Emerald Ash Borer Management Plan
Big Foot Beach State Park
January 2014

Background
Emerald ash borer (EAB, *Agrilus planipennis* Fairmaire) is an exotic beetle that is native to China, Mongolia, North Korea, South Korea, Japan, Taiwan, and the Russian Far East. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. It was first identified in the Detroit, Michigan area, including Windsor, Ontario, in 2002. Emerald ash borer was also verified in Ohio in 2003, Indiana in 2004, Illinois and Maryland in 2006, Pennsylvania and West Virginia in 2007, Wisconsin, Missouri, and Virginia in 2008, Minnesota, New York, and Kentucky in 2009, Iowa and Tennessee in 2010, and Connecticut, Kansas, and Massachusetts in 2012, and New Hampshire, North Carolina, Georgia, and Colorado in 2013.

As of January 2014, Wisconsin has 21 counties quarantined for EAB, mostly in the southeastern and west-central parts of the state. Residents and affected businesses in quarantined counties are restricted from moving any hardwood firewood, ash nursery stock or ash logs or timber out of the quarantine area. See "Wisconsin's Emerald Ash Borer Information Source" (http://datcpservices.wisconsin.gov/eab/index.jsp) for further information about quarantine regulations. Big Foot Beach SP is within a quarantined county.

Adult beetles nibble on ash leaves, but cause no significant damage compared to the larvae which bore under the bark, causing dieback and eventual mortality. The canopy of infested trees begins to thin above infested portions of the trunk and major branches because the borer destroys the water and nutrient conducting tissues under the bark. Heavily infested trees exhibit canopy die-back usually starting at the top of the tree. One-third to one-half of the branches may die in one year. Most of the canopy will be dead within 2 years of when symptoms are first observed. Sometimes ash trees push out sprouts from the trunk or the base of the tree after the upper portions of the tree dies. Although difficult to see, the adult beetles leave a "D"-shaped exit hole in the bark, roughly 1/8 inch in diameter, when they emerge from May thru September.

EAB can have a one- or two-year life cycle. Adults begin to emerge mid- to late May with peak emergence in late June. Females usually begin to lay eggs about 2 weeks after emerging. Eggs hatch in 1-2 weeks, and the tiny larvae bore through the bark and into the cambium - the area between the bark and wood where nutrient levels are high. The larvae feed under the bark, typically passing through four stages, eventually reaching a size of roughly 1 to 1.25 inches long. Most EAB larvae overwinter in a small chamber in the inner bark or in the outer inch of wood. Pupation occurs in spring and the new generation of adults will emerge in May or early June, to begin the cycle again.

EAB adults can fly at least 1/2 mile from the tree where they emerge, and some beetles likely fly several miles before laying eggs. Many infestations, however, are started when people move infested ash nursery trees, logs, or firewood into un-infested areas.

Key Concerns for Big Foot Beach State Park
Emerald ash borer was first detected at the park in the summer of 2012, when adult beetles were collected from two purple panel detection traps placed in the center of the park. At that time, there were numerous declining, mature ash but none showed obvious signs of EAB infestation. In early 2013, winter surveys found that many trees had signs of woodpecker activity and abundant

EAB galleries could be found on numerous trees. Signs of EAB infestation could be seen all over the park, and many open-grown, mature trees had become safety hazards.

The main concerns regarding EAB in Big Foot Beach State Park are public safety, resource protection, and aesthetics. Big Foot Beach State Park offers many recreational opportunities including a 100-site campground, a picnic area and playground, a swimming beach on Lake Geneva, several miles of hiking trails, and various winter activities.

Trees in heavily used areas such campgrounds and picnic areas are typically under greater stress than forest trees due to soil compaction and bark and limb injuries and may be more attractive to EAB females for depositing eggs. Older trees are difficult to replace when they die, and dead trees will be aesthetically unappealing. Areas of heavy use by the public will be the first sites assessed for hazard tree identification and removal and new tree plantings.

Current Situation

In March 2013, DNR Forestry staff assessed potential hazard trees in the picnic area, near the beach, and in and near the campground. About 118 trees, ranging from 2 to 28 inches in diameter, were identified as being potentially hazardous. About 26 trees were in the picnic area, 35 trees were near the lagoon or entrance station, and 9 were in the campground. The remaining 48 trees were in the woods immediately adjacent to the mowed areas or roads. About 100 large trees were felled in 2013. The wood was stored away from public-use areas.

Priority Areas for EAB Management at Big Foot Beach State Park

1. Mowed areas: picnic areas, entrance station, near lagoon, campground, service area.
2. In wooded areas surrounding roads and mowed areas.
3. Along trail system.

Schedule for priority areas:

Area 1: Fell and process marked ash trees, complete spring 2013
Area 2: Identify, mark, fell, and process ash trees, continual process.
Area 3: Identify, mark, fell, and process ash trees. Begin spring 2013, continual process.
Assess staff capabilities for ash tree management once trees have been identified.

Low Priority Areas

Low visitor use wooded areas, grasslands, and wetlands. Ash trees in these areas will typically be allowed to die and become wildlife habitat, as long as they are not a safety hazard. The DNR Forester for Walworth County will be consulted about options for maintaining an appropriate tree species mix and stocking for these sites, and if any invasive plant management needs to be done.

Wildlife Concerns

Ash species, especially white ash, can be important sources of habitat and browse for wildlife. The samaras are good forage for many other birds and small mammals. White ash's ability to readily form trunk cavities if the top is broken and its large size (24 to 48 inches) at maturity make it highly valuable for primary cavity nesters such as woodpeckers. Once the primary nest excavators have opened up the trunk of the tree, it is excellent habitat for secondary nesters such as wood ducks, owls, nuthatches, and gray squirrels.

Endangered Resources and State Natural Area Concerns

There are no State Natural Areas designated at Big Foot Beach State Park. There is a Natural Heritage Inventory historical record for a plant and an older record for a fish.

Tools for Management of EAB

Hazard Tree Removal
Hazard trees will be identified and removed from within the priority areas noted above. When possible, all infested trees will be chipped. Depending on the quantity, chips can be blown into wooded areas. Any chip collection will be retained on the park, away from the public. Wood that cannot be chipped will be stockpiled in the park, away from the public. Stumps in mowed areas will be ground down so that they are not a tripping or maintenance equipment hazard. Stumps of hazard trees that are felled should be treated to prevent re-sprouting. Sales to a firewood concessionaire remain a possibility for hazard tree management.

Replacement Tree Planting
Tree planting will be needed to replace hazard trees that are removed from high use areas. Replacement trees will be a diverse mix of species that are not susceptible to EAB, with a balance of fast-growing and slower species. More quickly growing trees will help replace shade trees sooner while allowing slower growing, longer living species to reach maturity. Proper maintenance after the trees have been planted, such as watering as needed and reducing competition from other vegetation, will be needed to increase the survival of the saplings.

Monitoring
Park staff will monitor for EAB symptoms and hazard trees in the park. Woodpecker activity and thinning crowns will be the primary signs of emerging hazards.

Biological Controls
Several parasitoid, non-native wasp species have been identified and authorized for release by the U.S. Department of Agriculture to help reduce EAB populations and slow ash tree mortality. The wasps are small, non-stinging insects that are harmless to humans. During the summer of 2013, two species, *Tetrastichus planipennisi* and *Oobius agrili*, were released in the wetlands area of the park.

Pesticides
Insecticides can be used to protect any identified high value (for example, a large shade tree) trees that are identified. Depending on the chemical used, pesticides treatments would need to be applied at one or two year intervals.

Public Education and Communication
EAB posters and other information will be posted in the campground bulletin boards. Flyers and information will be handed out in the park office. Notices about hazard tree removal will placed on bulletin boards and in the park office. A public outreach campaign about EAB management within Big Foot Beach State Park should be developed and implemented with the Office of Communications. A news release about the tree removals was done in the spring of 2013, as many trees were being removed.

Funding
Educational literature is available through the DNR at no charge. The park may be able to purchase any materials for physical controls and labor out of the operations budget. Regional sawyer crews may be used for felling hazard trees. Chipping and tree planting may be accomplished through a variety of labor such as a Department of Corrections crew. Tree planting may also be done by volunteers.

EAB management will be multiple year effort that will likely strain the operations fund of the park. Park staff will identify and pursue alternate funding sources to augment the park operation budget. Alternates can include the Sustainable Forestry Fund.

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Revision comments:

Big Foot Beach State Park Priority Areas