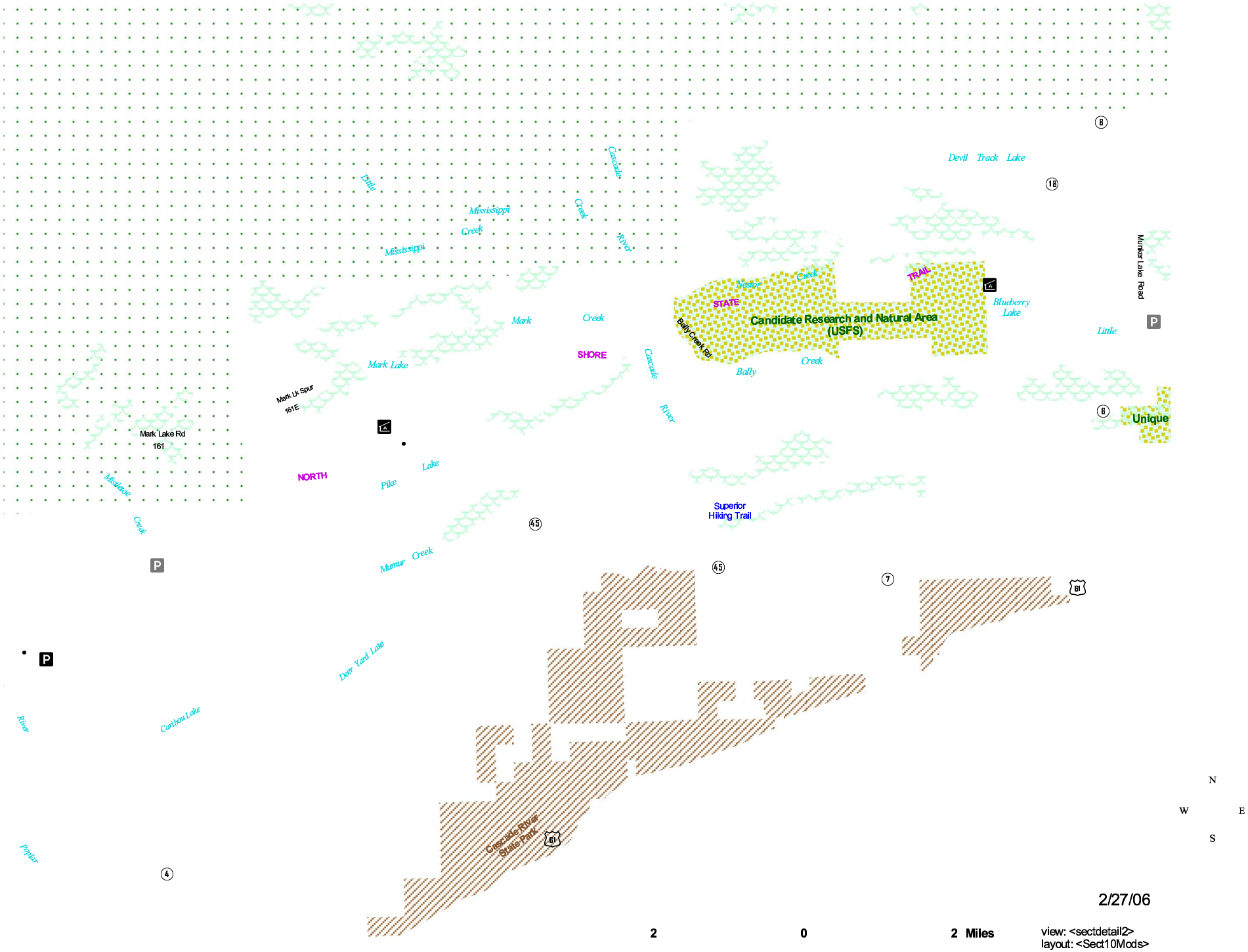


Map B-8. Section 8 Details



Map B-9. Section 9 Details




Devil Track Lake
Little Mississippi River
Mississippi Creek
Cascade River
Mark Creek
Mark Lake
Mark Lk Spur 161E
Mark Lake Rd 161
Mesler Creek
STATE TRAIL
Candidate Research and Natural Area (USFS)
Bally Creek Rd
Bally Creek
Blueberry Lake
Munker Lake Road
Little
Unique
SHORE
NORTH
Pike Lake
Superior Hiking Trail
Murmur Creek
Deer Yard Lake
Caribou Lake
Misslatoe Creek
Poplar River
Cascade River State Park
N
W
E
S
2/27/06
2 0 2 Miles
view: <sectdetail2>
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Map B-11. Section 11 Details