

EXECUTIVE SUMMARY

FOREST HEALTH PROBLEMS IMPACTING INDIANA FOREST RESOURCES

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The current and future forest health problems for Indiana forests involve native and exotic insects and diseases. The current forest health problem is tree mortality from the looper epidemic, forest tent caterpillar epidemic, pine bark beetles, oak wilt, Dutch Elm Disease, Ash Yellows and weather. Other impacts from these forest health problems are change in species diversity, altered wildlife habitat, growth loss and reduced timber value.

The future forest health problem is tree mortality and the other associated impacts from tree death from exotic species and the insects and diseases listed above, as they will continue to cause damage in the near future and then return again some time in the future. The exotic species that are a problem and of concern for Indiana are Gypsy Moth, Emerald Ash Borer, Asian Longhorned Beetle, Exotic Bark Beetles, Sudden Oak Death and Beech Bark Disease.

The forest condition that will add to future forest health problems is the Aging Forests of Indiana. The oak decline event in the Ozark forests of Missouri and Arkansas, as well as past decline events, found that increasing tree age and increasing stand density makes forests more vulnerable to decline and mortality (Oaks, et.al. 2004). Current forest inventory data indicates that this condition is found on public land, especially state owned land, in Indiana.

STATUS OF CURRENT FOREST HEALTH PROBLEMS:

Looper Epidemic – The epidemic occurred from 2002-2004 in south central Indiana with the majority of defoliation occurring on five State Forests, Brown County State Park and the Hoosier National Forest. Total acres defoliated in any one year were 131,943 in 2004. The epidemic collapsed in 2005 and is not expected to return for 20-25 years. Mortality is occurring on Jackson-Washington and Clark State Forests and could range from 2-50% and average 10-15%. Other areas of the epidemic are also expected to experience mortality. Predominant mortality will be to red and black oaks and hickories. Using information from the early 1980's looper mortality, average mortality is an estimated 600 bd.ft./acre (Doyle Scale) with a value of \$117/acre. Expanded to both state forests, timber mortality is estimated to range from \$468,000 to \$936,000.

Recommendation:

It is recommended that management activities (salvage harvests) be conducted within one year and no longer than two years (by end of winter of 2006/2007) to optimize recovery of timber value and to return the forest to a healthy state. Research indicates the two year period is the optimum period to recover the most timber value trees

killed by defoliation.

It is also recommended that management activities be conducted in a manner to prepare the future stand for gypsy moth by using the Gottschalk's Silvicultural Guidelines for Forest Stands Threatened by Gypsy Moth.

Forest Tent Caterpillar – The epidemic started in 2002 and still defoliated trees in 2005. Surveys indicate the epidemic is collapsing and defoliation should decrease or stop in 2006. The defoliated area extends from Madison east to Rising Sun on the bluffs north of the Ohio River. Timber mortality to oak, maple, and hickory has started and quick visual surveys estimate 20-30% of some forests are dead. Using mortality estimates (192.5 bd.ft./acre) from the prior epidemic, timber mortality is estimated to be \$1,657,713. Most of the land in the epidemic is private land. Splinter Ridge F&W Area, Clifty Falls State Park and Lanier Home are the state properties defoliated.

Recommendation:

It is recommended that management activities (salvage harvests) be conducted within one year and no longer than two years after trees die to optimize recovery of timber value and to return the forest to a healthy state. Defoliation is expected to stop after 2006. Thus, management should begin in 2006 and continue through 2008. Much of the management effort will be directed at private landowners.

It is also recommended that management activities be conducted in a manner to prepare the future stand for gypsy moth by using the Gottschalk's Silvicultural Guidelines for Forest Stands Threatened by Gypsy Moth.

Pine Bark Beetles – The aging pine forests in Indiana has created a situation ideal for Ips bark beetles and others to attack and kill pines. In addition to old age, the pine forests also lack management activity in the past that would reduce density and aid in maintaining health of the trees. Thus the future is increased presence and death by pine bark beetles.

Recommendation:

It is recommended that forest management activities be conducted on public lands to reduce stand density and salvage or destroy beetle-killed trees.

It is also recommended that forest management activities convert the stand to hardwoods when it is determined that the pines have served their purpose of soil protection and the site is ready for hardwoods.

To aid in restoring the health of the pine forests, markets are needed for pine and it is recommended that efforts be expended to develop markets for pine.

Oak Wilt – Oak wilt occurs across the state but has not been reported from counties in central eastern Indiana. It is a common disease that is easily seen in the rural and urban forests of northwestern Indiana where it kills red and black oaks. In the forests of southern Indiana, oaks killed by armillaria root rot and two lined chestnut borer may mask the symptoms and presence of Oak Wilt. Oak wilt is a regulatory issue for exporter of oak logs. Current regulations require fumigation of logs and lumber and no bark on

exports to Europe.

Recommendation:

Management guides for the urban and rural forest are available. It is recommended that these guides be implemented to manage this disease and that pruning of oaks be avoided during mid April to late July/August to avoid insect transmission of the disease.

Dutch Elm Disease: - This disease is killing elm across the state each year. It has been an active killer of elm for the past 10 years. This epidemic of Dutch Elm Disease is believed to be the result of the elm tree increasing in size making it able to support the beetle populations that transmit the disease. It is also the result of a new strain of the Dutch Elm Disease fungus.

Recommendation:

Management of this disease is primarily through sanitation – removal and destruction of infected trees as soon as possible. Thus, it is recommended to remove elms from the forest during management operations.

Ash Yellows – This disease, caused by a phytoplasma organism, occurs across the state. Symptoms and mortality from Ash Yellows are more common in northern Indiana than in southern Indiana. It is a slow killer of trees and management guides are available for this disease.

Recommendation:

The use of the management guide is recommended to guide management decisions during harvest operations. In northern Indiana, management decisions need to be guided by the proximity to Emerald Ash Borer. In areas near Emerald Ash Borer infestations, any ash yellows tree should be removed from the forest. The closer to Emerald Ash Borer infestations, then all ash should be removed from the stand.

Weather – Tornados, flooding, and drought are events that stress and damage the forest. The last flood to seriously impact forests was in 2003 in northern Indiana along the Wabash and other rivers. The last tornado damage was in 2004 on Clark State Forest. The last drought event was 1999 and 1988. These events influence the forest for several years after the event occurred. Drought especially is a problem as it can lead to forest declines.

Recommendation:

When these events occur it is recommended that forest management activity (salvage harvesting) occur as quickly as possible to restore the forest.

FUTURE FOREST HEALTH PROBLEMS

Gypsy Moth – Indiana's Gypsy Moth Management Program joined the USDA Forest Service Slow The Spread Program and gained financial, technical and operational support to achieve a negative spread rate of 0.42 mile per year. Through this joint effort the state has received \$2,773,111.74 of Slow The Spread funds to manage gypsy moth. Since joining Slow The Spread, for every 28.9 cents of state funds expended on gypsy moth, Slow The Spread has provided 71.1 cents. To date, only two sites in Allen County and

one site in Scott have noticeable defoliation from gypsy moth for a total of 4 acres defoliated. The need for a gypsy moth suppression program has been delayed by the use of Slow The Spread Protocol.

Recommendation:

It is recommended that Indiana remain in the Slow The Spread program and receive the benefits of this federal program.

It is also recommended that preparation continue for a suppression program and that funding is developed to operate a suppression program.

It is also recommended that the funding needs of Emerald Ash Borer not impact the funding of Slow The Spread.

Emerald Ash Borer – This is latest exotic pest in Indiana and is a very serious threat to the elimination of the ash resource. Found in 2004 in Steuben County, presently there are four infestations of which two have received eradication measures (Jellystone and Manapogo) and two are undergoing eradication measures (Shipshewana and Grand View Bend). For this effort to date, over 118,500 ash trees has been killed or destroyed over 12.5 square miles of Indiana. The eradication work in 2004/2005 has been supported by an estimated \$2,502,341 of federal funds from the USDA that did not need state match. Starting with 2005/2006, the state must provide a 20% match to the federal funds. Based on the \$2,502,341 expended on the first eradication project, the estimated state match could total \$500,000. At this level of match and with limited state funds, this creates a threat to the Gypsy Moth Slow The Spread program, which could need \$250,000 of state funds for treatments in 2006. Surveys have been and are still being conducted to detect new infestations. Approximately 1,000 trap trees are spread across the northern tier of counties to detect Emerald Ash Borer. Presently, the movement of infested firewood and logs is the greatest risk to the introduction and spread of Emerald Ash Borer.

Recommendation:

It is recommended to continue the eradication protocol recommended by the Emerald Ash Borer Science panel and eradicate any infestation detected.

It is recommended that surveys continue annually to detect Emerald Ash Borer.

It is recommended that cooperative management between state and federal agencies continue. (Agencies involved – Division of Forestry, Division of Entomology & Plant Pathology, USDA Forest Service, USDA Aphis and Purdue University).

It is recommended that silvicultural guidance and forest management activities reduce the amount of ash in the forests within and closest to quarantine townships.

It is recommended that state funding sources for Emerald Ash Borer be developed so that they do not interfere with Gypsy Moth funding needs. It is recommended \$1-2 million of state funds be made available to match federal funds for Emerald Ash Borer management.

Asian Longhorned Beetle – This beetle is not present in Indiana. But it is a threat and concern to the maple resource in Indiana because of the infestation in Chicago. The Chicago infestation is expected to be declared eradicated by 2008. It is also present in New York City, New Jersey and Toronto, Canada.

Recommendation:

It is recommended that monitoring and awareness of this beetle continue as it may be found sometime in the future in Indiana related to the Chicago infestation or from separate introduction.

Exotic Bark Beetles – There are many exotic bark beetles recognized as a threat to Indiana and North American forests. One beetle is Banded Elm Bark Beetle detected in 2004. This beetle may be a better vector of Dutch Elm Disease. Another beetle is the Asian Ambrosia Beetle that is present in forests and nurseries in Indiana. A third beetle is oak bark beetle, which is not present in Indiana. Like Banded Elm Bark Beetle, this beetle may be a better vector of oak wilt.

Recommendation:

Continue support and assistance with the USDA Aphis with their exotic bark beetle survey.

Sudden Oak Death – This disease is not in Indiana. However, there have been potential introductions through nursery stock from California. This disease is a large risk to the oak resource of Indiana. Of the exotic diseases, this disease has the greatest concern for spread to and impact on the forests of Indiana.

Recommendation:

Continue to support and conduct surveys to detect this disease in Indiana. Prepare a federal grant through the USDA Forest Service for funds to survey for this disease.

Beech Bark Disease – This disease is not present in Indiana, but is present in the lower and upper peninsula of Michigan. It attacks American beech and is a risk to slowly kill the American Beech.

Recommendation:

Continue to remain aware of this disease and its locations in Michigan. Continue to monitor for this disease and train foresters to recognize the disease.

Declines – Aging Forest – Indiana forests are getting older. This is true on public forestland, especially state forests. As this happens, the forest becomes more susceptible to decline such as oak decline that has resulted in widespread forest mortality in the Ozarks of Missouri and Arkansas. As the forests continue to age, the risk of widespread mortality grows and can be triggered by a severe drought or defoliation epidemic. One indicator that a decline is starting is the 20 percent of all hardwood mortality reported in the 2002 forest inventory is ‘other red oak species’. ‘Other red oak species’ include black and scarlet oak, which are species that are the first tree species to die from stress situations

Recommendation:

It is recommended that state forests and other public lands examine forest inventory data to determine which stands have a high percentage of old age trees, high stand density, sites that are prone to drought stress, pockets of mortality and poor crown conditions.

For the stands identified, it is recommended that management activity, such as timber stand improvement and timber harvesting, be applied to reduce stand density, reduce over all stand age, salvage any mortality and improve tree crowns.

It is also recommended that in conducting management measures, the silvicultural guidelines for gypsy moth be utilized to prepare stands against gypsy moth.