

# Harmony-Preston Valley Trail

## Master Plan



*Minnesota Department of Natural Resources  
Trails and Waterways Unit*

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## **Acknowledgments**

The Harmony-Preston Valley Trail would not have materialized without the tireless dedication of the citizens of the communities of Harmony and Preston. The Harmony-Preston Joint Powers Board (Vicky Tribbon, Eric Slindee, Bruce Bigalk, Andrew Overby, David Kingsley, Phillip Burkholder, Richard Nelson, Steve Corson, David Joerg, Jon Haugan, Ray Bisco, and Joyce Bisco) spearheaded the local effort. This group was instrumental in promoting the original concept, seeking legislative authorization, working with local landowners, and identifying and securing the alignment. City and county officials, legislators, civic group leaders, landowners, other state agency personnel, trail user groups and trail users contributed their time and ideas to the project. The Minnesota Parks and Trails Council assisted the cities of Harmony and Preston with interim loans for the purchase of the land for the trail.

The master plan document was prepared by the Trails and Waterways Planning Section: Laurie Young, John Morse, Brian McCann, and Barbara Burgum. Craig Mitchell, Regional Supervisor, Craig Blommer, Area Supervisor, and Leslie Udenberg, Root River Trail Technician, and DNR resource managers were an integral part of the planning team. Special thanks go to Marge Gear for word processing.

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# Introduction



## **Overview of the Harmony-Preston Valley Trail**

The Harmony-Preston Valley Trail will be a multi-use (predominately bicycling, hiking, in-line skating and cross-country skiing) trail connecting the communities of Harmony and Preston to the existing Root River State Trail. See Figure 1, page 2, for the location of the trail. This trail segment is a component of the legislatively authorized Blufflands Trail System which loops through Fillmore and Houston counties. Trail users will be able to experience the resources of the scenic Blufflands landscape along the 18 mile trail.

The northern two-thirds of the alignment follows and/or crosses Watson Creek, the South Branch of the Root River and Camp Creek providing scenic views and vistas. The trail will provide access to these streams for trout fishing. Trail users can observe wildlife such as great blue herons, hawks, and deer. The trail passes through a variety of wooded areas and farmland along this segment. The trail also provides distant and "up close" views of limestone bluffs. The southern third of the trail changes in character as the trail climbs out of the valley and traverses a ridge line between valleys. Rural farm landscapes and vistas of rolling terrain dominate the scenery along this stretch. Sinkholes dot the landscape adding points of interest. The trail passes by three small wooded areas providing diversity to this segment.

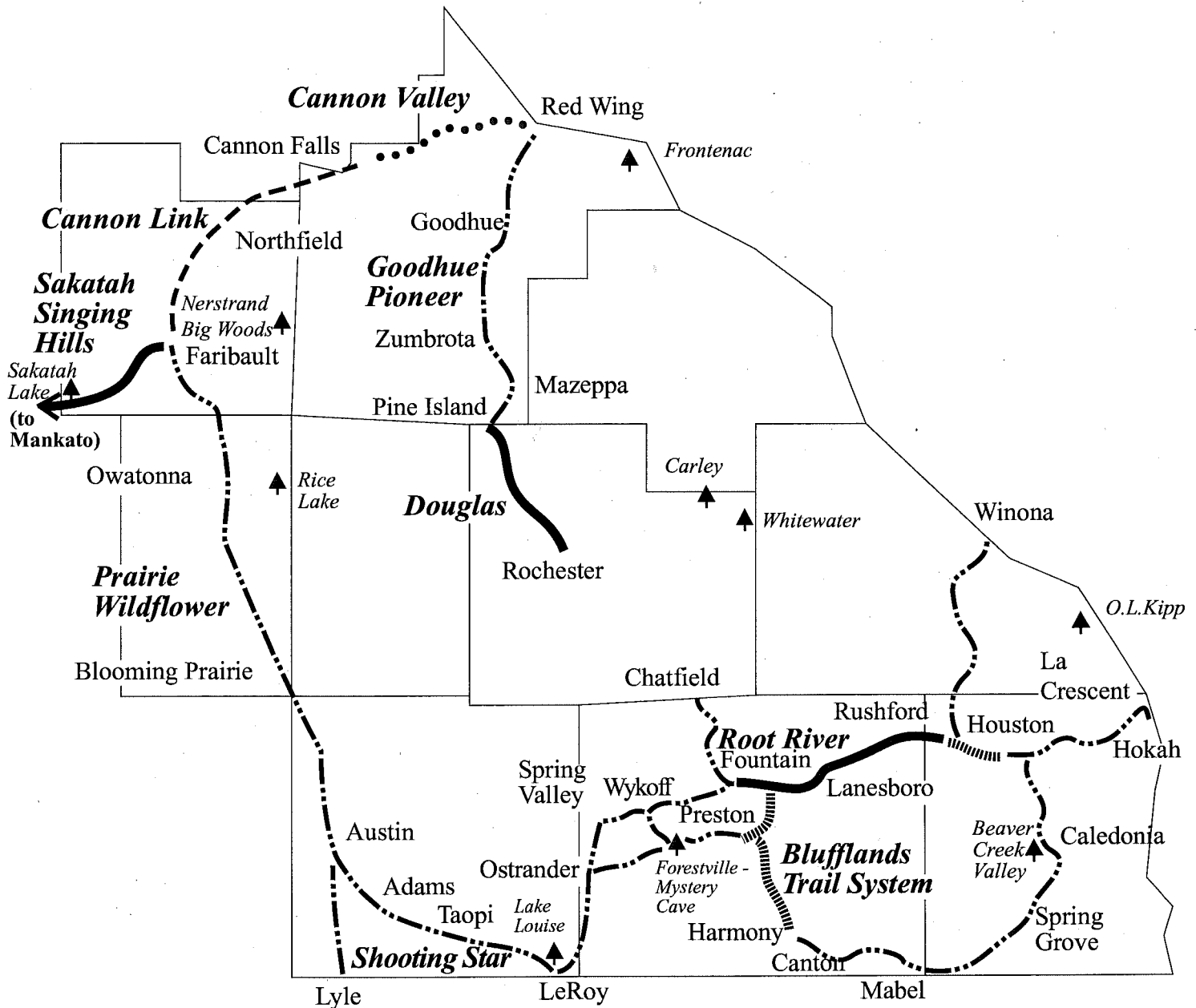
The completion of the Harmony-Preston Valley Trail will be the realization of a long held dream for the citizens involved with identifying and acquiring the alignment. The Harmony Preston Area Trail Commission, a formal joint powers board made up of 12 people (six from the Harmony area, six from the Preston area), has spent countless hours on this trail project. Their efforts, in partnership with state legislators, resulted in legislative authorization for the trail in 1992. In 1993, \$1 million was appropriated by the legislature as recommended by the Legislative Commission on Minnesota Resources (LCMR). In 1994, an additional sum of approximately \$1 million was appropriated for the trail.

## **Project Status**







The public review of the draft master plan was complete March 30, 1995. DNR acquired the right-of-way from the communities of Harmony and Preston in the spring of 1995.

Construction of the first three bridges, the Preston parking area, and the first six miles of paved trail surface between Isinours Junction and Preston was complete in the fall of 1995. Construction will resume in the spring of 1996 on the section heading north from Harmony.

# Trails in Southeast Minnesota



## Existing and Proposed Trails in Southeast Minnesota -3/95

-  Acquisition authorized by Legislature for state trail
-  Acquisition in progress for state trail
-  Developed state trails
-  State Parks
-  Cannon Valley Trail (managed by the Cannon Valley Joint Powers Board)
-  Local initiatives for potential trails - alignments in a variety of initial planning stages

## **Planning Process: Purpose and Scope**

### Process Goals and Objectives

Master planning for the Harmony-Preston Valley State Trail is being conducted in response to the need to:

- Guide the development, management, maintenance and operation of the Harmony-Preston Valley State Trail.
- Provide a forum for open public discussion and debate concerning trail use and trail development options, trail maintenance and management issues, and trail operations and enforcement needs.
- Inform the decision making process by assessing the projected impacts of trail development on natural, cultural and historic resources, and on local communities.
- Satisfy the intent of Minnesota Statutes, Chapters 85.015A and 86A.05 which authorize creation of the Harmony Preston Valley State Trail and set forth planning guidelines designed to ensure that interested persons are properly informed and consulted during plan development.

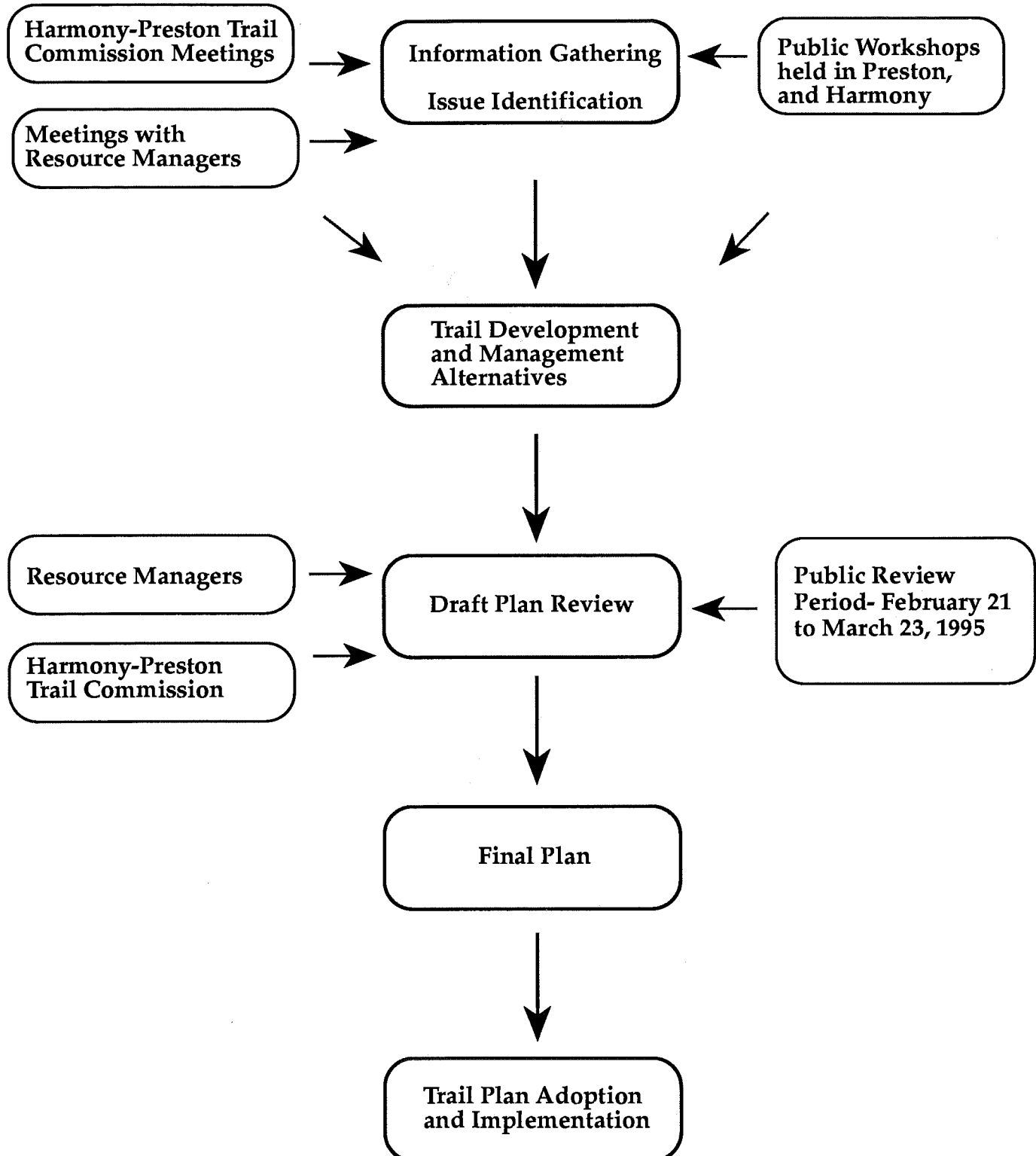
### The Planning Process

Figure 2, page 4, outlines the planning process used in developing the master plan.



Figure 2

## Harmony-Preston Valley Trail Planning Process



## Trail Authorization

The Harmony-Preston Valley Trail is part of the Blufflands Trail System which was legislatively authorized in 1992. (Minnesota Statutes 85.015, Subdivision 7(b).

*"Additional trails shall be established that extend the Blufflands Trail System to include La Crescent, Hokah, Caledonia, and Spring Grove in Houston County and Preston, Harmony, Fountain, Wykoff, Spring Valley, Mabel, Canton, and Ostrander in Fillmore County and Winona in Winona County. In addition to the criteria in Section 86A.05, Subdivision 4, these trails must utilize abandoned railroad rights-of-way where possible."*

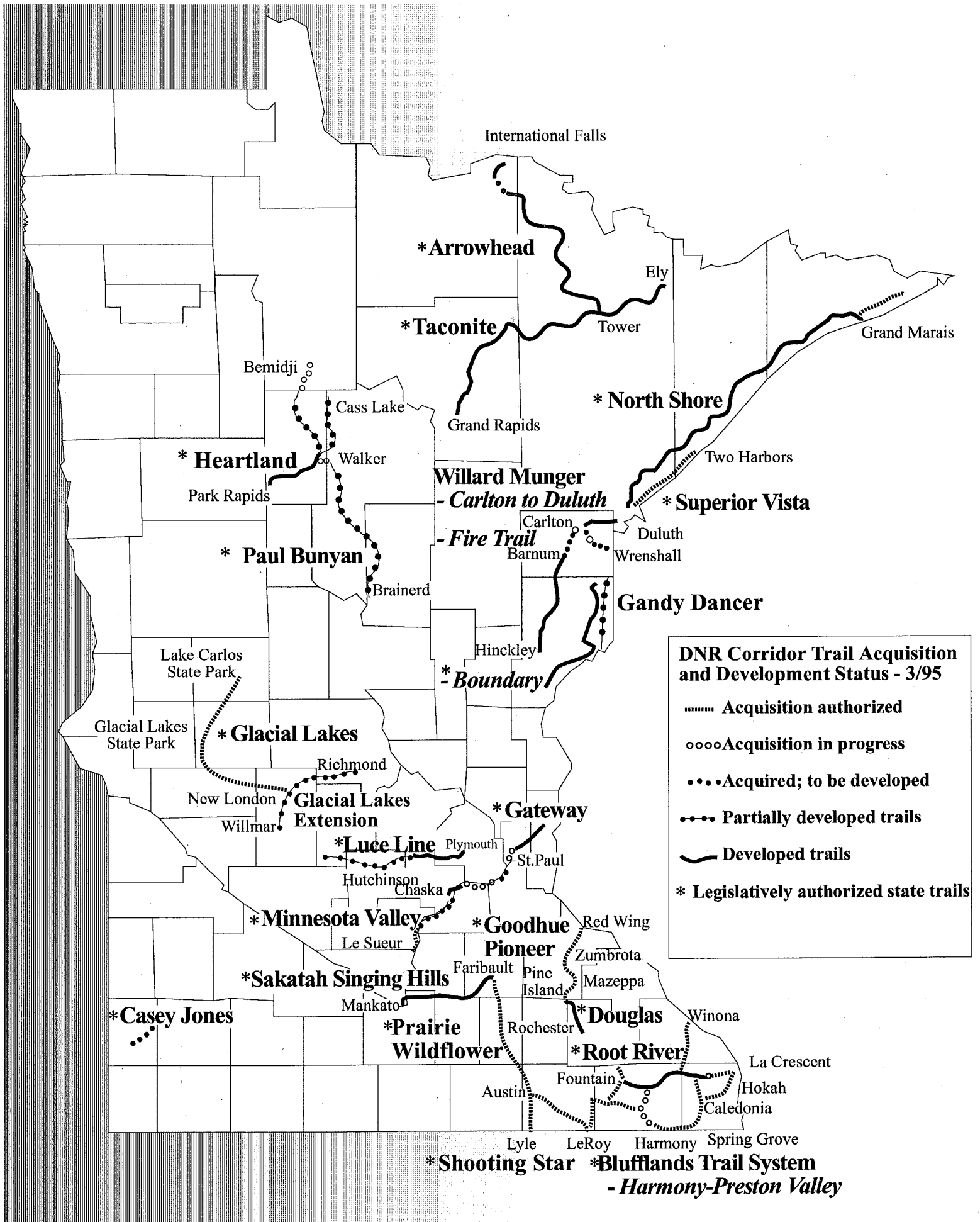
The Harmony-Preston Valley Trail is one of 20 legislatively authorized state trails (Minnesota Statutes 85.015). Sixteen of these are currently being planned, developed or managed by the Department of Natural Resources (DNR). See *Figure 3, page 6*.

State trails are one unit of the state's outdoor recreation system established by the Legislature. In 1975 the Minnesota Legislature enacted the Outdoor Recreation Act (ORA) Minnesota Statutes, Section 86A.05, Subdivision 4 and Section 85.015). This act established an outdoor recreation system comprised of eleven components or "units" classifying all state managed recreation lands. The ORA requires that the managing agency prepare a master plan for the establishment and development of each unit. This plan has been developed pursuant to this mandate.

The Harmony-Preston Valley Trail meets the criteria established for state trails in the Outdoor Recreation Act and is a valuable addition to the state trail system.

Minnesota Statutes 86A.05, Subdivision 4, State Trail; purpose; resource and site qualifications; administration; designation.

- a. *"A state trail shall be established to provide a recreational travel route which connects units of the outdoor recreation system or the national trail system; provides access or passage through other areas which have significant scenic, historic, scientific, or recreational qualities; or establishes or permits travel along a historically prominent travel route or which provides commuter transportation."*



b. *"No unit shall be authorized as a state trail unless its proposed location substantially satisfies the following criteria:*

1. *Permits travel in an appropriate manner along a route which provides at least one of the following recreational opportunities:*

(i) *"Travel along a route which connects areas or points of natural, scientific, cultural and historic interest."*

The Harmony-Preston Valley Trail connects the communities of Harmony and Preston and ties them to the existing Root River State Trail. Natural, cultural, and historic resources include the South Branch of the Root River and Camp Creek, designated trout streams, geologic features such as sinkholes and bluffs, museums in Harmony and Preston as well as other historical and cultural amenities in those communities.

(ii) *"Travel through an area which possesses outstanding scenic beauty."*

The Harmony Preston Valley Trail provides vistas and views of the area's bluffs, valleys, forests, rivers and farmlands.

(iii) *"Travel over a route designed to enhance and utilize the unique qualities of a particular manner of travel in harmony with the natural environment."*

The Harmony-Preston Valley Trail will allow trail users to travel "fast enough to span the forest and slow enough to spot the trees" in the words of Jack Lehman, a noted author and bicyclist. Traveling through the Blufflands by trail allows a person to observe and experience the Blufflands region in a unique way.

(iv) *"Travel along a route which is historically significant as a route of migration, commerce or communication."*

Approximately ten of the eighteen miles of trail will be located on an abandoned railroad grade. The northern segment of trail is located primarily on a former rail line developed by the Chicago, Milwaukee, and St. Paul Railway.

(v) *"Travel between units of the outdoor recreation system or national trails system."*

The Harmony-Preston Valley Trail will be connected to the existing Root River State Trail. In addition, this trail has the potential to connect to other future trails of the Blufflands System. Potential direct connections include the proposed trail located from Harmony to Canton and Mabel, and the Carimona Trail, located between Preston and Forestville State Park.

2. *"Utilizes to the greatest extent possible, consistent with the purposes of this subdivision, public lands, rights-of-way and the like."*

The Cities of Harmony and Preston are in the process of acquiring the right-of-way from private landowners. The Department of Natural Resources will soon acquire the right-of-way from Harmony and Preston. Approximately ten miles of trail will be on a railroad grade that had been in private ownership. Another two miles will be located within the right-of-way of county or township roads.

3. *"Provides maximum potential for the appreciation, conservation, and enjoyment of significant scenic, historical, natural, or cultural qualities of the areas through which the trail may pass."*

Overlooks, waysides and interpretive facilities have been proposed to increase trail users' appreciation and understanding of the natural and cultural resources of the area.

The trail will be developed to minimize the impact on the natural resources within and adjacent to the trail corridor.

4. *"Takes into consideration predicted public demand and future use."*

The master plan evaluates and uses the current research and trends on existing use of trails and demand for trail opportunities. Information gathered at public workshops is also considered.

## **Goals for the Harmony-Preston Valley Trail**

Provide a high quality, multi-use, non-motorized trail component of the Blufflands Trail System between Harmony and Preston, connecting to the Root River State Trail, that is managed in harmony with the Blufflands Landscape and meets the needs of trail users and surrounding communities.

### Environmental:

- Preserve and enhance the natural and cultural features of the trail corridor.
- Interpret the natural and cultural features of the trail and the Blufflands Landscape.
- Design, construct, and maintain the trail in a way that protects and enhances the natural environment and minimizes trail users' impact.
- Protect, restore, and manage plant communities, wildlife, soil and water resources in a way that is appropriate to the Blufflands Landscape.

### Meeting Trail User Needs:

- Provide access for a wide range of people with varying degrees of capabilities, including those with disabilities.
- Promote the safety and security of trail users.

### Adjacent Landowner Relationships:

- Develop and maintain the trail so that impacts on adjacent landowners are avoided or minimized.

#### Trail Integrity/Connectivity:

- Provide a continuous, off-road multi-use trail which serves as a component of the Blufflands Trail System.
- Connect regional tourist travel destinations and population centers.
- Connect state and local outdoor recreation lands and facilities.

#### Partnerships/Cooperation:

- Work with local communities in developing, managing and maintaining the trail right-of-way to mutually benefit both trail users and the community.
- Complement the character and economic vitality of the communities through which the trail passes.
- Involve local units of government, user groups, adjacent landowners, and other concerned citizens in the planning, design, and operation of the trail so that their needs are identified and addressed.
- Work cooperatively with other units of the DNR and public agencies to fulfill mutual objectives.

## **The Blufflands Landscape**

The Harmony-Preston Valley Trail is located within the Paleozoic Plateau Subsection (also known as the Blufflands) of Minnesota, one of 21 subsections of the state. *See Figure 4, page 12.* A subsection is a portion of the state defined by the interrelationships and results of interactions among the climate, geology, geomorphology, parent material, soil, vegetation, hydrology, wildlife and land history. The Paleozoic Plateau consists of an old plateau covered by loess (windblown silt), and then extensively eroded along rivers and streams. The eastern portion has bluffs and deep stream valleys 500 - 600' deep. The western portion is a gently rolling glacial till that is covered by loess in places. Oak forests dominated here, but oak barrens and tallgrass prairies were also present. River bottom forests grew along major streams and rivers.

The Blufflands is a large ecological unit. There is need to sustain the integrity of ecological systems, and approach development and land management activities with an understanding of the potential impacts to the system. In this regard, the development of the trail is described below relative to its impacts in the landscape.

### **Natural Resources**

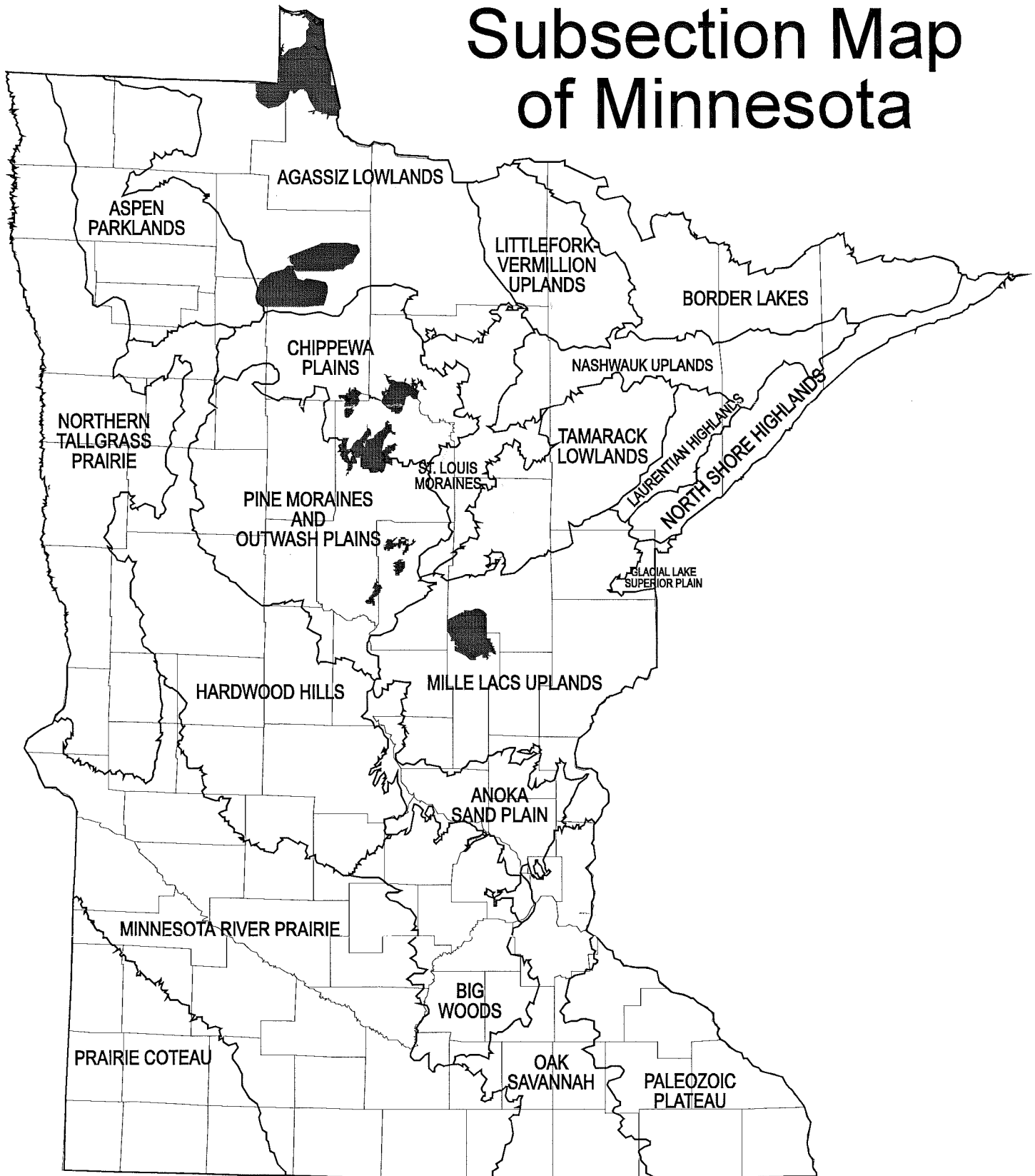
The trail will be developed and managed to minimally impact native communities and conserve biodiversity while providing a recreational opportunity that allows for appreciation of the landscape. The Harmony-Preston Valley Trail will be a man-made connecting corridor within the landscape. Additional habitat will be created, as portions of the right-of-way that once were agricultural are naturalized with native vegetation. This will provide some benefit for wildlife as nesting and escape cover. It will also provide a corridor for some genetic movement. Some stream bank areas will be revegetated. Existing vegetation along streams will be maintained or enhanced to maintain appropriate vegetative cover. The trail right-of-way can serve as a filter against non-point source pollution in some areas. In previously pastured fields adjacent to streams, the trail right-of-way will exclude the stream bank from grazing and provide a buffer strip generally ranging from 50' - 100' wide. All but the treadway will be in permanent vegetative cover.

In agricultural row crop areas, the trail right-of-way can add biodiversity and act as a windbreak/shelterbelt lessening wind speed and/or siltation from erosion.

This plan recommends that any wetlands impacted by development are replaced within the landscape although technically replacement could be located anywhere within the state. Development, such as the bridges required for the trail, will be designed to ensure that the hydrologic function of floodplains and riparian zones are not inhibited. Vegetation can be managed within the trail right-of-way to protect water quality by slowing runoff, in comparison to the pre-trail condition. Permanent vegetation in the trail right-of-way can serve as a filter against non-point source pollution.



# Subsection Map of Minnesota



## **Information/Education**

The Harmony-Preston Valley Trail has great potential to be used for environmental education purposes. The trail allows travel through the landscape allowing trail users to experience the diversity of the landscape first-hand. It allows close up inspection of the diversity of resources that comprise the Blufflands, as well as providing views and vistas of the landscape. The trail right-of-way can be managed to be a role model for sustainable resource management of shelterbelts, road rights-of-way or stream corridor edges. Interpretive messages along the trail can illustrate how people and environment are interdependent.

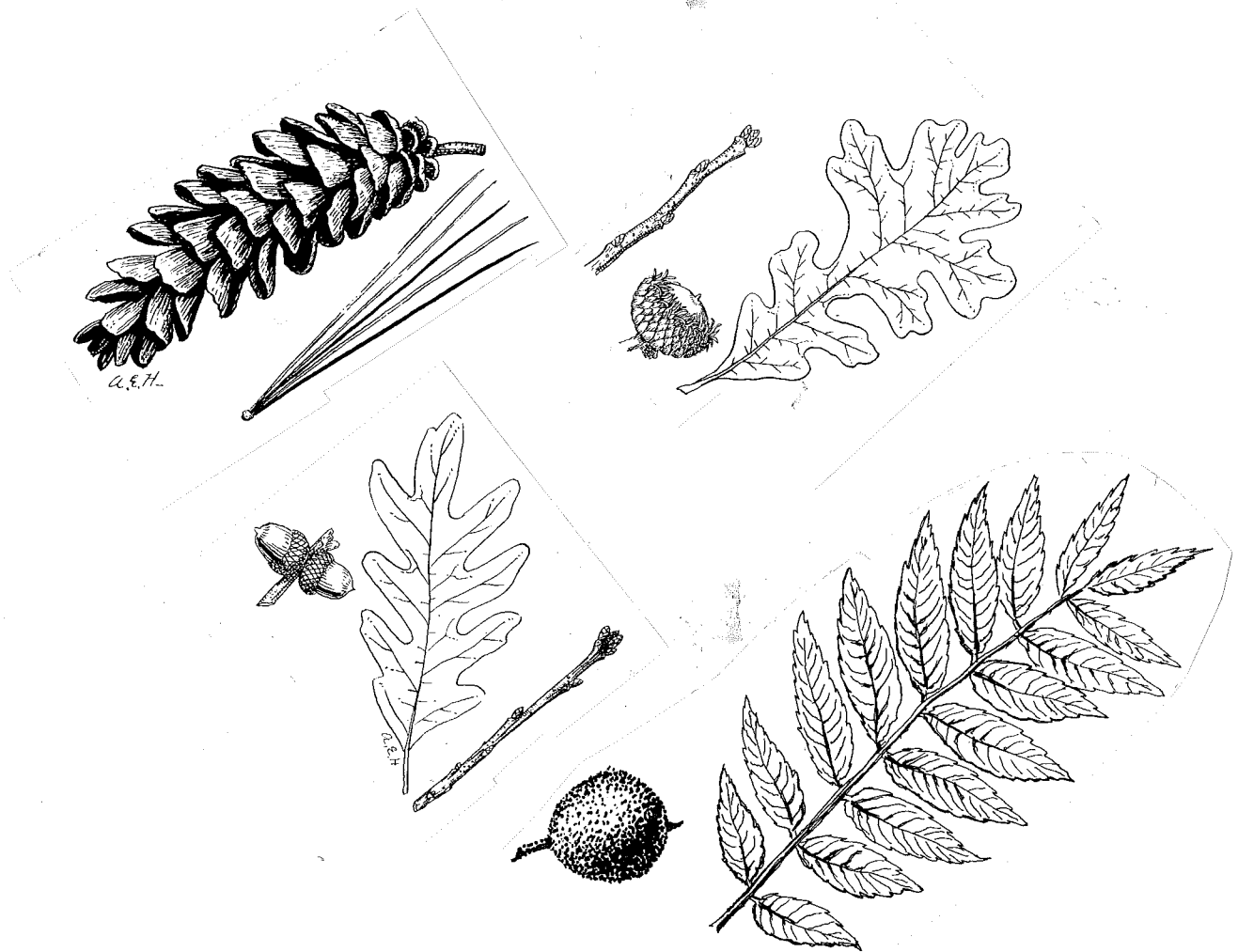
## **Transportation**

The trail, as part of a trail system, will provide an opportunity for bicycling, the most efficient form of transportation. The trail will be integrated into the communities of Harmony and Preston providing the benefits of trail recreation and off-road transportation for residents that enhances the quality of life.

## **Economics**

Trail development should have a positive impact on the local economy. Growth in services for trail related tourism is likely. Trail heads will be located within the towns of Harmony and Preston, strengthening and encouraging the focus of development within the communities.

# Trail Development Recommendations



## **Projected Trail Use**

It is anticipated that the number of users, profile of users, and pattern of use will be similar to what is occurring on the Root River State Trail, with many of the current repeat Root River trail users likely to explore a new connecting trail.

A summer survey by DNR in 1990 indicated that an estimated 18,900 use occasions occurred on the Root River State Trail during the May–September season. DNR staff interviewed a statistical random sample of trail users to find out when they used the trail, where they came from, how much they spent, and how they heard about the trail. The survey was conducted during the period May 20 – September 8, between 8 AM – 8 PM. While the summer-type use likely starts before and ends after this time frame, no attempt was made to adjust the numbers to reflect that supposition. Many tourists visit southeastern Minnesota earlier in spring to view wildflowers, or later in the fall during the peak color season. Surveys of winter use have not been conducted.

The 18,900 total represents a substantially lower number of use occasions than what is occurring presently. Based on trail manager observation, use on the Cannon Valley Trail, and counter numbers on the Root River State Trail, a more likely use estimate is 50,000 use occasions. This is what is expected on the Harmony-Preston Valley Trail.

Most of the Root River summer trail users were adults (63%). Children were the next largest user group, at 25%, and teens the smallest, at 12%. Over half of all users were on the trail on weekends. A counter installed on the Root River State Trail east of Lanesboro confirms this trend with numbers of users passing this point highest on Sundays and Saturdays, followed by Mondays and Fridays. Midweek use was significantly less.

The largest percentage of users were bikers (81%), followed by hikers (10%), in-line skaters (6%), and joggers (2%). Field staff report that skaters seem to be increasing in numbers in the four years since the study was done.

Many of those surveyed were repeat users of the trail. 73% said they had used the trail at least once in the past, 50% said they had been to the trail that summer already, and 21% said they had been on the trail in the wintertime.

Sixty-seven percent of trail users were more than 25 miles from their home.

About 22% of all trail users were on an overnight trip away from home. Using the trail was the primary purpose of 14% of all those on an overnight stay. Those that were staying overnight primarily to use the trail were an average of 130 miles from their homes. Those that were away from home, but whose primary purpose was not to use the trail, were an average of 425 miles from home. Many of these travelers were probably using the trail in conjunction with a longer vacation or business trip.

Seventeen percent of all trail users were from out of state, with a higher percentage of out-of-state users on the trail on weekdays.

There was a strong local use component, as 27% of all trail use was by people who live in towns on or near the Root River Trail. Trail use by persons living in towns on the trail was heavier on weekdays, with a higher percentage of trail use in early evenings.

Regional use of the trail is also strong. Rochester residents accounted for 20.6% of all trail use, and other SE Minnesota residents for 18%. Minneapolis-St. Paul area residents were less than 10% of all trail users.

The average trail user spent about \$9.71 per day, but those that were spending an overnight away from home to use the trail spent \$33.46 per person per day.

Over half of trail users had heard about the trail from word-of-mouth. Twenty percent live, work, or have friends who live close to the trail. Eleven percent had read about the trail in a tourism brochure.

The average trail users spent about 2½ hours on the trail. Those people who were less than 25 miles from home spent the least time on the trail (1½ hours) while those that were away from home just to use the trail spent the longest time on the trail (3.4 hours).

When asked if they found any problem with the trail, 88% of summer trail users said they had no problems. Those that mentioned problems cited trail or bridge surfaces, concerns about safety or security, lack of facilities (water, rest stops, phone, etc.), complaints about other users or pets, or weeds or vegetation.

Another aspect which should be factored into a discussion of projected use is the potential national significance of the Blufflands System. As development of this system occurs, a unique recreational resource will be created that may have potential to draw users nationwide.

Monitoring trail use and satisfaction is critical if trail users needs are to be met and if the trail and associated facilities are to be developed appropriately. This plan recommends that an ongoing use and satisfaction program be developed and implemented in order to guide the future development of the Blufflands Trail System.

## RECOMMENDED TRAIL USES

☒ Bicycling

☒ Hiking

☒ In-line skating

☒ Cross-country skiing

☒ Trail development will be accessible to people with disabilities wherever possible.

☒ Access for trout fishing. Certain segments of the trail parallel trout fishing streams. The trail can be used to access the streams for fishing. This will be advantageous for people with mobility impairments. A hard surfaced link to the stream from the trail and a hard surfaced pad will be developed to facilitate accessibility for anglers with mobility impairments. Parking close to these trails will be developed where possible.

## **Other Use Considerations**

### Primitive Camp Sites

The DNR in general, does not provide camping sites along state trails. Camping is allowed on state forest land, and current users of the Root River State Trail may camp in the Isinours Unit of the Dorer Memorial Hardwood State Forest. Camping opportunities developed by the private sector and communities are also available in the area.

### Hunting/Shooting

State rules regarding hunting will apply to the Harmony-Preston Valley Trail. No firearm or bow and arrow shall be discharged within the trail right-of-way at any time, except for the purpose of lawful hunting during the period from September 15th to March 30th and the spring turkey hunt only. No rifle, shotgun, with slug, or bow and arrow shall be discharged upon, over or across the trail treadway at any time. Local regulations or ordinances concerning the use of firearms, bows and arrows and traps may be more restrictive and take precedence.

## **RECOMMENDED TRAIL SURFACE**

A 10' wide asphalt surface is recommended.

Asphalt is recommended as the surface for a number of reasons.

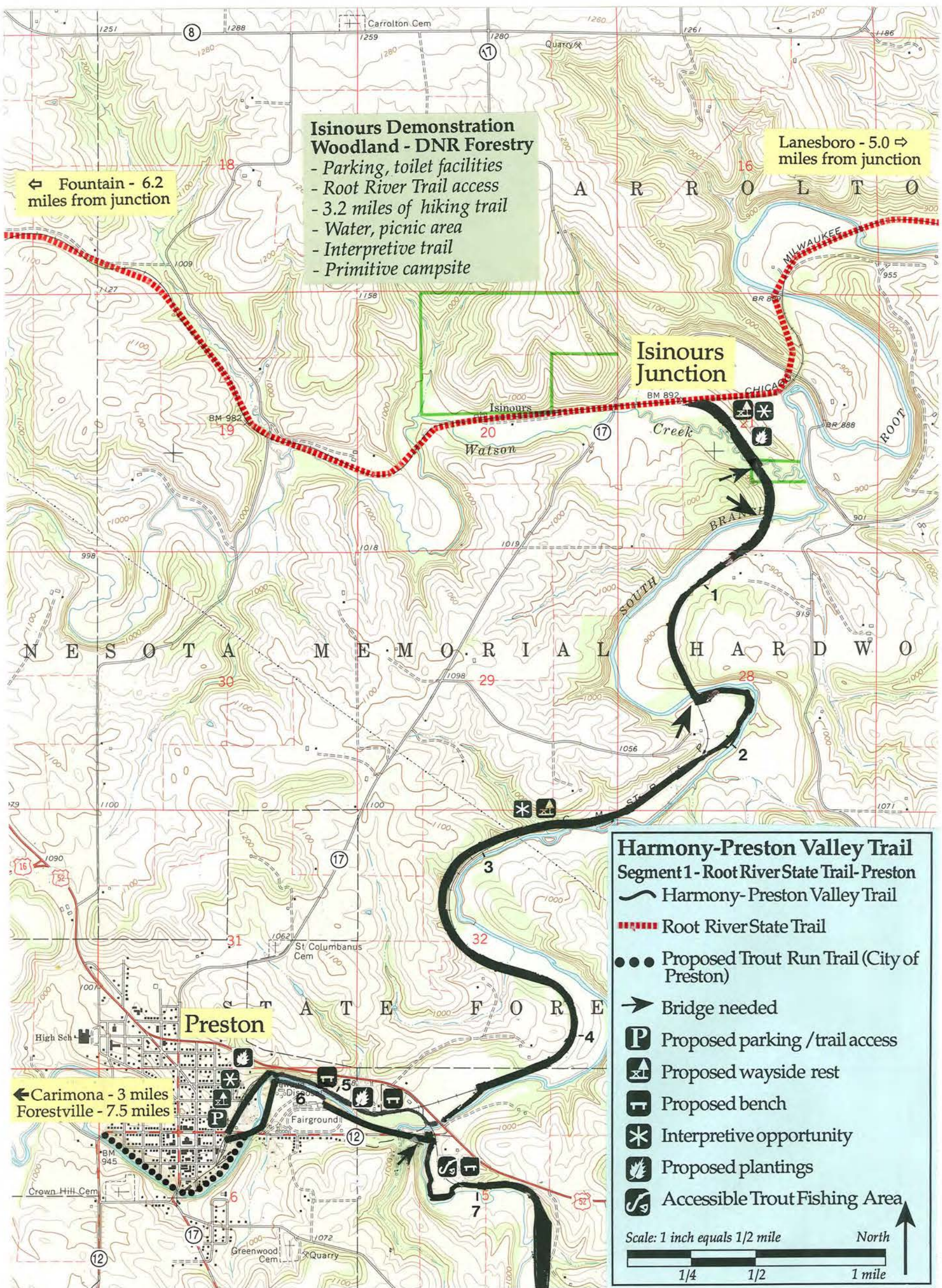
- It is recommended in order to accommodate in-line skaters, whose numbers are growing and whose use of state trails is significant.
- Asphalt is also consistent with the existing Root River State Trail, thereby maintaining system continuity.
- Maintenance costs are significantly less than other alternatives such as limestone.
- Feedback from state trail users indicate asphalt is the preferred surface for bicycling.

The recommendation for 10 foot width is consistent with current trail development standards.

The proposals for development of facilities and amenities along the trail are shown on the following three maps. Each map shows about six miles of the trail at a scale of one inch equaling 1/2 mile. Proposed sites for rest areas, parking, angling accessible to those with mobility impairments, bridges, and interpretive opportunities are shown.

Following these maps are maps of the junction with the Root River State Trail at Isinours, and the communities of Preston and Harmony. These communities have an important role for trail users. They are a major part of the regional identity, and will provide opportunities for historic interpretation, retail and service facilities, as well as being the trail access/parking locations for this trail.





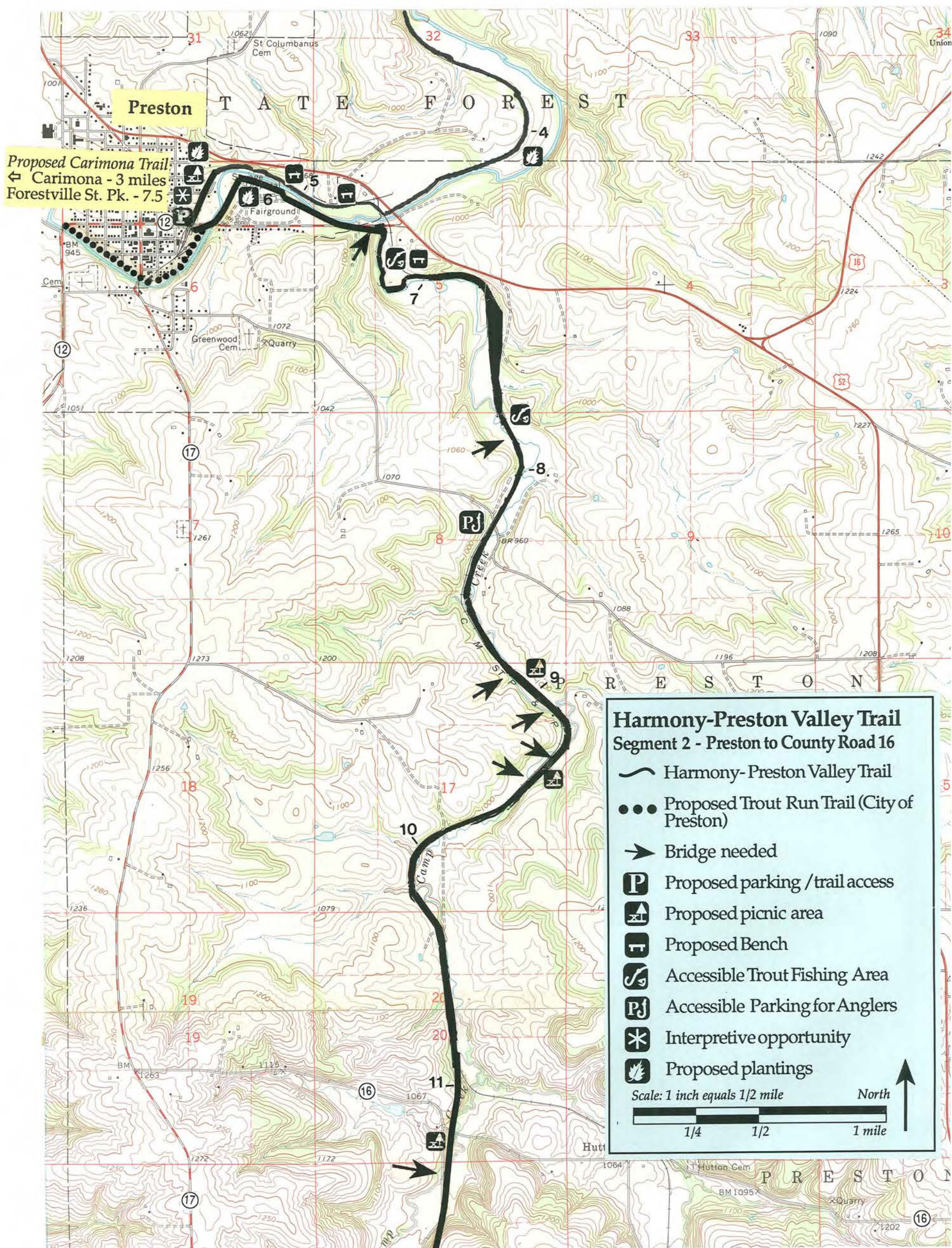


## Harmony-Preston Valley Trail

### Proposed Development and Management Recommendations

Segment 1	ROOT RIVER STATE TRAIL TO PRESTON
Mile 0.0 Isinours Junction	<b>Intersection with the Root River State Trail - "You Are Here" Rest Area.</b> The Harmony-Preston Valley Trail joins the Root River State Trail at this location. A pull-off (hardened surface off the treadway), information board, shelter and benches should be located here. The intersection should be designed so that congestion on the trail treadway is avoided, and clear, concise signing about the trail system is displayed. Plantings could further enhance the site.
Mile 0 - 18	<b>Archeological Assessment.</b> Because of the potential for archeological sites within the trail right-of-way, it is recommended that a professional archeologist make an assessment of the proposed alignment.
Mile 0 - 6.5	<b>Fishing Access Development.</b> Additional opportunities exist for anglers with mobility impairments in this segment. However, additional fishery easements may be required.
Mile 0.30 - 0.4	<b>Vegetation Management.</b> The trail right-of-way on the west side should be defined by plantings in order to screen a sensitive resource and discourage exploration off the trail.
Mile 0.4	<b>Bridge.</b> A bridge over Watson Creek is needed.
Mile 0.7	<b>Bridge.</b> A bridge is needed over the South Branch of the Root River. A bench could be included.
Mile 1.5	<b>Bridge.</b> A bridge is needed over the South Branch of the Root River. A bench could be included.
Mile 2.7	<b>Rest Area.</b> A pull-off with a picnic table and interpretive sign explaining the geology of the bluffs and valley is recommended in this area.
Mile 4.0 - 7	<b>Benches.</b> Benches should be sited along this stretch to accommodate persons walking short distances from the community. Benches should be designed to be low maintenance and blend into the surrounding landscape. Limestone could be an option. <b>Wildflower Plantings.</b> DNR should cooperate with the City of Preston to continue planting wildflowers along this stretch appropriate to the Blufflands landscape and provide interpretive signing.
Preston Mile 5.6	<b>Preston trail access/parking lot and rest area.</b> The DNR will work cooperatively with the City of Preston in the development of this area. DNR will work with the city to provide a parking lot for trail users (approximately 60 spaces), rest rooms, landscaping, and an information board. The city plans to renovate a historic elevator, and build an interpretive center.

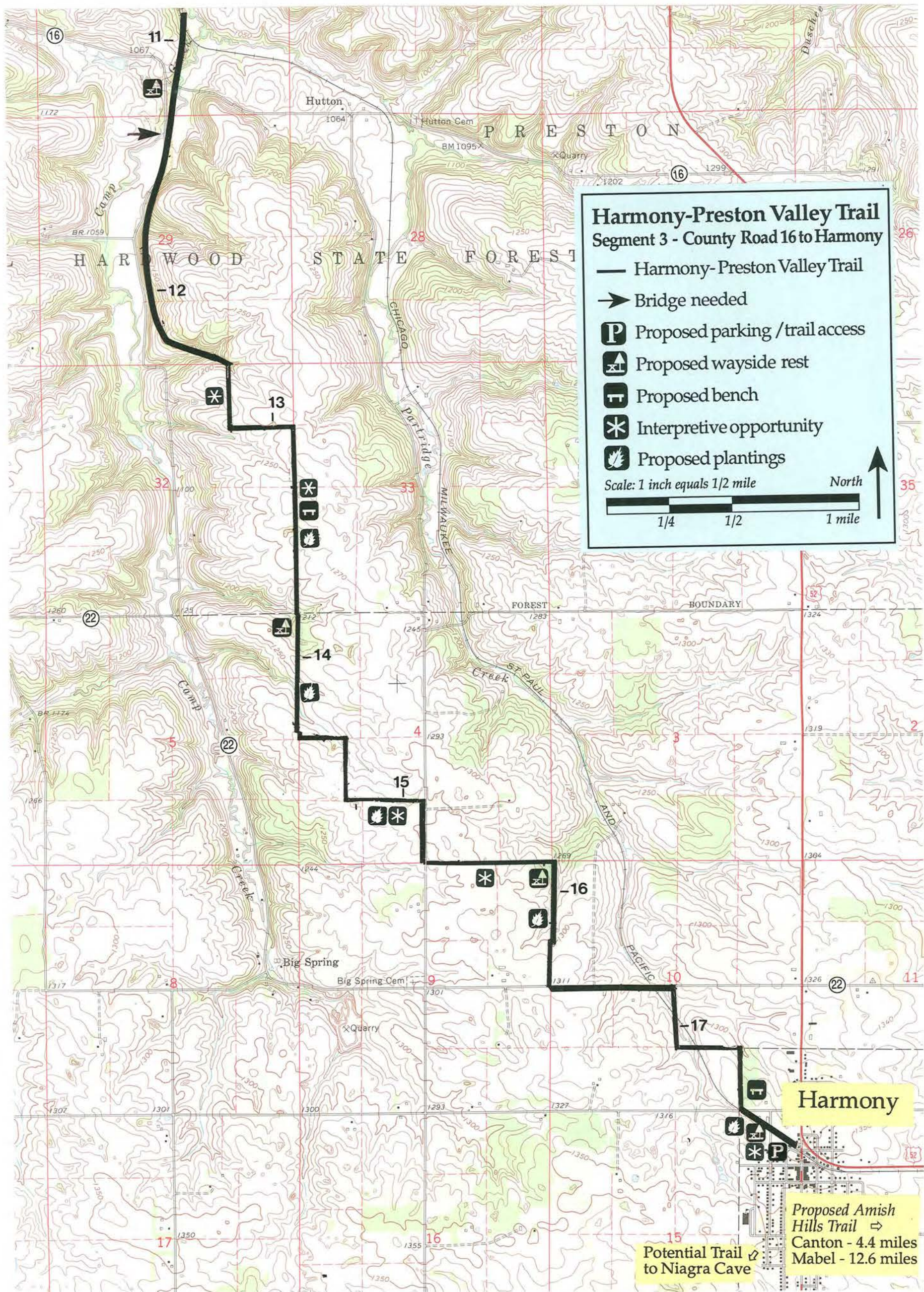






Segment 2	PRESTON TO COUNTY ROAD #16
Mile 5.6	<b>Trail Connection.</b> Trail connection to the proposed City of Preston Trout Run Trail which will connect the Harmony-Preston Valley Trail to the future Carimona State Trail.
Mile 5.7	<b>Bridge Crossing.</b> A bridge crossing over the Root River will be developed as part of a county road improvement project (CSAH 12). It will be constructed to accommodate trail users.
Mile 6.5	<b>Bridge Crossing (CSAH 12)</b> The feasibility of an underpass should be explored during the engineering design of the trail. Use of the existing culvert location is one alternative site for the crossing that should be explored in cooperation with Fillmore County. An at-grade crossing further east is also an alternative.
Mile 6.6	<b>Bridge Crossing.</b> The bridge crossing CSAH 12 (Fillmore Street) over Camp Creek will need to be designed to accommodate trail users when it is upgraded.
Mile 6.6 - 8.4	<b>Treadway Design.</b> The trail treadway needs to be designed and constructed to withstand use by the maintenance vehicles required for maintenance of the fisheries habitat improvement along Camp Creek.
Mile 6.7 to 11.5	<p><b>Accessible Trout Fishing Areas.</b> A few fishing areas should be developed along this section, which parallels the existing fishing easements to Camp Creek, to accommodate anglers with mobility impairments. These areas will be identified and developed in cooperation with the Minnesota Trout Association, DNR and the city of Preston.</p> <p><b>Demonstration Stream Habitat Projects and Interpretation.</b> There is potential for the development of demonstration stream habitat projects where the trail comes close to Camp Creek. Accompanying interpretation would provide trail users an understanding of the goals of this program, as well as of the fish and stream ecology in Camp Creek and the Root River.</p>
Mile 8.1	<b>Bridge.</b> A bridge over Camp Creek is needed.
Mile 8.5	<b>Accessible Parking for Anglers With Mobility Impairments.</b> A small off road parking area should be sited where trail user's view of the intersecting road will not be obstructed. This site will facilitate access by anglers with mobility impairments.
Mile 8.8	<b>Bridge.</b>
Mile 9.1	<b>Bridge.</b>
Mile 9.3	<b>Bridge.</b>
Mile 9.5	<b>Bridge.</b>
	A shelter should be included at two of the five sites above. A small area where trail users can pull off the trail which includes a picnic table, benches, or interpretive signs could be included at the bridges. Designs should ensure that minimal impact to the shoreline and stream results.







Segment 3	COUNTY ROAD #16 TO HARMONY
County Road #16	<b>County Road #16 Rest Area.</b> Nearly a mile to the west of Hutton, the site is at the intersection of the trail and the road. Facilities to be included are picnic tables and rest rooms. Water would be desirable, if feasible. The site should be designed so as to minimize visual intrusion as well as other impacts to the trail's neighbors. The site should be landscaped to help achieve this objective.
Mile 11.5 to 12.5	<b>Development Issue.</b> Beginning at about mile 11.0 the trail leaves the rail grade and follows the east side of the township road. Near mile 11.5, the trail leaves the road right-of-way and rises to an elevation of 1250 feet at mile 13.0. This is a rise of about 200 feet in 1.5 miles. Minimizing the slope for trail users and minimizing the impact on the resources are site issues to address.
Mile 11.5 to 12.5	<b>Vegetation Management.</b> Revegetation of this slope following construction will need to be carefully planned to minimize erosion and restore the site.
Mile 12.6	<b>Interpretive Sign.</b> An interpretive sign explaining the soil and water conservation practices is recommended.
Mile 12.5 - 18	<b>Shelterbelt Plantings.</b> Shelterbelts of native vegetation should be planted along sections of this segment of the trail. They can provide an additional wildlife habitat corridor in the agricultural landscape, help to retain snow cover on the trail, provide shade and visual interest for trail users, and define the trail corridor. These strips of permanent vegetative cover can slow wind speeds and filter runoff, reducing erosion. In designing the shelterbelts, consideration should be given to the height and location of vegetation to minimize negative impacts, such as shading, on adjacent croplands. Species of trees, shrubs, grasses and wildflowers native to the Blufflands regions which are valuable for wildlife can also add appeal for trail users.
Mile 13.6	<b>Lone Oak Rest Area.</b> A pull-off with a bench is recommended for this site. At elevation 1270 there is an excellent view to the west. A sign interpreting the Blufflands landscape is also recommended.
Mile 13.8	<b>Rest Area.</b> A small rest area with a pull-off and picnic tables is proposed for this site in an oak woodlot.
Mile 15.0	<b>Interpretive Sign.</b> An interpretive sign explaining the nearby sinkholes is recommended for this site near the adjacent township road.
Mile 15.8	<b>Rest Area.</b> A small rest area with a pull-off and a picnic table is proposed for this wooded site.
Mile 16.5	<b>Road Crossing (CSAH 22)</b> Alternatives for the crossing should be explored during the engineering design phase, including an overpass or underpass, marking the roads, and signing.
Mile 17.8	<b>Potential Future City Campground.</b> Development of a camping area is being considered by the City of Harmony at this wooded site near the northwest corner of the city.
Mile 18.0	<b>Harmony trail access/parking lot and rest area.</b> The DNR will work cooperatively with the city to develop a parking lot, landscaping, an information board, and rest rooms. The city has potential plans to expand their community center to include an interpretive center to be used by trail users, tourists, residents, and schools.

## Isinours

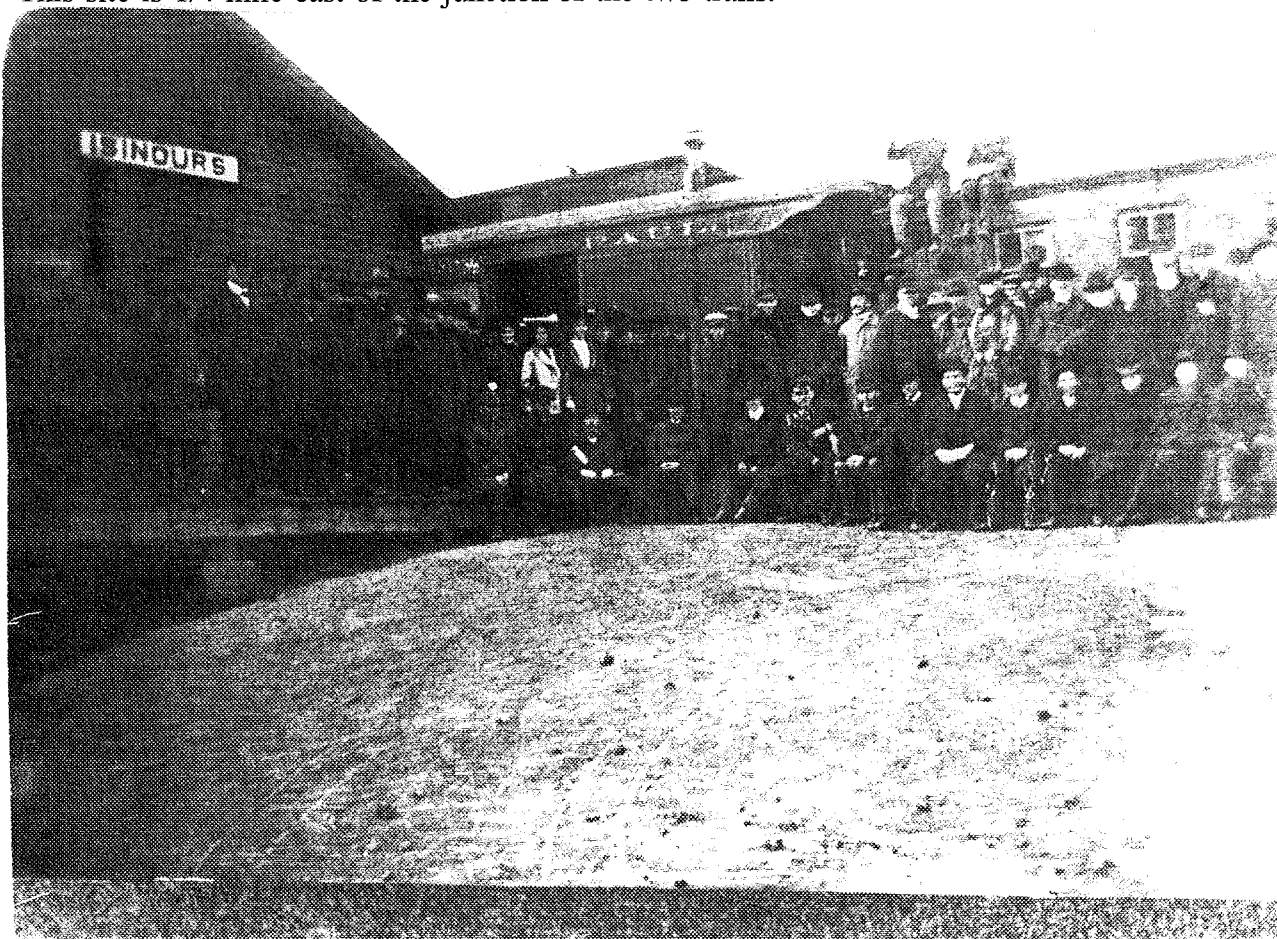
The Harmony-Preston Valley Trail will join the Root River State Trail one mile east of Isinours, about midway between Lanesboro and Fountain. This junction marks the northern terminus of the new trail. Isinours is nearly five miles north of Preston.

By 1870, the Southern Minnesota Railroad had been completed from the Mississippi to Fountain, bypassing Preston. Through the purchase of land from George Isenhour and the formation of a freighting association, the people of Preston obtained permission from the railroad to build a freight house and station at this newly acquired site. The cost of constructing, operating, and maintaining the building was completely borne by the residents of Preston.

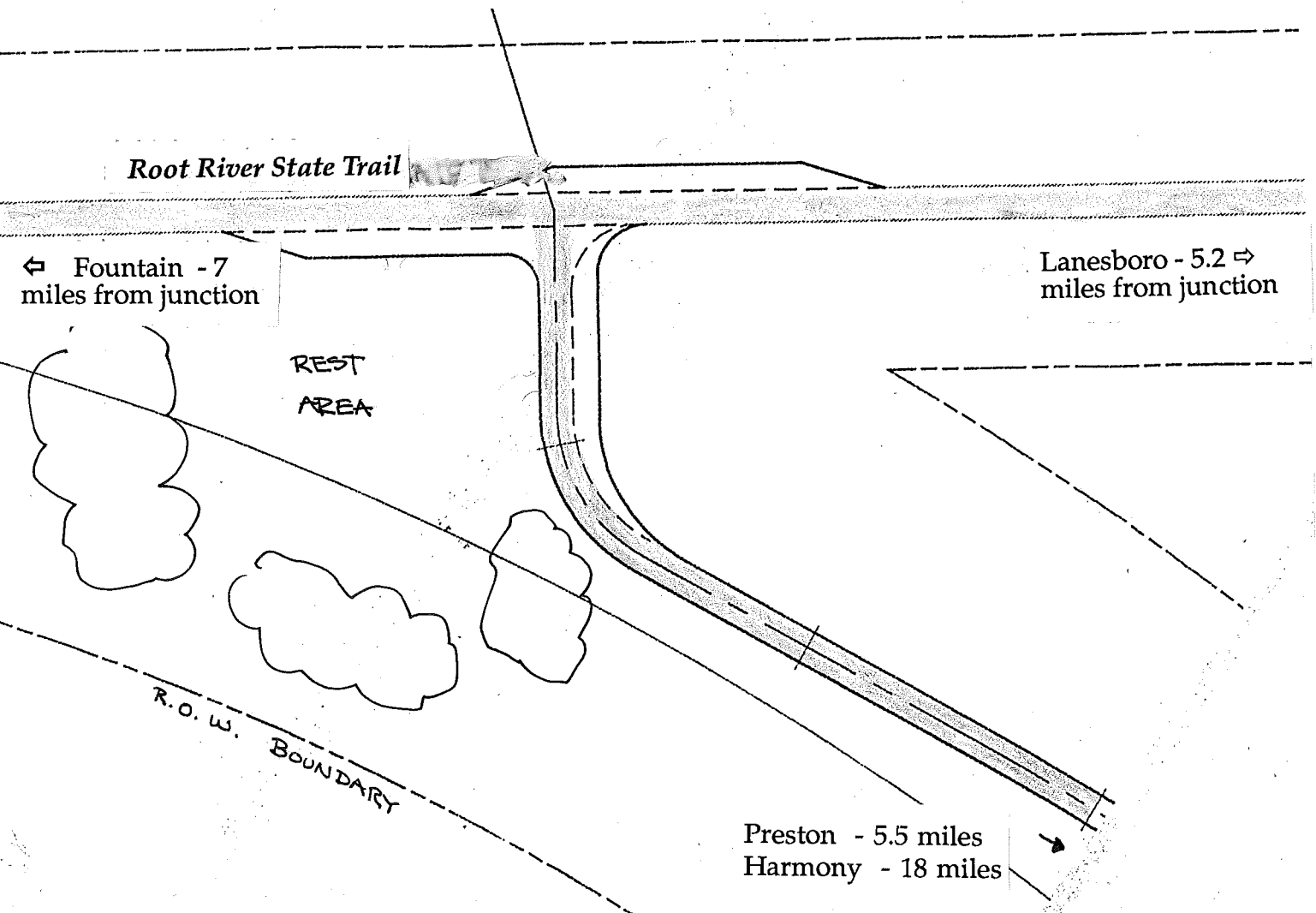
Once the depot was completed and operational, stage and freight lines connected Preston to Isinours, and the railroad connected both locations to the outside world. By this time, although named for the site's original owner, the spelling had been changed to its present form.

Originally, passenger trains only stopped when flagged down. With the establishment of a post office at Isinours in 1871, however, trains made scheduled stops to pick up and deliver mail.

Although Isinours never grew as a community, it had a prominent role in shipping. By 1877, all of the flour from the mills located in the towns of Clear Grit and Preston was shipped from Isinours. About 80 percent of the flour came from the Clear Grit mill, one of the largest in Southern Minnesota. Abandoned over 100 years ago, Clear Grit was located on the South Branch of the Root River, just below the hilltop site of the historic Allis Barn (Old Barn Resort). This site is 1/4 mile east of the junction of the two trails.



Isinours Map this page



### Isinours Junction - Concept Plan

Widen existing Root River State Trail at junction

Provide Rest Area

- Information and Map Kiosk
- Picnic Tables/Benches
- Plantings
- Bike racks
- Small shelter

Install advance directional and mileage signs,  
and reassurance signs on all trails



## **Preston**

Settled originally in 1853, Preston was actually platted two years later when it was named by its founder, mill owner John Kaercher. The name was chosen to honor Kaercher's millwright Luther Preston. Soon after, when a post office was established, Luther Preston became the community's first postmaster.

Located on the South Branch of the Root River, the city's early history was closely tied into its development as a center for flour milling and the struggle to gain railroad access to the markets of the day. After establishing the depot at Isinours, a narrow gauge railroad (the Caledonia, Mississippi and Western) reached Preston in 1879. However, it was not until 1903 that a standard gauge railroad connected Preston to Isinours. By this time, railroads in the area belonged to the Chicago, Milwaukee, and St. Paul Railway. After much effort by the citizens of Preston, the railroad agreed to construct a line from Preston to Isinours if the community would provide the right-of-way, free of charge, to the railroad company. This accomplished, the first train traveled over the new link on November 23, 1903.

The first county seat of Fillmore County was in Chatfield; a short time later it was moved to Carimona; and finally, in 1856, it was permanently placed in Preston—a fitting location, since the city lies in a picturesque river valley at the county's geographical center. On June 10, 1856, the first term territorial court was held by Judge Welch. By the fall of 1859, the Fillmore County Commissioners voted to build a courthouse for a cost of less than \$6,000. Preston was incorporated as a village on March 4, 1871.

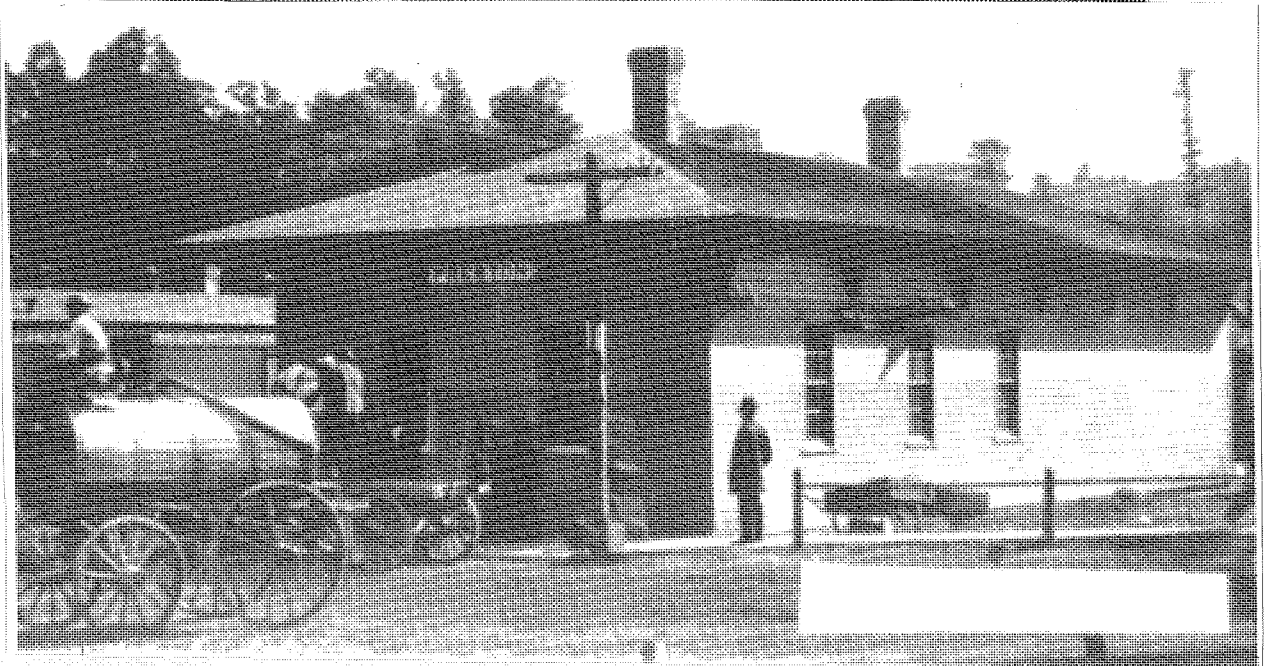
The closing years of the nineteenth century saw Preston as a growing, diversified community. Its role as a milling and agricultural service center was being augmented by many other businesses and service functions. The Preston Foundry was one of several growing industries. Besides a variety of stores and shops, the village boasted two hotels—the Park Hotel and the Tibbetts House.

Today, with a 1990 population of 1,530, the City of Preston ranks as Fillmore County's third largest community. While the original courthouse has been replaced, there is a distinctive courthouse square within the center of the downtown district. Restaurants, stores and shops around the square offer most of the goods and services needed by residents and visitors alike. Additional businesses, including a hilltop supper club overlooking the city and the valley, are along Highway 52, to the north of downtown. Overnight accommodations include a motel and two bed and breakfasts. One of these B & B's, the former county jail, has been remodeled into a 12 room historic inn and listed on the National Register of Historic Places. The trail passes the former brewery, a privately owned limestone building listed on the Minnesota Register of Historic Buildings. A public swimming pool, parks, tennis courts, and a golf course are additional recreational resources available to visitors. Trout fishing is as close as the river flowing through the city. Forestville and Mystery Cave State Park are six miles west of the city.

The Preston trail head is about two blocks to the east of downtown, on the north side of Fillmore Street. Initial plans call for a large parking lot, restrooms, bike racks, trail access for disabled users, and landscaping. The DNR will assist the community in the provision of these initial plan

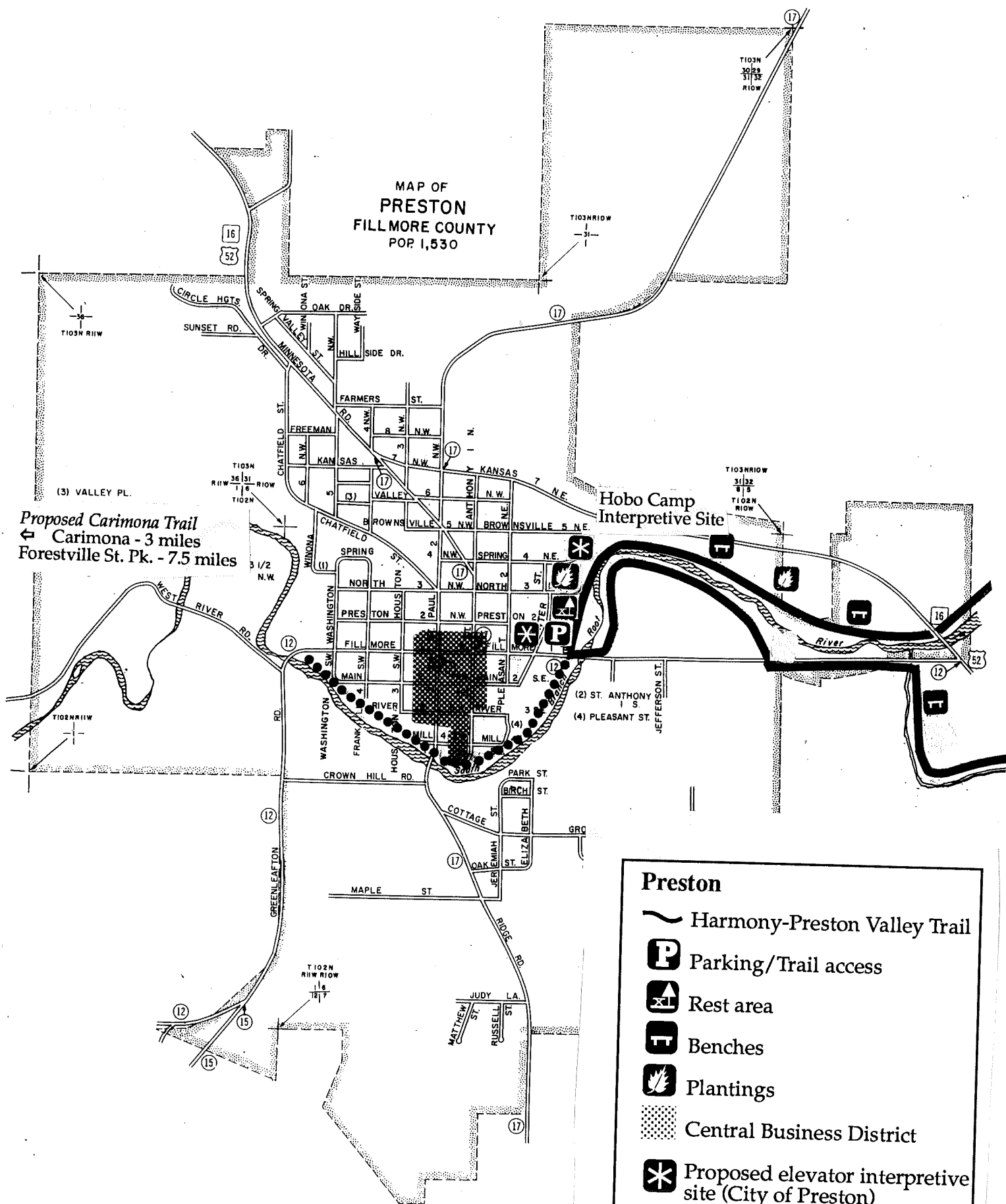
features. Expanded facilities—such as an interpretive center, and additional landscaping—are currently being planned by the city. The city has acquired the elevator at this site, and plans to provide historical interpretation. This will be an asset to the trail. An additional opportunity for historic interpretation is the site of the former hobo camp.

Preston has received an ISTE grant to stabilize the elevator and acquire and develop the proposed Trout Run Trail within the city limits.



*Historic photos, such as these of the former Preston depot, and flooding on the Root River (in 1865), can help trail users visualize the history of the area. Photo courtesy Minnesota Historical Society and Fillmore County Historical Society.*

# MAP OF PRESTON FILLMORE COUNTY POP 1,530



Proposed Carimona Trail  
 ← Carimona - 3 miles  
 Forestville St. Pk. - 7.5 miles

## Preston

- Harmony-Preston Valley Trail
- Parking/Trail access
- Rest area
- Benches
- Plantings
- Central Business District
- Proposed elevator interpretive site (City of Preston)
- Proposed City of Preston Trout Run Trail

Scale: 1" equals 1/4 mile

North ↑



*Angling has long been a popular sport in this area, as this post card from the early 1900s shows. Photo courtesy the Minnesota Historical Society.*

## Harmony

The township of Harmony was originally settled by Europeans in the fall of 1852. The present city was incorporated in January of 1896. The route of the recently completed railroad influenced the location.

Local legend states that at a meeting to select a name, each group of settlers wanted the fledgling town to be named after its leader and there was much loud bickering. An exasperated chairman finally banged down his gavel and shouted, "Let's have HARMONY here!"

Well-preserved buildings in the downtown core date from the late nineteenth century and provide a pleasant historical atmosphere to the area. Ornamental lighting has been added in recent years to complement the historic character of the buildings. Other historic sites are found near the present city. One notable example is the restored Lenora stone church. Built in 1856 by the Reverend John Dyer, a Methodist circuit riding preacher, the church is believed to be the first church in Fillmore County. Located a few miles to the east of Harmony, the church is near the intersection of County Highways 23 and 24. It is listed on the National Register of Historic Places.

Although still important as an agricultural service center, Harmony's economy is more diversified today than it was in the past. The Harmony Community Hospital is the city's largest employer, followed by Harmony Enterprises, a manufacturer of recycling balers. In recent years, tourism has grown into a major area industry.

With a 1990 population of 1,081, the city contains a wide variety of retail businesses and service establishments. Visitors can choose from several downtown restaurants or browse through antique and specialty shops. Overnight accommodations include a motel and bed and breakfasts. Farm vacations in the nearby are growing in popularity. Campers are welcome at Harmony's municipal campground. South Park and the municipal golf course provide additional outdoor recreation. The city also serves as the entry way to Niagara Cave, located a few miles to the south.

Harmony is closely associated with Minnesota's largest Amish farm colony. About 100 Amish farm families live in the countryside around Harmony. Descendants of a strict sect of early Mennonites, the Amish live a traditional farm life without modern conveniences or luxuries.

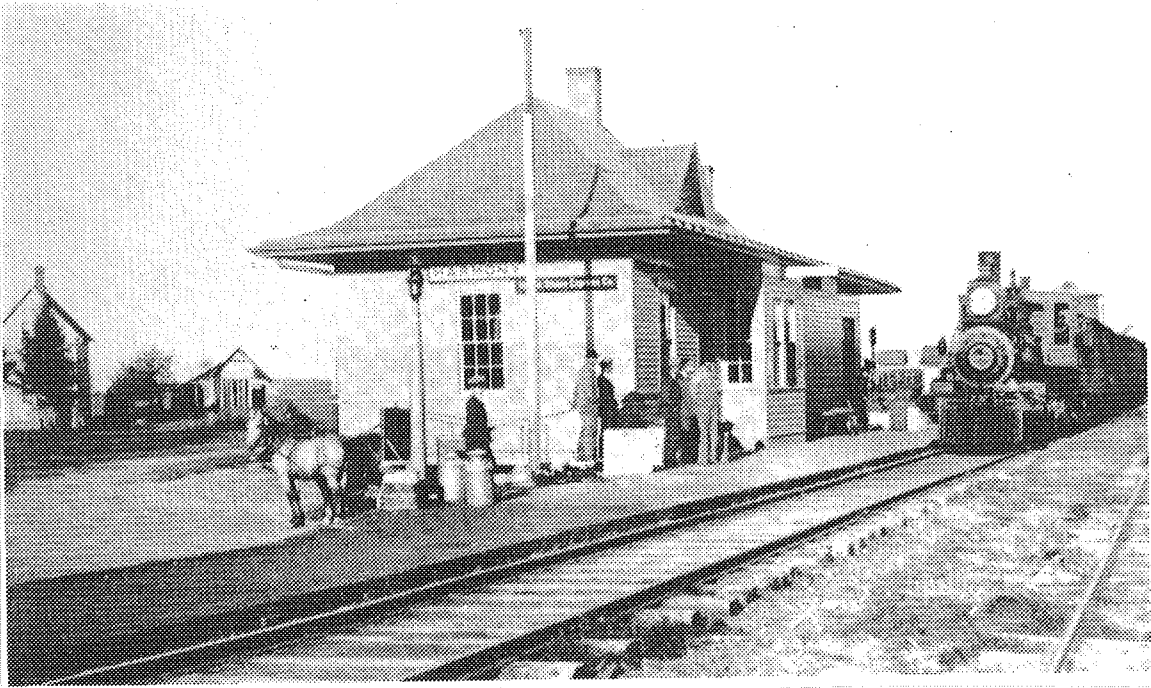
Touring Amish farms has grown in popularity in recent years and guided tours are available through two local companies. Touring affords the visitor a chance to purchase baskets, handmade furniture, and other high quality hand-crafted products.

Harmony lies at the southern end of the Harmony-Preston Valley Trail. Its trail head is in the city's northwest corner, less than a block from the downtown core. Appropriately, the trail head area includes the city's depot and two other restored buildings used for selling gifts, snacks and antiques. The DNR will work with Harmony to provide a parking lot, rest room facilities, bike racks and landscaping near the trail head. The city plans to develop the trail head area as a green space focal point in the community to serve trail users, tourists, and residents. Plans include an



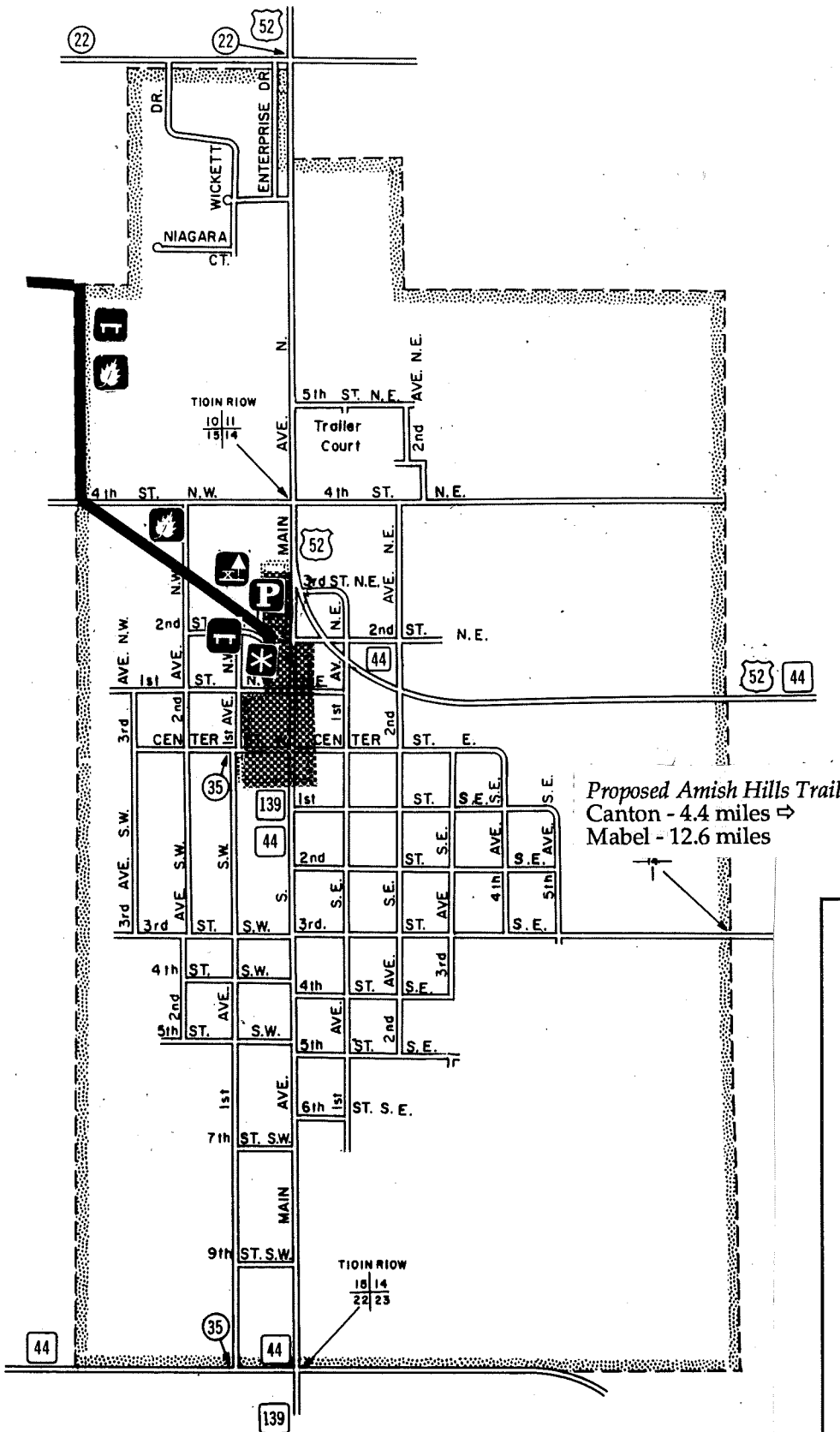
addition to the community center to serve as an interpretive center focusing on the Amish culture, the area's unique geology, and local history. This would be an asset to trail users.

Future opportunities for trail connections include the Amish Hills Trail connecting Harmony to Mabel and Canton; Niagara Cave; and the trails in Iowa.








*Many of the ornate storefronts from the 1900s are well-preserved in downtown Harmony. Photos courtesy the Minnesota Historical Society.*

MAP OF  
HARMONY  
FILLMORE COUNTY  
POP. 1,081



### Harmony

-  Harmony-Preston Valley Trail
-  Parking/Trail access
-  Proposed plantings
-  Benches
-  Rest area/picnic tables
-  Central Business District
-  Proposed Interpretive Center (City of Harmony)

Scale: 1 inch equals 1000 feet North 

## Natural Resource Considerations: Guidelines for Development and Management

The following guidelines and recommendations were developed based on an analysis of the resource inventory (see pages 39 - 98), input from DNR resource managers and input received at public workshops during the planning process.

### Vegetation Management Recommendations

1. A more detailed inventory of the plant communities within the right-of-way should be conducted.
2. Minimize disturbance to soils and native plant communities during construction. Protection of natural communities is a key component of efforts to protect Minnesota's natural biodiversity. Protection of natural biodiversity is important because natural systems are responsible for sustaining ecological processes such as purification of the air and water, balance of predators and prey, cycling of nutrients and generation and maintenance of soils. In addition, these communities have value as habitat for ground nesting birds and as browsing locations for deer.
3. Native plant species, consistent with the native plant communities of the Blufflands region should be used to vegetate areas disturbed by erosion, overuse, and construction, in the shelterbelt plantings and in the landscaping of parking areas and waysides.
4. Avoid planting and try to eradicate any of the plants listed below with specific attention to those that have an asterisk (\*); all of these plants are aggressive introduced species which will crowd out native species.

### Aggressive Introduced Species (exotics)

*Carduus nutans*\* (Musk Thistle)  
*Centaurea maculosa*\* (Spotted Knapweed)  
*Cirsium arvense*\* (Canada Thistle)  
*Cirsium vulgare*\* (Bull Thistle)  
*Euphorbia esula*\* (Leafy Spurge)  
*Lythrum salicaria*\* (Purple Loosestrife)  
*Rhamnus cathartica*\* (Common Buckthorn)  
*Robinia pseudoacacia*\* (Black Locust)  
*Sonchus arvensis*\* (Sow Thistle)  
*Acer ginnala* (Amur Maple)  
*Acer platanoides* (Norway Maple)  
*Berberis thunbergii* (Japanese Barberry)  
*Bromus inermis* (Smooth Brome)  
*Cannabis sativa* (Hemp or Marijuana)  
*Chrysanthemum leucanthemum* (Ox-eye Daisy)  
*Cichorium intybus* (Chicory)  
*Convolvulus arvensis* (Field Bindweed)  
*Coronilla varia*\* (Crownvetch)  
*Daucus carota* (Queen Anne's Lace)

*Elaeagnus angustifolia* (Russian Olive)  
*Elaeagnus umbellata* (Autumn Olive)  
*Glechoma hederacea* (Creeping Charlie)  
*Hieracium aurantiacum* (Orange Hawkweed)  
*Lonicera tatarica* (Tartarian Honeysuckle)  
*Lotus corniculatus*\* (Birdsfoot Trefoil)  
*Melilotus alba* (White Sweet Clover)  
*Melilotus officinalis* (Yellow Sweet Clover)  
*Morus alba* (Mulberry)  
*Phalaris arundinacea* (Reed Canary Grass)  
*Plantago major* (Common Plantain)  
*Poa compressa* (Canada Bluegrass)  
*Poa pratensis* (Kentucky Bluegrass)  
*Rose multiflora* (Multiflora Rose)  
*Tanacetum vulgare* (Common Tansy)  
*Taraxacum officinale* (Dandelion)  
*Ulmus pumila* (Siberian Elm)  
*Verbascum thapsus* (Common Mullein)  
*Vinca minor* (Common Periwinkle)



5. Plants should be used to screen unsightly areas, to deter encroachment by adjoining landowners, to deter trespassing by trail users, and to assist in retaining snow cover along the trail treadway.
6. Restore, or if necessary, recreate native grassland, woodland, or wetland communities along the trail to minimize maintenance, to minimize the use of pesticides, to control noxious weeds, and to enhance natural species abundance and biodiversity for enhanced user experience.
7. Develop a vegetation management plan in order to apply the above listed criteria to the Harmony-Preston Valley Trail.

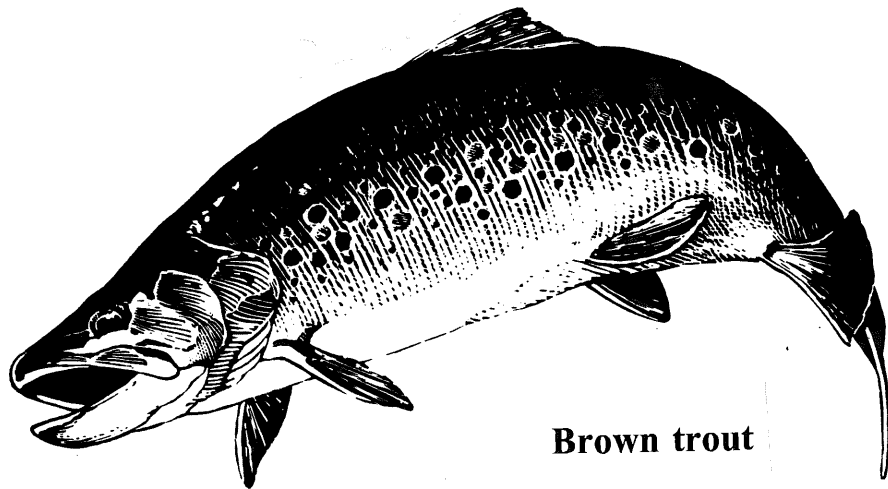
#### Water Resources

1. Minimize trail development and maintenance impacts to water resources through the use of mulching, geo-textiles, silt screens, and seeding to establish vegetation.
2. Vegetation between the trail and shoreland should be maintained to serve as filter strips or buffer zones to control runoff. Vegetation will slow surface runoff and trap excess nutrients that might otherwise runoff into adjacent water resources.
3. Appropriate erosion control measures should be taken to minimize potential impacts to adjacent water resources.
4. A wetland mitigation plan will be prepared to address the identified, impacted wetlands.

#### Fish and Wildlife

1. Trail construction at water crossings should be timed so that it does not coincide with spawning or migration of fish species. Silt plumes that may result can negatively affect fish and habitat.
2. Wildlife habitat will be enhanced through vegetative management and through such projects as installation of bluebird houses at appropriate locations.
3. The presence of endangered species were noted in the area of the trail. No adverse impacts are anticipated by trail development and use. Trails and Waterways will work with DNR Natural Heritage Program to resolve any issues that may occur over time. Interpretation of these species will create an awareness, appreciation and understanding of their importance.

# Trail Management Recommendations



**Brown trout**

## **Information and Education**

### Identification of Services

Trail users benefit from knowing where they can obtain services (medical assistance, telephones, gasoline, food, lodging, rest rooms, campgrounds, repair facilities, other retail) and local businesses benefit from an increase in customers.

A listing of the services available in each community developed and maintained by the community could be developed and displayed on information boards in each community. Currently, state trail rules and regulations prohibit commercial advertisements and concessions in the right-of-way.

### Trail User Orientation

Trail users must have good information about the trail system so they can make choices about destinations appropriate for their schedule, skill level, need for services such as food and lodging, and the type of scenery and other recreational opportunities available along the route. This type of information should be displayed on information boards at parking areas, in communities, and trail junctions (such as Isinours) and include distances between communities, options for other trail connections, and locations of services.

Points of orientation should be located along the trail so the trail users can locate themselves and also so that emergency vehicles could find a particular point along the trail. Mile markers, maps and signing road crossings and water crossings are examples of helpful tools that could be installed.

### Trail Rules and Regulations Education

The Visitor Services program has developed trail courtesy and safety display boards aimed at educating trail users about appropriate behavior, promoting safe trail use, and protecting the quality of the trail environment. These user-friendly versions of the rules applying to state trails should be posted at information kiosks along the trail.

### Interpretation of Natural and Historical Resources

There are many natural resources of significance and interest along the trail. These include rivers, bluffs, wetlands, forests and prairie vegetation. In addition, there are many places that tell the history of this region. Providing information about these resources can add enjoyment to the trail experience. Interpretive signs will be developed in consultation with other DNR divisions, and the Minnesota Historical Society (MHS), especially near sensitive resources. An overview of the natural and cultural resources can be found on pages 39 - 98. Specific sites recommended for interpretation are identified in the development summary (*see pages 20 - 38*). Additional sites will also be interpreted over time.

An interpretive theme is identified for state trails during the planning process. The interpretive theme helps tie together spatially separated interpretive sites and provides a continuity in the messages. The recommended interpretive theme for the Harmony-Preston Valley State Trail should include railroad history, geology, the Blufflands landscape and

Amish culture. Interpretive messages should be linked whenever possible.

Interpretive resources should be identified and interpretive themes established for each major trail segment. The communities along the trail system have expressed interest in interpreting historical and natural resources in their area. Both Preston and Harmony are planning interpretive buildings at their respective trail heads. The communities could focus on interpreting the unique natural, cultural, and historical resources of their area.

#### Environmental Education

The trail has great potential for environmental education. Additional discussions with teachers, naturalists, nearby environmental education facilities, and other environmental educators are needed to identify potentials and develop programs appropriate to specific grade levels and areas of study.

#### **Enforcement**

Effective enforcement plays a very important role in successful management of the trail. It is important in creating and maintaining a safe trail environment and good working relationships with the trail's neighbors.

Additional efforts by the Division of Enforcement are needed to enforce trail rules and regulations on the trail as well as dealing with enforcement issues more proactively through education. Education efforts working with groups such as trail user groups, school groups, and civic groups.

The DNR Division of Enforcement has recommended that an additional conservation officer's time is required to provide effective enforcement on the Harmony-Preston Valley Trail. This additional level of effort would also benefit the existing Root River State Trail and other segments of the emerging Blufflands Trail System.

Other actions that contribute to compliance with trail rules and regulations and appropriate trail behaviors are the development of interpretive signs along the trail, the presence of DNR staff working on the trail and volunteer efforts such as the bike patrol that currently exist on the Root River State Trail.

#### **Trail Maintenance & Operations**

This 18 mile trail will add to the maintenance responsibilities that already exist, requiring more equipment, labor time, personnel and facilities. Some maintenance needs could be met by forming partnerships with the communities.

An additional labor position is recommended for maintenance on the Harmony-Preston Valley Trail. This recommendation was determined by analyzing the time and tasks required for maintenance of the existing Root River State Trail and projecting the need for the Harmony-Preston Valley Trail.

# Resource Inventory



Opossum

## **Climate: A Regional Overview**

Southeastern Minnesota is subject to the state's strong continental weather patterns, which are influenced by cold Arctic air masses in winter and hot Gulf of Mexico air masses in summer. Typically, January is the coldest month of the year and July is the warmest.

Due to its location several hundred miles farther south, winter temperatures average 10+ degrees warmer than the northern one-third of Minnesota. By contrast, summer temperatures vary by only a very few degrees, when the North Shore of Lake Superior is excluded from the state's northern region.

Although there are local variations, mean annual precipitation ranges between 30 and 32 inches in this southeastern corner of the state and gradually decreases to 19 inches in the extreme northwestern portion of Minnesota. On an annual average the southeastern region receives the most precipitation of any region in Minnesota. Precipitation is distributed over the year with about 8 inches falling in the months of March-May, 12 inches in June-August, 7 inches in September-November, and 3 inches in December-February.

Seasonal snowfall averages about 42 inches through most of the region. Snow cover of an inch or more occurs on an average of about 90-100 days annually. By contrast, snowfall of 60+ inches and snow cover for 140 days is common in the extreme northeastern part of the state.

The freeze-free growing season in the region generally starts about the second week of May and ends about the first week of October. The eastern portion of the region, especially near the Mississippi River, has a growing season of 160 days or more. Slightly shorter seasons are found farther west in Fillmore County. The regional growing season is one of the longest in Minnesota.

The generally shorter snow season in southeastern Minnesota limits the recreational use of trails for snowmobiling and cross-country skiing. For example, it takes at least a six-inch snowfall before trail grooming can begin. However, the earlier spring warm up and the generally longer season of mild weather creates more opportunity for hiking, biking, and related summer activities. Also, as described in the Wildlife and Vegetation sections, the area's climate is partly responsible for the wide variety of species found here. A number of species are at the periphery of their natural range in the southeastern corner of the state.

Wind data collected are part of the hourly wind speed observations taken at National Weather Service and Federal Aviation Agency stations. Data for southeastern Minnesota were recorded at the Rochester Municipal Airport. Prevailing wind patterns at this location are southerly from April through October, without a clearly evident full-month transition period. During the winter months the prevailing wind is from the northwest. The annual mean wind speed at the station is 12.9 miles per hour, ranging from a mean of 14.7 miles per hour for January and April to 10.8 miles per hour for July and August.

### Microclimates

The following table shows regional similarities and variations by microclimate among seven Blufflands trail communities. Localized conditions—such as topography, wind intensity, presence of water bodies, and sheltering valleys or exposure to the full force of the elements—play a significant part in moderating the immediate climate.

<b>Community</b>	<b>Days over 90°</b>	<b>Average snowfall, in inches</b>	<b>Yearly precipitation, in inches</b>	<b>January Minimum/Maximum Temps.</b>	<b>July Minimum/Maximum Temps.</b>	<b>Days between killing frosts</b>
La Crescent	16	42"	31"	9°/27°	65°/87°	160
Caledonia	20	41"	33"	11°/28°	65°/85°	219
Houston	14	42"	30"	9°/27°	65°/87°	154
Spring Grove	20	41"	29"	9°/27°	65°/87°	180
Rushford	14	42"	30"	9°/27°	65°/87°	154
<b>Preston</b>	<b>14</b>	<b>45"</b>	<b>32"</b>	<b>4°/20°</b>	<b>60°/80°</b>	<b>150</b>
<b>Harmony</b>	<b>10</b>	<b>45"</b>	<b>35"</b>	<b>0°/24°</b>	<b>65°/85°</b>	<b>150</b>

*Source: Community Profiles, Minnesota Department of Trade and Economic Development, 1992 and 1993.*

## **Geology and Land Forms: A Regional Overview**

The Blufflands trail system is located within the "Paleozoic Plateau" of southeastern Minnesota. In contrast to most of the land in Minnesota, this region was glaciated so long ago that little or no evidence of glaciation remains. Unlike most of the landscape in Minnesota and the Midwest as a whole, the regional landscape found here is very old and highly dissected. Steep hills, bluffs, and deep river valleys are the dominant features.

Total relief is approximately 650 feet. Level land occurs at an elevation of about 1300 feet and below 800 feet. The land is steep and rocky between these two extremes. Exposed rock is abundant and visibly divided into varying strata, which erode at different rates and occupy different levels in the landscape.

Precambrian bedrock, or the archaic igneous and metamorphic rock at the earth's crust, is several hundred feet to perhaps 1,500 feet below the land surface. Soils, some of which are thin layers of wind blown loess, range up to a thickness of 20 feet and may cover older glacial till. Between the overlay of soil and the Precambrian bedrock lie hundreds of feet of Paleozoic rock. Paleozoic rock is sedimentary rock - limestone, shale, dolomite, and sandstone - that was originally deposited by the advance and retreat of shallow inland seas. These rock layers range in age from 350 to 600 million years old. Paleozoic means "ancient life", which is reflected in the fact that abundant fossils of early sea life will be found in certain layers of limestone, such as the Galena, Maquoketa, and Platteville formations.

The oldest rock formations are exposed in the extreme eastern part of the region, near the Mississippi River. The reason for this phenomenon is that the ancient underlying bedrock (Precambrian) dips to the southwest at an average rate of 15 feet per mile. Although this bedrock dips in a westerly direction, the earth's surface actually rises due to the presence of younger, less eroded deposits over the older rock strata when moving west.

After the final retreat of the Paleozoic seas, some 300 million years ago, the regional landscape was subjected to great change through the action of wind, ice, and moving water. The Pleistocene Ice Age began about two million years ago and ended about 10,000 years ago. There were several different episodes of glaciation and interglacial periods. While much of the Paleozoic Plateau escaped the last period of glaciation (Wisconsin Ice Stage), which lasted until about 13,000 years ago, the area may have been subjected to glacial activity more than 500,000 years ago. This is thought to be about the time the Mississippi River was formed.

The process of down cutting of streams, which probably occurred during mostly the last 160,000 years, was aided by the enormous quantities of glacial meltwaters from the north and west. Ancient drainageways were enlarged and new ones were carved out of the rock layers. The deep Root River valley, along with other major stream valleys in the area, is a product of this sculpting action by glacial waters. Glacial meltwaters eroded the more resistant rock strata, dolomite and limestone, into narrow, steep sided channels and gorges. At elevations where the more easily eroded sandstone strata predominated, the resulting valleys became broad plains. This pattern of erosion, of course, continues today.



In addition, when a stream flows from a limestone or dolomite formation to sandstone, its gradient increases because of the more rapid erosion of the sandstone. The resulting rapids or waterfalls were often used by early settlers to power mills at these locations. Communities usually developed around these early mill sites.

The Root River valley has a "dendritic" or branchlike drainage pattern, which dissected the layers of rock over a very long period of time. With the diminishing of glacial meltwaters, the valley was filled with a fine alluvial material. Renewed down cutting of the Root and its tributaries left remnants of these higher valley floors. Called stream terraces, these remnants can be seen along much of the valley. Bordering stream terraces are most noticeable at the broad confluence of the Root and Looney valleys, just to the northeast of Houston. The city of Houston is built upon river terraces, and a sandy river terrace is evident on the north side of the Root, between Rushford and Peterson.

Of interest, especially in Houston County, are the butte-like mounds that project out of portions of the ancient floodplain of the Root and its tributaries. They are rock cores formed when archaic oxbow meanders of the streams were abandoned. Part of the former bluff (the rock core in the center of the meander) was isolated when the stream changed its path.

Houston County, showing virtually no evidence of glacial activity, includes the eastern portion of the Root River Valley. The Root flows into the Mississippi just to the east of Hokah. Houston County's portion of the Root River Valley is more than 500 feet deep. The upper formations consist of Shakopee and Oneota Dolomite over yellow Jordan Sandstone in this area. Under the Jordan strata, but usually covered by talus and colluvium (rock fragments and soil falling from the cliffs above), are older formations of St. Lawrence Limestone and Franconia Sandstone. The St. Lawrence formation has been extensively quarried in the eastern part of the county.

The predominant strata throughout most of the Root River Valley region are the Prairie du Chien formations of Shakopee and Oneota Dolomite and Jordan Sandstone. These formations are commonly seen as the Root River State Trail enters Fillmore County and twists and turns while traveling west within the confines of the narrow valley floor. In some locations steep cuts in the rock strata closely border the trail's treadway. At other trail sections, stream terraces and broader farm fields may be viewed. The topography is varied and interesting throughout. Some vistas are truly spectacular.

The hills west of Rushford reveal a range of rock formations from the upper Oneota Dolomite to Franconia Sandstone at the lowest level. Jordan Sandstone and St. Lawrence Limestone are found in the middle layers. Between Rushford and Whalan, the trail user will see Franconia Sandstone exposed on the bluffs. St. Lawrence Limestone has been quarried at Whalan and nearby Lanesboro. The trail cuts through Oneota Dolomite at Lanesboro, however, the visitor will be able to view Jordan Sandstone at the level of the river. The higher escarpments near Lanesboro consist of Shakopee Dolomite covered by a variable layer of St. Peter Sandstone. Platteville Limestone, although not well exposed, overlies the sandstone. West of Lanesboro, a variable layer of New Richmond Sandstone is sometimes found within the Shakopee layer.

Moving west from Lanesboro toward Fountain, the traveler encounters a changing landscape. Considered as a transition zone between the river bottom to the east and the upland area to the west, there is a noticeable rise in elevation and the topography tends to flatten out. Here and there, relatively small circles of trees will be seen among the corn and soybean fields. This is especially noticeable to the west of Fountain. These circles are actually the outer boundaries of steep sided, rocky holed that were formed by dissolving limestone.

Called a karst landscape, these holes or "sinks" in the ground are common in the western half of Fillmore County and other areas of southeastern Minnesota. The sinks range in diameter from 30 to 150 feet and may be 30 feet deep. They form in areas of at least moderate rainfall, and where Galena Limestone (one of the "younger" rock formations) is near the land's surface.

As rain falls, it absorbs atmospheric carbon dioxide and becomes slightly acidic. Seeping into the ground, the rain water picks up additional carbon dioxide and becomes a weak form of carboic acid. Eventually, the underlying the limestone dissolves leaving the sinks and caverns. The Galena Limestone in this area has been subject to this process for as long as 100 million years.

The Harmony-Preston Valley Trail passes near several sinks north of Harmony. Interpretation of these sites is proposed. Other locations such as cuts through rock formations and stream terraces could also be interpreted.

The Harmony-Preston Valley Trail will join the Root River State Trail at Isinours, between Fountain and Lanesboro. Moving southward, this trail passes through a series of scenic river valleys and along a ridge to link the cities of Preston and Harmony. At Preston, opposite the site of the old mill, Jordan Sandstone and Oneota Dolomite are exposed. The water power for the mill was derived from the drop from the Oneota to the Jordan formation. Within the vicinity of Harmony, the hills are capped with loess, or wind deposited silt.

Covered only by a thin mantle of soil, a 10 mile wide belt of Galena Limestone extends from Chatfield to Harmony. Ground water has dissolved some of this limestone and created the numerous sinks and caverns mentioned earlier. Of major significance are Mystery Cave, located west of Preston in Forestville and Mystery Cave State Park, and Niagara Cave near Harmony.

## Soils

Soils along the trail route reflect the mosaic of influences of geological history, topography, vegetation, and previous uses of the site. Soil types within the trail right-of-way have implications for the development and management of the trail. The variety of soil types will require variation in construction and erosion control methods, and selection of appropriate species for revegetation. In addition, hydric soil types are one of the three factors used to delineate wetland areas that may be impacted by the trail and require avoidance, minimization of impact, or mitigation efforts.

Soils within Fillmore County formed primarily in the deposits laid down by wind, water and ice during the Pleistocene glacial period, over the sedimentary bedrock described in the preceding section. Loess, or wind-blown soil, covers much of the county, ranging in thicknesses from a few inches to as deep as twenty feet.

Most of the northern 11 miles of trail will be constructed on a former rail grade, so the soil types underlying the trail treadway have been radically altered by cutting or filling to achieve the elevations needed by the railroad. Since the railroad was constructed along the "path of least resistance" paralleling Root River and Camp Creek, the soil types beside the rail bed are mainly alluvial soils typical of floodplain or river terraces. In these areas, the soil types next to the trail treadway will have an impact on the species most suited for revegetation in areas disturbed by construction, or revegetation of previously farmed areas included within the trail right-of-way. In sites where the trail deviates from the rail grade, these soil types will also be an important consideration for construction, wetland mitigation, and erosion control methods.

Starting from the north end of the trail at the junction with the Root River State Trail, the rail grade was built on Fayette soils, the most extensive soil type in the county. These silt loam soils developed under mixed hardwood forest in loess deposits, both on the ridgetop divides and on river terraces. Fayette soils are generally light colored, shallow, acid, low in organic matter and fertility, and subject to erosion on slopes.

The first deviation from the grade will be for approximately 1/8 mile, just north of the Watson Creek crossing, onto fairly well-drained, previously pastured/farmed alluvial soil, to reduce disturbance to a sensitive resource. Care will need to be taken in the design, construction, and maintenance phases to ensure the stability of the trail and prevent erosion of the surrounding right-of-way.

The trail crosses rivers ten times, as well as many intermittent, unnamed spring-fed trickles, and field drainage swales. Soil conservation techniques will be especially important at these crossings to minimize erosion of riverbank soils.

Between the first and second crossings of the Root River, the railroad was built on three soil types just above the flood plain. First are terraces of Chelsea and Boone loamy fine sands, which have low fertility and low moisture-holding capacity. These light-colored soils form in valley fills below St. Peter or Jordan sandstone outcrops, from the sandstone parent materials.

Wind erosion can be a problem on unprotected soils of this type. Renova silt and silt loam, a well-drained soil type of low fertility and organic matter formed under hardwood forests over limestone bedrock, also underlies the rail grade in this area. These soils are very susceptible to erosion on slopes. Thurston and Wykoff soil types, both well-drained to droughty upland sandy loam soils, developed from prairie vegetation over sand and gravel drift.

The second deviation from the rail grade will occur south of the second crossing of the Root River, between miles 1.5 - 2, onto alluvial and eroded Fayette silt loam terrace soils.

These same soils are found on either side of the rail grade when the trail rejoins the former rail grade, until the trail reaches the area where the railroad was perched between the riverbank and the steep rock outcrops, between miles 2.5-3.5. Soil development over these steep wooded slopes is minimal, and provides habitat for specific species adapted to this niche. Care will be needed to prevent erosion and trail run-off from impacting the river.

The rail grade continues to follow around the base of the rocky bluffs and wooded slopes as it winds to the south, but a wider alluvial terrace has been formed between these bluffs and the Root River to the east. After mile 3.8, the rail grade traverses areas of shallow, erodible Dubuque/Whalan silt loams, Fayette silt loams, and alluvial soils until mile 4.5 where the trail leaves the rail grade. The trail will be on alluvial soils parallel to the Root River as it crosses under US Highway 52 bridge. A wetland delineation inspection is needed for this stretch within the city of Preston as the trail follows both banks of the river on alluvial soils. After crossing County State Aid Highway (CSAH) 12, also known as Fillmore Street and the Camp Creek bridge, the trail leaves the rail grade and swings closer to Camp Creek on alluvial soil for approximately 1/4 mile. It rejoins the grade at mile 7.1, and again is sandwiched between rocky bluffs and a river. This section of the former rail grade between Preston and CSAH 16 was almost entirely built on mixed alluvial soil, except for a brief section where Camp Creek is more distant (between miles 7.5-8.0) where the grade was built on a slightly higher elevation of Chaseburg/Judson and Fayette silt loams.

The trail will leave the rail grade following the west bank of Camp Creek at mile 11.2, onto Dubuque silt loams, which are shallow and erodible. The trail will follow the gravel township road right-of-way for approximately a mile south, on alluvial soils. At mile 12 when the trail leaves the road right-of-way to ascend to the ridge, the trail will be built on Dubuque soils with an 18-45% cross slope. Erosion control during construction and in maintenance is a major consideration at this site.

Next the trail will traverse a small area of former pasture on Schapville soils (mile 12.2-.4). These soils formed from a thin mantle of loess over upland benches of calcareous shales. Since the shales are impervious to water which filters through the overlying layers of limestone, there may be seep spots and springs in this area. The approximately 6 mile long upland section of trail into Harmony is not on a rail grade. Instead, it follows fence lines, shelterbelts, township and county roads, and section lines across the high ridge that divides Camp Creek valley from the Partridge Creek valley. Soils on this ridgetop are almost entirely in the Fayette series, which developed under hardwood forests (primarily post, bur and white oak, as well as maple, elm and other hardwoods). Most of the land along the trail has been cleared and is planted to corn and small grains, with the exception of three small 5

to 20 acre woodlots. These loess soils overlay permeable limestone, so the ridge is pockmarked with sinkholes.

These sinkholes are a notable feature in the landscape. Since runoff into sinkholes directly enters the groundwater, it is important to filter sediments by establishing permanent native grass and shrub ground cover at the perimeter of the sinkholes. Pesticides should not be used in areas that drain into sinkholes. During construction, diversion dikes, silt fences, and/or mulching should be used to prevent sediments from running into sinkholes.

Sinkholes also present the possibility of being an attractive danger for some trail users who wish to explore them. Sink holes may fill with water following heavy rains, may have cavities or openings into the groundwater, and may have served previously as dump sites. Barriers of thorny shrubs, such as raspberries/wild roses could be planted thickly between the trail and sinkholes.

As the trail route dips across a small drainageway dissecting the ridge at mile 13.5, the soils are again of the Dubuque series, varying in type with the degree of slope.

The other exception to the Fayette soil types between mile 10 and Harmony are the Chaseburg/Judson soil types found along the upper reaches of the drainageways of this divide between mile 15 and 17. These very young soils have formed from higher-lying colluvium and alluvium that have washed down from the uplands. These topsoil materials have accumulated so recently, in the years since the land was cleared for farming, that the soils have no true native vegetation. These silt loams are fertile, with moderate moisture holding capacity.

These are the general soil types that will be found along the trail, but for specific site planning, particularly for choosing vegetation, more in-depth inspection will be helpful. Pockets of soil types too small to be separately mapped by the Fillmore County soil survey may exist along the trail right-of-way that could influence construction, maintenance and vegetation needs of these specific sites.

## **Water Resources**

The Blufflands trail region lies within the 1,670 square miles of the Root River watershed. Largest of the watersheds draining southeastern Minnesota into the Mississippi, the Root's headwaters originate in the spring-fed sloughs of eastern Mower and Olmsted counties. Headwaters streams flow in wide shallow valleys that cut through a thin mantle of glacial drift. They gradually deepen as these streams flow toward the east into the Blufflands. As this network of streams enters Fillmore County, the valleys are incised to a level of 100 to 300 feet below the upland surface. In eastern Fillmore County and Houston County, they become deep, sinuous gorges that deepen and widen toward the east. Gorges of the Root River at Lanesboro, Rushford, and Hokah are 400 to 550 feet deep and from a quarter of a mile to one mile wide. Tributary streams, entering from the north and south, flow through steep walled coulees into the main branches of the Root. The eastern boundary of the watershed is the wide Mississippi River Valley with a depth of about 600 feet.

The western part of the Root River watershed is drained by numerous tributaries and three main branches—aptly (if not imaginatively) named the North, Middle, and South branches. The approximate fall of all branches from their sources to Lanesboro is about 550 feet. Beginning at Lanesboro, drainage is primarily through the main river channel, its South Fork, and four tributaries. The fall from Lanesboro to the Mississippi is approximately 150 feet.

The well-defined dendritic drainage pattern throughout the Root River watershed has eliminated most of the undrained depressions. Runoff is rapid in the deeply incised stream beds and steep valley slopes. Consequently, many disastrous flash floods have been recorded since the time of European settlement. Until conservation practices were initiated in the 1930s, floods were the nemesis of area farmers and several communities. Although still an environmental problem, measures have been implemented to prevent flooding or reduce some of its adverse impacts through proper land use planning.

Since the Root River watershed is devoid of lakes, streams are sustained by springs from groundwater sources. Huge quantities of groundwater are stored in the layers of dolomite, limestone, and sandstone that underlie the entire watershed. After the peak flows in spring and early summer have receded, the depletion of water in this natural storage occurs very slowly and the stream flow gradually diminishes. Aquifers continue to supply accessible water throughout most of the watershed.

A small area of the Bluffland trail region—to the south and west of Harmony—is drained by the Upper Iowa River. This river drains about 70 square miles in parts of four Minnesota counties and meanders several times across the Minnesota-Iowa state line before finally turning south into Iowa near Granger.

### **South Branch of the Root River**

The South Branch of the Root River has its source in the drainage ditches and field tiles of eastern Mower County. After flowing 19 miles, it sinks beneath the stream bed in the vicinity of Mystery Cave No. 1, only to reappear after 4.5 miles of dry stream bed. This

stream rebirth is from more than a dozen springs, just to the west of Forestville State Park. Two other karst streams converge with the South Branch of the Root River within Forestville State Park, each sinking and reemerging at major springs. From this point, the South Branch flows for another 36.8 miles to its juncture with the North Branch of the Root River below Lanesboro.

The headwaters of the South Branch are about 1300 feet above sea level and located in a relatively level landscape of rich sandy loam soil. Most of the watershed is farmed right up to the stream bed. By the time the stream reaches the North Branch of the Root, it has dropped more than 300 feet and is within a greatly changed environment. From Forestville to Lanesboro, the South Branch cuts through Shakopee or Oneota Dolomite, Jordan Sandstone, and St. Lawrence Dolomite. Steep, heavily wooded slopes and high bluffs predominate; cliffs of 120 feet are common; and much of the remaining land is devoted to corn, other row crops, or pasturage. Nearly all of the land in the immediate watershed is in private ownership. Only five percent of the developed land is used for urban related purposes. The remaining 95 percent is used for agriculture.

The hydrology of the karst landscape provides a topic essential to the understanding of the Blufflands landscape region. Interpretive signage, such as the display developed for the sinkhole near Fountain, can play an important role in informing trail users about the region they are traversing.

## **Vegetation: A Regional Overview**

At the time of European settlement, the Blufflands trail region was at the interface of two major biomes in Minnesota: Eastern Deciduous Forest and Tall-Grass Prairie. Deciduous forests were prevalent on the steep-sided valleys and alluvial plain that comprise nearly three quarters of Houston County, and about 20% of Fillmore County in the valleys of the Root River and its tributaries. Upland prairie, with scattered groves of oak and brush, once dominated the rolling crests of the bluffs that are more characteristic of Fillmore County and southwest Houston County.

These two biomes were further divided into six major vegetation types found within the Paleozoic Plateau: Floodplain forests, Prairie wetlands, Maple-basswood forests, Oak woodland-brushland, Upland Prairies, and Primary Communities.

As might be expected after more than a century of development, these natural communities have been significantly altered. The original maple-basswood forest has been reduced to small areas at scattered locations. Most forested areas are on the steeper hillsides and along the banks of streams. Large areas of cropland and pastures have replaced most of the prairie and much of the oak woodland and brushland. Present forest cover is dominated by a variety of oaks and hickory.

The original distribution of these vegetation types was determined by a variety of environmental factors: climate, soil, and the patterns of landforms. Natural disturbances (such as fire, drought, windstorms, and outbreaks of insect infestations) also played a part. However, the frequency of fires appears to have had the greatest impact. Frequent fires on the tall-grass prairie maintained the species composition and kept it treeless. Dense forests of maple, basswood, and elm developed in areas protected by natural firebreaks created by rugged topography and rivers.

Floodplain forests. These forests characterize the valleys of the Mississippi, Root, and other local streams. These lowland sites are subject to periodic flooding and drought. Frequent spring flooding enriches the soil by depositing silt over the forest floor. Dominant trees include silver maple, American elm, green ash, black willow, and cottonwood. Sedges, woody climbers, poison ivy and stinging nettle are among the most common understory plants.

Prairie Wetlands. Large prairie wetlands were in the floodplains of all major waterways, especially in the alluvial fans or deltas created at the confluence with the Mississippi River. Smaller prairie wetlands were found along trout streams and other small tributaries in seepage areas and old oxbow sloughs. Prairie wetlands are also found in the upland swales of Southwest Fillmore County. Rushes, sedges, cattails, blue-joint grasses, and cordgrass dominate these areas.

Maple-basswood forests. About half of Houston County and smaller areas of Fillmore County were once covered by maple-basswood forests. Maple-basswood forest as defined in the *MN DNR Biological Report: Natural Vegetation of Minnesota* are dominated by sugar



maple, basswood, elm, and also include moist forests dominated by red oak. This forest type was called the "Big Woods" by early settlers in the south-central part of the state, where it covered a contiguous area of over 3,000 square miles. These trees are fire sensitive and were partially protected by natural firebreaks of water courses and rough topography.

Oak woodland and brushland. Most of Fillmore County and significant portions of Houston County were included in the oak woodland and brushland vegetation type, an ecotonal (transitional) type between the prairie and deciduous forest. Fire, more than any other natural disturbance, influenced the position and extent of this community. These areas were typified by a landscape ranging from small groves of trees among open prairies to scrub forests and dense shrub thickets of hazel. Dominant trees consisted of bur oak and Northern pin oak. White oak and black oak were also common.

Upland prairie. Tall-grass or mesic prairie characterized by big bluestem and Indian grass once existed on the broad plateau of both Fillmore and Houston counties. (Nearly all of this area has been cultivated or converted to pastures of Eurasian grasses.) Representative of the true prairie ecosystem, these areas blended into areas of oak woodland and brushland. Midsize grasses such as little bluestem were dominant on dryer areas, sandy river terraces, and on steep south-facing bluffs and cliffs. Many of these areas have become overgrown with red cedar and other brush, in the absence of fires.

Primary communities Primary communities comprise all habitats where persistent vegetation is sparse or absent. These areas are characterized by unusual, extreme conditions that restrict typical soil and vegetation development. Although these communities are uncommon and local in distribution, they provide the habitat for some of the state's rarest species. Types of primary community found here include dry cliffs, algific talus slopes, moist cliffs, and the moderate subtype of moist cliff.

Algific talus slopes. These are primary communities found only in the Paleozoic plateau, the landform region that includes southeast Minnesota and similar areas in Wisconsin, Iowa and Illinois. Talus is a rubble of coarse rock that has separated from dolomite or limestone bedrock and has accumulated with soil, leaf litter, and other organic matter to form a very steep slope. When this talus covers fissures in the bedrock that vent cold air from ice formed in caves, a tundra-like microclimate is created which can maintain soil temperatures just above freezing throughout the summer – hence the geological term algific. Algific talus slopes are often found on the north-facing side of deeply dissected valleys that receive only indirect sunlight. The closed canopy forests overhead insulate the naturally refrigerated environment. Summer air temperatures rarely exceed 60° F on these algific talus slopes.

This combination creates a habitat suited to species that are relicts of the glacial era, or those that are only now found in boreal habitats farther north. Algific talus slopes can be as small as a square yard, or may be linear features of much greater extent, up to a mile long. Mosses, ferns, and rare plants such as *Chrysosplenium iowense* (golden saxifrage), and *Adoxa moschatellina* (moschatel) are found here. The upper, more stable rock slopes are forested with more northern species such as balsam fir, yew, and yellow birch. Talus slopes are very fragile environments that could be easily disturbed by erosion, compaction, construction, or

alteration in drainage patterns.

Moderate Cliffs. Moderate Cliffs are primary communities that are geologically similar to algal talus slopes in that they contain fissures in exposed bedrock that emit cold air and water from subterranean ice. Moderate cliffs are formed when the talus either slumps away from the bedrock or is eroded by an adjacent stream. Often bands of ferns and mosses can be seen on the cliff face where water seeps in between different layers or strata of bedrock. Mostly they are on north-facing exposures but sometimes they occur on south or west-facing cliffs that are shaded by tree canopies or overhangs. The endangered *Sedum integrifolium* spp. *leedyi* (Leedy's roseroot) is only found here in Fillmore County and at one other location, in New York. These populations are thought to be relicts of a much colder climate. These cliffs are usually steep enough to preclude agricultural development, but changes in the uplands could disturb the drainage pattern that is crucial to the vegetation. Other residents of considerable interest are very small land snails that were once thought to be extinct. Fossils of these snails from the Pleistocene era are common, but the species was thought to be extinct till living specimens were found in the few talus slope areas in southeastern Minnesota and northeastern Iowa. These pinhead size snails are found in the leaf litter layer.

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Information contained within this chapter is mainly drawn from the Minnesota DNR Biological Report No. 1, *Natural Vegetation of Minnesota*, by Keith M. Wendt and Barbara A. Coffin, 1988, and Minnesota DNR Biological Report No. 20, *Minnesota's Native Vegetation: A Key to Natural Communities*, 1993.

## Endangered, Threatened and Special Concern Plant Species

Fillmore County is host to a rich diversity of native plant species, due to the geological and climatic conditions of the Paleozoic Plateau. Since so much of the original habitat has been developed for agriculture, many of these species are relegated to isolated remnants of habitat that meet their particular requirements. These limited ranges may be vulnerable to degradation or destruction. Some of these plants are on the extreme periphery of their extensive original natural range, while others are only found in this limited area of the Midwest. Others are 'disjunct' species, located hundreds of miles from other existing populations.

More valuable information will be forthcoming from the Fillmore County Biological Survey, which is in progress 1994-6.

The plan recommends that if such species are located, the Trails and Waterways Unit will provide information to the Wildlife Section. Any new plantings of native species should be appropriate to the previous vegetation, soil, moisture, and exposure of the sites. A vegetation management plan should be developed for the trail to ensure that these goals are met. An inventory of species along the grade is also recommended.

Four endangered, threatened or species of special concern plants have already been noted near or within 1/8 mile of the trail route. They are: *Napaea dioica* (glade mallow), *Allium cernuum* (nodding onion), *Sanicula trifoliata* (Black snakeroot), and *Dryopteris goldiana* (Goldie's fern).

Appendix B lists 54 endangered, threatened or special concern plant species found in Fillmore County, along with a brief description of the habitats where they are likely to be found.

## Vegetation along the Trail

The Marshner map of the original vegetation of Minnesota was constructed from the notes made by surveyors at the time of the public land survey. Fillmore County, surveyed in 1853, is shown as a patchwork of floodplain forests, prairie wetlands, maple-basswood forests, oak woodland-brushland. Primary communities too small to be shown on the scale of the Marshner map occupy niches of extreme conditions that restrict soil or vegetation development. The general comments of the surveyors rating the suitability of the townships for development by the standards of that century are of interest.

Since 1853, many of these natural communities have been completely altered by development, and the landscape is now primarily rural agricultural, with both row crops and livestock operations. However, there are some remnant natural communities, mainly in areas too wet, too rocky or too steep to farm. Rail grades sometimes act as reservoirs of the formerly common species of vegetation. The DNR is conducting the County Biological Survey in 1994-6 for Fillmore County, and more information about these remaining natural communities will be available when it is complete.

About Carrolton Township (which include miles 0 to 4 of the trail) surveyors said, *"This township is very broken, well watered & tolerably well-timbered. The land is mostly 2nd rate. Those streams of any size have the Brook Trout in them. There is also plenty of Lime Stone in this Township – No doubt good quarries may be found for building purposes."*

From the northern end of the trail to Preston, the trail parallels Watson Creek and the Root River, and lies almost completely within the area marked as floodplain forest on the Marshner map. On higher ground on either side of the floodplain, the map of the original vegetation shows oak openings or barrens. Most of the level areas that adjoin the right-of-way have been cleared for corn fields, or pasture. Along the stream banks, where the railroad right-of-way is close enough to the river to preclude agricultural uses, dense riparian vegetation exists alongside the grade.

At the junction with the Root River State Trail (mile 0.0), the rail grade is slightly elevated above the surrounding old field, rich with aster and goldenrod, and then enters lowland woods. Just before crossing Watson Creek, the trail leaves the wooded grade and crosses the base of a small, previously pastured valley, to avoid disturbing a sensitive resource. Planting additional trees for screening and encouraging the natural growth of nettles and raspberry brambles to discourage exploration off the trail is recommended.

The trail passes through a wooded DNR forestry site for 1/4 mile at mile 0.4, between the Watson Creek bridge and the first bridge over the Root River. This stretch between mile 0.5 and 0.8 has typical lowland forest vegetation of ash and cottonwood, and a ground layer of nettles, bedstraw, impatiens, virginia waterleaf, cow parsnip, and grape vines.

After crossing the first Root River bridge, the trail crosses a stream terrace planted in row crops between mile 0.8 and 1.3, then dips into a wooded cut between mile 1.3 and 1.5.

South of the second Root River bridge the trail will be rerouted off the rail grade for about .3 mile, and follow a bend in the river, in a floodplain forest dominated by cottonwoods, with a ground layer of nettles, wild grapes, and virginia waterleaf. A wetland mitigation project is planned to compensate for the approximately 2 acres of lowland woods and previously farmed wetlands that will be disturbed by the trail.

At about mile 2.0, the trail rejoins the grade, and bisects lower-lying farm fields for .4 mile. From this vantage point, there are views of the wooded bluff line to the north and the wooded river's edge to the south. The adjoining landowner has requested that a screening planting of conifers be planted within the trail right-of-way.

Between miles 2.4 and 3.8, the trail curves along the base of steep limestone bluffs cut by railroad construction, and crosses small ravines that drain toward the Root River. This area, which is heavily wooded, will allow trail users to sequentially observe the differences in vegetation on south-, east- and north-facing bluffs. This steep wooded area, too narrow to be separately mapped on the Marshner map, hosts plants adapted to the varying slope, moisture, temperature and light levels on the bluff faces. Cedar, black walnut, maple, basswood, cottonwood, and ash line the trail right-of-way, and in summer, will provide a dense screen that allows only occasional glimpses of the river that is so close at this point. In this area, the trail ownership is very narrow (between 25 and 50 feet) so vegetation management will primarily consist of reseeding areas disturbed by construction, and removing tree limbs or hazardous trees that obstruct the trail.

Between miles 3.8 and 4.2, the trail continues around the base of more gentle wooded slopes, mapped as oak openings on the Marshner map. The land to the east of the grade is a level farm field lying between the slopes and the river.

As the trail nears Preston, and leaves the rail grade to cross under the Hwy. 52 bridge over the Root River, it still lies within the area marked as floodplain forest on the Marshner map. The stretch between mile 5.2-5.4 is again sandwiched between steep bluffs and river. In this area, the city of Preston has plans for additional wildflower plantings. Between mile 5.4 and mile 6.7 within the town of Preston, the original floodplain forest has been replaced by a more manicured landscape of parks and public open space, road-rights-of-way, the county fairgrounds, and commercial development.

In 1853, the surveyors described Preston Township, which includes miles 4-13 of the trail. *"This land is mostly second rate, and not much timber or water. The timber is mostly of the scrubby kind and most Bur Oak. There is very little brush in this county."*

Between miles 7 and 10.5 south of Preston, the trail crosses an area marked prairie on the Marshner map. Since the former rail grade is so close to Camp Creek over this stretch, it seems more likely that floodplain forest was the original vegetation of the immediate 100' strip of right-of-way, but that the ribbon of floodplain forest was too narrow to portray at the scale of the Marshner map. This section varies between a closed canopy of riparian vegetation similar to that beside the Root River to a more open environment adjacent to

pastures or fields.

From mile 10.5 on into the town of Harmony, the trail crosses an area that formed the boundary between areas marked on the Marshner map as oak openings on the west and big woods vegetation to the east.

At mile 12, the trail rises to the ridge top, along a wooded bluff. Revegetation of this slope following construction will need to be carefully planned to minimize erosion.

As the trail changes at mile 12 from the wide loops of a rail grade paralleling streams, to the right angled, squared-off route that follows section lines, roads and field edges, so too does the surrounding landscape. The ridge has been logged, and is now cultivated, with open views of rolling pastoral landscapes. Three small woodlots that the trail passes through offer a glimpse of what this upland forest contained, with oak, maple, basswood and black cherry evident. Cottonwood, ash and shrubs fill the sinkholes adjacent the route.

The trail enters Harmony Township after mile 13, and the surveyors recorded this impression of this township. *"This township is a fair average of 1st rate land and nearly all lays well for cultivation, but is very scarce of timber being nothing but scattering of scrubby Bur Oaks. Water is scarce caused by those large sinks that carry it off under ground. I have sometimes found springs their branches losing themselves in those sink holes. There is no marshy land in the Township."*

Along the entire length of trail, in areas disturbed by construction, native grasses and forbs of the Blufflands region should be reseeded. Seed mixtures should be tailored to fit the varying moisture, soil and light environments along the trail. Along streams, vegetation that will help to slow erosion, filter runoff, and help to regulate water quality and temperature is of critical importance.

Between mile 12-17 in the upland section of the trail, shelterbelts of native vegetation should be planted along segments. These strips of permanent vegetative cover can provide multiple benefits. They can provide an additional wildlife habitat corridor in the agricultural landscape, help to retain snow cover on the trail, provide shade and visual interest for trail users, and define the trail corridor. Shelterbelts can slow wind speeds and filter runoff, reducing erosion. In designing the plantings, consideration should be given to the height and location of vegetation to minimize negative impacts, such as shading, on adjacent croplands. Species of trees, shrubs, grasses and wildflowers native to the Blufflands region that are valuable for wildlife can also add appeal for trail users.

Within the communities of Harmony and Preston, landscape plantings of native trees, shrubs, grasses, and wildflowers should be added to define and enhance the trail corridor, to provide shade and screening where needed, to integrate the trail into the communities, and to help transform the former rail-grade into an inviting recreational space. Intensive plantings should be massed around areas of highest visual impact for trail users, such as the trail entry, parking and rest areas, and visitor information services boards.



## Wildlife

In addition to the many species that are commonly seen throughout Minnesota, there are some uncommon or even unique creatures in this part of the state. Observant visitors may catch sight of wild turkeys, turkey vultures, or even a rare peregrine falcon. Occasionally, timber rattlesnakes, a species of special concern, are seen on rock outcrops and in the river bottoms. Blanding's turtles, a threatened species, and bullfrogs, a species of special concern, are sometimes seen near calm waters or wetlands. (*See Appendix B for a definition of endangered, threatened and special concern species.*)

### Mammals

There are 77 native species in Minnesota, 51 of which may be found in southeastern Minnesota. Abundant or common mammals likely to be seen by trail users include woodchucks, thirteen-lined ground squirrels, eastern chipmunks. Mounds of the plains pocket gopher, and striped skunk scent may be noted by trail users, even if the animals are not in view.

Of the 20 species for which the DNR has set hunting or trapping seasons, most are found in southeastern Minnesota. White-tailed deer, red and gray fox, coyote, raccoon, muskrat, beaver, fox and gray squirrels, mink, and eastern cottontail rabbits are common. The prairie vole (*Microtus ochrogaster*), a species of special concern, has been noted near Preston. This small rodent prefers grassy uplands. There are two bat species of special concern in Fillmore County—the northern myotis and the eastern pipistrelle. Caves and mines in southern Minnesota provide them with winter habitat for hibernation.

### Birds

As with mammals and other forms of wildlife, habitat diversity is directly related to a diversity of bird species. Greater diversity of habitat and more complex structures within the habitat lead to an increase in bird species. Several species reach their highest relative abundance or are only found in southeastern Minnesota.

Commonly seen birds include sparrows, grackles, starlings, crows, robins, meadowlarks, red-winged blackbirds, mourning doves, house wrens, bobolinks, cardinals, and swallows. Such waterfowl as mallards, blue-winged teal, and wood ducks are common during the summer months and seasons of migration. The Mississippi is heavily used by migrating waterfowl, including such species as tundra swans, great blue herons, and great egrets. While the ring-necked pheasant will occasionally be seen, the ruffed grouse is the most plentiful upland game bird. Frequently observed raptors include the great horned owl, American kestrel, and the red-tailed hawk. Red-shouldered hawks, ospreys, and northern harriers have been spotted on occasion. As noted earlier, wild turkeys are a special feature of this area of the state.

Turkey vultures, red-tailed hawks, belted kingfishers, red-bellied woodpeckers, rough-winged swallows, white-breasted nuthatches, house wrens, cardinals, indigo buntings, and field sparrows can also be seen. The northern bobwhite, blue-winged warbler, Bell's vireo,



and blue-gray gnatcatcher can also be observed in Fillmore County. The loggerhead shrike, a threatened species once common and widely distributed across the United States, has recently seen drastic declines in its range. Breeding populations have been noted in the past in Fillmore County. It inhabits dry grasslands, nesting in shelterbelts, hedgerows or farmstead trees. It is a predatory bird with the unusual behavior of impaling prey such as mice or frogs on thorns or barbed wire.

### Reptiles and Amphibians

The diversity of reptiles and amphibians increases in the state's southeastern region. Warmer temperatures and higher annual precipitation contribute to this increase, as do the unique habitat requirements found in this region of the state.

Turtles include the common snapping turtle, western painted turtle, and spiny softshell turtle. The Blanding's turtle, a threatened species, is present in Fillmore County.

Snakes and Lizards are especially compatible with the habitats of southeastern Minnesota. A common lizard is the six-lined racerunner. The five-lined skink, an endangered species of lizard, has been found in Fillmore County on exposed limestone or sandstone outcrops in wooded ravines and bluff prairies. The region boasts the greatest number of snake species in Minnesota. The Eastern garter snake and Eastern hognose snake are present. Of 13 other species of snakes found in this region, three are not found in any other part of the state. These three species include the timber rattlesnake and the rarely seen Eastern massasauga, Minnesota's only venomous snakes, and the black rat snake.

Timber rattlesnakes are classified as a species of special concern in Minnesota. This species has unique or highly specific habitat requirements and deserves careful monitoring of its status. Habitat is limited to the woods and river bluffs within six southeastern counties. Dens are found in rock fissures of bluffs or in openings under the rock formations.

Currently, there are no known den sites along the trail. The results of the Minnesota County Biological Survey of reptiles and amphibians in Fillmore County due in the summer of '96 may provide more information about specific locations.

Trail users should be made aware of their presence in the area and what to do if they encounter one. Such a sign has been developed and used on the Root River State Trail. Trail managers will report any sightings to the DNR non-game wildlife manager at DNR's regional office.

Records indicate another snake species of special concern, the Bull or Gopher snake, (*Pituophis melanoleucus*). This large, non-poisonous snake may be mistaken for a rattlesnake when it hisses and vibrates its tail when disturbed. It is vulnerable to over-collection for the pet trade. Two other snake species of special concern that occur in Fillmore County are the eastern milk snake and the fox snake.

Amphibians include the Eastern tiger salamander, American toad, and nine species of frogs.

The northern leopard frog is the most common near the region's wetlands and water bodies. Other frogs include the northern spring peeper, gray treefrog, western chorus frog, green frog, and wood frog. The spring peeper, treefrog, and the pickerel frog may be found within forested areas. In addition, the bullfrog and the pickerel frog can only be found in southeastern Minnesota. Although rare, the Blanchard's cricket frog has been recorded in the region.

### Insects

Two species of tiger beetle found in Fillmore County have been proposed for protected status. As predatory insects at the top of their food chain, they are susceptible to accumulations of contamination from their prey. Many of the habitats they require are also preferred habitats for humans. *Cincindela macra macra*, a proposed threatened tiger beetle, is found on moist, sandy stream edges along rivers in hardwood forests. *Cincindela splendida cyanocephalata*, a tiger beetle with proposed special concern status, is found on steep clay embankments along riverbanks.

### Fisheries Resources

*Lampetra appendix* (American brook lamprey), a species of special concern, has been noted in Camp Creek just above the junction with Root River east of Preston. This species is found only in small and medium sized streams with good water quality. The gravel chub is a minnow species of special concern that has been found in the Root River. Another fish species of special concern is the bluenose darter, known from a single collection in the Root River.

The fisheries resources in southeastern Minnesota include a variety of warmwater fishes indigenous to the Mississippi and Root River watersheds. In addition, there are nearly 80 coldwater trout streams in Houston and Fillmore Counties.

Warmwater fish are those that thrive in water temperatures above 70 degrees F. There are 19 warmwater species in the Mississippi River that are considered common or abundant. The most abundant include gizzard shad, carp, emerald shiner, and bluegill. Other common gamefish include northern pike, largemouth bass, walleye, sauger, and crappies. Some 18 species have been identified in the mainstem Root River near Lanesboro. Game fish found here include northern pike, bluegills, smallmouth bass, green sunfish, and crappies.

As one of only two major trout stream areas in the state, southeastern Minnesota is well known for its many miles of coldwater streams. In contrast to trout streams along the North Shore of Lake Superior, most southeast streams rise from coldwater springs and remain cool through the entire summer. Besides being dependent upon cool water (less than 70 degrees F), trout require well-oxygenated water that is free of pollutants and has a reliable food pyramid or chain. Besides the large number of spring creeks in the area, the various branches and forks of the Root River also support trout populations.

Trout species present are brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*). Brook trout is the only native trout to southeast Minnesota. Brown trout were introduced to North America from Europe, while rainbow trout were indigenous to western North America. Brook trout require clear, very cold streams with excellent water quality. They have historically declined in southeast Minnesota because of habitat degradation and competition from brown trout. Brown trout tolerate warmer, more turbid waters than brook trout and have successfully established wild populations throughout the area. Brook trout are presently limited to the headwater areas of many streams and small spring tributaries. Rainbow trout are managed primarily by put-and-take stocking in southeast Minnesota. They are highly susceptible to angler harvest and are prone to migrating out of areas stocked. They do not produce self-sustaining populations.

As a major natural resource and sport fishing attraction, trout stream management is a priority within the Blufflands Trail region. The promotional importance of trout fishing within the area of the proposed Harmony-Preston Valley Trail is illustrated by Preston's annual celebration, Trout Days.

#### Trout Habitat and Stream Improvement

Post-European agriculture and urban development have degraded southeast streams. Deforestation and conversion of lands to agricultural use led to less stable stream flow patterns, increased sedimentation, deterioration in water quality, and severe bank erosion. By the early part of the twentieth century, deteriorated fish habitat was common. Largely through the efforts of Thaddeus Surber, a biologist with the Minnesota Game and Fish Department, the situation began to improve. Beginning in 1920, Surber made extensive field investigations of stream conditions in relation to fish requirements and recommended fish management procedures. He suggested greatly improved management of stream valleys to counteract the effects of erosion and advised restocking of trout where conditions were suitable.

Fish habitat has been improved since 1920 and continues to be an important fisheries management tool to the present. Traditional trout stream habitat improvement has focused on "instream" improvements to narrow and deepen channels, restore riffle-pool complexes, and add adult fish cover. Fisheries managers are expanding stream habitat management to include land use management within watersheds for longer term solutions to habitat degradation.

#### Trout Resources Along the Harmony-Preston Valley Trail

Today, the South Branch Root River supports one of the finest trout populations in the state. Recent samples taken at sampling stations near Forestville State Park estimated 4,674 brown trout per mile of stream, or 92 pounds per acre of water surface. An estimated 196 trout per mile are 10 or more inches in length. Past surveys indicate trout abundance can exceed 200 lb/acre in parts of the South Branch. Coolwater game fish, such as smallmouth bass and northern pike are found in the lower reaches of the South Branch. Summer water temperatures range between 65 to 72 degrees F. While water clarity is usually good, it can

take more than a week to clear after heavy rain and accompanying runoff. Recent surveys indicate no serious point source pollution; however, land use practices in some areas cause moderate erosion. Runoff from farmland bordering the stream can bring silt, fertilizers, and pesticides into the water.

The majority of the South Branch Root River is classified as semi-wild trout waters. Brown trout populations are maintained by a combination of natural reproduction, fingerling stocking, and yearling stocking. Rainbow trout are much less abundant and maintained by yearling stocking. Occasional brook trout are found in the river, which are the result of migration from coldwater tributary streams. Habitat conditions favor brown trout over the other two species. The "no-kill" or "catch-and-release" regulations initiated in 1984 appeared to increase abundance of medium sized trout (10-14 inches in length) but were socially controversial and discontinued in the late 1980's.

The waters of Camp Creek, a tributary of the South Branch with its mouth at Preston, are somewhat colder than the receiving waters of the South Branch. July temperatures range between 55 and 68 degrees F. Brown trout is the dominant trout species and has historically been maintained through stocking. However, recent habitat improvements and corridor improvements in the lower three miles of Camp Creek hold the promise of increased natural reproduction. Brook trout are found in headwater areas and coldwater tributaries of Camp Creek. Brown trout fingerlings and yearlings are stocked along with small numbers of rainbow trout yearlings. The 1989 fishery survey found 1,615 brown and 26.5 rainbow trout per mile of stream. There was an estimated 75 pounds of brown trout and 4.7 pounds of rainbow trout per acre of surface water. In addition, an estimated 104 brown and 13 rainbow trout were 10 inches or more in length.

#### Camp Creek Fisheries Management Area

Personnel from DNR Fisheries are presently active in improving trout habitat and securing additional easements along lower Camp Creek to provide critical habitat protection and greater angler access, including those with disabilities. Beginning at Highway 12, immediately South of Preston, a series of continuous easements along Camp Creek will result in about three and a half miles of stream frontage available for public angling. The stream corridor easements are 132 feet wide, or 66 feet on either side of the stream's center line. Access to the easements are from public road crossings. Trail development will result in increased accessibility to easement areas.

Habitat improvement projects have been completed on most of the lower 3.5 miles of Camp Creek, with additional work planned contingent on easement acquisition. Corridor easements maintain vegetated buffer strips on portions of the stream while other portions receive light cattle grazing. Additional fencing may be required if overgrazing occurs. A second part of this effort is improved cover for adult brown trout through channel modifications (narrowing and deepening) and construction of rip rap banks, bank deflectors, and underwater habitat structures or bank covers. Bank covers are typically constructed after removing a portion of stream bank, installing the structure underwater, and replacing the earth cover over the

structure. Overhead cover in the water provides shade to keep the water cool and protection from predators. Habitat modification augments natural trout stream conditions including riffles, undercut stream banks, and overhanging vegetation. Artificially increased cover can improve trout abundance by 300 to 500 percent, sometimes higher.

#### Trail Development and Impact on Fishery Resources

The Harmony-Preston Valley Trail will run parallel to Camp Creek from its mouth at Preston to a point about five miles farther south. The trail corridor crosses the creek about five times and overlaps fishery easements in several places. The Section of Fisheries has invested approximately \$150,000 in stream habitat improvements and fishery easements. It is currently proposing spending an additional \$70,000. Due to the substantial investment of angler resources in this area, a careful analysis of potential benefits and negative impacts is necessary, along with formulation of strategies to avoid or offset negative impacts.

##### *Potential Benefits:*

- 1) The trail will provide improved access to the creek and allow greater freedom of movement along easements for disabled anglers. Development of disabled angler "fishing pads" will offer an additional angling opportunity not present on most southeast trout streams.
- 2) The trail may generate increased fishing pressure within these areas resulting in increased number of angler trips and associated benefits (aesthetic and economic).
- 3) Water quality may improve in areas where the trail corridor lies next to the stream, since the trail will provide an additional vegetative buffer between the stream and any agricultural fields.
- 4) The trail development offers the opportunity for the development of an interpretive display on southeast fishery resources, stream habitat improvement, and watershed management.

##### *Potential Negatives:*

- 1) Development of the bike trail may result in loss of aesthetic value to trout anglers. Many trout anglers prefer a solitary fishing experience and the presence of bike traffic may detract from angling quality. The area presently provides a relatively isolated fishing experience, and this will undoubtedly change with the development of a bike trail and interpretive signs.
- 2) Increased fishing pressure associated with ease of access may put additional stress on trout populations requiring more intensive fisheries management.
- 3) Trail development may impact critical riparian elements including springs, bluffs, etc. Impervious materials used for trail paving have the potential for increasing speed and

quantity of surface runoff during heavy rain.

- 4) Bike trail location and design may hinder access to the easement corridor by fishery maintenance vehicles and heavy equipment.

*Strategies for avoiding and offsetting negative impacts:*

- 1) The trail should be designed to minimize angler and cyclist contact by using available trees and land features as visual buffers. Plantings to create screening could also be used. Careful consideration should be given to the impact of interpretive displays and features that tend to stop bike traffic and concentrate trail users. Displays may serve to educate trail users, but an increased view of trail users may result in a loss of aesthetic quality for anglers. Thus, the location of the interpretive displays and their development should be a cooperative effort by Fisheries and Trails and Waterways in order to ensure that mutual objectives are fulfilled.
- 2) Because Camp Creek is primarily a brown trout fishery, it should be relatively stable even in the face of increased fishing pressure. Continued monitoring of the fishery in this area should document trends in fish population. In addition, a joint Fisheries-Trails recreational use survey prior to and 3-5 years after completion should be used to measure impacts on angler/trail user attitudes.
- 3) Trails and Waterways will work cooperatively with Fisheries in the design of the trail to ensure both fisheries needs and trail user needs are met including Fisheries need to accommodate trucks.
- 4) Trails and Waterways will manage the trail right-of-way where it overlaps the fishery easements consistent with the easement.
- 5) Trails and Waterways will work with adjacent landowners to address any concerns relating to impacts by trail users through techniques including trail user education, fencing, and signing.

No fishery easements have to date been purchased along Trail Segment One from Root River Trail to Preston. This section of the Root River currently offers a very secluded trout fishing experience due to its limited accessibility. Trail development will increase accessibility to anglers and increase fishing pressure. Additional easements could be pursued in order to increase accessibility. This section also offers good potential for the development of fishing areas for anglers with mobility impairments.

## Historical Resources

### Prehistory

Humans have inhabited southeastern Minnesota for thousands of years. Many centuries before the arrival of the first Europeans, the Mississippi Valley served as a gateway to Minnesota for a variety of Native American cultures. Beginning about 8000 B.C., these early people entered this area of the state in search of game. Very little is known about these first inhabitants other than they were nomadic hunters and lived in small groups.

While later cultures (beginning about 5000 B.C.) continued to hunt for game, they also depended on the gathering of such food sources as acorns, wild plums and cherries. Fish was an additional important food source. Group populations remained small. However, they were semi-nomadic and shifted their camps seasonally to use available resources.

About 1000 B.C., the Woodland Culture appeared in southeastern Minnesota. This cultural tradition was marked by the use of pottery and the burial of the dead in earth mounds. People continued to live in small groups until the use of wild rice became common, thought to be around 800 A.D. This new food source caused a surge in population and the establishment of permanent villages.

The northward spread of the Mississippian Culture around 1000 A.D. brought a new way of life to southern Minnesota. Although still dependent on hunting and fishing, agriculture dominated this culture. A major center for this new culture was the lower Illinois Valley and to the east of present day St. Louis.

Rather than cultivate the heavy upland sod, these early farmers worked the sandy soils of the river bottoms and terraces with bone hoes and other hand tools. Their settlements were typically large villages of 600 to 800 inhabitants surrounded by fields of corn, beans, squash, sunflowers, and tobacco. Refined pottery and the continued use of burial mounds also characterized this culture.

While a major concentration of villages was located near Red Wing, around the confluence of the Mississippi and the Cannon rivers, this important culture spread into other river valleys as well. Earthworks and habitation sites have been found in the Root River Valley, notably near Yucatan in western Houston County. Many other village sites were along the Root River and its tributaries; however, some have been completely destroyed by flooding, erosion, cultivation, or development.

Although only limited surveys of archaeological sites on the Root River watershed have been completed, 115 prehistoric sites were recorded. It has been estimated by the Minnesota Historical Society that these sites represent only a small percentage of the sites in this area. The abundant resource base and the sheltering environment of the valleys would have been an attractive inducement to prehistoric settlement.

Few sites have been documented near the proposed Harmony-Preston Valley Trail. Two

habitation sites have been located immediately east of the trail alignment, between Isinours Junction and Preston. However, the potential for other sites is high, especially within the two reroutes away from the former railroad grade in this same trail segment. The reroutes closely follow the South Branch of the Root River. Unless existing bridge abutments are used, stream crossings are also critical since they have the potential for disturbing any undiscovered sites.

In addition, the southern one-third of the trail will leave the former railroad grade and travel cross-country, generally following the ridge line between Camp Creek and Partridge Creek. This cross-country trail section has potential for disturbing prehistoric sites in the area. Similar areas have been shown to be the locations for weapon and tool working sites, some of which are as much as 8,000 years old.

### Historic Native American Culture

Native American culture was continuously present in southeastern Minnesota from prehistoric times until well into the nineteenth century. Even today, a small band occupies Prairie Island, one of four Dakota (Sioux) communities in the state.

Tradition relates that a wandering band of Hurons and Ottawas stayed on Prairie Island for a short time. They had been driven out of eastern Ontario by the Iroquois in the 1640s. A quarrel with the Dakota, who were living around Lake Mille Lacs and along the Mississippi above St. Anthony Falls at that time, forced them to move eastward into Wisconsin. This exchange between the Hurons and Ottawas and the Dakota may have been the first acquaintance of the Dakota with European technology and trade goods. The Hurons and Ottawas had been trading with the French for some time and continued to do so from their Minnesota-Wisconsin locations. However, no real evidence for this exists.

Forced from their original northern homeland by fierce battles with the Ojibwe, the Dakota were well established in southeastern Minnesota by the 1770s. A large band made its headquarters near the present city of Winona. This band—together with other bands in the areas of St. Paul, Red Wing, and the lower Chippewa River in Wisconsin—comprised a major tribal division called the Mdewakanton. Bands of the smaller Wahpekute division occupied the upper reaches of the Cannon and Zumbro rivers and parts of the Root River Valley. The Dakota name for the Root was Hokah.

The Woodland Dakota had customs and habits common to both forest and prairie. They cultivated crops, but were also skilled hunters. While their arrows were similar to those used on the Plains, their bows were patterned after those used in the East. Many Dakota associated with tribes unrelated by language and had more dealings with them than their own distant kinsman to the west.

While there were several outstanding leaders among the Dakota in southeastern Minnesota, Wabasha was the most well known. Born around 1725, Wabasha was a strong supporter of British trading interests during the American Revolution. He used his influence to oppose American colonists, whom he perceived as interested in only taking more land. His



descendants adopted his name and maintained his tradition of strong leadership for three generations.

Some areas of southeastern Minnesota were frequented by such other tribes as the Fox, Sauk, and Winnebago. Much of Fillmore County was an intermittent battleground between the Dakota and their enemies, the Fox and Sauk. In the 1830s, a neutral area was created to separate these warring groups. Parts of Fillmore County were included in this neutral area.

The eastern portion of the neutral area was granted to the Winnebago for their hunting grounds. Although the Winnebago had been forced to move to northeastern Iowa from their Wisconsin homelands in 1832, Winneshiek, a major chief, lived and hunted much of the time in Houston County. His principal home was on the Root River, about seven miles west of the present city of Houston. In 1848, the Winnebago ceded their rights to the area and were sent to a reservation near Long Prairie.

In 1837, the Dakota relinquished their claims to the lands east of the Mississippi. The 1851 Treaties of Mendota and Traverse de Sioux took all of southeastern Minnesota away from them. Two years later, the Dakota reluctantly left their homes along the Mississippi and other area rivers and moved to a narrow reservation of land along the Minnesota River Valley. Additional pressure and abuse by the government and some of its officials led to war with the white settlers in 1862. At the end of the war, they were banished to the Dakota plains.

### The Fur Trade

The Mississippi River and its tributaries were natural "water highways" for the movement of trade goods and furs. French activity began in 1686, when Nicolas Perrot wintered at Trempealeau on the Wisconsin side of the Mississippi. He built a post on the northeast bank of Lake Pepin during the following spring. Two more forts were built in the early 1690s, one opposite the mouth of the Chippewa River, on the Minnesota side, and the other on an island—probably Prairie Island. A 20 year halt to French expansion occurred about 1695. A wave of new expansion brought the establishment of Fort Beauharnois in 1727. Although no traces of it have ever been found, it is thought that its location was in the vicinity of Old Frontenac. Intermittent wars with the Fox tribe caused its abandonment two years later. Finally, in 1750, a highly profitable French trade was permanently opened, but only for a brief six years.

Between 1765 and 1816, British fur traders wintered frequently in southeastern Minnesota. Since no permanent posts were established, there is little record of this activity. Prairie du Chien had developed into an important settlement and trading center by this time and traders could base their operations there without the need for other posts. This practice remained after control of the trade shifted to the Americans. However, as the frontier of settlement moved into the valleys along the Mississippi, independent traders established posts at a number of river locations. For example, Reads Landing takes its name from trader Charles Read, who operated a post at this site.

## European Settlement

Although a few settlements—consisting of simple cabins and gardens—appeared in Houston County in the late 1840s, it was the ratification of the 1851 treaties and the removal of the Dakota people that brought a rush of white settlers into southeastern Minnesota. Since it was the first area of the new territory reached by steamboats bound upriver, it was also the first area settled. Immigration was heaviest between 1854 and 1857. The 1860 U.S. Census reported 13,542 residents in Fillmore County, the highest population of any county in the state.

The fertile river terraces and surrounding prairies attracted immigrant farmers to the area and soon crops of wheat flourished. The area's streams and rivers provided abundant water power for the many small flour and grist mills that were built in most of the early settlements. As logging grew in importance, sawmills appeared at settlements along the Mississippi. Houston County's Brownsville, settled by and named for Job and Charles Brown in 1848, established a sawmill in 1855. The village was already an important steamboat landing. Also, 1855 marked the formation of the Root River Steamboat Company and the charter of the Southern Minnesota Railroad Company.

As new farms and settlements were established in the Root River Valley and elsewhere in the region, land values soared and speculation ran rampant. Some settlements prospered, others failed, and still others remained as merely dreams on paper. After the financial panic of 1857, capital dried up and interest rates reached record heights. However, the Civil War years created high prices for wheat and bumper crops were produced.

While many of the first settlers were farmers from New England and other eastern states, it was not long before immigrants from Scandinavia, Germany, and Ireland joined the rush to claim land. Thousands of Norwegians settled in western Houston County and the eastern part of Fillmore County. Although soon outnumbered by other groups, New Englanders continued to dominate the business and social leadership in southeastern Minnesota for many years. Such towns as Chatfield were founded by New England Yankees or modeled after Yankee communities.

As settlement and wheat farming continued through the 1860s and 1870s, weather, insects, and soil exhaustion began to take their toll. Disastrous flooding of the Root River occurred in 1865 and again in 1876, when several people drowned. Wholesale cutting of trees in the steep valleys caused severe erosion of the thin soils. The lower valleys were often buried in alluvium after flash floods.

The demise of wheat and milling in the region was gradual. By 1880, two occurrences indicated that their days in southeastern Minnesota were numbered. The exhausted soils and erosion brought an end to the wheat bonanza and the overwhelming competition from the rapidly expanding mills in Minneapolis sealed the fate of area flour mills. Fed by the vast, newly opened wheat fields to the north and west, Minneapolis gained control of this important industry. A few mills in southeastern Minnesota survived well into the twentieth century and imported wheat from western Minnesota and the Dakotas after the local supply

began to decline.

Repeated wheat crop failures caused a shift from a sole dependency on wheat to other crops and livestock. Agricultural practices gradually improved; however, it was not until the 1930s that concerted work was done to restore the area. It was largely through the efforts of such conservationists as Richard J. Dorer that unlimited grazing stopped, the slopes were reforested, and improved cultivation took place. Soybeans and corn have replaced wheat on river terraces and floodplains.

As briefly mentioned earlier, the boom years of settlement, farming, and flour milling created a number of villages that were eventually doomed to failure. The best example is Forestville, located a few miles to the west of Preston. Originally platted in 1854 and named for one of its proprietors, Judge Forest Henry, the community grew very rapidly. It reached the height of its prosperity by 1858, when it boasted two sawmills, a gristmill, a furniture factory, a wagon shop, a tavern, two hotels, and two stores. Bypassed by the railroad and dependent on the declining milling industry, it was eventually abandoned. Today, its only remaining brick building, the Meighen Store, is preserved in the Forestville and Mystery Cave State Park.

### Railroad History

It was not long after the first rush of settlement that the need for a railroad into the interior from the Mississippi was being considered. Chartered in 1855, the Root River and Southern Minnesota Railroad was actually constructed between 1865 and 1870. As originally planned, it was to be only a branch line of the Southern Minnesota. The main line was to go through Chatfield to Rochester. However, the main line was never constructed, and the Root River branch line remained the only railroad built by the company.

In 1857, the name of the company was shortened to the Southern Minnesota Railroad and it was given a Federal "land grant" by the Territorial Legislature to raise money for construction. Much of this land grant and subsequent grants were surrendered to meet interest payments on the construction bonds.

The national financial panic of 1857 spelled ruin for the fledgling railroad. By the end of 1858, only 20 miles of roadbed had been graded from the Grand Crossing (La Crosse) on the Mississippi River to Houston. No tracks had been laid. With no capital to start construction and unable to find buyers for the land it offered for sale, the company received credit from the Minnesota Legislature. Unfortunately, prosperity did not return and the railroad could not meet its responsibility to the state. In 1860, the state foreclosed and became the owner of the line.

Four years later, an act of the Minnesota Legislature reorganized the company and established a new board of directors. This reorganization act required that the railroad be built from La Crescent through Chatfield to Rochester.

Finally, after a delay of 10 years, construction began. Hokah became the operations center with a machine shop, foundry, and facilities for building passenger and freight cars. A 26-

foot waterfall provided sufficient power for these operations.

The initial work on the grade and tracks was done quickly. In 1866, tracks were laid on the previously graded roadbed between the Mississippi and Houston. However, the quality suffered. Bridges were not rip-rapped or properly protected from high water and flooding. As a result, costly washouts occurred. Despite these problems, the line reached Rushford in 1867. Progress stopped at this point while a decision was made about where the railroad should go from here. In 1868, the Legislature decided to allow the company to select its own route from Rushford to Albert Lea.

Unlike many of the railroads built in Minnesota during this era, the Southern Minnesota was constructed in an area that already contained a relatively large population. While it spurred growth and created some new settlements, its completion signified cheap transportation and prosperity to the farmers, businesses, and communities existing along the right-of-way. Railroads built into the vast pine forests of northern Minnesota, on the other hand, created new settlements and towns for the lumber industry.

Lanesboro was platted in 1868 in anticipation of the arrival of the railroad. It is one of the most significant new town sites that survived and prospered into modern times. The community quickly established itself as a water powered milling center and railroad shipping point.

By 1870, the line reached Fountain, the most western town on the Root River State Trail. Unlike its more eastern neighbors along the railroad, Fountain is not on a river or stream. Its economy was never based on milling. Its first business opened in 1869 to sell whisky to the workers building the railroad.

While some towns prospered and grew because of the railroad, others declined or even died because they were bypassed. The fate of one community, Forestville, has been mentioned earlier. Carimona, at one time the county seat for Fillmore County, was another village that withered away after being bypassed by the railroad. While Chatfield and Preston were adversely affected at the time, they survived and eventually prospered.

A narrow-gauge railroad (3' - 0") was eventually built to Preston from Caledonia by a competing company. Incorporated in 1879 as the Caledonia, Mississippi, and Western Railroad Company, its purpose was to construct and operate a railroad connecting the Mississippi River to Minnesota's western state line; however, it was never extended beyond Preston. In addition to Preston, the line ran through Spring Grove, Newburg, Canton, and Harmony.

Typical of many railroads during this era, the Southern Minnesota was never financially stable. Construction in rugged topography, flood damage, competition from other railroads, the fact that many commodities went east but few went west, and that the principal product, wheat, was on the decline—all contributed to its financial problems.

By 1880, this financial toll spelled the end for the Southern Minnesota Railroad. On May 1, 1880, it was purchased—along with the narrow-gauge line—by the Chicago, Milwaukee, and

St. Paul Railway (later named the Milwaukee Road). In 1901, the narrow-gauge tracks were upgraded to standard gauge. At this time, there was still no rail link between Preston and the station at Isinours on the Root River. Dray lines continued to be used for transportation between the two locations. After considerable pressure from the citizens of Preston, the Chicago, Milwaukee, and St. Paul agreed to construct a rail connection to Isinours if Preston would furnish the right-of-way. This was accomplished in 1903; and Preston was finally connected to the railroad it wanted many years earlier.

In 1978, with the line becoming unprofitable, the Milwaukee Road applied to the Interstate Commerce Commission for permission to abandon 100 miles of its trackage from the Mississippi, through the Root River Valley, to Ramsey Junction near Austin. Permission to abandon was granted in June, 1979. On April 1, 1980, just one month short of 100 years of operation, the Milwaukee Road sold its right-of-way to the Minnesota DNR. The Root River State Trail was completed in 1988.

### Communities

While the railroad certainly spurred development of the region, most communities existed before the arrival of the railroad. As related earlier, it was the lure of fertile farm land and sufficient water power for milling that drew settlers into the interior. Many community names reflect the era of settlement in that they were named for a founder or a significant personality of the time. For example, the two counties that contain the Bluffland Trail System are both named for famous men living at the time the counties were organized. Houston County, established in 1854, honors Sam Houston, the famous Mexican War hero. Fillmore County, established in 1853, was named for President Millard Fillmore, who retired from office the day before the county was created by the territorial legislature. Other community names are taken from American Indian names for area locations, have origins in antiquity, honor the settlers' eastern or European heritage, or reflect a significant physical feature found at the site of the settlement.

Isinours is the location of a railway station that was established about 1870. It was named (with a change in spelling) for George Isenhour, owner of the land on which the station was located. The station was an important shipping point for area flour mills.

Clear Grit was a short lived wheat "boom town." Started with the construction of a dam and grist mill in 1869, it was purchased in 1872 by John Kaercher, an innovative businessman from Preston. In nine years, Kaercher transformed the small country mill into one of the largest and best equipped mills in southern Minnesota. By 1877, about 80 percent of the flour shipped from nearby Isinours Station came from Clear Grit. Although never legally platted, the community contained a variety of businesses and a population of 107 by 1880. Financial problems forced Kaercher to sell the mill in 1881. Poor wheat crops and the disinterest on the part of the new owner led to the decline of the mill and the community. The mill was dismantled in 1885. Little evidence of the town's existence remains today. The town site lies 1/4 mile to the east of the Harmony-Preston Valley Trail junction.

Preston was initially settled in 1853. The village was platted two years later and given its

name by its founder and mill owner, John Kaercher. The name was chosen to honor Kaercher's millwright, Luther Preston. Soon after, when a post office of the same name was established, Luther Preston was also appointed the first postmaster. The city of Preston, which is located in the geographic center of Fillmore County, has been the county seat since 1856. Situated on the South Branch of the Root River, the community was an early center for the flour milling industry. First incorporated in 1871, the city was platted into 11 blocks with one reserved for a court house square.

Harmony was settled as a township in the fall of 1852. As was true for the majority of townships in Fillmore and Houston counties, it was organized on May 11, 1858. The village was not founded until 1880, shortly after the arrival of the railroad. Popular for its time, the name has been given to communities in at least 15 other states. However, local legend states that at a meeting to select a name, each group of settlers wanted the new village to be named after its leader and there was much loud bickering. An exasperated chairman finally banged down his gavel and said, "Let's have HARMONY here!"

## Socioeconomic Resources

### Demographics

The combined 1990 population of Fillmore and Houston counties totaled 39,274. A 1991 estimate made by the State Demographer's office indicates a slight increase of 139 people since 1990. The 12 counties that make up southeastern Minnesota contain a population of 438,173. While substantial numbers of this local or regional population use the Root River State Trail, the impact of the trail extends far beyond this limited area. A survey conducted by the DNR's Trails and Waterways Unit in the summer of 1990 revealed that an estimated 18,900 people used the trail during the summer season. (A conservative estimate suggests a 20 percent increase in 1991, or about 22,700 summer users.) Observations made by DNR field personnel, unrelated to the survey, suggest higher use numbers for the season, perhaps more than 25,000 users. It was also reported that 67% of the interviewed trail users were non-resident, or more than 25 miles away from home. Trail users were an average of 82.2 miles from his or her permanent home.

A radius of 150 miles around the Root River Trail was established as the primary market area for visitors to the trail. Obviously, many users are drawn from beyond 150 miles, but it was felt that 150 miles was a reasonable distance for most users to travel for a one or possibly two day visit. This area includes major portions of Minnesota, Iowa, Wisconsin, and a small corner of Illinois. The total 1990 population of this area was in excess of **5.5 million**. Included within this area are the Twin Cities Metro Area, Rochester, Mankato, and Winona, as well as many major urban centers in Iowa and Wisconsin.

While the Blufflands trail region is typified by a low density population, which is scattered among farms and small communities, its location places it within an easy drive of many major cities in the Midwest.

In addition to the sheer numbers of people within the region and market area, changes in the makeup of the population must be examined. For example, changes in the age composition will have a significant impact on the popularity of various recreational activities. Minnesota's aging "Baby Boomers" are projected to increase the population of those between 35 and 54 by more than 50 percent by the year 2000. By contrast, those between 15 and 34 are expected to decrease by 14 percent during the same period. While the demand for baseball and softball fields may decline by 4 percent, an expected increase of 16 percent in hiking/walking will create pressure for more trail oriented recreation.

### The Economic Impact of Tourism

Domestic travel and tourism in Minnesota generated a total of 97,498 jobs, \$1.7 billion in wages or salaries, and \$5 billion in gross receipts in 1990. While the Twin Cities metro region accounted for 53.2 percent of the total receipts, the state's other five tourism regions shared the remaining 46.8 percent. As might be expected, these regional shares were not equal. The northcentral region, with its many attractive lakes and pine-covered landscape, claimed the largest share at 12.4 percent of the state's total receipts. However, southeastern

Minnesota followed closely with 11.6 percent, ranking it third among the six regions of Minnesota.

As shown by the following table, Olmsted County generated most of the receipts for the region. Much of this, of course, is due to travel related to the Mayo Clinic at Rochester. Freeborn, Goodhue, and Winona counties generated large receipts because of their locations along major travel corridors. Albert Lea, with a population of nearly 20,000 and as the county seat for Freeborn County, is strategically located at the intersection of I-35 and I-90. Goodhue and Winona counties benefit from their locations on the Mississippi River, the Great River Road, and U.S. Highway 61.

<b>ESTIMATED ECONOMIC IMPACT OF TOURISM</b>			
<b>County</b>	<b>Employment (No. of Jobs)</b>	<b>Wages Paid (Millions of \$)</b>	<b>Gross Receipts (Millions of \$)</b>
Dodge	N.A.	N.A.	N.A.
<b>Fillmore</b>	<b>137</b>	<b>2.35</b>	<b>6.96</b>
Freeborn	564	9.66	28.54
Goodhue	1053	18.08	53.37
<b>Houston</b>	<b>495</b>	<b>8.50</b>	<b>25.10</b>
Mower	113	1.93	5.69
Olmsted	7580	136.56	390.75
Rice	382	6.53	19.33
Steele	149	2.52	7.52
Wabasha	79	1.35	4.02
Waseca	87	1.48	4.36
Winona	594	10.18	30.12

N.A.= Not applicable. No data available from the Minnesota Department of Revenue.

*Source: Estimates of Economic Impact of Domestic Travel in Minnesota in 1990, Minnesota Office of Tourism.*

When compared to some of the larger, more urban counties in Minnesota, the economic impact of tourism on Fillmore and Houston counties appears quite modest. However, relative to their smaller populations, the jobs, wages, and travel expenditures have a substantial impact within the two counties.



The growing popularity of Houston and Fillmore counties is shown by the very large increases in gross sales in lodging (hotels/motels, resorts, etc.) over the last few years. Fillmore County sales rose from \$233,000 in 1989 to \$994,000 in 1991. The sales in Houston County rose from \$561,000 to \$622,000 during the same time. While the impact of tourism is still modest in the two counties, it is growing and there is great potential for attracting more visitors to the area. As reported in the 1990 Tourism Research Report, prepared by St. Mary's College, visitors to southeastern Minnesota most enjoy the area's scenery and natural beauty. Based upon a survey of 300 tourist parties that had visited the three-county area (Fillmore, Houston, and Winona counties) between July 1, 1989 and July 1, 1990, this research revealed much about the visits to the area. The most important findings are summarized below:

- \* By far, the most often mentioned influence on the decision to visit southeastern Minnesota was word-of-mouth (friends and relatives). Tourism pamphlets, brochures or fliers, and stories or articles were also cited.
- \* Apart from visiting friends or relatives, the most important reason for the trip was to enjoy the scenery or natural beauty. Most visitors (81%) went sightseeing.
- \* Summer accounted for most visits (53%), followed by fall (22%).
- \* Most (70%) stayed three days or less. Over half (53%) stayed in four communities (Winona-18%, Lanesboro-15%, Caledonia-10%, and Rochester-10%).
- \* Campgrounds accounted for 30% of the respondents' lodging choices, followed by hotels/motels (29%) and bed and breakfast accommodations (21%).
- \* Nearly 60% of the respondents participated in some type of outdoor activity, including such trail oriented activities as hiking (36%) and bicycling (13%).
- \* Forty-one percent of the respondents spent \$200 or more in southeastern Minnesota.
- \* Eighty percent of the respondents have recommended southeastern Minnesota to others and over half plan to return to southeastern Minnesota.

Report findings recommend that a variety of advertising be continued and even increased to promote the area. Theme and media should be reviewed to ensure maximum effectiveness. Since most travel to the area occurs during the summer and fall, promotional efforts should be geared to these seasons. Also, since visitors did not stay in the area very long, some thought should be given to inducing them to extend their visits, a task possibly made easier in that nearly 40 percent of the respondents said there were activities of interest for which there was no time for participation.

## The Regional Economy

Despite a strong traditional tie to agriculture, the economy of the two counties is quite diverse. Manufacturing represents nearly 18 percent of total employment (20% in Fillmore County). The largest manufacturing employers are Rush Products, a maker of automobile switches in Rushford, and Northern Engraving, an automobile instrument panel manufacturer in Spring Grove. Other major industries in the area produce electronic components, library software, recycling balers, roof trusses, fabricated steel, dairy products, and a variety of building products. Apples and the production of apple products are important to the economy of La Crescent.

As reported by the Minnesota Department of Jobs and Training, manufacturing jobs have been growing within most counties of southeastern Minnesota. Between 1982 and 1991, manufacturing jobs grew by 58% in Fillmore County and 41% in Houston County.

Another major growth component is in retail trade and services. Governmental services, education, and health care are the area's largest service employers. Besides the usual downtown businesses, such specialized services as the sales and repair of farm machinery, livestock dealers, feed and fertilizer sales, and trucking add an additional economic dimension. As stated earlier, tourism plays a small, but growing part of the local economy. About 12.5 percent of the jobs in Houston County are directly related to tourism or the travel industry. In 1990, only 2.4 percent of Fillmore County jobs were found in the tourism sector, a percentage that may have increased since then.

As indicated by the chart below, employment in the two counties is quite stable. The unemployment rate is under the average for the state as a whole.

Employment (Number of Jobs)				
County	Manufacturing	Non-Mfg.	Total	Unemployment Rate
Fillmore	1,144	4,598	5,742	5.8%
Houston	580	3,391	3,971	4.4%

*Source: Community Profiles, Minnesota Department of Trade and Economic Development, 1990 county annual average employment data & 1991 annual average unemployment data.*

## **Other Recreational Resources: A Regional Overview**

The Bluffland Trail System is located in a region of abundant outdoor recreational resources. Unlike counties in northern Minnesota, however, very little land is in public ownership.

Only 4.5 percent (about 65 square miles) of the land area in Fillmore and Houston counties is owned by county, state, or federal governments. Approximately 85 percent of the land in the two counties is in individual farm ownership. While the region is devoid of lakes and extensive pine forests, its rugged bluffs, pastoral landscapes, hardwood forests and deep river valleys have their own, unique appeal.

### Rivers and Streams

The lack of lakes in the region is offset by the presence of numerous rivers and creeks. Some 365 miles of state designated trout streams are found in the two counties. As mentioned earlier, this region is one of the two major trout fishing areas in Minnesota. In addition, the warmer water of the Mississippi and the main channel of the Root offer excellent fishing for other species of game fish.

The Mississippi and Root rivers are also state designated canoe and boating routes. There are eight carry-in access points for canoe launching on the Root and four water access areas or boat launching ramps on the Mississippi. In addition, four canoe-only camping sites will be found on the Root. Canoe rental or outfitters are at Chatfield, Lanesboro, and Rushford. The extensive wetland acres of the National Upper Mississippi River Wildlife and Fish Refuge form Houston County's eastern border.

### State Forests

There are 17 units of the Richard J. Dorer Memorial Hardwood State Forest in the two counties. While all are available for some type of recreational activities, typically hunting and fishing, some units permit a much broader range of recreation. A limited number of campsites are available at the Isinours, Oak Ridge, and Reno Units. Campsites range from walk-in sites to those accommodating vehicles and horseback riders. In addition, several units have developed trails for a variety of recreational activities. The following chart shows trail miles.

## Trails in the Richard J. Dorer Memorial Hardwood Forest

Unit	Hiking	Cross-Country Skiing	Horseback Riding	Snowmobiling
Brightsdale	5.7	5.7	--	--
Money Creek	4.0	--	4.0	4.0
Isinours	3.2	3.2	--	--
Oak Ridge	8.8	8.8	8.8	2.2
Reno	9.5	--	9.5	9.5

### State Parks

The Bluffland Trail System will eventually be connected to two popular state parks. While not part of the present plan for the Harmony-Preston Valley Trail, a future trail extension to Forestville and Mystery Cave State Park (about five miles west of Preston) and beyond is under consideration. Eventual completion of the trail system on the east will provide a connection to Beaver Creek Valley State Park. While both parks have many similar facilities, each has its own distinct character. Lake Louise State Park will be connected on the Shooting Star Trail.

Forestville and Mystery Cave State Park covers 2,691 acres of stream dissected landscape, which includes gentle to steep or rugged topography. More than 60 percent of the area is covered by northern hardwoods and includes about 1,000 acres of uncut timber originally preserved by the Meighen family. The South Branch of the Root River and two other streams flowing through the park provide excellent trout fishing. A great variety and abundance of wildflowers exist in the park during the spring and summer months.

As mentioned earlier, the park is the site of historic town of Forestville and its only remaining brick building, the Meighen store. Historic interpretation of this "ghost town" site and cave tours of Mystery Cave are two unique attractions in the park. Mystery Cave is a large limestone cave with 12 miles of mapped passageways. The cave visitor will see a small lake, stalactites, stalagmites, and numerous fossils.

Campgrounds include 73 drive-in sites, 80 equestrian campsites, and a group camp for 100 people. Trail development consists of 14 miles for horseback riding and 16 miles for hiking. For winter use, there are 6.5 miles available for cross-country skiing and 9 miles set aside for snowmobiling.

Beaver Creek Valley State Park encloses 1,214 acres of rugged landscape within the extreme eastern portion of the driftless area. Nearly half the park's area has a slope greater than 12

percent. The valley walls, composed of a sandstone layer sandwiched between two layers of dolomite, rise as much as 250 feet above Beaver Creek. One of the major scenic attractions is the big spring that percolates from the base of a bluff and gives origin to the park's namesake.

The park's major natural amenities include the valley's steep, forested slopes, a high quality trout stream, a fresh water spring, a wide variety of wildlife, significant areas of rare or unique plant species, and several scenic vistas. Campgrounds consist of 42 drive-in sites, 6 walk-in sites, and a group camp for 75 people. There are 8 miles of developed hiking trails and a short segment (0.5 mile) of snowmobile trail.

### County Parks

Houston County's Wildcat County Park provides a small, but attractive recreational resource on the Mississippi River. Its 104 acres include a boat launching ramp on the Mississippi, hiking trails, 65 drive-in campsites, and picnic facilities. Swimming and fishing are also permitted in the park.

### **Existing Trails**

The Root River State Trail is a multiple use trail that parallels the Root River for 35 miles in Fillmore and Houston counties. Hiking is permitted for its entire length. The paved treadway (29 miles between Fountain and Rushford) is available for bicycling in the summer and cross-country skiing in the winter. The six mile segment between Rushford and Money Creek was paved in the fall of 1995. Snowmobiling is permitted on this trail segment in the winter. Plans are underway to extend the trail six miles eastward to Houston.

Grant-In-Aid Trails provide many additional miles of snowmobile trails for winter use in the two county region. Seven trails with a total of about 475 miles are administered by Fillmore and Houston counties. The Valley Crest Trail, administered by the city of Rushford, adds another 105 miles to the snowmobile trail system.

### Other Public and Private Recreational Opportunities

Additional recreational resources include about 20 city parks. Most contain picnic grounds and six have developed campgrounds. Other attractions open to the public consist of 10 golf courses, 10 privately operated campgrounds with more than 1300 campsites, and several municipal swimming pools.

The state designated Great River Road (TH 26) marks the eastern edge of Houston County. While serving as an alternate route to the National Great River Road, which is located on the Wisconsin side of the Mississippi, this state highway generates a substantial amount of tourist traffic and must be considered as a definite recreational resource.

Two additional state facilities are of interest to many visitors. The DNR's Isinours Demonstration Woodland on the Root River State Trail provides an outdoor experience for

those interested in how proper forestry techniques can be used to restore badly eroded land. Peterson State Hatchery, the DNR's largest cold-water fish hatchery, just a short distance south of Lanesboro, produces 1.5 million trout annually. Visits to the hatchery can be arranged at the trail center in the Lanesboro Historical Society Museum.

A special attraction for trail users and tourists is Niagara Cave. Located only five miles southwest of Harmony, Niagara Cave is one of two or three large commercial caves in Minnesota. As briefly mentioned earlier, it was formed by the gradual dissolving of Galena Limestone. It is a deep, single passage cave with a dramatic sinkhole entrance. Also, the cave contains a spectacular 60 foot waterfall.

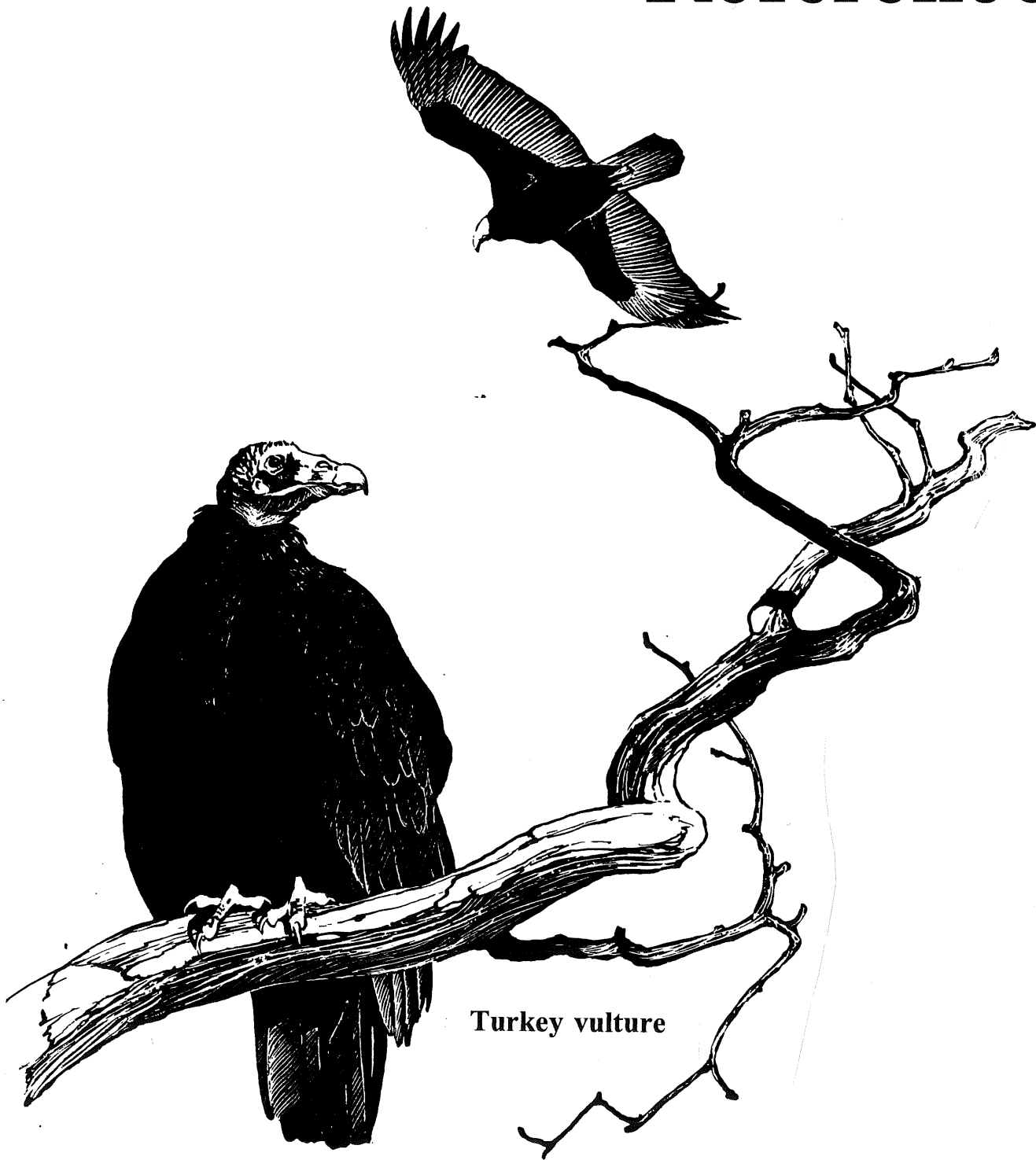
The Forest Resource Center is a private, non-profit environmental learning center located approximately six miles north of Lanesboro. Programs demonstrating how to manage forestry resources for wise multiple use are offered here. Future plans call for hiring full time naturalists and building a dormitory.

### Lodging

While southeastern Minnesota is not commonly known as a resort area, its unique attractions are rapidly being discovered by the travel industry. The two counties contain only 11 hotel/motels with a total of about 150 units or rooms. However, nearly every larger community has at least one motel or hotel. By contrast, bed and breakfast accommodations appear to be "booming." Currently, there are 17 B & B's with a combined total of 73 rooms. They range from one room to as many as 12 rooms per establishment. Given their growing popularity and the historic character of the region, it is likely that more B & B's will be established in the future. A few resort cabins and a hostel within the historic Allis Barn provide additional lodging facilities.



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Turkey vulture



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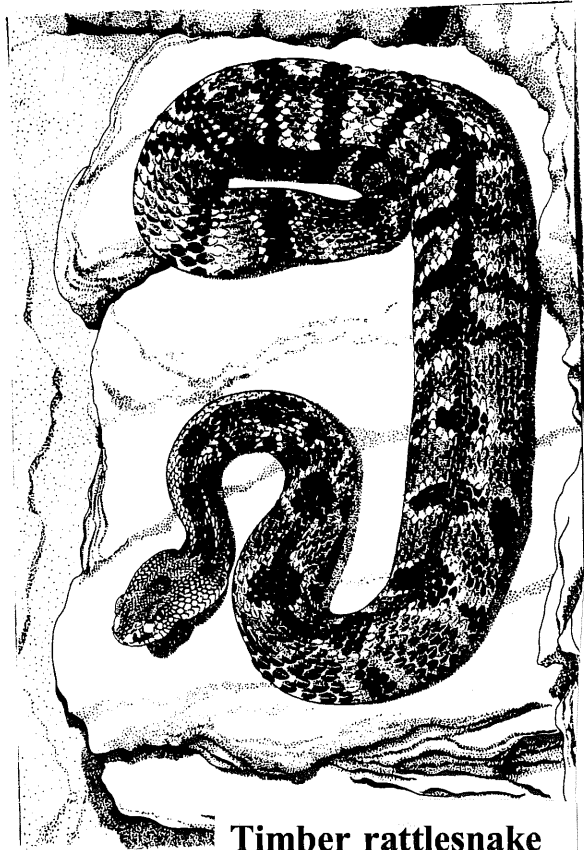
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# Appendices



**Timber rattlesnake**

## APPENDIX A

This section covers Minnesota laws and Trails and Waterways policies regarding issues of easements for public and private crossings, cattle passes, fencing, and trespass on public land.

### Public Crossings

All public crossings (i.e., state, county, township, and so forth) which are in existence at the time the Department of Natural Resources (DNR) has acquired the abandoned railroad right-of-way should be investigated to determine under what authority such crossings exists.

If the public body is capable of producing a legal document (i.e., road order, easement, license, lease, crossing agreement, deed, or final certificate of condemnation) the State will honor all terms of such document. Documents of this nature, when they exist, are usually in the possession of the railroad. Therefore, prior to the real estate closing of the State's acquisition, a request to the railroad should be made for all documents pertaining to crossings.

Where the road authority is unable to supply the State with a legal document which evidences their authority to cross the right-of-way, it shall be presumed that either (1) such road had at one time been legally laid out, but the usual accompanying documentation is no longer in existence; or (2) such road finds its authority in statutory dedication, see Minnesota Statutes, Section 160.05, Subdivision. 1. In either case, the State will recognize the crossing only to the extent of actual use, plus that portion reasonably necessary for maintenance and considerations of safety. In the event the road authority desires to upgrade the road through widening, any such widening shall be considered by the State as an enlargement of the original grant or dedication which will require a conveyance from the State pursuant to Minnesota Statutes, Section 84.63.

All state, county, or township road rights-of-way established after the DNR has acquired the railroad right-of-way must be supported by the State's conveyance of the appropriate easement pursuant to Minnesota Statutes, Section 84.63. Such conveyance shall be made at an appraised value.

All other roads that the state, county, or township declines to certify as a public road will be deemed a private road and subject to the rules governing a private road if it is being used by a private party, subject to the rights of the private party to prove otherwise.

### Private Crossings

All private crossings of the railroad right-of-way, which exist at the time the DNR acquired the abandoned railroad right-of-way, will be recognized according to and to the extent of the terms found in the written agreements with the railroad. At such time as the written agreements with the railroad expire, a new agreement with the State, usually in the form of an

easement, may be entered into. Further, if work is contemplated beyond the limits of the original written agreement, a new agreement with the State may be appropriate.

All private crossings of the railroad right-of-way which exist at the time the DNR acquired the abandoned railroad right-of-way, and for which no documentation exists, may be recognized to the extent of actual use where it can be demonstrated to the State that said roadway did, in fact, exist previous to the State's acquisition. Such proof may take the form of affidavits, aerial or other photographs, written documentation, site inspection, and any other evidence which, in the sole opinion of the DNR, demonstrates the presence of a private crossing. The width of the right-of-way shall be determined by the State and subsequently documented in an easement, long term lease (+10 years), or other agreement between the State and the private party. Such transactions require the party applying for the crossing to pay costs based on the market value of the crossing area.

All private crossings established after the State has acquired the railroad right-of-way must be supported by an easement, lease, or other written agreement from the State at an appraised value. The decision to convey such an easement, including its terms and conditions, will be at the sole discretion of the State. The requirements of Minnesota Statutes, Section 84.631, control this situation.

#### **M.S. 84.631 ROAD EASEMENTS ACROSS STATE LANDS.**

The commissioner, on behalf of the state, may convey a road easement across state land under the commissioner's jurisdiction other than school trust land, to a private person requesting an easement for access to property owned by the person only if the following requirements are met: (1) there are no reasonable alternatives to obtain access to the property; and (2) the exercise of the easement will not cause significant adverse environmental or natural resource management impacts. The commissioner shall:

- (1) require the applicant to pay the market value of the easement;
- (2) provide that the easement reverts to the state in the event of nonuse; and
- (3) impose other terms and conditions of use as necessary and appropriate under the circumstances.

Potential impact on the trail user is the paramount consideration in granting an easement for any new crossings. Trails and Waterways field personnel will work with adjacent landowners who request a new crossing, prior to submitting a request for an easement to the DNR Bureau of Real Estate Management. There is a fee for easements that are granted.

Following are some of the general criteria which will be considered in granting an easement or lease for a new crossing.

- If the private crossing goes from state property onto a public road, it is the private party's responsibility to get the entry permit to the public road.
- Crossings must be perpendicular to the trail.
- Traffic on private road crossings will be required to stop prior to crossing the trail.
- Crossings will not be granted where there is inadequate sight distance, due to hills or

curves.

- New crossings should be kept to a minimum to the greatest extent possible. Using a frontage road parallel to the trail right-of-way to consolidate multiple new crossings is preferable.
- Crossings should be located and constructed with the least impact to the environment.

### **Parallel Roads**

The policy of the State relative to roads running parallel to trails shall be same as the state's crossings policy as discussed above.

### **Existing Cattle Passes**

Persons owning lands bisected by a state trail who have an existing cattle pass at the time of the purchase by the state from a railroad may continue to use the cattle pass as long as it is used in such a manner as not to obstruct or impair the use of the trail. The cattle pass shall be on a lease basis (unless a recorded agreement with the railroad existed) and shall be maintained and kept in repair by the adjacent owner. If a recorded agreement existed, the State will honor the terms of the agreement.

It is the responsibility of the private party to maintain the cattle pass, at their expense, in a manner that protects and preserves the public's ability to use the trail.

### **New Cattle Passes**

Persons owning grazing lands bisected by a state trail may construct, at their own expense, cattle passes under, over, or across the trail in such a manner as not to obstruct or impair the use of the trail. The cattle pass shall be on a lease basis and shall be maintained and kept in repair by the landowner.

In the case where a major surfacing or rehabilitation project is taking place in the area of the proposed cattle pass and said cattle pass is determined to be of benefit to the state and shall not obstruct or impair the use of said trail, the state will construct the cattle pass in equal shares with the adjoining owner, but the cattle pass shall be maintained and kept in repair by the adjacent owner.

### **Utility Crossings**

Utility crossings will be granted in compliance to Minnesota State Regulations Natural Resources 5100.

### **Fencing**

The DNR's fencing policy for the Root River State Trail and the Blufflands Trail System is as

follows:

The reasons for fencing include: first, the protection of adjacent landowners from trespassing and property damage by trail users; and, second, the enclosure of pasture land adjacent to the trail. The state will provide for the construction and maintenance of a fence based upon a mutual agreement with the adjacent landowner. [Fences and natural barriers (rocks and vegetation) may also be installed to deter unauthorized trail use or encroachment].

If an existing fence on a common property line is in such a poor state of repair that it requires replacing and if the property owner is unable to do so, the State will negotiate an agreement equitable to both parties for the construction and maintenance of a new fence.

Where an existing fence is improperly placed on state land, the State will relocate the fence on the appropriate boundary, the cost shared equally by the state and the property owner.

If fencing is not covered by a local ordinance, the minimum standards stated in Minnesota Statutes, 1990, Section 344.02, will apply.

### **Trespass/Encroachment onto the Trail Right-of-Way**

Trespass (meaning illegally using public land, such as the trail right-of-way, for prohibited personal use or personal economic gain) is an issue at some sites along state trail rights-of-way. The trail right-of-way is not to be used by private individuals for agricultural purposes, commercial enterprises, storage, dumping or any other private use that detracts from trail use and enjoyment by the public. Structures such as deer stands are not permitted within the right-of-way. Minnesota statute 92.70, which follows, outlines the civil and criminal penalties for such trespass on public land.

### **M.S. 92.70 LAND USE TRESPASS.**

Subdivision 1. **Public land definition.** "Public land" means publicly owned land or interests in land including land and interests in land that are owned by the state, counties, or road authorities, administered by the commissioner of natural resources, owned by the state as beds of navigable waters, acquired as conservation easements with benefits running to the state, a county, or the public under the conservation reserve program, water bank program, or other state or county programs.

Subdivision 2. **Casual trespass.** (a) A person who uses public land for personal use or personal economic gain where the use is prohibited is guilty of trespass and a petty misdemeanor and shall be subject to a penalty not to exceed \$50 per occurrence and is subject to a civil penalty for twice the amount of actual damages. (b) A person violating paragraph (a) may be issued a ticket by a sheriff, conservation officer, or personnel of the department designated by the commissioner. The ticket must identify the trespass, where the trespass occurred, and the official observing the ticket. A copy of the ticket must be sent to the public agency responsible for managing it. Penalty shall be paid to the public agency responsible for



managing the land. (c) A civil penalty paid to the state is appropriated to the state agency responsible for managing the land to restore the damage and improve state land. (d) Within 60 days after a ticket is issued, the public agency responsible for managing the public land where the trespass occurred must make a determination of whether civil penalty will be sought for the trespass and notify the person.

Subdivision. 3. **Willful trespass.** (a) A person who willfully and knowingly uses public land for personal use or personal economic gain where the use is prohibited is guilty of trespass and a misdemeanor and is liable to the state or county for a civil penalty three times the amount of the damage. (b) A person violating paragraph (a) may be issued a ticket and summons for a court appearance. The prosecuting authority shall prosecute the misdemeanor and shall bring an action for the civil penalty or, on failure to do so, the attorney general at the request of the public agency responsible for managing the land may prosecute the misdemeanor and shall bring an action for the civil penalty. (c) Damages must be determined as the greater of: (1) the cost to restore the public land to the condition it was in before the trespass occurred plus an amount to compensate the public for the loss of use; or (2) the economic gain realized by the person committing the trespass. (d) The civil penalty shall be paid to the court and the court administrator shall pay: (1) for a trespass on county land, the entire amount to the county to be used for restoration of the trespass and county land improvement purposes; responsible for (2) for a trespass on state land, the civil penalty to the state agency responsible for managing the public land which is appropriated for restoration of the trespass land improvement purposes.

Subdivision 4. **Separate actions.** The prosecution for criminal trespass and the civil penalty are separate criminal and civil actions. If a trespass occurs, an action may be commenced for the criminal penalty, the civil penalty, or the civil penalty and the criminal.



## APPENDIX B

### Endangered, Threatened or Special Concern Plant Species Lists for Fillmore County

The following information about the endangered, threatened or special concern plant species found in Fillmore County is from *Minnesota's Endangered Flora and Fauna*, Barbara Coffin and Lee Pfannmuller, editors, 1988, and *Minnesota's Native Vegetation, A Key to Natural Communities, Version 1.5, 1993*. The list may be expanded, following completion of the Minnesota County Biological Survey (MCBS) in 1994-6. Following the listing is a brief description of the plants and the natural communities where these plants may be found, as well as some of their common associates.

The status categories are defined in state statute. **Endangered** species are threatened with extinction throughout all or a portion of its range. Such species may be dependant on scarce, sensitive, and/or exploited habitat. State **threatened** species are those that are likely to become endangered within the foreseeable future, throughout all or a portion of its range. **Species of special concern** are those which are not endangered or threatened, but are extremely uncommon in Minnesota, or else have unique habitat requirements, and deserves careful monitoring of their status. A species on the periphery of its range that is not listed as threatened may be included in this category, along with those which were once threatened or endangered, but now have increasing, or protected, stable populations. Species whose breeding biology is affected by human activities are also included in this category.

This list is currently being revised, and many of the species which are listed as "proposed" may be upgraded to a protected status in 1995.

<u>Species</u>	<u>Common Name</u>	<u>State Status</u>
<i>Adoxa moschatellina</i>	Moschatel	Special concern
<i>Allium cernuum</i>	Wild Onion	Threatened
<i>Arenaria dawsonensis</i>	Rock Sandwort	Special concern
<i>Aristida tuberculosa</i>	Sea-beach Needlegrass	Special concern
<i>Asclepias amplexicaulis</i>	Clasping Milkweed	Special concern
<i>Asclepias sullivantii</i>	Sullivant's Milkweed	Threatened
<i>Aster shortii</i>	Short's Aster	Proposed special concern
<i>Athyrium pycnocarpon</i>	Narrow-leaved Spleenwort	Special concern
<i>Baptisia bracteata</i> var. <i>glabrescens</i>	Wild Indigo	Special concern
<i>Cacalia muhlenbergia</i>	a species of Indian-plantain	Proposed special concern
<i>Cacalia suaveolens</i>	Sweet-smelling Indian-plantain	Endangered
<i>Cacalia plantaginea</i>	Tuberous Indian-plantain	Threatened
<i>Carex careyana</i>	Carey's sedge	Proposed threatened
<i>Carex laevivaginata</i>	a species of sedge	Proposed threatened
<i>Carex woodii</i>	Wood's Sedge	Special concern
<i>Chrysosplenium iowense</i>	a species of Golden Saxifrage	Endangered
<i>Cirsium Hilli</i>	Hill's Thistle	Special concern
<i>Cypripedium candidum</i>	Small White Lady's-slipper	Special concern
<i>Desmodium cuspidatum</i> var. <i>longifolium</i>	Large-bracted Tick-trefoil	Special concern
<i>Desmodium illinoense</i>	Illinois Tick-trefoil	Threatened
<i>Desmodium nudiflorum</i>	Stemless Tick-trefoil	Proposed special concern
<i>Dicentra canadensis</i>	Squirrel-corn	Special concern
<i>Dodecatheon amethystinum</i>	Jeweled Shooting Star	Proposed special concern
<i>Draba arabisans</i>	a species of Whitlow Grass	Special concern
<i>Dryopteris goldiana</i>	Goldie's Fern	Special concern
<i>Eryngium yuccifolium</i>	Rattlesnake Master	Special concern
<i>Hamamelis virginiana</i>	Witch-hazel	Special concern
<i>Hydrastis canadensis</i>	Golden-seal	Endangered
<i>Iodanthus pinnatifidus</i>	Purple Rocket	Proposed special concern
<i>Jeffersonia diphylla</i>	Twinleaf	Threatened
<i>Lechea tenuifolia</i>	Narrow-leaved Pin Weed	Proposed endangered
<i>Melica nitens</i>	Three-flowered Nitens	Threatened
<i>Napaea dioica</i>	Glade Mallow	Endangered
<i>Orobanche fasciculata</i>	Clustered Broom-rape	Special concern
<i>Orobanche uniflora</i>	One-flowered Broom-rape	Special concern
<i>Panax quinquefolium</i>	Ginseng	Special concern
<i>Paronychia canadensis</i>	Canadian Forked Chickweed	Proposed special concern
<i>Parthenium integrifolium</i>	Wild Quinine	Endangered
<i>Pellaea atropurpurea</i>	Purple Cliff-brake	Threatened
<i>Phegopteris hexagonoptera</i>	Broad Beech Fern	Special concern
<i>Poa wolfii</i>	Wolf's Junegrass	Special Concern
<i>Polytaenia nuttallii</i>	Prairie-parsley	Proposed endangered
<i>Psoralea tenuiflora</i>	Slender-leaved Scurf Pea	Proposed special concern
<i>Sanicula trifoliata</i>	Black Snakeroot	Special concern
<i>Sedum integrifolium</i> ssp. <i>leedyi</i>	Leedy's Roseroot	Endangered
<i>Silene nivea</i>	Snowy Campion	Proposed threatened
<i>Solidago sciaphila</i>	Cliff Goldenrod	Special concern
<i>Sullivantia renifolia</i>	Reniform Sullivantia	Endangered
<i>Talinum rugospermum</i>	Rough-seeded Fameflower	Endangered
<i>Tephrosia virginiana</i>	Goat's-rue	Special concern
<i>Tradescantia ohioensis</i>	Ohio Spiderwort	Special concern
<i>Trillium nivale</i>	Snow Trillium	Special concern
<i>Valeriana edulis</i> ssp. <i>ciliata</i>	Valerian	Threatened
<i>Verbena simplex</i>	Narrow-leaved vervain	Special concern

Species within the **natural community groups I-IV** can be found within any type of natural community of that group, but tend to occur more frequently in the type they are listed under.

**Group I** include these natural community types: the *Dry Prairie - Bedrock Bluff Subtype*, *Jack Pine Barrens/Dry Oak Savanna - Barrens Subtype*, *Dry prairie - Barrens Subtype*, and the Primary Community, *Dry Cliff*.

#### Dry Prairie - Bedrock Bluff Subtype

These sunny, exposed habitats can be found along steep, south-facing bluffs. In southeastern Minnesota, *Verbena simplex* (narrow-leaved vervain), a species of special concern, is found on loose, gravelly soils on the edge of its natural range. It is more abundant in the Kansas-Missouri region.

*Psoralea tenuiflora*, the slender-leaved scurf pea, has been rediscovered near Rushford on a rocky, south-facing hillside. It is common over parts of the southern and central Great Plains, but is a proposed species of special concern in Minnesota.

Another species with a preference for sandy, dry, open sites on is the Ohio spiderwort (*Tradescantia ohioensis*) which is on the northern periphery of its range in southeastern Minnesota.

A species proposed for the state endangered list is *Polytaenia nuttallii*, the prairie parsley. It was once collected near Lanesboro, but has not been recorded recently, and may be extirpated from Minnesota. It occurs in rocky prairies, savannas and glades.

*Cirsium Hilli*, Hill's thistle, is a species of special concern which prefers dry, sandy or gravelly soil in prairie or open woods.

*Orobanche uniflora* (one-flowered broom-rape) is an essentially subterranean and inconspicuous species of special concern. Like all plants of this species, it is an obligate root parasite, and does not perform photosynthesis.

*Orobanche fasciculata*, the clustered broom-rape, is parasitic, primarily on the roots of *Artemisia* (wormwood) species. Since it derives its nutrition from its host plant, it contains no green chlorophyll, and is shades of brown and purple.

*Baptisia bracteata* var. *glabrescens*, the wild indigo, can be found along mesic habitat along an abandoned rail grade SNA in Mower County, as well as more xeric habitat in goat prairies and sand dunes in southeast Minnesota.

*Desmodium illinoense*, the Illinois tick-trefoil, is a threatened species which reaches the northern edge of its range here in southeastern Minnesota. This is a large perennial legume whose stem is covered with hooked hairs, which give it a 'sticky' feel.

*Cacalia plantaginea*, the tuberous Indian-plantain, is a threatened species has declined as populations once continuous across southern Minnesota have been reduced to a remnant colonies of a few individuals, which may be incapable of supporting a viable population. *Dodecatheon amethystinum*, the jeweled shooting star, is proposed for special concern status, as it is rare or threatened wherever its scattered, disjunct populations are found.

#### Dry Cliff (Primary Community)

*Poa Wolfii*, Wolf's Junegrass, is a special concern species found on dry slopes.

*Pellaea atropurpurea* is a small, evergreen fern on Minnesota's threatened species list. This purple cliff brake is found on dry, exposed ledges of sandstone or dolomite on steep, southwest facing cliffs that are baked by the sun.

*Solidago sciaphila* (cliff goldenrod) is found in crevices of sandstone or dolomite cliffs and outcrops, or in sandy, rocky, south-facing hillsides. Its status as a species of special concern is based on its habitat requirements and its limited range.

Dolomite ledges/sandstone outcrops or dry, rocky hills in Fillmore county provide the southernmost recorded locations for *Arenaria dawsonensis* (rock sandwort). The rest of the natural range of this species of special concern is far to the north in Alaska and extreme northern Canada.

#### Dry prairie - barrens subtype (openings in savannah and jack pine)

*Talinum rugospermum*, the rough-seeded fameflower, an endangered species, is found only in an extremely limited range in southeastern Minnesota, and bordering areas of Iowa and Wisconsin on xeric sand dunes near the Mississippi or its tributaries. One of the distinctive features of this species is the precise flowering time period, from 3 to 6 in the afternoon.

*Lechea tenuifolia*, the narrow-leaved pin-weed, a proposed endangered species, is found in dry, open areas.

*Aristida tuberculosa*, the sea-beach-needlegrass, is found on the Gulf Coast, as well as here in its secondary range, in the midwest, where it is limited to sandy areas.

There are recent records of the grass *Melica nitens* (three-flowered melic) near Peterson, and along an abandoned railroad ROW near Hokah in neighboring Houston County, and historical records of this distinctive prairie grass near Whalan and Rushford. This threatened species is on the northern edge of its distributional range in the Root River Valley.

*Asclepias amplexicaulis* (clasping milkweed), a special concern species, is on the extreme northwest edge of its natural range in Minnesota, and is locally common over many of the eastern states. Fire may be necessary to maintain the vegetation succession pattern this plant requires. Small colonies of this plant have been found on sand barrens near Rushford.

#### Jack Pine Barrens/Dry Oak Savanna - Barrens Subtype

*Tephrosia virginiana* (goat's rue) is a species of special concern that also prefers the shifting sands and dry open sites of dunes or barrens. It is on the northern edge of its range in Minnesota, and seems unable to recolonize an area after disturbance.

*Paronychia canadensis* (Canadian forked chickweed) is known near Rushford in a dry, sandy jack pine woods. Southeastern Minnesota is the extreme western edge of the natural range limit for this species of special concern.

**Group II** natural communities include Wet Meadows and Emergent Marsh, as well as the seasonally wet Floodplain Forest and wet-mesic Lowland Hardwoods natural communities. These areas most often border streams.

Wet meadows, Emergent Marsh

*Carex laevivaginata*, a species of sedge, has been proposed for threatened status.

*Silene nivea* (snowy campion), a proposed threatened plant, has been found in association with *Napaea dioica* (glade mallow) in a grassy meadow near the banks of the Root River. It is uncommon over most of its range, which is limited to a few Midwestern states.

Floodplain Forest/Lowland Hardwood Forest

These moist or seasonally inundated, shady sites are the habitat for *Iodanthus pinnatifidus* (purple rocket), a proposed special concern species. There are no recent records, but it was once found in the Root River Valley in an area dominated by silver maple, and American elm.

*Cacalia muhlenbergia*, a species of Indian plantain, is a proposed species of special concern, and is found in openings in these wet forested natural communities.

*Cacalia suaveolens* (sweet-smelling Indian-plantain), an endangered species, was once found near Lanesboro, but the only known remaining Minnesota population is in Houston County. It is found in wet meadows along stream courses, or wet ditches.

*Napaea dioica* (glade mallow) is another endangered species which requires the moist conditions of alluvial meadows, or in the partial shade of a wet woodland edge. It is a distinctive, tall species that has been recorded on several tributary stream banks in Fillmore County. There is a new record for this species along the South Branch of the Root River near mile 2.9 of the trail. Common associates for both of these plants are *Heracleum lanatum* (cow-parsnip), *Angelica atropurpurea* (alexanders), *Silphium perfoliatum* (cup plant), and *Rudbeckia laciniata* (cut-leaved coneflower).



### Group III

#### Maple Basswood Forest

*Carex careyana*, Carey's sedge, is a proposed threatened species found in moist wooded areas.

*Trillium nivale*, the snow trillium, is the first trillium to bloom in early spring, and is also the smallest of the family. Its rarity and popularity with gardeners has earned it status as a species of special concern.

The roots of endangered *Hydrastis canadensis*, or golden-seal, have been extensively collected for folk-medicine. This herb is found only in undisturbed wooded mesic slopes or ravines, often in association with squirrel-corn and twinleaf.

*Jeffersonia diphylla*'s Latin name has the same meaning as its common name of twinleaf, from the division of each leaf into two leaflets. This is at the northwestern limit of its range in southeastern Minnesota.

*Dicentra canadensis* (squirrel corn) is a spring ephemeral similar to the common Dutchman's Breeches, but has a smaller geographic range and is more rare. All of the sites within Minnesota are in the Paleozoic Plateau. It grows in the thin humus under deciduous woods on sandstone slopes.

*Athyrium pycnocarpon* (narrow-leaved spleenwort), a special concern species of fern, is only found in deeply wooded stream valleys, and reaches the northwestern limit of its range in Southeast Minnesota. Common associates include *Athyrium thelypteroides* (silvery spleenwort), and *Dryopteris goldiana* (Goldie's fern). Goldie's fern, a special concern species, is rare over much of its range in the Northeastern United States, and reaches the limit of its range in Minnesota.

Another fern species of special concern is the *Phegopteris hexagonoptera*, the broad beech fern. In Minnesota, this fern is restricted to a small area of the Paleozoic plateau. It is found on north-facing slopes with a canopy of elm, maple oak or basswood.

*Sanicula trifoliata* (black snakeroot), a species of special concern, was noted by the MCBS on a steep wooded slope above the Root River, about 1/8 mile west of the second bridge over the Root River.

*Carex woodii* (Wood's sedge), a special concern species of sedge, shares a preference for these mesic, north-facing wooded slopes. This sedge is susceptible to grazing.

*Panax quinquefolium* (ginseng) is listed as a species of special concern due to its history of intense collection for commercial use. Native populations are threatened with extirpation over a significant proportion of their range.

*Allium cernuum*, the nodding onion, a threatened species, has been noted on steep wooded slopes on the banks opposite the trail near mile 4, and also within the town of Preston opposite the proposed Trout Run Trail.

#### Oak Forest - Mesic Subtype

*Aster Shortii* (Short's Aster) has been proposed as a species of special concern. This uncommon aster is on the northwestern limit of its range in southeastern Minnesota. prefers moist, forested slopes.

*Desmodium nudiflorum*, the stemless tick-trefoil, has been proposed as a species of special concern. It has been noted near Chatfield, in a forest of walnut, oak and basswood.

*Hamamelis virginiana* (witch-hazel) reaches the western limits of its range in Minnesota, and is only found in sheltered ravines in hardwood forests, or on rocky, shaded stream banks. It is a shrub noted for its spidery yellow blooms in late fall.

## Group IV

### Mesic prairie

Since 99% of the original prairie habitat in Minnesota has been converted to agriculture, the populations of many prairie species are restricted to isolated remnants, and the status of many species is deteriorating. Many cannot withstand grazing, pesticide use, or repeated haying, and show little ability to survive in degraded habitats. *Asclepias sullivantii* (Sullivant's milkweed), *Cacalia plantaginea* (tuberous Indian-plantain), *Erygium yuccifolium* (rattlesnake master), and *Parthenium integrifolium* (wild quinine) are frequently associated in the few remaining areas of suitable habitat.

Another species of special concern found in such areas is a prairie orchid – the small white lady's slipper, *Cypripedium candidum*. It is found in mesic and moist prairies, calcareous fens, and sedge meadows in other areas of the state. This orchid and *Valeriana edulis* spp. *ciliata* may also be found in moist microhabitats of bluff prairies.

*Valeriana edulis* spp. *cilliata* (valerian), a threatened species, is found in calcareous fens, meadows or wet prairies, often in association with other declining species such as Sullivant's milkweed, small white lady's slipper, and tuberous Indian-plantain. However, in the Paleozoic plateau area of southeastern Minnesota, it is also found on thin soil on exposed bluffs. This would seem to be quite different than its typical habitat, but it provides the same conditions of sunlight, moisture and pH. It has been documented near Preston, on a limestone bluff. While Minnesota is a stronghold for this species, it is declining or threatened in other states. The future of this orchid may depend on the stability of Minnesota's population, according to *Minnesota's Endangered Flora and Fauna*.

## Primary Communities

### Talus Slopes - Algific Subtype

*Chrysosplenium iowense*, an endangered species of golden saxifrage, is found only on these cold rocky slopes. The nearest populations of this saxifrage are found hundreds of miles to the north in Manitoba in boreal habitat. The conditions found here on algific talus slopes have allowed it to persist, but it is unable to survive the post-glacial conditions of the surrounding area.

*Adoxa moschatellina* (moschatel), is also thought to have been more widespread in preglacial era, but the subsequent warming trend left disjunct populations in isolated refuges, where the cold air draining from rocky fissures allow it to persist. Associates include *Carex media*, balsam fir, and several endemic land snails.

### Moist Cliff

*Sullivantia renifolia* (Reniform sullivantia), an endangered species, is another pre-glacial relict that is restricted to north or northeast facing cliffs, with cool water seeping through the porous rock, and the protection of an overhang. 250 plants of this species are all that remain in Minnesota, and the only other location where it may be found is a similarly restricted habitat in a small portion of the Ozarks. There is no recent record of it in Fillmore County, but the habitat that it requires is not easily converted to other uses, so there may be undiscovered populations.

### Moist Cliff - Maderate Subtype

*Sedum integrifolium ssp. leedyi* (Leedy's roseroot) roots into rock crevices on north-facing ledges of limestone cliffs that are constantly dripping wet.

Another rare disjunct species is also found on these cliffs: *Draba arabisans*, a species of whitlow-grass. This may be localized on to seams of calcareous strata.