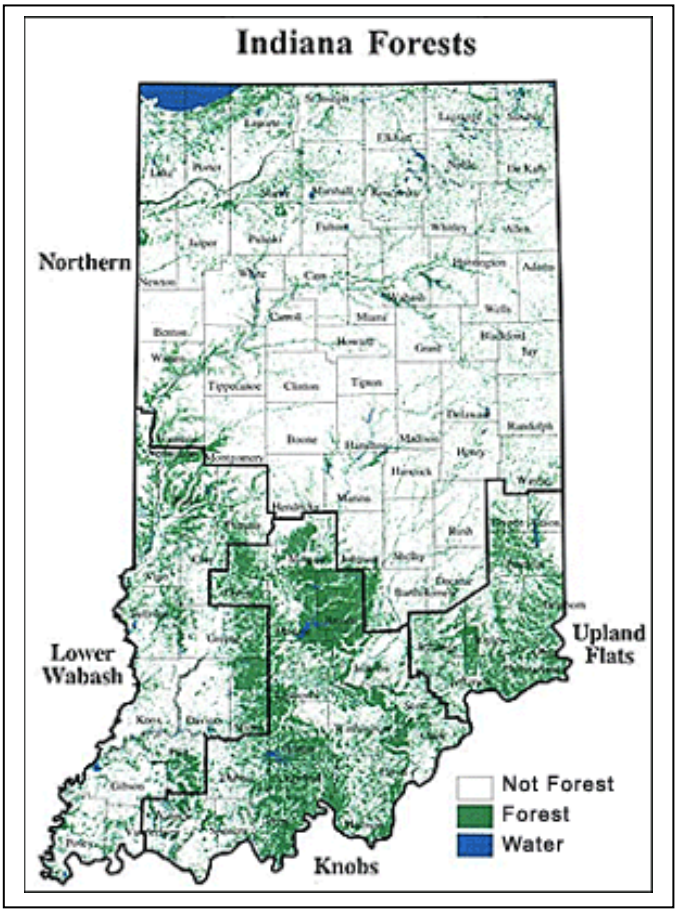
THE FOREST RESOURCES

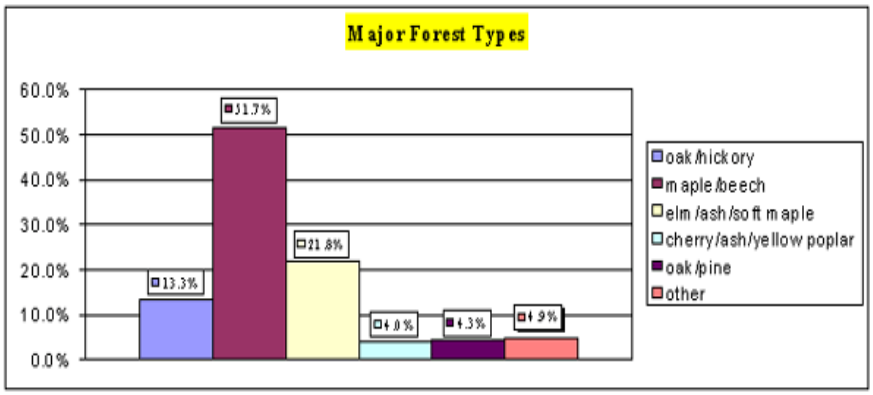


Indiana's economy gains over $9 billion annually from its forests. Over 54,000 Forest-based manufacturing jobs annually generate payrolls of over $1.4 billion. Indiana forests continue to develop, with state woodlands growing more than 2 times the volume removed. In 2000 an estimated 97 million cubic feet of wood was harvested to produce sawtimber, veneer, handles, pulp, and cooperage. Additionally, Forest-based recreation and tourism expenditures contribute $1 billion to the state economy.

Approximately one of five acres in Indiana — 4.5 million acres — is covered in forest (Table 1). Since 1907, forestland has increased approximately 430,000 acres, and from 1967 to 1998, the volume of timber increased from 3,800 to 6,900 million cubic feet. More than 85 different trees grow in Indiana forests. Hardwoods account for 95% of the forest that is identified into 13 forest types. Reflecting the effect of past glaciations, forests exist in large consolidated blocks chiefly in the hilly southern part of the state (Figure 1). In the northern two-thirds of the state, forests generally occupy scattered woodlots, wetlands, and riparian corridors.

Table 1: Indiana Forest Statistics	
Total acres	22,957,400
Forested acres	4,501,300
Percent forested - all land	20%
Percent timberland - all land	19%
Percent timberland - forest land	96%
Reserved forest = 159,100 acres / 3.5% forest land	

Indiana's timberland is quite productive. Annual net growth of the state's forests averaged 60 cubic feet per acre, with average timberland yielding 157 board feet per acre each year. Acre per acre, Indiana's growing stock volume is 11 percent greater than neighboring Michigan's, with board foot volumes 300 percent greater. Indiana's per-acre standing sawtimber volume dwarfs other states in the region, with nearly double the board feet volume per acre (4,380 board feet versus regional average of 2,328 board feet) of the average



found in Michigan, Wisconsin, Minnesota, Illinois, Missouri and Iowa. Moreover, stumpage sales are reported to average $ 0.33/board foot, reflecting the state's quality and high-value species mix.

INDIANA FOREST HEALTH ISSUES IN 2004

The 2004 growing season had the following major forest health problems – Gypsy Moth, Forest Tent Caterpillar, Looper Complex and Emerald Ash Borer. In addition, 2004 saw Anthracnose, White Oak Mortality, Conifer Bark Beetles and Pine Plantation Mortality, Late-Season Drought, Dutch Elm Disease, and Decline/Death of Hickory, Yellow-Poplar & Ash as forest health problems of a lesser degree. Recurring forest health issues continue with Oak Wilt, Butternut Canker, Ash Yellows, White Pine Root Decline (Procera Root Rot), Winter burn, and Pine Shoot Beetles. Other forest pests of concern (but not yet encountered) for Indiana in 2004 include three exotics – Sudden Oak Death, Sirex Woodwasp and Banded Elm Bark Beetle – and a native species – Beech Blight Aphid.

MAJOR FOREST HEALTH PROBLEMS

GYPSY MOTH NUMBERS DOWN AGAIN IN 2004

Influenced by a cool wet spring and summer, the gypsy moth population was down in 2004. The number of moths detected decreased to 9,014 from 15,569 & 23,090 for 2002 and 2003, respectively (Table 2 & Figure 3). The majority of the moth catch occurred in the Action Zone of the Slow-The-Spread (STS) zone. There were a few scattered moth catches in the central and southern part of the state.

Table 2: *Number of male gypsy moths caught in the three survey areas from 2002 to 2004.*

Year	STS Evaluation Area	STS Action Area	State Area	Total
2004	3,887	5,108	19	9,014
2003	14,607	8,425	58	23,090
2002	9,018	6,752	27	15,797

2004 saw the most acres and sites treated for gypsy moth – 39 sites totaling 39,757 acres. Twenty-two sites totaling 3,969 acres were treated with *Bacillus thuringiensis* var. *kurstaki* (Btk) at 30 BIU/acre/application. Thirteen Btk sites were treated with two applications (2,362 acres). Nine Btk sites were inside mating disruption sites and treated with one application (1,607 acres). Eight sites totaling 8,298 acres and nine sites totaling 30,579 acres in eleven counties received one application of pheromone flakes for mating disruption at 6 and 15 grams, respectively, in June. Delimit surveys to monitor treatment success found two Btk blocks failed (Arcola & Cobb's Corners). This was most likely due to small block sizes and weather.

The aerial survey of the five northeastern counties in the Evaluation Zone and the other counties with treatment sites in the Action Zone did not detect defoliation.

No defoliation was observed at Parkview Hospital in Fort Wayne, where it was seen last year. This is due to the dramatic reduction in moth population. The hospital and surrounding areas were sprayed with Btk, which reduced the moth catch from 30,300 moths found in 130 traps in 2003 to 62 moths found in 15 traps this year. A treatment of Btk in 2005 has been proposed to "clean up" the site and to insure that management goals for the area are met.

The goal of Indiana's Gypsy Moth Management Program is to slow its spread and development. From 2001 to 2004, the program was successful, with an average spread rate of a negative 0.42 mile/year during this period. Figures 4-5 demonstrate the lack of spread and development in Indiana.

Figure 3: *Number of male moths caught in each county in 2004.*

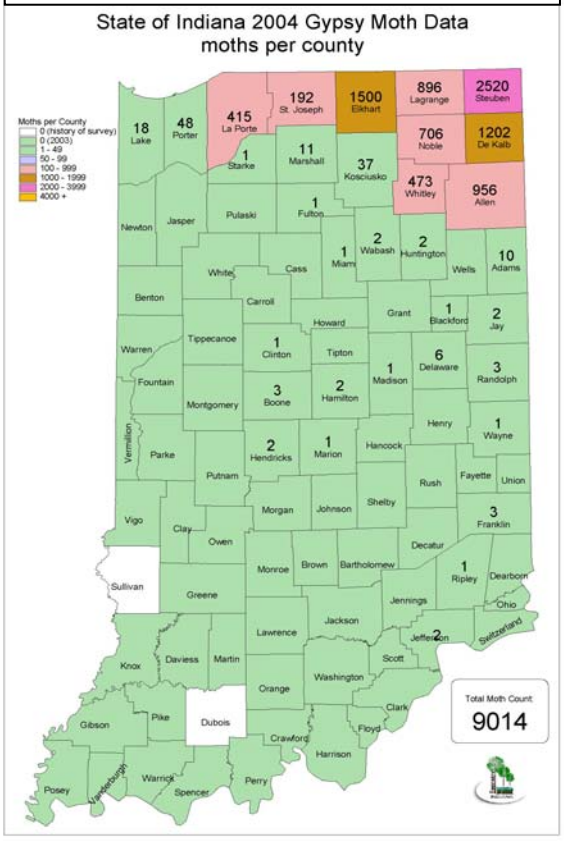
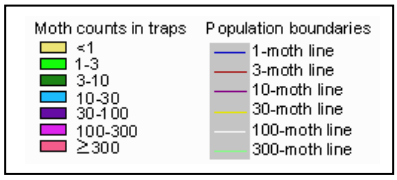
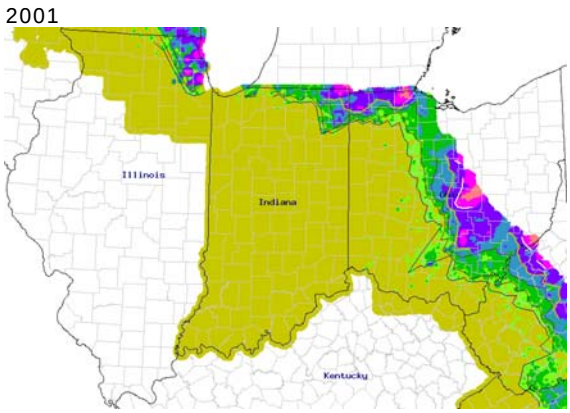
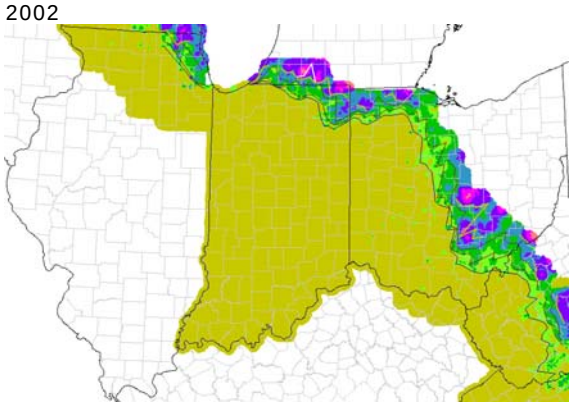
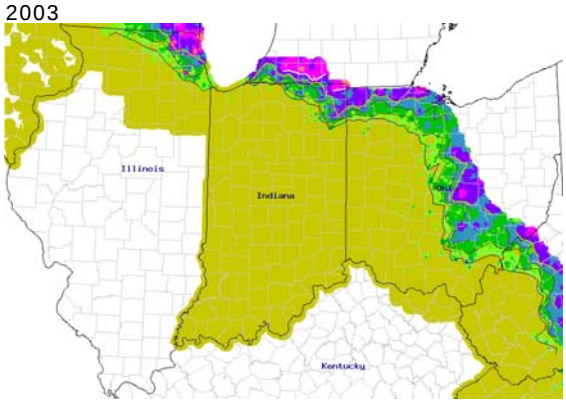


Figure 4: *Gypsy moth catch density changes 2001-2004*









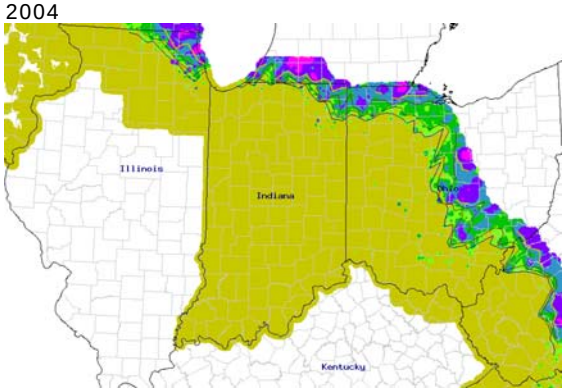
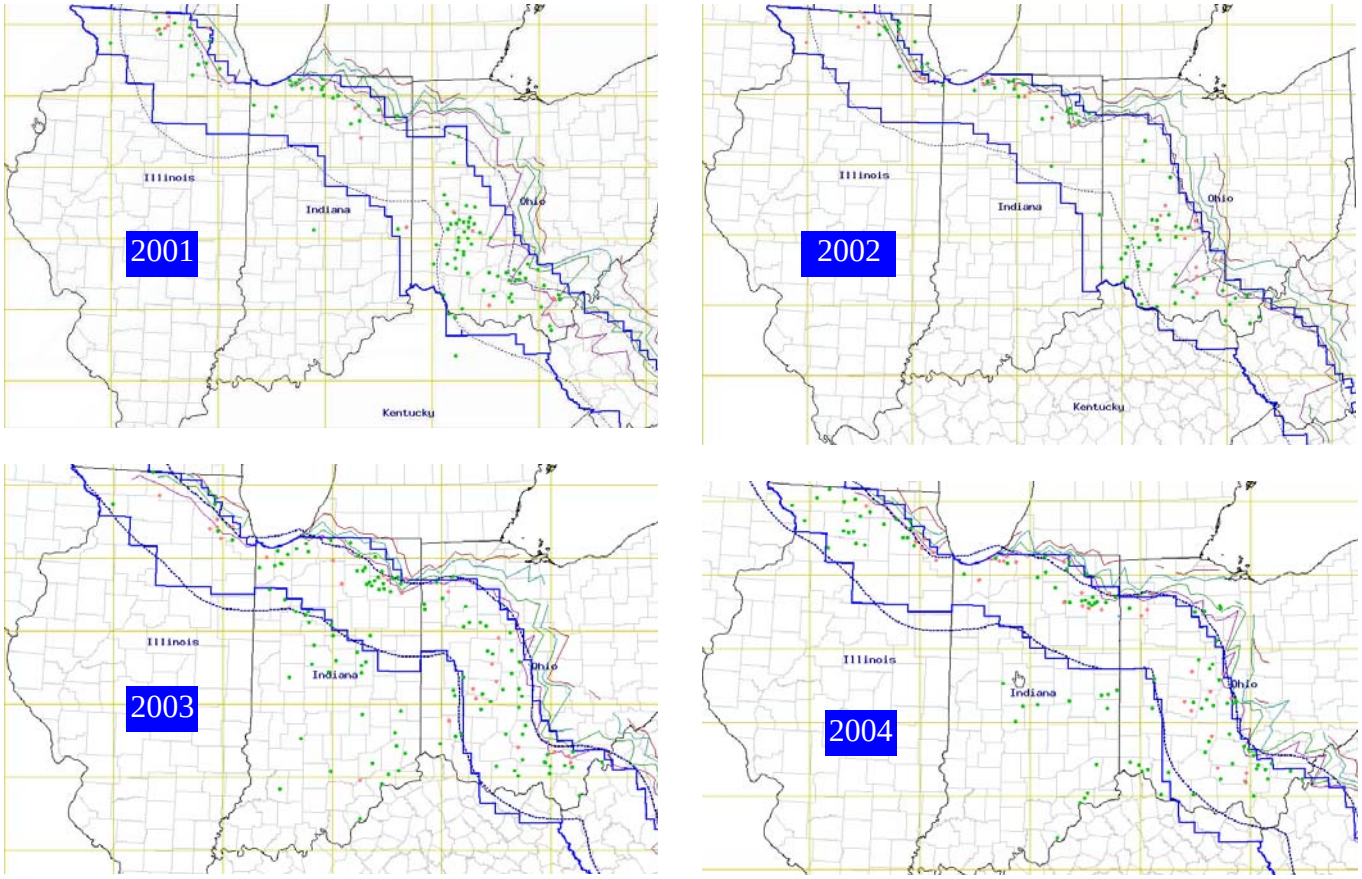


Figure 4 (top): *Gypsy moth lines and action zones for 2001 to 2004, respectively.*



FOREST TENT CATERPILLAR – *MALACOSOMA DISSTRIA*

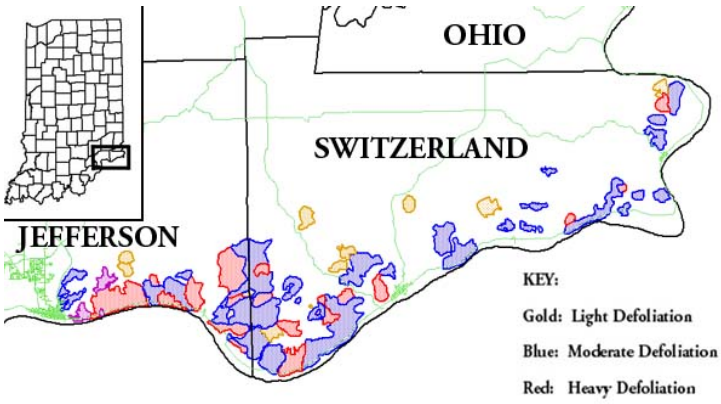


Figure 6: *2004 Forest Tent Caterpillar defoliation in extreme southeastern Indiana*

The second consecutive year of noticeable defoliation by Forest Tent Caterpillar (FTC) occurred in the southeastern counties of Jefferson and Switzerland. FTC defoliation ranged from light to severe with the majority of acres defoliated in the moderate to severe class. The defoliation in the two counties occurred on the forested bluffs immediately north of the Ohio River and extended north for 3 to 5 miles (Figure 6). The defoliated area is a triangular area bounded by the Ohio River on the south, the city of Madison on the west and the small town of Patriot on the east. A total of 28,707 acres were defoliated in 2004, nearly 10,000 acres more than 2003.

The primary species defoliated included the oaks and sugar maple. Other species defoliated include black cherry and hickory. Mortality to oaks, especially black oak, and sugar maple has started to occur, but was only observed in scattered individual trees. Mortality should increase in 2005 after the third year of defoliation and from the late summer drought in 2004. The increase in mortality is expected to be in the red oak group.

The last time FTC defoliated the forests of Indiana was in the late 1970's and that epidemic collapsed after the third year. Although defoliation in this infestation is expected in 2005, it should be decreasing in area and intensity because natural control should start to occur. One of the natural controls – the 'Friendly Fly', *Sarcophaga aldrichi*, is expected to be involved. This fly is larger than a housefly and does not fly away quickly when it lands on you.

LOOPER COMPLEX – LINDEN LOOPER *ERANNIS TILIARIA* AND HALF WINGED GEOMETER *PHIGALIA TITEA*

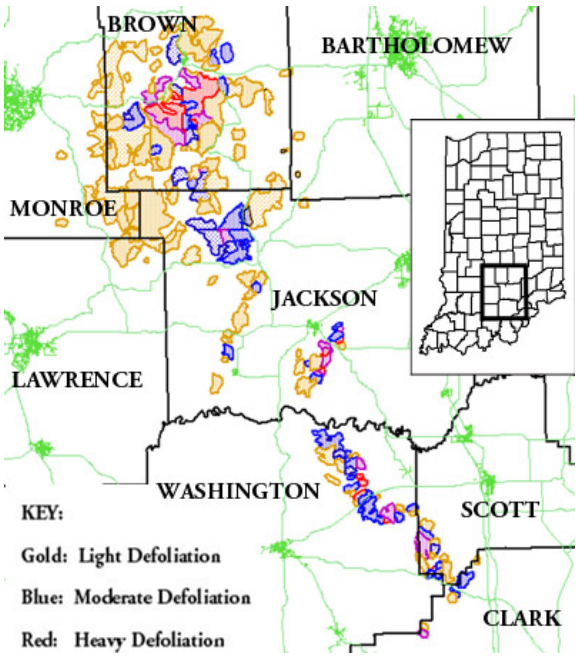


Figure 7: *2004 Looper defoliation in south-central Indiana*

The native half-wing geometer is frequently found in association with the linden looper – hence the name "Looper Complex". Hosts of these insects include most hardwood trees, including various oaks, hickories, and maples. Their populations exist at low to moderate levels, and then expand dramatically every 10 to 20 years (Table 3).

Under the current 2004 population expansion, loopers throughout southern Indiana defoliated a total of 131,943 acres (Figure 7). This increased by more than 40,000 acres over the 2003 level of 89,252 acres. This increase occurred in Brown County State Park, the northeastern area of the Hoosier National Forest – which includes Brown, Jackson, Lawrence and Monroe counties – and Yellowwood State Forest.

Brown County State Park sustained the most defoliation receiving severe (100%) defoliation over the heavily used areas (campground, lodge, nature center, etc) of the Park. The forest area around the Houston area of Jackson County also had severe defoliation. Defoliation to the other areas ranged from light to heavy. The majority of Yellowwood State Forest had light to moderate defoliation. In contrast, Morgan Monroe State Forest, adjoining Yellowwood SF to the west, exhibited none to light defoliation. It is expected that Morgan Monroe State Forest will suffer heavier defoliation in 2005.

Conversely, the looper complex decreased its population and defoliation in the areas it defoliated in 2003, except for one area of Jackson-Washington State Forest. The decrease occurred in Clark State Forest, Harrison-Crawford State Forest and the Tell City District of the Hoosier National Forest, which includes the following counties – Clark, Floyd, Harrison, Crawford, Perry, Orange

Year of Survey	Number of Female Loopers per Trap Tree
1980/81	**43.2**
1981/82	**19.6**
1982/83	**5.5**
1983/84	**0.6**
1984/85	**0.1**
1985/86	**0.6**
1986/87	**0.7**
1987/88	**0.7**
(new data gathering re-started in 2002)	
2002/03	**11.4**
2003/04	**9.3**

Table 3: *Looper Trap Data Showing Infestation cycle of 1980-87 and current data 2002-2003*

and Spencer Counties. Defoliation in these areas was none to light. Scattered single-tree mortality was observed in Clark State Forest.

Loopers have been surveyed in Indiana from 1979 – 1991 and 2002 – present, using trap trees. During this period, up to 68 looper habitat locations were annually surveyed from November - April, using 3 trap trees per plot. Flightless female loopers become entangled on the trap's sticky bands when they climb trap trees to mate and lay eggs, and serve as a predictor of that year's imminent defoliation.

The highest numbers of loopers were observed 25 years ago, with a high point of more than 43 females being caught per tree in the 1980/81 trapping season (Table 3).

Past experience of looper infestations show that they first plague extreme southern Indiana and eventually move in a wave as far north as Morgan-Monroe State Forest, south of Indianapolis. As in the past, the 2004 looper defoliation also increased in areas north of where it had produced noticeable defoliation in 2003.

Population collapse in the northern part of the epidemic is expected to start after 2005 and be complete by 2006. Natural parasites and predators will cause the collapse. For 2005, no defoliation is expected in the southern areas of the epidemic, while defoliation similar to 2004 is expected in the northern part of the epidemic. Tree mortality is expected to occur and increase in 2005 because of the defoliation and the 2004 late summer drought. Forest managers should be aware that in the past, the Looper Complex caused up to 10% oak mortality, especially in the red and black oaks, and should plan salvage operations accordingly.

EMERALD ASH BORER – *AGRILUS PLANIPENNIS*

Eradication - Emerald Ash Borer was detected on April 19, 2004 in a campground (Jellystone) in Steuben County. By the end of May 2004, the ash within a ¼ mile radius of the initial tree were removed and destroyed. The remaining outer ¼ mile radius to complete the ½ mile eradication area was left for completion by the spring of 2005 (Figure 8). Approximately 1,100 ash trees were removed and destroyed at a cost of $87,000.

During EAB eradication operations in Steuben County, a landowner in adjoining LaGrange County near the Amish community of Shipshewana reported EAB in his ash tree. Investigation of this report and subsequent surveys has found EAB in Clay and Van Buren Townships of Lagrange

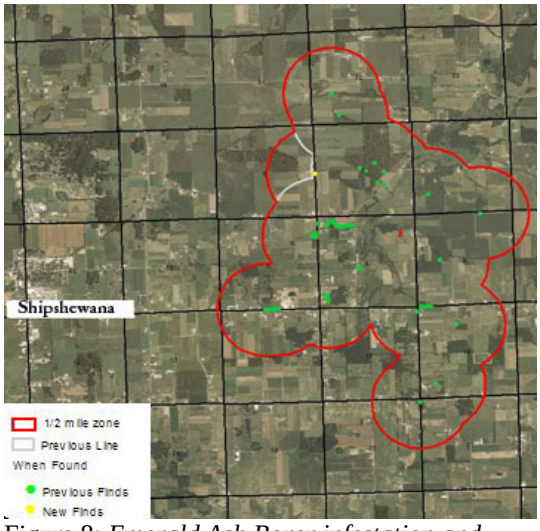


Figure 8: *Emerald Ash Borer infestation and treatment areas near Shipshewana, IN as of February 2005. Each square contains 640 acres.*

County. This infestation of EAB is believed to have entered Indiana through logs, as there is a pallet mill within ¼ mile of the landowner. It has been in this location for 3-5 years based on the extent of the infestation and the fact that several woodlots have ash trees showing dieback and decline symptoms from heavy EAB infestations. The spread of the infestation has been through natural movement from the pallet mill and through firewood movement within the Amish community of this area of the state.

Figure 9: *Ash eradication during the wet winter of 2004-5 has proven to be very challenging (Indiana Division of Forestry).*

Currently, the Shipshewana eradication area covers 9 sq. miles in the two townships. Over 31,000 ash trees >3/4" DBH have been marked for removal and burning. An additional 75,000-plus ash trees <3/4" DBH will be treated with an herbicide. To date, the DNR has spent over one man-year of time in marking the ash trees for the Shipshewana site. The current cost of the project is estimated at $1.2 million.

Detection Survey: Trap Trees – 300 EAB Trap trees were created in northeastern Indiana. Trap trees were created with 3" – 8" dbh ash trees, using a double girdle and plastic tree wrap spread with Tree Tanglefoot®. While completing the trap tree survey in the five northeastern counties, an infested tree was found at a second campground (Manapogo) in Steuben County. Subsequent surveys found eight infested trees. This added a second infested township, Mill Grove, in Steuben County (Jamestown is the other township). The township has been quarantined and is now undergoing the process to be included in the eradication project. Plans are to mark the trees in January 2005 and remove them by spring. This area is expected to increase as more trees may be found during the marking project.

The trap tree delimit survey of a trace forward (trees planted from a nursery in an infested area) site in Winchester (Randolph County) was negative. Additional monitoring of trace forward sites includes a subdivision in Porter County and street trees in downtown South Bend.

Detection Survey: Road Survey - A visual survey of street trees in cities and towns, campgrounds, nurseries and sawmills in the northern half of the state was conducted in 2002 and 2003. Surveyors identified stressed trees and examined the bark and branches for evidence of exit holes and other signs. These surveys did not detect EAB. In 2004, 122,637 ash trees were observed with 5.7% of those in decline, and no reports of EAB in those trees. An estimated 28,000 miles was driven to complete the road survey in 2004.

SECONDARY FOREST HEALTH PROBLEMS FOR 2004

ANTHRACNOSE

The wet spring produced another year of moderate to heavy defoliation of sycamore from anthracnose across the state. In certain instances, some people confused anthracnose with frost damage, which is superficially resembles. The majority of the defoliation was in the northern part of the state. Oak, maple and ash also had damage but to a lesser degree than the highly susceptible sycamore. Anthracnose in walnuts, which occurs later in the summer, was also more severe in 2004 and caused some observers to believe that leaf fall had commenced early.

The causal fungi for hardwood anthracnoses encompass several genera, and not all hardwoods are affected equally. Sycamore is the most susceptible species, and is the gauge that is used to determine the severity of anthracnose each year. Other species vary as to their susceptibility. For example, most oaks in the white oak group are more susceptible to anthracnose than those in the red oak group. Pin oak, swamp chestnut oak (a white oak group member), and bur oak are only rarely affected.

It is impractical and impossible to control anthracnose in forest stands. For urban forests and nursery stock, anthracnose may be regulated by raking leaves and pruning infected twigs and branches. This reduces the amount of overwintering fungi in plant materials that is available to cause infection during the next growing season.

PERIODICAL CICADA

Periodical cicadas, *Magicicada* spp., or '17-Year Locust', appeared from May to July 2004. Their black bodies, reddish-orange eyes and legs, clear wings with orange veins, and huge droning numbers held the attention of Hoosiers throughout much of the state for several weeks

Figure 10: *Brood X 17-year locust emerged during May 2004 across much of the eastern USA.*

Periodical cicadas emerge once every 17 years. Different groups called "broods" emerge somewhere in the eastern United States almost every spring. Biologists believe this behavior aims to overwhelm predators, ensuring that enough survivors will be left behind to reproduce. The recent large group in Indiana was known as Brood X.
Cicadas weaken trees throughout their life by piercing and sucking nutrients from under the ground as nymphs. As adults, it is only the females that damage trees and shrubs by laying eggs in small twigs. This damage causes twigs to split, wither, and die, causing a symptom called "flagging." Flagging is especially serious on young plants (four years or younger) because more of the branches are of the preferred size for oviposition, 1/4 to 1/2 inch in diameter.

Brood X emergence was reported throughout most of the state, especially south-central Indiana. Most of the oviposition damage – twig breakage and browning of foliage – occurred in south-central Indiana. Evidence of oviposition damage was also observed during aerial surveys in the northeast corner of Indiana during June. The only action required in 2005 would be to prune back damaged wood on ornamental and fruit trees. Cicada damage causes few if any long-term problems for trees.

WHITE OAK MORTALITY

Several reports of white oak and chestnut oak groups dying were received in 2004. Receiving reports of white oak dying is unexpected. Normally the white oak group is more resistant to death from various stress factors compared to the red oak group. Examination of two sites in southern Indiana (Orange & Putnam Counties) and one in northern Indiana (Lake County) found that Two Lined Chestnut Borer and Armillaria Root Rot were involved in the decline and death of the white

oak. Again, making the report of white oak mortality unusual was that the red oak group species observed in the sites were not declining or dying.

A. bilineatus attacks primarily oaks trees, weakened by various stress factors including drought and defoliation. The larvae bore into the inner bark, begin feeding and form meandering galleries in the inner bark and outer wood (Figure 12). The feeding galleries of many larvae in a heavy infestation effectively girdle the tree by blocking the movement of food to the roots and water to the shoots. These borers first infest the upper crown; later infestations are lower and often reach the base of the tree. The combined actions of the borer in the stem and the fungus in the roots (Figure 11) can bring about rapid decline and death.

Figure 11: *Typical shoestring-like Armillaria under the bark of an infested tree (USDA Forest Service)*

Figure 12: *Typical gallery of the two-lined chestnut borer A. bilineatus (USDA Forest Service*)

Scattered white oak mortality has been observed in Morgan, Jackson, and Orange counties and is probably more widespread than reported. In areas were groups of white oak trees are dying, salvage harvest operations should be implemented to preserve the timber value and contain further spread of two-lined chestnut borers.

CONIFER BARK BEETLES AND PINE PLANTATION MORTALITY

Pine stands were planted on Indiana's public lands primarily from the 1930's to the 1950's. Many of these stands were never thinned and were planted with species outside of their native ranges. The main purpose in these plantings was to stabilize steep soils from erosion, and secondarily serve as a nurse crop for emergent hardwoods. As these trees approach up to 70 years in age, they are in declining health and subsequently have been attacked by bark beetles of the genus's *Ips* and *Dendroctonus*. Pine stands primarily of red, shortleaf and loblolly pines have been affected throughout south-central Indiana on public lands. Older-growth native Virginia pine at the Clark State Forest fire tower and other locations has also been affected. Stands of affected pines are found as scattered individuals or in small groups, affecting at most several acres. This is expected to expand in scope and severity as insect populations build into an increasing base of favorable habitat. Any effort to salvage these pines would be recommended, however softwood markets in Indiana are currently limited.

LATE SEASON DROUGHT IN 2004

After a very wet spring and early summer, a minor drought period occurred across Indiana from mid August to early October. This was a welcome event for the foresters who marked the ash trees in LaGrange and Steuben County, as it dried the woods making it easier to work and kept the mosquito population down. Recent rains in late October and November appear to have replenished the soils and no serious damage is expected now or during 2005.

DUTCH ELM DISEASE - *OPHIOSTOMA ULMI* (SYN. *CERATOCYSTIS ULMI*)

Since its introduction into the US, Dutch Elm Disease (DED) has had a devastating effect on native elm populations. With the increasing age classes of Indiana's forests, similarly aging elms are beginning to show a marked increase of mortality through DED. Nearly 25% of U.S Forest Service Forest Health Monitoring (FHM) program plot mortality volume was due to elm mortality chiefly due to DED, on FHM plots 1998 -2002.

As Indiana forests continue to age, the incidence of DED will probably increase. Forest managers should mark with prejudice elms greater than 16 inches diameter whenever encountered, particularly in stands already expressing DED symptoms to prevent economic loss and reduce the disease base.

DECLINE/DEATH OF HICKORY, YELLOW POPLAR & ASH

Indiana landowners and foresters have reported dieback and mortality in pignut hickory, yellow-poplar & ash. It is probable that the 1999 and 2002 droughts are partially responsible for these reports.

To better understand these observations, the locations of certain declining hardwood groves have been identified and are being surveyed to collect stand data on dead and dying trees. During 2005, survey will continue and analysis will be made to determine the association of decline symptoms with site, aspect, slope, position, stocking rates, crown condition and other related factors. It is hoped that interpretations from this study will aid foresters and landowners in making sound management decision for future drought events.

RECURRING FOREST HEALTH ISSUES

OAK WILT - *CERATOCYSTIS FAGACEARUM*

Oak wilt was confirmed from black and red oak in one location in Grant County in 2001. This is the latest county with a confirmed identification, increasing the number of counties with Oak Wilt to 62 (Figure 13). No new counties have been added since 2001.

Oak wilt is predicted to continue as a minor and localized concern in Indiana. Pockets of trees infected with the disease should be cut and properly treated. Injury to stems, especially in the red oak group, should be avoided to help prevent oak wilt from expanding.

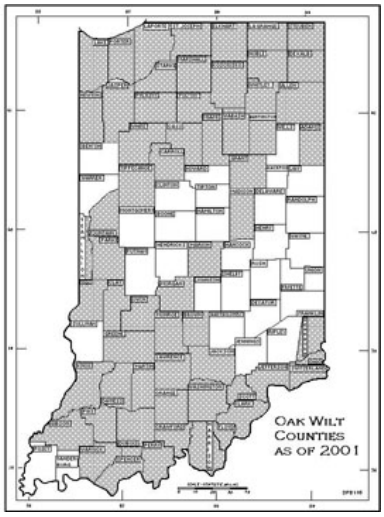


Figure 13: *Extent of oak wilt in Indiana in 2004*

BUTTERNUT CANKER - *SIROCOCCUS CLAVIGIGNENTI-JUGLANDACEARUM*

Butternut is being decimated throughout Indiana by *Sirococcus clavigignenti-juglandacearum*, a fungus most likely introduced from outside of North America. Butternut Canker was first observed in Wisconsin, in 1967, and has since spread over nearly the entire range of this tree. Cankers develop throughout a tree, and when the resulting callus material encircles the stem, the tree will be girdled and die. The disease is spread by rain splashed spores, possibly by insects and birds, and perhaps by seeds. Currently no butternut selections are available that have known canker resistance. A few healthy butternut trees have been found growing among diseased and dying trees and may be resistant to the disease. Reports of resistant butternut continue each year; however work limitations have slowed the screening of the reported trees. Landowners are still encouraged to locate and report healthy butternut to their District Forester, the State Forest Health Specialist or other Division of Forestry employees.

ASH YELLOWS

Ash Yellows (also known as Ash Decline) continues to be found across the state primarily on white and green ash. The disease is caused by a microbe that resembles bacteria which lack cell walls, but have many differences and are grouped differently. These microbes are called mycoplasma like organisms (MLO), and are possibly transmitted by leafhoppers. Symptoms of the disease, especially crown dieback and growth loss, are more prevalent in the northern part of the state. It is generally more common to observe the disease on wetter sites, but witches'-brooms (a diagnostic symptom) also can be found on trees growing on dryer sites. Trees in an advanced state of decline have the greatest change with 7% dying annually. Cumulative mortality over this period was greatest in trees with advanced decline, about 49%. Healthy trees and early declining trees had mortality of 2% and 5%, respectively.

Landowners and forest managers should approach Ash Yellows as a chronic condition requiring long-term rather than immediate attention. Removal of affected ash trees can be considered over a long-term (e.g. 10 year) planning horizon, which coincides with cutting cycles for uneven-aged management on better-quality Indiana woodlands.

WHITE PINE ROOT DECLINE - *VERTICICLADIELLA PROCERA*

Procera Root Rot (White Pine Root Decline) has been noticeably killing white pine across the state for more than 10 years. During 2005, mortality from this disease continued its role as the most common request for assistance. It continues to kill windbreak, yard and plantation trees. This disease is the most common forest pest that landowners request assistance, and as such has the status of the number one disease in Indiana.

USDA, Forest Service, S&PF

Figure 15: *Procera Root Rot tends to affect single trees in windbreaks*

Trees from 4 to 30 feet tall and 3 to 6 inches in diameter are commonly killed. Trees can turn brown

in color at any time of the year, but do so more commonly in the spring and fall. Infected trees appear light green and sparse or thin at first. Then the trees turn brown in a short period of time. Most landowners do not recognize the early symptoms of the disease. They usually see the dead brown tree and sawdust from woodborers that attack the dead tree. Management of the disease is done by using sanitation measures. There is no cure or preventative treatment for the disease.

WINTER BURN

Winter burn was observed in parts of Indiana on evergreen trees due to cold windy weather in the winter of 2003 – 2004. Winter burn injury can take place whenever the soil freezes and winds blow draw moisture from leaves. Plant roots cannot uptake water from frozen soil to replace the losses experienced in the leaves. The longer these conditions exist, the more moisture is lost and death of leaf tissue results. Evergreen plants in wind-exposed location are most susceptible; therefore planting should be made to minimize wind exposure.

PINE SHOOT BEETLE

The pine shoot beetle (*Tomicus pineperda*) was identified in pine plantations in the northern third of the State (Figure 16). The pine shoot beetle is an exotic species from Europe, and was first reported in Indiana in 1992. In Indiana, primary concern is with Christmas tree growers, who are particularly concerned about the potential of this introduced insect to cause destructive losses to their industry. Adults quickly colonize recently cut pine stumps, logs, and the trunks of severely weakened trees. In Indiana, *Tomicus* now is found in 60 of the 92 counties. Under state and federal quarantine law, all nurseries and Christmas tree growers in quarantined counties are required to have an inspection certificate before they can ship pine trees to non-quarantined counties. It is illegal to move any parts of pine from these counties.

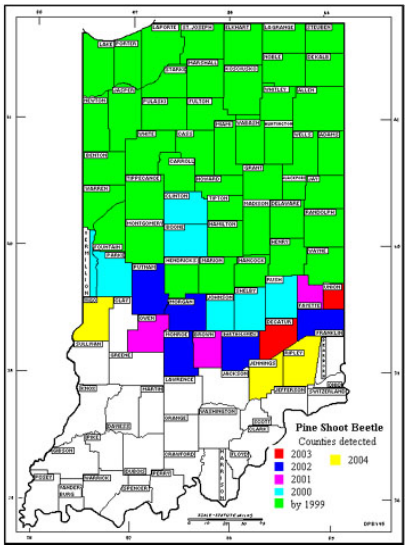


Figure 16: *Indiana pine shoot beetle infestation, by county and year*

BEECH BLIGHT APHID

A somewhat irregular pest for Indiana became quite common during the summer of 2004. It is a woolly aphid species known as the Beech Blight Aphid (*Grylloprociphilus imbricator* (Fitch.)).

Oddly resembling cotton candy, this aphid gathers on the twigs, small branches, and the undersides of foliage primarily of beech trees. Populations were obvious as early as July, but by September and October, they were obvious to even casual observation. In addition to its showy appearance, Beech Blight Aphid produced vast amounts of honeydew. Sooty molds turned this honeydew black, making winter-bare beech appear sickly or even fire-scarred. There is no strong consensus among forest pest specialists that this aphid causes any real serious harm beyond that of the vast amounts of aesthetically displeasing sooty mold. Managers should monitor beech and remove sickly individuals as needed.

OTHER FOREST PESTS OF CONCERN

The following pests have not yet infested Indiana but are of concern due to their potential to create great harm to the forest base.

SUDDEN OAK DEATH

Sudden Oak Death (causal agent, *Phytophthora ramorum*) has affected oak and other susceptible woody plant species in California and Oregon, killing many thousands of oak trees. Because southern Indiana is considered at moderate risk to *P. ramorum*-caused oak death, foresters are especially concerned of the spread of this disease through infected nursery stock.

To counter this threat, Forest Service personnel conducted two surveys during the summer of 2004. Two researchers from Ohio State University conducted a nursery perimeter survey. 87 Leaf samples from oaks and other host species found in wooded tracts near 9 Indiana plant nurseries were sampled and analyzed. Forest Survey personnel conducted a second survey on 6 oak stands on public lands in southern Indiana, collecting 57 samples. Declining and non-declining oak stands in southern Indiana were sampled. PCR labs analysis of samples taken confirmed that no sudden oak death was present in the samples screened.

Continued monitoring of Indiana nurseries and woodlands will continue with assistance from the Forest Service into the foreseeable future. A similar survey is planned in 2005.

SIREX WOODWASP - *SIREX NOCTILIO*

Sirex noctilio, the European wood wasp, was found in a Bloomington industrial location during the summer of 2002. This was the first detection of this species in the US. The wasp originated with a shipment of materials that came from Spain. It is found there, as well as Australia, New Zealand, and South Africa where it is a significant pest of pine forests.

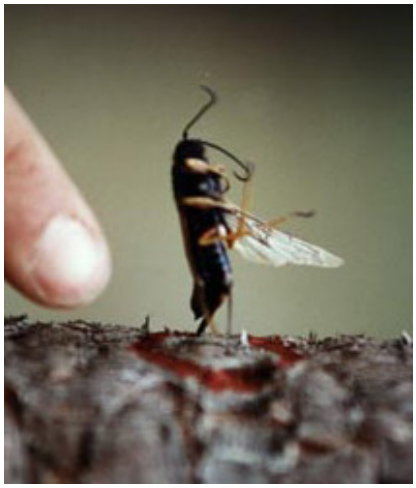


Figure 17: *Sirex female laying eggs (USDA Forest Service)*

Unlike similar species native to the US, *Sirex noctilio* attacks trees in massive numbers, resulting in rapid loss of vigor and death. Because it is a non-native insect, it is thought to possess great potential for damage.

IDNR Entomology and Forestry personnel are currently in their second year of surveys near the original introduction. Red, Virginia, and shortleaf pine trees were frilled and treated with an herbicide (dicamba) to create conditions of stress that could attract any *Sirex* nearby. Trap logs were placed around the interception sites and in areas where trap trees could not be used. At the end of the growing season, these trap trees and trap logs were collected, cut, and placed in cages to monitor emergence in 2005. To date, *Sirex* has not been detected.

BANDED ELM BARK BEETLE - *SCOLYTUS SCHEVYREWI*

Scolytus schevyrewi, the banded elm bark beetle (proposed common name), was first collected in insect traps set near Denver, CO and Ogden, UT, in April 2003. By the fall of 2003 this bark beetle had been collected in the following states: Arizona, California, Colorado, Idaho, Illinois, Kansas,

Nebraska, New Mexico, Oklahoma, Oregon, South Dakota, Utah, and Wyoming. The banded elm bark beetle has a similar life cycle to that of S. multistriatus, the principal vector of Dutch Elm Disease. Furthermore it has been observed to be more aggressively colonizing dying elm trees, and poses an unknown risk to Indiana elms both due to its potential harm and close proximity in Illinois.

CONCERN OVER BEECH BARK DISEASE AS OHIO CONFIRMS CASE

American beech is susceptible to several species of aphids and scale due to the tree's thin bark. Most noteworthy is beech bark scale (*Cryptococcus fagisuga)*. It is the first actor in an advancing killing front in the disease complex known as **Beech Bark Disease**. The scale has been present in northeast Ohio for sometime, but just recently the fungus involved in the disease complex – *Nectria* galligena – was reported for the first time. In recent years, Beech Bark Disease was found killing beech in the Upper Peninsula of Michigan and more recently on the western side of the Lower Peninsula. Thus, the disease is of concern to Indiana, as it has gotten closer to Indiana.

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