HAZARD TREE MANAGEMENT PLAN
SLEEPING BEAR DUNES NATIONAL LAKESHORE
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INTRODUCTION

Extensive portions of Sleeping Bear Dunes National Lakeshore (Lakeshore) contain trees as natural or landscape components. Among these trees may be human-made developments with accompanying visitor activities. This poses the risk of damage due to property and injury to visitors from tree failure. Even though any tree or portion of a tree may present some degree of risk or hazard to visitors, employees, and property simply by its proximity, in most cases only such trees that are determined to possess a significant flaw or structural defect may be deemed hazardous.

The need for a hazard tree management plan arises from the responsibility of the National Park Service (NPS) to reasonably protect visitors as invitees to parklands. Failure to do so could make the NPS liable. A deliberate effort by the NPS to manage for hazard trees reduces the risks and liability by avoiding vulnerability to claims of negligence or breach of duty.

DEFINITIONS

Hazard Tree—A tree, because of a recognizable mechanical flaw, poses a threat to people or property. Plants that contain toxins, irritants, or even addicting drugs should not be termed hazardous but **noxious.**

Negligence—Failure to take responsible action to adequately protect visitors. Liability for damages from hazardous trees commonly revolves around the determination of whether the NPS was negligent in its programmatic approach to managing hazardous trees. There are four elements that together constitute negligence:

1. There must be a legal duty or obligation requiring the agency to conform to a standard of conduct to protect the visitor against unreasonable risks. The responsibility of the agency to the visitor may generally be defined as using "ordinary and reasonable care to keep the premises reasonably safe for his visit and warn him of any hidden danger" (Smith v. U.S., 1974).

2. There must be a failure (breach of duty) to meet the standard.

3. There must be an established connection between the action (or inaction) and the resulting injury or damage.

4. There must be a definable injury or damage level.

Invitee—The traditional visitor or worker who, in effect, enters park lands by expressed or implied invitation. As the steward of park lands, the NPS is obliged to exercise reasonable care for the safety of invitees during their visit. Other users of the land who

are not invited are not owed the same level of protection. Examples of the latter include people who enter a park or park area that is closed and poachers.

Target—The object, structure, or person that potentially may be hit or impacted by a falling tree or tree part.

OBJECTIVES

The NPS must seek to implement a hazard tree management program that will reasonably protect visitors from unnecessary risk resulting from hazard trees. The program should be directed toward the public welfare while simultaneously avoiding a posture of negligence.

A hazard tree reduction program provides a systematic method for mitigating tree hazards to avert damage to people or property. The program addresses visitor use, landscape management, interpretation and transportation corridors (such as parking lots, visitor centers, walkways, campsites, and picnic areas), which the public is openly invited or requested to use. The program is not applied to wild or natural areas away from trails or shelters.

The inherent challenge in addressing hazardous trees is to preserve and sustain healthy trees as components of the Lakeshore's natural systems, while treating or removing trees with discernible defects that represent risks to the public or property. The attitude when inspecting a tree must be: Can this tree be reasonably retained as a vital component of the natural system? If not, should the tree be removed? The action taken should result from an evaluation of the tree as a functional and aesthetic component of the landscape, in addition to its potential hazard.

AUTHORITIES

Impetus for the hazard tree management program derives from aspects of liability. The Federal Tort Claims Act-146 (28 USC 2671-80 and 1346 (b)) provides the basis for the NPS to be held liable for failure or negligence with respect to visitor protection. Most interpretations of tort law make the landowner responsible for taking reasonable care to avert harm to visitors. Reasonable care may take the form of actions and/or warnings. The government as a landowner is required to have superior knowledge of dangers that would not be obvious to the invitee if such dangers are discoverable in the exercise of due care. For example, in one case, where a camper was killed when a decayed tree fell on his campsite in Yellowstone, it was determined that the NPS had a duty to inspect the campsite for safety hazards. Since the camper was in a designated area he had the right to expect to be reasonably safe.

The *Management Policies* of the NPS do not specifically address hazardous tree management. However, they do state that:

> "….The National Park Service will conduct a program of preventive and rehabilitative maintenance and preservation to protect the physical integrity of facilities so as to provide a safe, sanitary, and aesthetically pleasing environment for park visitors and employees…"

The Lakeshore's *Documented Park Safety Program* (Safety Plan) states that "Every effort will be made by the park staff to identify those hazards in the park environment that may cause serious injury, illness, or property damage, to the park visitor."

PROGRAM SCOPE

Visitors to *backcountry natural areas* knowingly undertake certain risks inherent to such environments. Among these are hazards associated with falling trees and branches. It is not feasible or desirable for the NPS to attempt to eliminate all such risks in these areas throughout the National Park System.

The NPS attempts to reduce foreseeable hazards in *developed areas* where large numbers of visitors are routinely present. Toward that end, all trees within the following developed areas will be scheduled for annual inspections for hazard potential, and identified hazards will be addressed, as described in this plan:

- D.H. Day Campground (including the Group Camp)
- Platte River Campground
- Valley View Campground
- White Pine Campground
- Bay Campground
- Popple Campground
- Weather Station Campground
- Village Campground

All other developed areas within the Lakeshore will be routinely monitored by park rangers and maintenance personnel during the course of their daily activities. Identified hazards will be reported and resolved through the Lakeshore Work Request system.

Tree cutting in proposed or designated cultural landscapes will need an Assessment of Effect (XXX) form and review by cultural resources and cultural landscape specialists in the Midwest Regional Office, Omaha.

HAZARD IDENTIFICATION

Inspection Schedule:

The developed areas identified above will be inspected annually. The main inspection should be conducted in late winter-early spring, after snow melt allows for examination of roots areas, but before leaves obscure upper branches. Inspections should be carried

out during periods of reasonably good weather, when possible, to allow for better identification of defects. If done early enough, needed cutting may be accomplished before the trees break dormancy, or at least before visitation increases.

A supplementary inspection should be conducted after leaf-out, to allow for better identification of stressed or dead portions of deciduous trees. Special inspections may be required following severe storms.

Inspection Procedure:

During the main (spring) inspection, each tree within falling range of an identified developed site will be examined for significant signs of hazard potential. Trees displaying such signs will be systematically assessed and rated as described below. An adequate presentation of signs of tree hazard potential cannot be given here; rather, it must be obtained through hands-on training with a qualified instructor. Appendix A provides a brief overview of relevant problems.

The leafed-out season inspection will focus on foliage and will be relatively brief (since all other factors are assessed during the spring inspection). Trees that, because of their foliage, may be possible hazards will undergo the systematic assessment described below.

Hazard Rating System:

Trees in developed areas of the Lakeshore that display signs of structural weakness will be evaluated for hazard potential, using a combination of two ratings.

Rating #1, the *Failure Potential Rating*, reflects the chance of a tree (or a significant part of it) falling during the coming year. The tree is rated 1-3, with 3 representing a high potential for failure. This rating depends on the presence of defects that affect the structural soundness of the tree, such as root rot, internal decay, and broken branches. An extra point may be added if the tree has a bad lean, in addition to structural problems. The highest possible rating would then be a 4. Appendix A presents a general guide for assigning this rating. However, an adequate understanding of this subject can only be gained through thorough training.

Rating #2, the Failure Impact Rating, is based on the severity of damage or injury likely to occur if the tree does fail. The "target" is rated from 1-3, with 3 indicating a high possibility of serious damage. This rating is based on the following factors:

- Likelihood that the tree will strike the target (based on proximity, size, direction of lean, etc.)
- Degree of damage likely to occur if the tree does strike the target. Any site that is regularly occupied by people is automatically accorded the highest status in this part of the rating. Valuable structures and vehicles will also tend to receive high ratings.

The sum of Rating #1 and Rating #2 equals the *hazard rating* for the tree. The highest possible rating is 7. Table 1lists the recommended action for each hazard rating:

Table 1: Recommended Actions for Given Hazard Ratings

Hazard Rating	**Degree of Hazard**	**Action**
2-3	Low	No action
4-5	Moderate	Monitor
6-7	High	Remove hazard or target

Trees that receive a Hazard Rating of 6 or 7 will be mapped and documented on a Hazard Tree Evaluation Form (samples 1 and 2), as described under "Documentation," below.

Equipment Needed for Inspection/Hazard Rating:

The following equipment is recommended for use during the inspection/hazard rating process:

- Binoculars—To check the upper bole and tops of trees for defects.
- Clinometer—For determining tree height, which indicates the area of target impact.
- Compass/Tape Measure—For mapping tree locations. (Tape measure may not be needed if inspector can determine distances by pacing.)
- Cordless Drill: For boring trees to test for decay. A reversible drill is recommended. Also needed are the following accessories:

    1. Interchangeable power pack
    2. Rapid charger
    3. Bits: 1/8" x 12" aircraft – type twist bits with 9" fluting (available from Triumph Twist Drill Co., Crystal Lake, IL 60014)

- Diameter Tape: For determining dbh of tree.
- Flagging: For marking trees requiring attention.
- Increment Borer (and spare rods): For obtaining measurable data indicating age, growth patterns, and the internal condition of a trunk.
- Inspection and Map Forms.
- Mallet: For sounding trees.
- Pulaski: For checking root systems for disease.

Inspection Personnel:

Hazard inspections and assessments may be conducted by a combination of Ranger, Maintenance, and Resource Management personnel, who have undergone at least 12 hours of tree hazard identification training with a qualified instructor. Inspectors must

be familiar with the tree species of the area, and with the tree diseases and defects normally encountered. They must also understand how each site is used and managed.

HAZARD MITIGATION

Hazard Elimination vs. Target Removal:

Hazard mitigation can consist of pruning, target removal, closure of the hazard area, or tree removal (felling). Realistically, resource and budget constraints often preclude all options except tree removal. In instances where particularly valuable or special trees present hazards, target removal or area closure should be considered by Park Management. The following are examples of trees which could be considered for this status:

- A tree inhabited by a rare or special species
- A rare tree species
- A tree possessing a valuable genetic trait (such as an American Chestnut resistant to the Chestnut Blight)
- A Tree of "championship" size, or other noteworthy quality
- A tree that cannot be removed without major impact on other valuable resources
- A tree or trees that are valuable historic elements to a particular cultural landscape

Tree Removal vs. Pruning:

Trees which have been assessed and documented for hazard elimination will be handled by the Park Maintenance Division. The Roads & Trails Foreman or a trained designee will decide upon the most practical method for eliminating each hazard, based on consideration of equipment capabilities, manpower, resource concerns, etc.

While the appeal of large trees is obvious, consideration must also be given to the need for the smaller trees and bushes below to receive adequate sunlight. This is particularly relevant in campground settings, where visitors look for substantial understory to provide a buffer between campsites. Hazard trees with the following characteristics will typically be removed entirely:

- Trees with wide-spread disease
- "Over-mature" trees which are expected to present continuing problems
- Trees with hazardous branches beyond the reach of Park equipment, not feasible to prune
- Trees which are surrounded by other large trees, comprising a dense overstory that inhibits a healthy understory (in campgrounds and other areas where healthy understory is desirable).

Trees that are healthy except for a few hazardous branches, may be pruned if equipment allows.

Tree Removal and Pruning Procedures:

Routine tree removal and pruning activities will be conducted during periods of slow visitation. When possible, pruning should be done while trees are dormant. Normally, these activities should be scheduled for early spring, following the spring inspection. Tree hazards which have been identified for attention on an emergency basis will be resolved as soon as possible.

All tree removal, pruning, etc., will be performed only by qualified, trained personnel with appropriate safety equipment: Hard hat, ear protection, eye protection, gloves, chaps, and steel-toed boots. Work performed from ladders, buckets, or trees will be done with proper safety equipment. Tree work should be performed by at least two people working together. The work should be done so as to minimize damage to other trees and vegetation. Trees which are pruned should not have more than 25% of their branches cut during any one year. Pruning will be accomplished by methods which minimize damage to the remaining trees (Appendix B). Stumps of felled trees should be cut as close to the ground as possible.

Disposal of Cut Wood:

Clean-up following the cutting of hazard trees should be planned to minimize bucking and removal of stems. In addition to minimizing costs, leaving downed logs in place helps protect under story vegetation from trampling, provides barriers to expansion of campsites, and replenishes the soil and habitat.

Fallen trees and branches within campsites, roads, etc., which cannot be left as they are, will normally be bucked up by Park Maintenance personnel. In order to minimize costs and allow for good use of materials, resulting logs can be left for visitors to gather for campfires. Alternatively, they may be gathered for administrative use. Stacking logs outside of campsites, cleaning up debris, etc,. is a good project for VIP groups such as Scouts, Sierra Club, etc..

Cleanup and removal of all debris will occur within cultural landscapes. Disposal will help with the upkeep and appearance of the landscape. Removing debris from and around fruit trees helps prevent insect infestation.

REPLACEMENT OF REMOVED TREES

In most cases, natural regeneration will be adequate to replace hazard trees that have been removed. In some areas with dense over story or heavy human activity (such as in and

around the edges of campsites), seedlings may not be able to survive. In these cases, trees may be transplanted.

In most cases, removed trees in cultural landscapes will be replaced with the same or similar species, as recommended by the Midwest Regional Office cultural landscape specialist.

DOCUMENTATION

Hazard tree inspections must be documented in memo form. The memo will include the following information: Date, who conducted the inspection, scope (area covered), were all trees in the area covered?, number of hazards recommended for action.

During inspections, trees found to warrant action will be sketch-mapped Sample 2), and documented on a SLBE Hazard Tree Evaluation Form (Sample 1). Each tree will be numbered on its map to correspond with its numbered evaluation listing. Each evaluation form will then be stapled to the corresponding map forms. This documentation procedure will also be followed for tree hazards reported for evaluation on a one-by-one or emergency basis throughout the Lakeshore.

When a tree hazard has been corrected, the action taken will be documented on the original Hazard Tree Evaluation Form. This form (along with related maps and other documentation) will be kept in the Resource Management and Visitor Protection files for seven years.

The park IDT (Interdisciplinary Team) will review each year's planned hazard tree activities for necessary environmental compliance.

HAZARDS IDENTIFIED ON AN EMERGENCY BASIS

Possible tree hazards may be identified in any Park facility by any member of the Park staff or the public. When this occurs, the tree will be evaluated by a trained employee, documented on a Hazard Tree Evaluation Form, and reported for attention (if warranted) on a standard Work Request. The Work Request will be marked as a safety concern, and will be processed as a high priority. If necessary, the hazard area will be posted or flagged off until the hazard is eliminated.

SCHEDULED TRAINING

The following training courses will be held on an annual basis for those employees participating in the hazard tree management program:

- Chainsaw Use
- Bucket Truck Use
- Hazard Tree Management
- Electrical Hazard Awareness (Powerlines)

APPENDIX A
TATUM GUIDE FOR HAZARD TREE EVALUATION

APPENDIX B
NATURAL TARGET PRUNING AND TOPPING

APPENDIX C
HAZARD TREE EVALUATION FORM

APPENDIX D
HAZARD TREE LOCATIONS FORM

APPENDIX E
JHA—BUCKET TRUCK OPERATION

APPENDIX E (CONTINUED)

APPENDIX F
JHA—TREE FELLING/CUTTING

APPENDIX F (CONTINUED)