This brief summarizes the extent to which unique historical and cultural resources in forested areas are affected by timber harvesting and forest management activities.

**Types of Heritage Resources**

Heritage resources reflect the history, contributions, and ongoing cultures of the ethnic groups that created this state. Thus, they represent values that are important to Minnesotans. They can be divided into five main categories: cultural landscapes, standing structures, archaeological sites, cemeteries, and traditional-use sites.

**Cultural landscapes** are a collection of features that represent interaction between humans and the environment. Cultural meaning can be assigned to natural features or features that have been made or modified by humans.

**Standing structures** include things like buildings made and used by people, generally in the recent past. Standing structures are rare within timberlands and consequently, are not further discussed.

**Archaeological sites** are located on or below the surface of the ground or underwater. They include two major categories: 1) Native American sites such as the remains of large and small villages, camps, and processing sites; and 2) Euro-American sites such as fur trading posts, homesteads, and logging camps.

Most of these sites are not visible at the ground surface and can be located only by using special techniques. Many of them are present within forested areas and could be adversely affected by timber harvesting activities.

**Cemeteries** may contain the remains of one or more human beings and are common on forested lands in Minnesota. These include Native American and Euro-American cemeteries.

**Traditional-use sites** are locations that have been used in the past by one or more groups of people for some type of activity. They may lack the physical evidence of artifacts or structures and are often characterized by plants, animals, and/or topography of cultural and religious significance to Native Americans.

**Site Location**

Heritage sites have been intermittently inventoried for over a hundred years, with most having been recorded over the last three decades. A listing of these known sites is maintained by the state archaeologist’s office and now contains over 3,000 records; less than 1 percent of all sites estimated to be in Minnesota. Besides being incomplete, this inventory contains numerous inaccuracies.

Predictive models estimate the likelihood of particular types of cultural heritage sites occurring on particular types of landscapes. For example, they indicate that most pre-Euro-American sites are probably located within 1,000 feet of past or present water features.
(including swamps, marshes, abandoned river channels, etc.).

### Site Density

Although no densities could be determined for cultural landscapes or traditional-use areas, site density figures were estimated for archaeological sites and cemetery sites combined as one category. These estimates were developed for each of the seven GEIS ecoregions (geographic regions with similar physical and biophysical characteristics) shown in Figure 1.

Based on estimates given in Table 1 and the acreage of forest lands in each ecoregion, there are approximately 190,000 sites predicted to exist in ecoregions 1 through 6. The maximum number of sites potentially impacted at the three harvest levels studied in the GEIS process were estimated at: base scenario (4 million cords of wood annually harvested) - 105,000 sites or 55 percent; medium scenario (4.9 million cords of wood annually harvested) - 121,000 sites or 63 percent; and high scenario (7 million cords of wood annually harvested) - 142,000 sites or 75 percent.

### Site Size

Most archaeological sites are probably under 5 acres in size and appear to vary by ecoregion. Sites in the eastern prairie/forest transition zone may be the largest, generally occupying 5 to 10 acres. Sites in the central pine-hardwood forests are generally under 5 acres, but over 1 acre. Sites in the Lake Superior highlands are frequently under 1 acre in size. Cemetery sites vary considerably in size, from less than 1 acre to 25 acres. Cultural landscapes range from small features such as portions of rock outcrops to large areas that include major topographic features. Traditional-use areas may be less than 1 acre to 100 acres.

### Laws

Both state and federal laws control and guide the inventory and management of cultural heritage sites. The Minnesota Historical Society, the State Archaeologist, the Minnesota Indian Affairs Council, and the State Historic Preservation Officer (who is also the Director of the Historical Society) help to monitor and maintain these laws.

### Impacts

As Table 2 illustrates, most heritage sites are extremely fragile and can be seriously affected by timber harvesting and associated activities such as road construction. They are fragile because dislocation or destruction of artifacts and the sediments that contain them can destroy or seriously compromise the essential information that they contain. Earth-disturbing activities do not have to be very intense to negatively affect such sites.

Timber harvesting and forest management activities that account for most impacts to cultural resource sites include: construction of access roads, skid roads, trails, and landings; the felling of trees and the skidding of logs from the stand to the landing; and preparation of sites for regeneration or planting. Impacts that can occur as the result of these activities include: soil compaction, soil erosion, etc.

![Figure 1 - Ecoregions used in the study.](image-url)
Table 2 - General impacts of timber harvesting and forest management activities on various site types.

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Compaction of Soil (typically top 30 cm)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Vertical Displacement&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Horizontal Displacement&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Susceptibility to Physical Damage if Within Harvested Area&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARCHAEOLOGICAL SITES</strong></td>
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<td></td>
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<tr>
<td>Native American</td>
<td></td>
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<tr>
<td>Large village sites</td>
<td>vulnerable</td>
<td>vulnerable</td>
<td>vulnerable</td>
<td>high</td>
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<tr>
<td>Small camp sites</td>
<td>vulnerable</td>
<td>not vulnerable</td>
<td>vulnerable</td>
<td>moderate to high</td>
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<tr>
<td>Resource procurement sites</td>
<td>vulnerable</td>
<td>vulnerable</td>
<td>vulnerable</td>
<td>moderate to high</td>
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<tr>
<td>Special activity sites</td>
<td>vulnerable</td>
<td>not vulnerable</td>
<td>not vulnerable</td>
<td>moderate to high</td>
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<tr>
<td><strong>Euro-American</strong></td>
<td></td>
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<tr>
<td>Exploration, missions, and trade-related sites</td>
<td>vulnerable</td>
<td>not vulnerable</td>
<td>vulnerable</td>
<td>high</td>
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<tr>
<td>Logging-related sites</td>
<td>vulnerable</td>
<td>not vulnerable</td>
<td>vulnerable</td>
<td>high</td>
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<tr>
<td>Homesteads and more recent sites</td>
<td>vulnerable</td>
<td>not vulnerable</td>
<td>vulnerable</td>
<td>moderate to high</td>
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<td><strong>CEMETERIES</strong></td>
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<tr>
<td></td>
<td>vulnerable</td>
<td>N/A</td>
<td>N/A</td>
<td>moderate to high</td>
</tr>
</tbody>
</table>

a Depth of sites is the critical factor. Sites that are contained within the top 30 centimeters of soil will be vulnerable to impact.
b Stratified sites are vulnerable to impacts due to compaction, surface mixing, and puddling (changes in soil structure that restrict water infiltration).
c Sites where horizontal arrangement is important are susceptible to horizontal displacement.
d Increasing size of a site increases susceptibility to damage if it is within a harvested area.

Streambank erosion, surface mixing of soils, and damage to above- and below-ground features. Traditional-use sites can be altered by modern harvesting operations through change of vegetative cover, reduction of availability of certain plants and animals, and changed frequency and mode of public access.

When threatened by development or other earth-disturbing activities, some sites significant for the scientific information they contain can be excavated to remove this information. Other sites, significant because of spiritual, aesthetic, or other values which cannot be saved by scientific recording, would be lost in whole or part if the property were adversely impacted.

Impacts at the three levels of harvesting studied in the GEIS process will vary in two important ways. The first is that as the level of harvesting increases (base to medium to high harvesting scenario), so will the area subjected to harvesting. Thus, over the planning period, more area will be impacted under the high scenario than under the base scenario. This is reflected in the number of sites predicted to be impacted.

Second, the rate of harvesting is also higher under the medium and high scenarios. This means that until mitigation strategies are implemented to lessen or minimize harvesting impacts, there is likely to be more area harvested without adequate protection for cultural and historical resources. Because many of these resources are nonrenewable, anything that is lost or destroyed is gone forever. Therefore, as the level of harvest increases, so should the urgency to implement mitigation strategies.

**Mitigations**

The following mitigation alternatives/strategies identified in the GEIS Unique Historical and Cultural Resources Technical Paper will lessen or minimize...
timber harvesting impacts on the state’s heritage resources:

- Provide the office of the state archaeologist with the resources to maintain and upgrade the state listing of known heritage sites.
- Collect information on cultural landscape and traditional-use sites that can be added to the existing site register.
- Develop predictive models for all timberland regions in the state to estimate what type of historical/cultural sites occur where.
- Develop procedures for the protection of identified historical sites located on timberlands.
- Establish education programs to inform landowners, timberland managers, natural resource professionals, and loggers about cultural and historic resources and how they can be protected.
- Consider traditional-use patterns in the development of road plans on timberlands.
- Initiate programs of heritage site surveys as part of the planning processes of all major public landowners.
- Modify harvesting and site preparation equipment and techniques to reduce the extent and degree of damage to the physical structure of the soil.

Sponsors:

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Minnesota Extension Service, University of Minnesota

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