**United States Department of Agriculture**

Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

# Asian Longhorned Beetle Cooperative Eradication Program in Clermont County, Ohio

## Environmental Assessment
## May 2012

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**Agency Contact:**
Brendon Reardon, National Program Manager
National Asian Longhorned Beetle Program
USDA–APHIS–PPQ
ALB Eradication Program
4700 River Road, Unit 137
Riverdale, MD 20737

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# I. Introduction

Asian longhorned beetle (*Anoplophora glabripennis*) (ALB) is a foreign wood-boring beetle that threatens a wide variety of hardwood trees in North America. The native range of ALB includes China and Korea. ALB is believed to have been introduced into the United States from wood pallets and other wood packing material accompanying cargo shipments from Asia.

## A. Asian Longhorned Beetle

### 1. Biology

ALB is in the wood-boring beetle family Cerambycidae. Adults are 1 to 1½ inches in length with long antennae, and are shiny black with small white markings on the body and antennae. After mating, adult females chew depressions into the bark of various hardwood tree species in which they lay (oviposit) their eggs. There are 13 genera of host trees that are regulated for ALB: *Acer* (maple and box elder), *Aesculus* (horse chestnut and buckeye), *Salix* (willow), *Ulmus* (elm), *Betula* (birch), *Albizia* (mimosa), *Celtis* (hackberry), *Cercidiphyllum* (katsura tree), *Fraxinus* (ash), *Koelreuteria* (golden raintree), *Platanus* (sycamore and London planetree), *Sorbus* (mountain ash), and *Populus* (poplar) (USDA, APHIS, 2008a). *Acer* is the most commonly infested tree genus in the United States, followed by *Ulmus* and *Salix* (Haack et al., 2010).

Once the eggs hatch, small white larvae bore into the tree, feeding on the vascular layer beneath. The larvae continue to feed deeper into the tree's heartwood, forming tunnels (or galleries) in the trunk and branches. The damage cuts off nutrient flow and weakens the tree, which will eventually die if the infestation is severe enough. Sawdust-like debris and insect waste or excrement (also called frass) is commonly found on the base of afflicted trees, as well. Infested trees are also prone to secondary attack by disease and other insects.

Over the course of a year, a larva will mature and then pupate. From the pupa, an adult beetle emerges chewing its way out of the tree, and forming characteristic round holes approximately ⅜ inch in diameter. The emergence of beetles typically takes place from June through October, with adults then searching for mates and new egg-laying sites to complete their life cycle.

### 2. History of ALB in the United States

ALB was first discovered in the United States in August 1996 in the Greenpoint neighborhood of Brooklyn, New York. Within weeks, another infestation was found on Long Island in Amityville, New York, after officials learned that infested wood had been moved from Greenpoint to Amityville. ALB was subsequently found in Queens and Manhattan, and in Nassau and Suffolk Counties, New York.

In July 1998, due to the U.S. Department of Agriculture's (USDA) national ALB pest alert campaign, a separate infestation was discovered in the Ravenswood area of Chicago, Illinois. This discovery prompted USDA's Animal and Plant Health Inspection Service (APHIS) to amend its existing quarantine of wood movement from infested areas, and place additional restrictions on importing solid wood packing material into the United States from China and Hong Kong. In 2006, these restrictions were expanded to include imports from all countries.

In October 2002, ALB was discovered in Jersey City, New Jersey, and in August 2004, ALB was discovered in the Borough of Carteret, the Avenel section of Woodbridge Township, and in the nearby cities of Rahway and Linden, New Jersey. It was subsequently found in 2007 in Richmond County, New York (Staten Island), across the Arthur Kill River from the New Jersey infestation sites.

In August 2008, ALB was discovered in Worcester, Massachusetts. This infestation includes the city of Worcester and the towns of Auburn, Holden, West Boylston, Boylston, and Shrewsbury.

In July 2010, an infestation was reported in the Jamaica Plain area of Boston, Massachusetts; however, to date, only six infested trees have been detected in this area.

Infestations in each of the locations listed above are being treated according to the New Pest Response Guidelines (USDA, APHIS, 2008a). This consists of cutting, chipping or burning, and disposing (by mulching) of infested trees and high risk host trees (ALB host trees that are located up to a ½-mile radius from infested trees) in close proximity to the infested ones. High risk host trees that are not cut are treated with either trunk injections or soil injections at the base of the tree using the insecticide imidacloprid. The imidacloprid is taken up and distributed throughout the tree. Imidacloprid is effective against females as they are depositing eggs, adult beetles as they feed on leaves and small twigs, and young larvae in the tree before they burrow into the heartwood (USDA, APHIS, 2008a).

To date, ALB has been eradicated from Chicago, Illinois; Hudson County, New Jersey; and most recently, Islip, New York. Portions of Manhattan and Staten Island, New York, and Middlesex and Union Counties, New Jersey, are undergoing a survey process that will eventually make them candidates for eradication in 2013 (Manhattan) and 2014 (Staten Island and New Jersey) if no more beetles are found. Successful eradication efforts in these areas were based on recommendations in the New Pest Response Guidelines (USDA, APHIS, 2008a).

On June 17, 2011, ALB life stages were confirmed in Clermont County, Ohio. A federal quarantine was enacted on July 13, 2011, including Tate Township and East Fork State Park, to stop movement of infested material outside the regulated area. On October 14, 2011, an area in Monroe Township was added to the federal quarantine because a satellite ALB infestation was detected there, as a result of movement of infested firewood from Tate Township. Surveys are being conducted in and around the regulated areas within Clermont County to determine the size of the infestation and to identify infested host trees (a process called delimitation). As of April 21, 2012, 106,263 host trees were surveyed and 7,873 infested trees were identified within Tate and Monroe Townships. A total of 6,782 infested trees have been removed. To date, Clermont County has the second largest ALB infestation (the Worcester, Massachusetts infestation is larger) detected in the United States.

## B. Purpose and Need

APHIS has the responsibility for taking actions to exclude, eradicate, and/or control plant pests under the Plant Protection Act of 2000 (7 United States Code (U.S.C.) 7701 et seq.). APHIS is proposing a program to eradicate ALB from Clermont County, Ohio. This action is necessary to prevent further spread of ALB and to eradicate it from the area.

This environmental assessment (EA) was prepared consistent with the National Environmental Policy Act of 1969 (NEPA) and APHIS' NEPA implementing procedures (7 Code of Federal Regulations (CFR) part 372) for the purpose of evaluating how the proposed alternatives, if implemented, may affect the quality of the human environment.

APHIS has prepared seven other EAs that are relevant to this current EA: Asian Longhorned Beetle Control Program (USDA, APHIS, 1996), Asian Longhorned Beetle Program (USDA, APHIS, 2000), Asian Longhorned Beetle Cooperative Eradication Program, Hudson County, New Jersey (USDA, APHIS, 2003), Asian Longhorned Beetle Cooperative Eradication Program in the New York Metropolitan Area (USDA, APHIS, 2007), Asian Longhorned Beetle Cooperative Eradication Program in Worcester and Middlesex Counties, Massachusetts (USDA, APHIS, 2008b), Asian Longhorned Beetle Cooperative Eradication Program in Essex, Norfolk, and Suffolk Counties, Massachusetts (USDA, APHIS, 2011a), and Asian Longhorned Beetle Eradication Efforts in Clermont and Brown Counties, Ohio (USDA, APHIS, 2011b).

This EA is being prepared because the September 2011 EA for ALB eradication activities in Clermont and Brown Counties considered only two alternatives: (1) no action by APHIS, and (2) to cut down and remove infested trees to prevent further spread of ALB. However, APHIS is considering other tools and strategies besides removal of infested trees as discussed in that EA because the intial work was considered only a first step at control prior to determining the extent of the infestation and steps needed to eradicate the infestation. This EA identifies four alternatives that are being evaluated, and after the public comment period, an alternative will be selected.

## C. Public Outreach

APHIS, along with the Ohio Department of Agriculture, have provided opportunities for public involvement and outreach regarding ALB program activities such as media interviews for newspapers and television, press releases, public service announcements on local radio stations, presence at industry shows, expos, and outreach venues; presentation of "Lurking in the Trees", a documentary produced in conjunction with the Nature Conservancy, on Clermont County cable access; social media including Facebook, Twitter, YouTube, and Flickr; public meetings; and, meetings with Federal and State legislators, town administrators, and other impacted groups and persons. Informational materials and sites have been made available to the public including Answers to Frequently Asked Questions, and various ALB informational sites: www.BeetleBusters.info; http://bugs.clermontcountyohio.gov/ALB.aspx; http://www.agri.ohio.gov/TopNews/asianbeetle/; http://clermont.osu.edu/news/asian-longhorned-beetle-found-in-ohio-osu-extension-offers-information-hotline; the APHIS ALB plant pest page http://www.aphis.usda.gov/plant_health/plant_pest_info/asian_lhb/index.shtml. See appendix A for a more complete listing of public outreach activities.

# II. Alternatives

This EA analyzes the potential environmental consequences associated with the proposed action to eradicate ALB from Clermont County, Ohio. Four alternatives are being considered: (A) no action by APHIS; (B) removal of infested trees and high risk host trees up to a ½-mile from infested trees (full host removal); (C) removal of infested trees and imidacloprid treatment of high risk host trees up to a ½-mile from infested trees; and (D) infested host removal and combination of removal or imidacloprid treatment of high risk hosts. Alternatives B through D are eradication program (action) options based upon the recently revised New Pest Response Guidelines for ALB (USDA, APHIS, 2008a).

## A. No Action

Under the no action alternative, no eradication efforts would be undertaken by APHIS. However, APHIS would continue to implement the quarantine restrictions in the area, as defined in the Federal Orders for Clermont County, Ohio that were issued on July 13 and October 14, 2011, and future Federal Orders should ALB be found in new locations and counties. Some control measures could be taken by other Federal or non-Federal entities; however, these measures would not be controlled or funded by APHIS.

Certain articles present a risk of spreading ALB if they are moved from quarantined areas without restrictions; these are called regulated articles. Restrictions are imposed on the movement of regulated articles because ALB can survive in these materials and could possibly be transported to uninfested areas. Implementation of a quarantine is expected to prevent the artificial (human-assisted) spread of ALB by limiting the movement of firewood, green lumber, and other living, dead, cut, or fallen material, including nursery stock, logs, stumps, roots, and branches from ALB host trees (host material) from ALB-infested areas into uninfested areas, but it does not limit the natural spread of ALB.

ALB host material may not move outside the quarantine zone unless each article is issued a certificate or limited permit by an APHIS or State inspector. No regulatory treatments have been approved to allow for the interstate movement of host material. See figure 1 for a map of the current quarantine area, although this area could expand if more ALB infested trees are found.

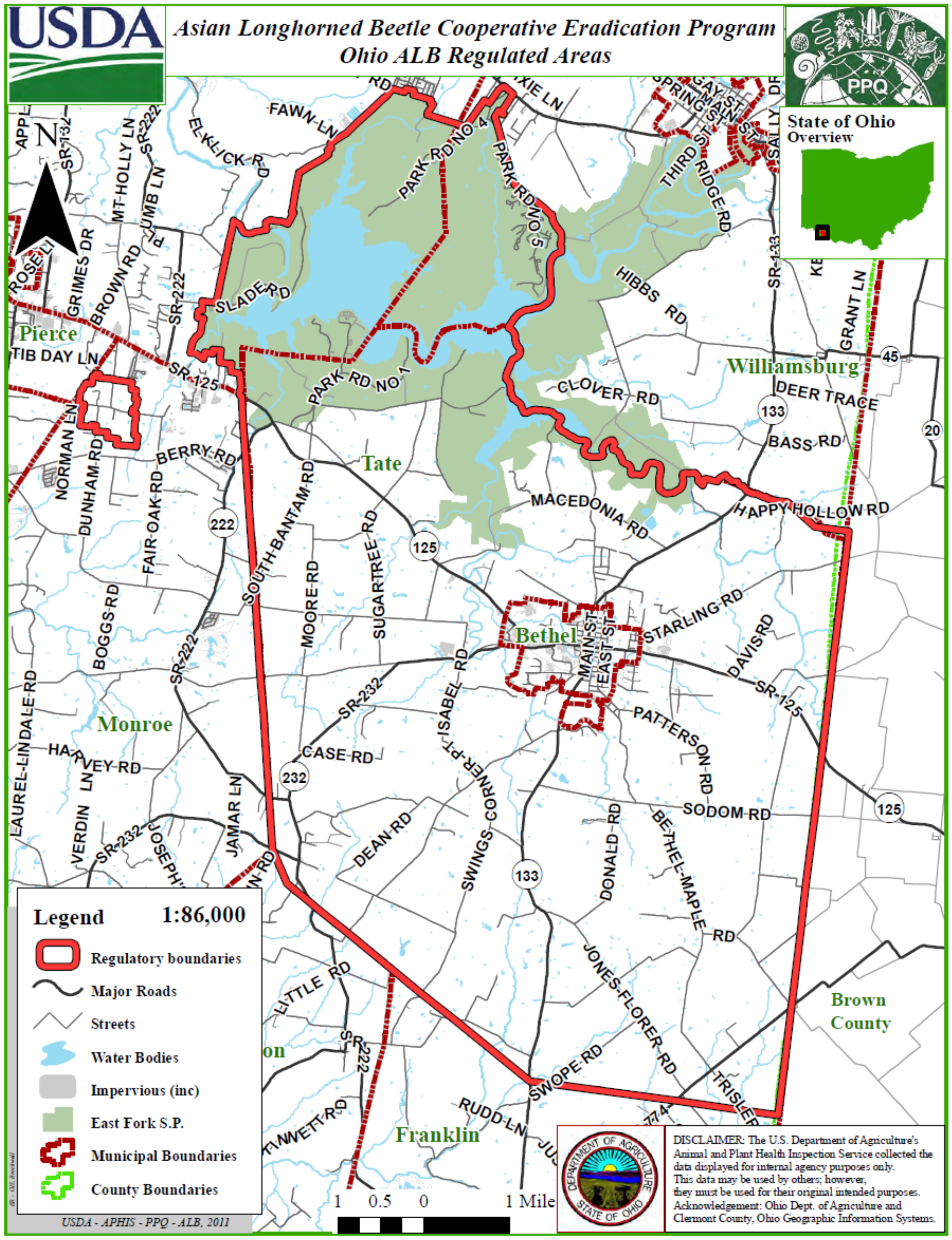



**Figure 1.** ALB quarantine areas in Clermont County, Ohio (56.2 square miles).

## B. Full host removal

Under this alternative, APHIS and its cooperators would remove both all infested host trees and all high risk host trees of known ALB host species (full host removal) to eradicate ALB and prevent it from spreading. Signs of low infestation levels are not readily apparent on high risk trees and can remain unnoticed by visual survey. Consequently, due to their proximity to known infested trees, there is a risk of infestation of high risk host trees. The eradication program under this alternative would consist of maintaining the current ALB quarantine as defined in the no action alternative; surveys of host trees; removal of infested trees and high risk host trees up to a ½-mile from infested trees; chipping or burning removed trees; and, stump grinding of removed trees, application of the herbicide triclopyr on stumps that cannot be removed, foliar applications of triclopyr tank mixed with two other herbicides, imazapyr and metsulfuron to sprouting foliage from stumps, or leaving stumps of high risk host trees to encourage regrowth in certain areas such as woodlots.

ALB inspectors use many methods and resources to conduct tree surveys multiple times over multiple years to detect infested trees and to ensure the absence of the beetle. Inspectors conduct visual surveys from the ground using binoculars to look for signs of infestation. In addition, interest groups and organizations voluntarily assist inspectors by searching trees from the ground. Surveyors look for signs of infestation, such as round ALB exit holes and heavy sap flow from damaged sites on host trees. Aerial tree inspections may also be performed by trained professionals using bucket trucks to peer into trees from above and by trained tree climbers to search for signs of an infestation within tree canopies. Use of tree climbers is the most effective method of detecting signs of ALB but is also a slower and more costly method (Hu et al., 2009). Currently, no method of survey for ALB is completely effective. Inspections conducted through ground surveys are approximately 30 percent effective in detecting a lightly infested tree, and climbing surveys are about 60–75 percent effective in detecting a lightly infested tree.

Under this alternative, infested trees, as well as high risk host trees up to a ½-mile radius of infested trees would be cut down, removed, and chipped or burned. Cutting down infested and high risk host trees removes ALB larvae that may be within those trees, thus eliminating potential adult beetle emergence and dispersal. For control purposes, high risk host trees include *Acer* spp. (maple and box elder), *Aesculus* spp. (horse chestnut and buckeye), *Salix* spp. (willow), *Ulmus* spp. (elm), *Betula* spp. (birch), *Albizia* spp. (mimosa), *Cercidiphyllum* spp. (katsura tree), *Fraxinus* spp. (ash), *Koelreuteria* spp. (golden rain tree), *Platanus spp.* (sycamore and London planetree), *Sorbus* spp. (mountain ash), and *Populus* spp. (poplar). Host removal is recommended in near proximity of an infested tree because of the likelihood of infestation (USDA, APHIS, 2008a). A minimum ½-mile radius for removal of high risk host trees is utilized because of the dispersal behavior of ALB. In a study in Chicago, 99 percent of trees with ALB egg laying sites were found within a ¼-mile of a tree from which adult ALB exited (USDA, APHIS, 2008a). As a safety factor an additional ¼-mile is added to the radius for high risk host removal around infested trees.

Roots of infested host trees would be removed to a minimum of six inches below ground level using a stump grinder. Any aboveground roots with a diameter of a ½-inch or more will also be removed. Because of limitations in moving equipment into certain areas or to prevent erosion, the program may apply a cut-stump herbicide treatment of triclopyr instead of using a stump grinder. Program or contract personnel would spray or paint the root collar area, the sides of the stump, and the outer portion of the cut surface including the cambium (thin layer of generative tissue lying between the bark and the wood of a stem, most active in woody plants) until thoroughly wet, but not to runoff.

Foliar applications of triclopyr tank mixed with two other herbicides, imazapyr and metsulfuron, would be applied to sprouting foliage from stumps that that have been removed as part of the eradication efforts. This use would occur if physical removal of stumps was not possible and would be used to prevent resprouting of stumps. ALB can reinfest sprouts of host trees. However, in some cases, such as woodlots, stumps of high risk host trees may not be ground or treated with herbicides to allow for more rapid regrowth of the trees. This would only be allowed if all high risk host trees have been removed within the designated radius of infested trees.

All host trees that are removed from within the quarantined area either burned or chipped to a size less than one inch in at least two dimensions. Chips of this size are no longer subject to Federal or State regulations. In both cases, trees will be moved to areas dedicated to either chipping or burning.

## C. Removal of infested trees and imidacloprid treatment of high risk host trees

Under this alternative, APHIS and its cooperators would remove infested trees and chemically treat high risk host trees. The eradication program under this alternative would consist of maintaining the current ALB quarantine as defined in the no action alternative; conducting surveys of host trees; removal of infested trees; chipping or burning of cut trees; imidacloprid trunk or soil injections of high risk host trees up to a ½-mile radius from infested trees; stump grinding of removed trees; application of the herbicide triclopyr on stumps that cannot be removed; and, foliar applications of triclopyr tank mixed with imazapyr and metsulfuron to resprouts from stumps.

Surveys, infested tree cutting, stump grinding, treatment of stumps with triclopyr, imazapyr and metsulfuron, and chipping or burning of cut trees are conducted as described in alternative B (full host removal). However, under this alternative, stumps of cut trees would not be allowed to regrow because only infested trees would be cut.

Imidacloprid trunk and/or soil injections would be applied to high risk host trees found up to a ½-mile from an infested tree. Imidacloprid treatments are made in the spring and early summer, prior to and during the adult emergence period, in order to allow the insecticide to be distributed throughout the tree and, therefore, be most effective. Chemical treatments of imidacloprid are made through direct injection either into the tree trunk or into the soil immediately surrounding the tree. The rate of imidacloprid depends on the application method, as well as diameter at breast height (dbh) of the host tree.

For soil injection, imidacloprid is injected at a minimum of 4 injection sites spaced evenly around the base of the tree. It is applied using 1.42 grams (g) of imidacloprid diluted in a ½-cup of water for each inch of dbh. The insecticide is applied under the soil around the base of the tree, normally no more than 12 inches from the base. No material may puddle or run off-site. Soil injection treatments may take up to 3 months before sufficient quantities of imidacloprid are observed in target plant tissues (depending on the size and condition of the tree).

For trunk injections, holes are drilled around the trunk, 2 to 6 inches above the soil-wood line. For non-pressurized injection, Mauget's injection capsules are seated in each hole in the tree at a rate of one capsule per 2 inches dbh for host trees measuring between 2 and 24 inches dbh. Host trees measuring more than 24 inches dbh are treated with one or two capsules per every 2 inches of dbh. The injection capsules are removed from the tree after 4 hours to ensure that the imidacloprid has emptied out of the unit and into the tree. During the 4-hour injection period, project personnel safeguard each tree to ensure capsules are not disturbed or removed during application. Safeguarding ensures treatment efficiency and safety from exposure to people and animals.

For pressurized injection, a tree can be treated in approximately five minutes because there is no need to wait for passive uptake of the insecticide into the tree. Trunk injections are applied at a rate of 0.22 g of imidacloprid for each inch of dbh for host trees measuring 24 inches or less dbh, and 0.22 g to 0.44 g of imidacloprid for each inch of dbh for host trees over 24 inches dbh. For both pressurized and non-pressurized trunk injection methods, the insecticide is distributed throughout the tree in 1 to 3 weeks.

Application of imidacloprid should be repeated once yearly over a three-year period to ensure that the concentration of the insecticide within the treated tree is at an adequate level to kill ALB. Imidacloprid treatments do not ensure complete control of ALB within a tree due to variability in treatments, weather conditions, and tree health, which all can result in non-uniform distribution of imidacloprid within a tree. In addition, the chemical treatment is not believed to be effective against large larvae already present in the tree at the time of treatment (USDA, APHIS, 2008a).

### D. Infested host removal and combination of removal or imidacloprid treatment of high risk hosts

Under this alternative, APHIS and its cooperators would remove infested trees, and would use a combination of removal and imidacloprid treatments of high risk host trees up to a ½-mile radius of infested trees. The eradication program under this alternative would consist of maintaining the current ALB quarantine and adding new areas to the quarantine area where additional ALB-infested trees are discovered; surveys of host trees; removal of infested trees; stump grinding, application of the herbicide triclopyr to stumps that cannot be removed, or leaving stumps of trees to encourage regrowth in certain cases, or treatment of stumps with a tank mix of the herbicides triclopyr, imazapyr and metsulfuron to prevent resprouting; and, chipping or burning of cut trees, all as described in alternatives B and C. The type of control action for high risk host trees that would be applied to an area is dependent on many factors, such as the level and size of the infestation, the density and distribution of host trees, and/or compliance with other environmental and legal statutes, such as the Endangered Species Act.

## III. Affected Environment

A quarantine area has been defined surrounding the initial ALB detections which occurred approximately 2 miles southwest from the village of Bethel (Figure 1) in Clermont County, Ohio. This EA not only covers the initial infestation and surrounding quarantined area, but all of Clermont County where ALB may be found during delimitation.

#### Human population

From 2010 census data, Clermont County has a population of 197,363, composed of 94.9 percent white, 1.2 percent black, 1.5 percent Hispanic, 1 percent Asian, and 0.2 percent Native American or Alaskan American (U.S. Census Bureau, 2012). Median household income in 2009 was reported as $57,877 with 10.4 percent reported as below the poverty level (U.S. Census Bureau, 2012).

Approximately three quarters of the residents are considered urban in Clermont County. ALB host trees are expected to occur in urban areas because many of the host trees occur naturally throughout the state and surrounding areas and are ideal for planting as ornamental and shade trees.

The distribution of urban and rural residents in Clermont County is reflected in the distribution of industries, with manufacturing and construction dominating in the more urban areas and zero to less than 1 percent in agriculture, such as forestry. Because more heavily timbered counties occur east of Clermont County and could become infested with ALB a discussion regarding timber-related impacts in the state is warranted if no action is taken to eradicate ALB. In Ohio, the forest product industry contributes $15 billion dollars to the state while providing employment for 119,000 people (ODNR, 2006). Furniture and cabinet production contribute more than three quarters of a billion dollars each to the economy in Ohio while in non-timber products such as maple syrup production, Ohio ranks fourth in the United States contributing five million dollars to the state economy (ODNR, 2006). A total of 92 million cubic feet of wood was harvested from Ohio's forests in 2006 and used for products; production has shifted from pulpwood to saw logs (USFS, 2009).

## Ecological Resources

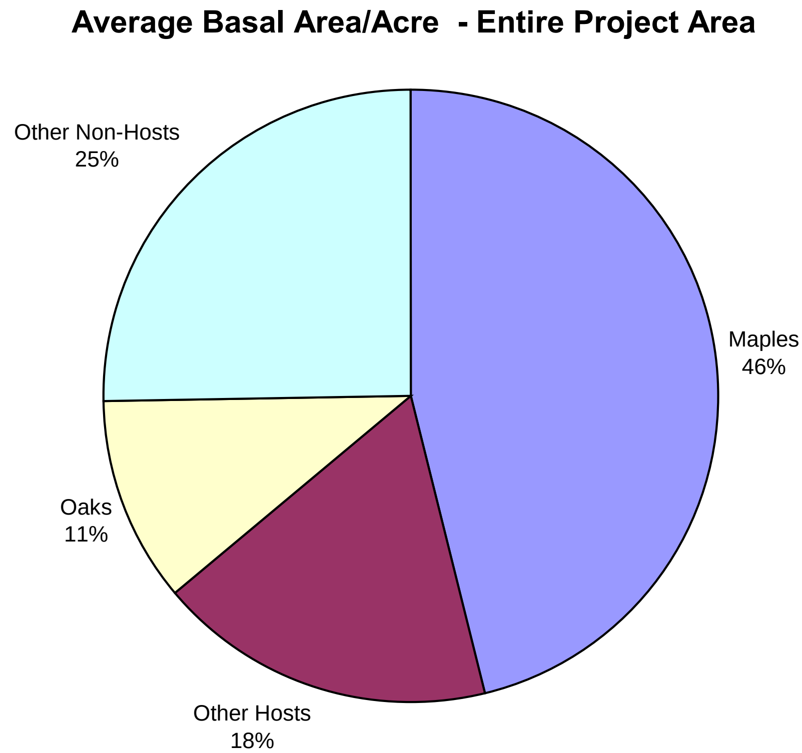
### 1. Parks and Preserves

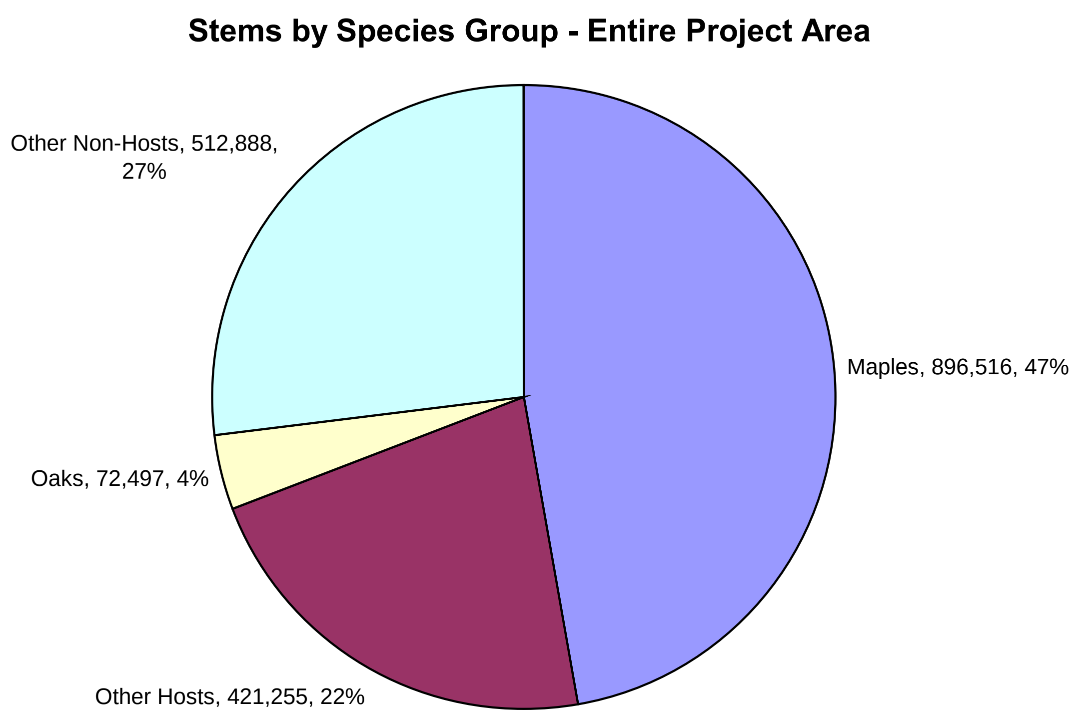
The current quarantine area includes the East Fork State Park which is less than five miles to the north of the initial ALB find. East Fork State Park is one of Ohio's largest State parks offering recreational and natural history opportunities (ODNR, 2011a). It also provides hiking trails, boating, fishing, swimming, and hunting, and contains an abundance of plant and animal life with ALB host plants present in upland and bottomland forested areas. In addition to the park located within the quarantine, Stonelick State Park occurs in Clermont County, outside of the quarantined area. Stonelick State Park has recreational opportunities similar to the East Fork State Park and has a variety of plant and animal life with ALB host plants present throughout the park. East Fork State Park is considered an Audubon Important Bird Area. Clermont County is also home to a nature preserve managed by the Division of Natural Areas and Preserves within the Ohio Department of Natural Resources. The Crooked Run Preserve is in the extreme southern end of Clermont County and is an artificial freshwater estuary.

The oak-hickory forest type is the most common forest type in Ohio and is dominated by oak and hickory species (ODNR, undated). Associate trees include black walnut, white ash, basswood, and black cherry (ODNR, undated). This type is most frequently found in the east-central, southeastern, and south-central hill country regions of the state (ODNR, undated). The second most common forest type is beech-maple (ODNR, undated). Species include large numbers of beech as well as sugar maple, red oak, white ash, white oak, black cherry, basswood, and shagbark hickory (ODNR, undated). This forest type occurs in poorly drained flatlands of southwestern, west-central, north-central, and northeastern Ohio (ODNR, undated). The third forest type is elm-ash and is interspersed throughout the other two forest types (ODNR, undated). Elm, ash, and maple are the dominant hardwoods in this forest type (ODNR, undated). It is found in the northern and western parts of the Ohio. A fourth non-specific but common forest type exists that has no dominant tree species. This forest type occurs in early forest development and consists of a mixture of hardwoods such as red elm, white ash, black cherry, red maple, and black locust (ODNR, undated).

ALB host species that are known to occur in Clermont County forests include box elder; black, red, silver, and sugar maples; American sycamore; eastern cottonwood and yellow poplar; Ohio and yellow buckeye; hackberry; white, black, green, and blue ash, and; American and slippery elm (USFS, Forest Inventory, unpublished). The Ohio buckeye is the state tree of Ohio. Other potential ALB hosts that occur in Ohio include quaking and bigtooth aspen; black, river, and yellow birch; horse chestnut, and; black and purple osier willow (ODNR, 2011b).

The Ohio Department of Natural Resources Division of Forestry conducted a species composition and size class survey of the forest tracts within a 25-square mile defined area of Tate Township in December, 2011. This area comprises the majority of the currently infested area in Clermont County. Sampling plots were taken in areas identified by the Ohio Department of Agriculture as “forest” within the 25-square mile section of Tate Township. Species and diameter were recorded for all trees greater than 2 inches of dbh growing within tenth-acre sampling plots. Global Positioning System (GPS) locations were taken at the center of each of 730 plots. The forest area of the 25-square mile area was determined to be 5,744 acres. There were portions of small acreages that were outside the forest areas and would likely require control (i.e., fencerows); these areas were not analyzed. The composition study found a high amount of ALB host species both in number of stems and proportion of total forest cover in all forest age classes. The areas of the most mature forest have a slightly lower percentage of host species. Figures 2 and 3 indicate the relative average basal area and the total number of stems by species group for the entire 25-square mile study area. Maples are clearly the most abundant tree species in the current quarantine area, constituting 46 percent of the average basal area per acre and 47 percent of stems by species group. See appendix B for the complete study.




**Figures 2 and 3.** Relative average basal area in square feet per acre and the total number of stems by species group for the entire 25-square mile study area.

## 3. Firewood

Firewood can vary widely in heat content, burning characteristics, and overall quality. Hardwoods such as oak, hickory, beech, and locust have better heat value than red maple, sassafras, black cherry, or softwoods such as pine, because the wood is denser. ALB host species that are considered to be commonly used for firewood in the United States include maple, elm, sycamore, ash, yellow birch, and willow, although these species vary in burning characteristics. Other ALB hosts including box elder, horse chestnut, mimosa, hackberry, buckeye, golden raintree, mountain ash, and poplar are not valued firewood species.

In a 2006 U.S. Forest Service survey, from a list of 12 reasons for owning forest land in Ohio, "part of home or cabin" was ranked first by number of people with forest ownership and "aesthetic enjoyment" was ranked first by those who owned larger forest acreage. Firewood production ranked low in importance to Ohio's family forest owners; it was ranked as important or very important by only 19 percent of owners who hold 19 percent of the acreage (USFS, 2009). However, 51 percent of owners holding 60 percent of the family forest land reported harvesting trees and 29 percent of owners had harvested firewood (USFS, 2009). When asked about activity planned for their land in the next five years, harvesting firewood was planned by 40 percent of owners (USFS, 2009).

## 4. Forest wildlife

Almost half of Ohio's wildlife species require woodland habitat (ODNR, undated). Federal and state listed endangered animals such as the Indiana bat, bobcat, and timber rattlesnake are dependent on woodland habitat for survival. The sharp-shinned hawk, bald eagle, game birds such as the wild turkey and ruffed grouse, and many songbirds inhabit Ohio's forests. Approximately 100 bird species are dependent on some stage of forested habitat. All of Ohio's 22 species of salamanders require woodland habitat at some time during their life cycle (ODNR, undated). Mammals such as raccoons, red foxes, gray and fox squirrels, white tailed deer, beavers, black bear, and opposums occur in Ohio forests.

The maturity of a woodland habitat influences the wildlife species using it. Early, sapling‑pole timber size stages of woodland development are used by wildlife such as the indigo bunting, rufous‑sided towhee, and yellow‑breasted chat that prefer an open stand (ODNR, undated). As the forest matures to a sawtimber stand, a different mixture of wildlife will replace the previous community.

Nearly 30 percent of all wildlife species using woodland habitat in Ohio use tree cavities as dwellings (ODNR, undated). These include bird species that make their own cavities such as the red‑bellied woodpecker, pileated woodpecker, and common flicker (ODNR, undated). Other species depend upon pre-existing and/or natural formation for cavities and include the black-capped chickadee, tufted titmouse, raccoon, and gray squirrel (ODNR, undated).

Species that feed on acorns and other hard mast such as hickory nuts and beech nuts include wild turkey, red-headed woodpecker, blue jay, squirrel and chipmunk, gray fox, striped skunk, and white-tailed deer. (USFS, 2009)

**5. Mine restoration**

Information through 2004 demonstrates that over 480 abandoned mine sites have been reforested by the state in counties east and north of Clermont County (ODNR, 2004). Several species that are host trees for ALB were part of those reforestation efforts designed to reduce erosion, provide wildlife habitat, and protect watersheds.

### Environmental Quality

Clermont County is contained primarily within the Little Miami watershed and partially in the Ohio Brush-Whiteoak watershed (EPA, 2011a). The Little Miami River is designated as a national scenic river and drains parts of Clermont County. The Little Miami River is also one of the larger rivers with sections that are listed as impaired under Section 303(d) of the Clean Water Act. Other streams within the Little Miami and Ohio Brush-Whiteoak watershed are also listed as impaired. The reason these water bodies are impaired varies but is usually one or a combination of excessive nutrients, habitat alteration, and sedimentation.

The predominant aquifer type in the program area is interbedded shale/carbonate which is part of a larger carbonate aquifer type in the western part of the state. Background water hardness in this aquifer type generally requires treatment to remove calcium and magnesium, and average levels of total dissolved solids, sulfates, and iron are typically above secondary maximum contaminant levels (SMCL) (Ohio EPA, 2008). The most common group of pollutants detected in this aquifer belongs to a group of chemicals known as volatile organic compounds (VOC). The detection of VOCs is correlated with population centers where sources for these types of chemicals (i.e., factories, machine shops, landfills) are more prevalent.

Air quality in Clermont County is variable based on proximity to urban areas. The air quality index (AQI) is a measurement of the level of pollutants in the atmosphere. An AQI above 100 indicates that air quality conditions exceed health standards while values below 100 indicate pollutant levels are below air quality standards. Based on data from 2008, portions of Clermont County had AQI values above 100 more than ten days out of the year (EPA, 2011b). The non-attainment of air quality standards in these areas is most likely associated with the city of

Cincinnati, and the surrounding area, and is related to exceedance of small particulate matter standards.

# IV. Environmental Impacts

## A. No Action

Environmental impacts from the no action alternative are related to the damage caused by the establishment and spread of ALB and impacts from the quarantine. Implementation of a quarantine reduces the artificial spread of ALB by prohibiting the movement of host material that could be infested with ALB. However, this alternative does not reduce the natural dispersal of the insect. Under this alternative, the beetle would be expected to expand its range into uninfested areas of the United States wherever hosts are available. Nevertheless, implementation of the quarantine is effective in slowing the spread of ALB and preventing it from becoming established in new locations by artificial movement, which limits the area where eradication methods would need to be applied. It is an important tool in the eradication of ALB by limiting the spread of ALB to new areas, but alone is not adequate to eradicate ALB from the United States.

The wide distribution of ALB host trees suggests the danger that ALB could spread across much of the country with increases in damage and losses commensurate with the spread. ALB establishment in the United States could result in the loss of as much as 60 percent of the tree population in some areas, and preferred host trees would not be expected to significantly recover and regenerate (USDA, APHIS, 2009).

### Human population

The potential establishment of ALB in the United States would cause damage to and loss of valuable ornamental and commercial trees, as well as naturalized and forested areas. The damage and losses could result in reduction of private property value. Studies conducted in Connecticut, Georgia, and Louisiana estimated that the presence of trees on a site increased property values from 2 to 6 percent (Anderson and Cordell, 1988; Dombrow and Sirmans, 2000; Morales et al., 1976; USDA, APHIS, 2009). A study in Austin, Texas indicated that trees contribute between 13 and 19 percent to the value of a property (Martin et al., 1989). Nowak et al. (2001) presented a worst-case scenario of the effects of ALB establishment in several U.S. urban landscapes, with potential value losses exceeding $600 billion and 30.3 percent tree mortality.

The establishment and spread of ALB within Ohio poses a threat to the forest products industry because many of the host species for ALB support forest product activities such as timber production, furniture manufacturing, and maple syrup production. Furniture and cabinet production contribute more than three quarters of a billion dollars each to the economy in Ohio. In non-timber products such as maple syrup, Ohio ranks fourth in the United States contributing five million dollars to the state economy (ODNR, 2006). In addition to economic damage to the forest industry, previous reforestation activities on abandoned mines would also be impacted if ALB expanded its range in the state. According to the Ohio Department of Agriculture, ALB could decimate maple trees in Ohio, impacting up to $200 billion worth of standing timber, adversely affecting maple sugar processors, damaging the state's multi-billion dollar nursery industry, and diminishing Ohio's fall foliage season (Espinoza, 2011).

Although implementation of a quarantine is important to reduce artificial movement of ALB, it restricts the movement of firewood, green lumber, and other living, dead, cut, or fallen material including nursery stock, logs, stumps, roots, and branches from potential ALB host trees. This can result in economic losses to industries that rely on transporting host trees and their products outside of the quarantine zone.

### Ecological Resources

Soil and water quality would be significantly impacted in forested areas where ALB-preferred host trees are dominant (USDA, APHIS, 2009). There would be changes in composition and age structure of forests which could have long-term effects on the ecological relationships in naturalized and forested areas. Wildlife that depend on ALB preferred hosts would be adversely affected in some locations with the permanent removal of these species from their habitat (USDA, APHIS, 2009). As ALB continues to spread, other Federal agencies or non-Federal entities may try to control or eradicate ALB through the use of chemical treatments. There are elevated environmental risks from the uncoordinated application of insecticides to limit the damage from ALB.

## B. Full Host Removal

Under this alternative, areas found to have ALB would be quarantined and the impacts from this action are the same as those examined under the no action alternative. The environmental impacts of full host removal and application of herbicides to stumps and resprouts of trees that have been removed are discussed below. The most important impacts of this alternative are from the potential removal of a large number of trees compared to the other action alternatives. This alternative is the most aggressive and efficacious method to eradicate ALB from Ohio because it more quickly eliminates the ALB population compared to alternatives C and D.  Full host removal can occur year-round and circumvents the need for multiple surveys, removal of additional infested trees, and chemical treatments over time.

### Human population

Human impacts are generally economic from the loss of trees in the ALB-infested area.  These impacts may include loss of property value and increased heating and cooling costs.  Studies conducted in Connecticut, Georgia, and Louisiana estimated that the presence of trees on a site increased property values from 2 to 6 percent (Anderson and Cordell, 1988; Dombrow and Sirmans, 2000; Morales et al., 1976; USDA, APHIS, 2009).  In addition, trees can have a protective effect on human health by reducing pollutant exposure and diminishing illnesses related to this exposure.  Presence of trees and natural environments have positive psychological effects on humans, both by reducing stress and by reducing the length of hospital stays and the need for pain-relieving drugs (HCNDACRSPNE, 2004; Kuo and Sullivan, 2001; Ulrich, 1984, as cited in USDA, APHIS, 2009).  From the ALB Species Composition Report (Appendix B), approximately 69 percent of trees could be removed because the trees are hosts of ALB.  Clear-cutting of natural areas is not expected to occur, and non-host trees such as hickory and oak will remain standing.  In unmanaged areas such as woodlots, uninfested stumps may not be treated with herbicide to allow resprouting to encourage more rapid regrowth of these areas.

### Ecological Resources

**1. Parks and Preserves**

State parks and preserves within the infested area could be adversely affected as infested and high risk ALB host trees are removed, depending on the number of host trees present within their forested areas.  Effects of tree removal can result in losses related to aesthetic values for residents and tourists, and use values from recreation activities such as hiking, bird watching, and fishing.  Damage to forest habitat from tree removal could affect the quality of forest resources in parks and preserves and lead to decreased participation in outdoor recreation activities, depending on the extent of tree removal.

**2. Forest tree species**

Impacts to the elm-ash forest type would be expected as this type contains many ALB host species and is present in southwestern Ohio.  The ALB Species Composition Report (Appendix B) indicates that 69 percent of trees in the currently infested area could be removed because the trees are hosts of ALB.  However, in unmanaged areas such as woodlots, uninfested stumps may not be treated with herbicide to allow resprouting to encourage more rapid regrowth of these areas.

**3. Firewood**

The most valuable hardwood species used for firewood, including oak, hickory, beech, and locust are not ALB host species and would not be removed. Maple species vary in their firewood value, but are commonly used for that purpose and are a preferred ALB host. Forty-seven percent of host trees in the currently infested area are maples (Forest Tree Composition Report (Appendix B)) and would be removed if within a ½-mile radius of infested trees and not available for use as firewood.

**4. Wildlife**

The cutting and removal of ALB-infested trees may have adverse effects on local wildlife that depend on those trees for food, cover, and related needs. These include birds, squirrels, and other animals that nest in trees, insects that live on or in trees, and animals that use trees for cover or shelter. Most stands of trees within Ohio are mixed with several different species, and there are few areas where any one tree species represents more than half of the stock of live trees (USFS, 2009). Common tree species such as oak, hickory, beech, basswood, black walnut, black cherry, and black locust would remain standing because they are not ALB hosts. However, because both infested and high risk host trees would be cut down, a large number of host trees may be removed in certain areas where a single or few ALB host species dominate an area, such as in the elm-ash forest type that consists mainly of American and red elm, white and green ash, and red and silver maples. Canopy forming and understory trees are expected to respond strongly to increases in sunlight and soil moisture resulting from tree removals. Unimpeded succession processes of partially cleared areas will restore the forested character of woodlots.

Temporary impacts to animals include disturbance by noise from tree removal activities. Some animals may be displaced when their home is cut down; however, non-host trees would not be removed, allowing animals to find new homes and habitat in the surrounding trees. Cutting trees will likely occur year round, but cutting in the fall and winter months would lessen impacts to nesting birds and other mammals during their breeding months when they are most vulnerable.

For birds, species restricted to the interiors of mature woodlands may be impacted from fragmented forests or may suffer high rates of nest predation or parasitism by the brown-headed cowbird. However, other bird species dependent on early successional habitats may benefit from cutting as those species have declined as Ohio's forests have matured into sawtimber size classes (ODNR, undated).

Species that dwell in tree cavities and hollows could be impacted if these trees are cut down. Ohio tree species that are prone to form cavities for woodpeckers include elm, ash, box elder, and basswood (ODNR, undated), and three of these are ALB host trees. Live trees with hollows furnish den sites for species such as the wood duck and fox squirrel are sycamores and beeches (ODNR, undated).

Impacts would be greater for some invertebrates and other animals that have limited foraging ranges. However, impacts to local populations are not expected as local populations would continue to exist in surrounding trees and surrounding areas.

To encourage regrowth of forested areas, stumps of high risk host trees may not be ground down or treated with herbicide in woodlots. Cut stumps will resprout to more rapidly replace trees that have been cut down. This would assist in creating early successional (immature) stands that result in the greatest diversity of wildlife (ODNR, undated).

### Environmental Quality

**1. Tree removal**

Full host removal of trees does have the potential to impact soil and water quality. The extent of these impacts would vary based on the number of host trees relative to the total number of trees within a given area as well as the proximity and surface gradient of these areas to receiving streams and other aquatic resources. Large scale tree removal can result in impacts to soil and water quality. Changes in soil temperature and moisture as well as soil erosion and loss of nutrients in areas where clear cutting has occurred can impact the ability of a forest to regenerate (Ballard, 2000). Selective harvest within infested areas would reduce the impacts to soil quality. Soil erosion in proximity to aquatic resources can also result in impacts to water quality. In particular, the movement of soil into receiving water bodies can result in sedimentation, eutrophication (a process where water bodies receive excess nutrients that stimulate excessive plant growth that decomposes and reduces the oxygen available to aquatic organisms), increased turbidity or cloudiness, and alteration of stream flow. In addition, tree removal adjacent to water bodies can also impact shading which is important in maintaining water temperature. Degradation of water quality due to sedimentation can result in trophic level impacts to aquatic organisms through direct or indirect impacts to fish, aquatic insects, and crustaceans, such as freshwater mussels and crayfish (Richter et al., 1997; Henley et al., 2000). The risk to soil quality and aquatic resources from tree removal can be reduced by the implementation of timber harvest practices such as selective removal of trees and Best Management Practices (BMPs) (Aust and Blinn, 2004). The Ohio Division of Forestry within the Ohio Department of Natural Resources has established BMPs designed to protect water quality (ODNR, 2012). These BMPs are currently being used in the ALB program and would be used along with other timber harvest practices to minimize impacts to soil and water quality in areas where host tree removal would occur.

Trees that are removed will be chipped or burned to eliminate the potential for ALB spread. In both cases, trees will be moved to areas dedicated to either chipping or burning to minimize noise pollution from chipping, or minimize impacts to air quality from burning. Impacts to air quality from burning will be minimized by acquiring the appropriate permits and complying with all applicable state and federal laws such as Ohio Environmental Protection Agency open burning regulations and the Clean Air Act.

**2. Herbicide use**

In addition to tree removal, there is the possibility of some herbicide use to occur in cases where tree stumps can not be physically removed. The herbicide triclopyr is the preferred herbicide for the program and is commonly used for control of woody and broadleaf plants under a variety of use patterns, ranging from poison ivy control by homeowners to maintenance of rights-of-way. For this program, it would be applied only to the stumps of cut trees in specific areas, thus limiting its exposure to humans and other plant and animal wildlife. Toxicity is considered low with the exception of terrestrial plants. Drift and runoff would be limited because of the application method (direct hand application to infested trees and some high risk host trees). The method of application and adherence to label requirements will minimize the exposure and risk to human health, as well as aquatic and terrestrial nontarget organisms (see appendix D).

In addition to herbicide treatment of stumps with triclopyr, APHIS would also make foliar applications of triclopyr tank mixed with two other herbicides, imazapyr and metsulfuron, to treat sprouting foliage from stumps that that were removed as part of the eradication efforts. This use would occur if physical removal of stumps was not viable and would be used to prevent resprouting of stumps which ALB could reinfest due to their presence in host trees that have not been identified as infested and removed. Risk to human health and the environment are expected to be low from these treatments because of the method of application, which involves spot applications to sprouting host material using a hand sprayer, the low mammalian toxicity, and lack of toxicity to most non-target organisms (appendix D).

## C. Removal of infested trees and imidacloprid treatment of high risk host trees

Under this alternative, areas found to have ALB would be quarantined and the impacts are the same as those examined under the no action alternative. The impacts from stump and resprout treatments using the herbicides triclopyr, imazapyr, and metsulfuron and chipping and burning of removed trees are the same as those discussed under alternative B. Environmental impacts from the application of imidacloprid are discussed below. The most important impacts of this alternative are from the application of an insecticide to a large number of trees compared to the other action alternatives.

**1. Imidacloprid**

Imidacloprid is used in a wide variety of sites to control many pests including certain beetles, leafhoppers, and whiteflies. The use of imidacloprid to treat host trees within a defined radius from an ALB find is discussed in detail in appendix C. Imidacloprid would be applied according to label directions by injection into soil at a rate of 1.42 g of active ingredient, diluted in a ½-cup of water per inch of tree dbh, or directly into susceptible trees as either a 5 or 10 percent solution.

Based on the proposed method of application and available effects data, exposure and risk to terrestrial vertebrates is expected to be minimal. Imidacloprid exposure to terrestrial invertebrates, particularly honey bees, is expected to be minimal based on expected residues from the proposed method of application, the presence of other nontreated flowering plants, and the available acute and chronic honey bee toxicity data for imidacloprid (see appendix C). There is some uncertainty in this assumption because nectar and pollen imidacloprid levels in trees using soil or trunk injection application methods are not well understood. Other treatment methods with crops typically demonstrate imidacloprid residues in nectar and pollen below levels that could impact honey bees. Exposure and risk to non-target terrestrial invertebrates will increase if a large number of trees are treated with imidacloprid. Impacts to sensitive terrestrial invertebrates that feed on leaves and twigs containing imidacloprid would be expected. Pollinator exposure and risk would also increase in cases where a large number of trees are treated, and then flower, attracting honey bees and other pollinators.

The method of application eliminates the potential for drift and, in the case of trunk injections, eliminates the probability of off-site transport via runoff that may affect aquatic species. There is a potential for subsurface transport of imidacloprid to aquatic habitats for applications made directly into soil due to its mobility; however, this type of exposure and risk will be minimized by only making applications where the ground water table is not in proximity to the zone of injection, and in soil types that would minimize the probability of pesticide transport. Any residues that could reach aquatic environments under this scenario would be expected to be below effect levels for aquatic biota and not pose a significant risk (appendix C).

There is the potential for leaf litter from treated trees to reach aquatic areas. The likelihood of impacts to aquatic invertebrates that feed on leaf litter will increase where treated trees adjacent to waterbodies would drop leaves that could enter aquatic resources. Impacts to some aquatic invertebrates have been noted in cases where leaf litter that contained imidacloprid residues were introduced into receiving streams (Kreutzweiser et al., 2009; Kreutzweiser et al., 2008).

Potential exposure to humans will be greatest for applicators and workers. Imidacloprid has low acute, dermal and inhalation toxicity and has not been shown to be carcinogenic, mutagenic, or teratogenic in mammals (appendix C). Human health effects associated with the application of imidacloprid will be mitigated through adherence to pesticide label requirements and standard operating procedures. The required protective gear for applicators and safety precautions will minimize exposure and risk. Imidacloprid is considered mobile in soil and has properties that suggest it could occur in groundwater. Precautionary label language regarding the protection of groundwater, the method of application proposed in the ALB program, and the depth to groundwater in the area will minimize the potential for contamination posing negligible risks to human health.

A potential exposure pathway for the public is the use of imidacloprid treated trees that would be harvested and used as firewood. The levels of imidacloprid in treated trees that could be used as firewood is expected to be low because the insecticide moves to the leaves and smaller actively growing branches in the tree where insect feeding is greatest. These parts of the tree would not typically be used as firewood. In cases where trees are treated, their removal would not be expected to occur in the same growing season as treatment, allowing degradation of imidacloprid. In addition, trees harvested for firewood are usually allowed to dry for a period of time before they are used as fuel which would allow for additional degradation of imidacloprid. Previous studies that have assessed pesticide exposure from firewood have demonstrated that rapid combustion and high temperatures, as can occur in a fireplace, result in rapid degradation of other types of pesticides and that residues are more likely under slow combustion and temperatures less than 600$^{o}$C (McMahon et al., 1985; Bush and Taylor, 1987; Bush et al., 1987). Imidacloprid would be expected to degrade at temperatures similar to those that would occur from burning firewood based on its measured thermal decomposition temperature which is below 500 $^{o}$C. Potential thermal degradation products from the use of the imidacloprid formulations that could be used in this program include hydrogen cyanide, carbon monoxide, and oxides of nitrogen and carbon. Concentrations of these degradation products would be very low due to the expected concentrations of imidacloprid in firewood and potential temperatures that could occur in burning firewood.

Imidacloprid treatments require an area wide application in order to be an effective component of eradication. Because of the high number of infested and high risk host trees and because there is a limited time frame when imidacloprid trunk and soil injections could be applied (in the spring and early summer), it would take longer to complete the treatment of all high risk host trees in the area currently known to be infested, compared to alternative B. Over 137,000 trees have been treated in a state in a single season by the ALB program. That number of host trees is approximately just under a third of the estimated trees that would require treatment in Ohio, if all high risk host trees received imidacloprid treatment in a single season. In addition, treated trees would need to be re-treated for up to two more years after the initial treatment. Because of the time it would take to complete treatment of all host trees in the currently infested area in Clermont County, this alternative could leave undetected infested trees in the environment, potentially allowing ALB adults to emerge and continuing the infestation and spread of the beetle. In addition, treatment of trees does not ensure complete control of ALB, based on available efficacy data, and should not be used as the only control method for eradication (Poland et al., 2006). The uptake and distribution of imidacloprid can vary based on the timing and type of application, host species, and health of an individual tree (Wang et al., 2005). The variability in imidacloprid levels within and between treated trees would result in some ALB receiving a lethal dose while others would not. This means that some ALB would survive and disperse to other areas.

Although this alternative would leave more trees remaining in the environment, the logistics of treating such a large number of high risk host trees and the variability in insecticide efficacy would result in a higher risk of spread of ALB.

### D. Infested host removal and combination of removal or imidacloprid treatment of high risk hosts

The environmental impacts described in the previous two alternatives would apply to this alternative. However, the impacts for alternative D would be reduced compared to those alternatives because neither imidacloprid treatment nor removal of high risk hosts would be used exclusively. For instance, under this alternative, imidacloprid treatment may be applied to certain high risk host trees that are considered high value or significant, located on a property listed in the National Register of Historic Places, in a landscape/managed situation, or to comply with Endangered Species Act tree removal restrictions. Imidacloprid treatments could also be applied to high risk host trees surrounding an isolated ALB infestation (small ALB infestations outside of the generally infested area). Removal of high risk hosts could occur under this alternative in unmanaged areas such as woodlots. Removal may also be conducted on high risk host trees surrounding an isolated ALB infestation.

The use of both treatment methods for high risk host trees would provide flexibility to APHIS to select an appropriate treatment for a given situation and would reduce the potential for environmental impacts from either method because any one method would be used over a smaller area. However, under this alternative, treatments would be conducted over a longer period of time, similar to alternative C. Therefore, similar to alternative C, there is a higher risk of leaving infested trees in the environment compared to alternative B (full host removal) because of the difficulty in identifying lightly infested trees. Inspections conducted through ground surveys are approximately 30 percent effective in detecting a lightly infested tree, and climbing surveys are about 60–75 percent effective in detecting a lightly infested tree. Implementation of this alternative may result in the least environmental impact, but may not be as effective as alternative B in eradicating ALB.

## E. Cumulative Effects

Cumulative impacts are those impacts on the environment which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

For the purposes of this EA, cumulative impacts are discussed for each of the four alternatives identified in the alternatives section.

Under the no action alternative APHIS would implement the quarantine restrictions in the area, as defined in the Federal Orders for Clermont County, Ohio, and expand the quarantine based on new detections; however, no eradication efforts would be undertaken by APHIS. The lack of a coordinated program to eradicate ALB would result in the spread of ALB to other host trees beyond the current area in Clermont County. The expansion of ALB beyond the current areas could result in additional stressors to host trees causing both economic and environmental impacts. Abiotic and biotic stressors such as climate change, other invasive pests, and air pollution all pose threats to ALB host trees and the addition of ALB to urban and natural forest ecosystems would be expected to result in cumulative impacts beyond those already identified as potential stressors (Iverson et al., 2008; Polland and McCullogh, 2006; Horsley et al., 2002). Economic losses to the timber industry would be anticipated as well as increased costs to homeowners that choose to treat trees or have them removed once they are infested. Economic data for the loss of ash trees in Ohio, which are just one of the hosts for ALB, show that landscape loss, tree removal, and replacement costs could range between 1.8 and 7.6 billion dollars due to the emerald ash borer (*Agrilus planipennis*) (Sydnor et al., 2007). Cumulative impacts to the environment would also be expected as ALB host trees are lost from urban and natural forests.

Under alternative B, full host removal, cumulative impacts to water quality due to sedimentation, which is a causal agent for impairment in watersheds within Clermont County, could occur in cases where large areas of timber are removed in proximity to water, or from watersheds vulnerable to soil erosion. The potential for cumulative impacts in these scenarios is reduced due to the implementation of BMPs by the program and recommended by the Ohio Department of Natural Resources (ODNR, 2012). The BMPs will reduce the potential for sedimentation and nutrient impacts to watersheds as well as reduce the impacts in the areas where tree removal would occur. The removal of infested and high risk trees that are up to a ½-mile away from infested trees would reduce the potential for ALB to spread beyond the current infested area as well as allow for regeneration of host trees. There would be some loss of wildlife habitat in areas where host trees are removed; however, those losses would not be considered permanent because in unmanaged habitats such as woodlots, stumps of high risk host trees would be allowed to resprout and regenerate, and replanting activities may occur in managed areas.

The potential for cumulative impacts from alternatives C and D relate to a combination of tree removal and insecticide use. The potential for cumulative impacts related to insecticide use would be greatest for alternative C because all high risk trees that are uninfested and are up to a ½-mile from infested trees would be treated with either a trunk or soil injection of the insecticide imidacloprid. In addition, herbicide use would increase because all stumps that are not removed would require treatment with triclopyr, or in cases where resprouting occurs, an herbicide tank mix application using triclopyr, imazapyr and metsulfuron may be applied. Herbicide treatments for both alternative C and D would be needed because treatment with insecticides is not as efficacious as host tree removal and ALB could infest stumps and sprouting vegetation. All pesticides proposed for use have residential and/or agricultural uses. Based on the large number of trees that could potentially receive imidacloprid treatments, there would be an increase in pesticide release into the environment beyond what is currently used in Clermont County. Imidacloprid is widely used in urban and agricultural settings; however, the increase in loading beyond what is currently used and what could be added due to ALB treatments is difficult to quantify because the number of treated trees is unknown. The amount of imidacloprid added to the environment would be substantially greater under alternative C because all high risk trees within a ½-mile radius of infested trees would receive treatment compared to alternative D where only select trees would receive imidacloprid treatments. The cumulative risk to aquatic resources would be greatest when considering large scale imidacloprid treatments of deciduous trees such as ALB host trees. Imidacloprid residues in leaf litter in the fall from treated trees can be transported to aquatic environments and have been shown to result in sublethal impacts to some aquatic invertebrates (Kreutzweiser et al., 2009; Kreutzweiser et al., 2008; Kreutzweiser et al., 2007). Streams that may already be impacted due to other factors could have cumulative impacts related to imidacloprid use in cases of large scale treatments.

Large scale treatment of trees using imidacloprid could also increase pesticide exposure to pollinators above current levels. Some pesticides, as well as other stressors, have been identified in native pollinators as well as domestic honey bees (Potts et al., 2010). Recent studies have also shown that honey bees exposed to sublethal concentrations of imidacloprid and pathogens can have interactive negative effects (Pettis et al., 2012; Alaux et al., 2010). The potential for exposure and cumulative impacts to honey bees and other pollinators from imidacloprid use will be reduced by the availability of other species of flowering plants and treating trees in small areas. Stump and sprouting host vegetation herbicide treatments will be localized because stump removal is preferred; however, for areas where herbicide treatments are applied, pesticide loading will increase relative to other current uses for each of the three herbicides. The potential for cumulative impacts to the environment from these treatments will be minimzed by the method of application which reduces non-target exposure and risk compared to other methods of pesticide application.

## F. Threatened and Endangered Species

Section 7 of the Endangered Species Act and its implementing regulations require Federal agencies to ensure their actions are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat.

In June, 2011, APHIS first contacted the U.S. Fish and Wildlife Service (FWS) in Columbus, Ohio for technical assistance regarding impacts to federally listed species in Clermont County. Currently, six endangered species (Indiana bat, *Myotis sodalis*; running buffalo clover, *Trifolium stoloniferum*; fanshell, *Cyprogenia stegaria*; rayed bean, *Villosa fabalis*; snuffbox, *Epioblasma triquetra*; and pink mucket pearlymussel, *Lampsilis abrupta*) and one species proposed for listing as endangered (sheepnose, *Plethobasus cyphyus*) occur in Clermont County. FWS personnel conducted a site visit on July 7, 2011 and provided an interim guidance letter on July 19, 2011 that provided guidance and recommendations for removal and destruction of trees infested with ALB. Measures to protect Indiana bat, running buffalo clover, and rayed bean were provided to APHIS. APHIS prepared a biological assessment (BA), including the measures provided by FWS in the interim guidance letter, and requested concurrence with its determination that with implementation of the proposed measures, the program was not likely to affect federally listed species in the program area for program activities occurring until September 30, 2011. APHIS received a concurrence letter dated August 15, 2011. APHIS then prepared a second BA that analyzed the effects of host tree removal occurring from October 1, 2011 to April 1, 2012 to federally-listed species in Clermont, Brown, Warren, and Hamilton Counties and received a concurrence letter from FWS dated September 30, 2011. In addition, FWS personnel revisited the infested area on October 27, 2011 and trained ALB program personnel to recognize Indiana bat habitat. APHIS is coordinating closely with FWS and has completed Section 7 consultation for program activities (infested tree removal) occurring after April 1, 2012. Section 7 consultation with FWS for expanded program activities will be completed prior to the implementation of the alternative selected in this EA to ensure the protection of listed species in the program area. APHIS will continue to coordinate closely with FWS throughout the duration of program activities.

## G. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle…[or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

According to the Ohio Department of Natural Resources, there is one eagle nest in Clermont County. Without the implementation of the protection measures outlined below, tree cutting could disturb eagles nesting at this site. The FWS has recommended buffer zones from active nests that require different levels of protection (FWS, 2007). They are as follows:

1. Avoid clear cutting or removal of overstory trees within 330-feet of a nest at any time.

2. Avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the breeding season within 660-feet of the nest. The distance may be decreased to 330-feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not

used to raise young, after eggs laid in another nest within the territory have hatched.

According to the FWS, the breeding season for bald eagles in Ohio is mid-January through July. APHIS will contact Ohio Department of Natural Resources for locations of eagle nests in the program area. APHIS will contact FWS before tree removal begins during the breeding season within 660 feet of a nest to confirm that all eagles have left the nest. Outside of the breeding season, cutting may occur within the buffer zone around nests.

## H. Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712) established a Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird.

The U.S. Fish and Wildlife Service has provided the following recommendations to minimize impacts to migratory birds:

1. Minimize tree removals during nesting season.

2. Minimize disturbance as much as possible (avoid impacts to areas of nonhost shrub/brush areas).

3. Replant areas that have been significantly deforested.

4. Use existing trails for equipment to avoid disturbance to pastures/open fields that could be used as breeding sites for ground-nesting birds.

5. Have the names and contact information for local wildlife rehabilitators so that if there is an issue (such as a raptor nest or fledging in the area) they can provide guidance on how to handle the situation.

## I. Other Considerations

Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” focuses Federal attention on the environmental and human health conditions of minority and low-income communities, and promotes community access to public information and public participation in matters relating to human health and the environment. This EO requires Federal agencies to conduct their programs, policies, and activities that substantially affect human health or the environment in a manner so as not to exclude persons and populations from participation in or benefiting from such programs. It also enforces existing statutes to prevent minority and low-income communities from being subjected to disproportionately high or adverse human health or environmental effects. The human health and environmental effects resulting from the four alternatives are expected to be minimal and are not expected to have disproportionate adverse effects to any minority or low-income family. Low-income families may depend on woodlots for firewood for heating their homes. However, the most valuable species used for firewood, including oak, hickory, beech, and locust, are not ALB host species and would not be removed. Although some maple species may be less valued for firewood, they are commonly used for that purpose and are a preferred ALB host. However, if no action is taken, allowing ALB to spread could result in permanent loss of maples and other ALB hosts from the area. For full host removal, stumps from high risk host trees in woodlots may be allowed to resprout to allow more rapid regrowth. Wood treated with imidacloprid and used as firewood is not expected to cause adverse health effects. Therefore, the human health and environmental effects from the action alternatives (B-D) are not expected to have disproportionate adverse effects to any minority or low-income family.

EO 13045, “Protection of Children from Environmental Health Risks and Safety Risks,” acknowledges that children, as compared to adults, may suffer disproportionately from environmental health and safety risks because of developmental stage, greater metabolic activity levels, and behavior patterns. This EO (to the extent permitted by law and consistent with the agency’s mission) requires each Federal agency to identify, assess, and address environmental health risks and safety risks that may disproportionately affect children. No disproportionate risks to children are anticipated as a consequence of any of the three action alternatives (B-D).

Consistent with the National Historic Preservation Act of 1966, APHIS has examined the proposed action in light of its impacts to national historic properties and is coordinating with the State Historic Preservation Officer (SHPO) to ensure that the program will not affect historic properties, including sites of tribal importance in in Clermont County. To ensure no adverse effects to any of the 27 historic places identified in the Clermont County, APHIS will contact the Ohio Historic Preservation Office prior to conducting control actions if any work is anticipated to be done within a 1-mile radius of any of the historic sites in Clermont County. If necessary, APHIS will initiate consultation with the Ohio SHPO at that time.

# V. Listing of Agencies and Persons Consulted

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–Emergency and Domestic Programs
4700 River Road, Unit 137
Riverdale, MD 20737

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–Environmental Compliance
4700 River Road, Unit 150
Riverdale, MD 20737

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
Environmental and Risk Analysis Services
4700 River Road, Unit 149
Riverdale, MD 20737

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
PPQ–ALB Eradication Program
920 Main Campus Drive, Suite 200
Raleigh, NC 27606

U.S. Department of Agriculture
Forest Service
Forest Health Protection
1601 North Kent Street
Arlington, VA 22209

U.S. Department of Agriculture
Forest Service
Forest Health Protection
180 Canfield Street
Morgantown, WV 26505

United States Department of Interior
Fish and Wildlife Service
Ecological Services
4625 Morse Road, Suite, 104
Columbus, OH 43230

Ohio Department of Agriculture
8995 E. Main St.
Reynoldsburg, OH  43068

Ohio State University-Extension Service
110 Boggs Lane, Suite 315
Cincinnati, OH  45246

Ohio Department of Natural Resouces
Division of Forestry
2045 Morse Road, Building H
Columbus. OH  43229

Ohio Historical Society
State Historic Preservation Officer
800 E. 17th Avenue
Columbus, OH 43211

Clermont Soil and Water Conservation District
P.O. Box 549, 1000 Locust Street
Owensville, OH  45160

U.S. Army Corps of Engineers
Cincinnati Field Office
10557 McKelvey Road
Cincinnati, Ohio  45240

Ohio Environmental Protection Agency
Division of Surface Water
50 West Town Street, Suite 700, P.O. Box 1049
Columbus, Ohio  43216

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## Appendix A – Public outreach for the Asian Longhorned Beetle Program in Clermont County, Ohio

**Media**

- Weekly media updates
- Media interviews and articles, including proactive opinion editorials
- Press releases (see APHIS ALB Newsroom page: http://www.aphis.usda.gov/newsroom/hot_issues/alb/alb.shtml
- Public service announcements airing on local radio stations
- Presence at industry shows, expos and outreach venues
- "Lurking in the Trees" documentary on Clermont County cable access, and provided to the public
- Use of social media online (Facebook, Twitter, YouTube, Flickr)
- Frequently Asked Question documents available at: http://www.aphis.usda.gov/publications/plant_health/index.shtml

**Public meetings**

- November 7, 2011 Bethel, Ohio; Ohio State University (OSU), Young's General Contracting, Ohio Department of Natural Resources (ODNR) and ALB program (Ohio Department of Agriculture (ODA) and APHIS)
- September 22, 2011 Bethel, Ohio; APHIS, ODA, ODNR, OSU
- July 14, 2011 Bethel, Ohio; APHIS, ODA, OSU
- June 30, 2011 Bethel, Ohio; APHIS, ODA, OSU

**Other meetings and presentations**

- June 23, 2011 OSU ALB overview for Green Industry Professionals, ALB program (ODA and APHIS) in Batavia, Ohio
- November 29, 2011 telephone town hall with Congresswoman Jean Schmidt and ALB program (ODA and APHIS)
- December 1, 2011 Asian Longhorned Beetle: The Threat in Black and White, Ohio State University, Bethel, Ohio
- January 9, 2012 Asian Longhorned Beetle Update for Green Industry Professionals, ALB program with Ohio State University, Cincinnati, Ohio
- February 2, 2012 OSU ALB update at Tri-State Green Industry Conference, Cincinnati, Ohio
- February 6, 2012 at East Fork State Park, Clermont County, Ohio, meeting with Federal and State legislators, town administrators, Ohio Department of Natural Resources, Ohio State University, and ALB program (Ohio Department of Agriculture and APHIS)
- February 9, 2012 at Bethel, Ohio, meeting with Village Council of Bethel, and Ohio Department of Natural Resources and ALB program (Ohio Department of Agriculture and APHIS)

**Legal notifications**

- Door hangers during survey and infested tree removal activities

- Letters from ODA to affected property owners prior to infested tree removal activities (legal notice)
- Federal Orders (July 13, 2011; October 14, 2011)
- State regulations: Ohio Administrative Code Chapter 901:5–57 Asian Longhorned Beetle

**NEPA document**
- Environmental Assessment for Clermont County (comment period July 29 – September 2, 2011)

**Informational Websites:**
- ALB informational site: www.BeetleBusters.info
- ODA website: http://www.agri.ohio.gov/TopNews/asianbeetle/
- Other websites: Clermont County ALB: http://bugs.clermontcountyohio.gov/ALB.aspx; OSU http://clermont.osu.edu/news/asian-longhorned-beetle-found-in-ohio-osu-extension-offers-information-hotline;
- APHIS ALB plant pest page http://www.aphis.usda.gov/plant_health/plant_pest_info/asian_lhb/index.shtml

## Appendix B – Forest Tree Species Composition Report

### Introduction

At the Ohio Department of Agriculture's request, the Ohio Department of Natural Resources Division of Forestry conducted a species composition and size class survey of the forest tracts within a 25-square mile defined area of Tate Township. Given the timeframe and parameters, this report represents an industry accepted approach to the gathering and interpretation of that data. The Division of Forestry is confident in the methodology used and results generated.

### Data Collection

Sampling plots were taken in areas identified by the Ohio Department of Agriculture as "forest" within a 25 square mile section of Tate Township. Species and diameter were recorded for all trees greater than 2 inches dbh growing within tenth-acre sampling plots. GPS locations were taken at each plot center. Seven hundred thirty (730) individual plots were taken and transcribed to a spreadsheet.

### Data Analysis

To create the most valuable dataset, spatial data was used for post stratification. Plots were placed in their spatially identified strata and analyzed with like plots. The data was then expanded based on the amount of acres per stratum. This approach not only removes bias on plot locations by field staff, but also if additional areas are added to the quarantine nearby, this system could be applied and a reasonable estimate of stems could be assessed without taking more field data. Finally, individual areas within the 25 square mile study area could be individually assessed and estimated without additional field work.

Strata were identified based on tree height using LiDAR imagery. Tree height is the greatest available indicator of diameter and relative forest maturity. Height classifications were chosen based on what was believed to be genuine differences in forest maturity. Error sources include GPS data, LiDAR quality, and human bias and error in assigning strata.

Although specific species information was taken in the field, the reports are based on four broad species groups – maples (*Acer*), other hosts (*Aesculus, Betula, Celtis, Fraxinus, Platanus, Ulmus*), oaks (*Quercus*), and other non-hosts. The results attempt to describe what is believed to be statistically sound. The individual species are too numerous and various to have reliable statistical error values.

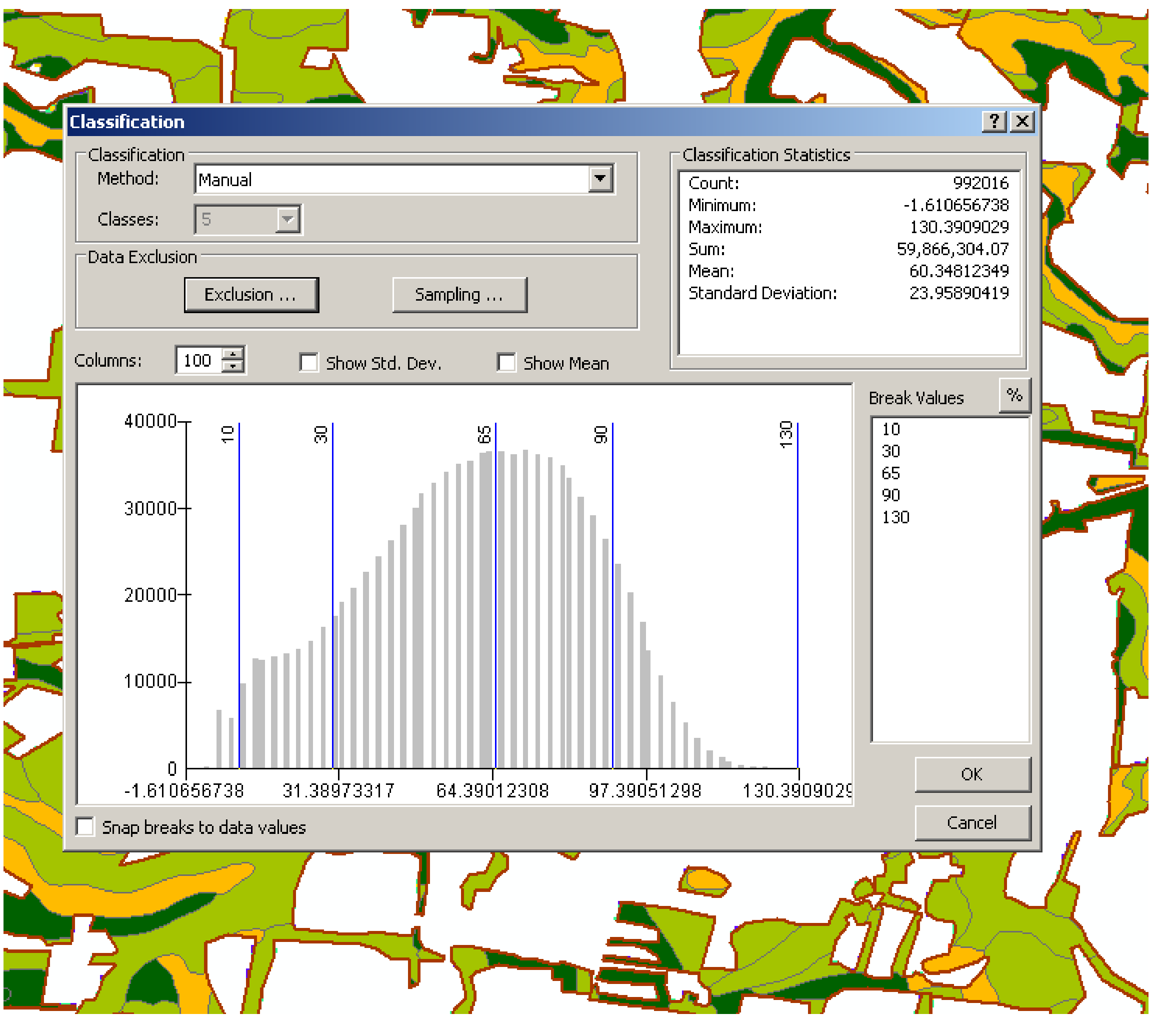
Three products were produced for each strata – stems by species group, basal area/acre by species group and diameter, and total stems by diameter class and species group. The first dataset is for the entire 25 square mile area and includes the total number of stems by diameter class and species group and average basal area per acre for each species group.

## Vertical Stand Development

OSIP I lidar data (7 foot average post spacing, 30'x30' cell size) was used to develop DEM (classification = 2) and a DSM of high vegetation (classification = 5). These two rasters were then subtracted resulting in a raster (tate_height) where each cell contained a height value. The raster was then clipped to the digitized Bethel woodlot boundary layer (Bethel_Woodlots_25sqmi3). This raster was then reclassified (tate_reclass) in the following method:

| Height minimum (feet) | Height maximum (feet) | Reclass value |
|---|---|---|
| minimum | 10 | 1 |
| 10.0 | 30 | 2 |
| 30.1 | 65 | 3 |
| 65.1 | 90 | 4 |
| 90.1 | 130 | 5 |

Distribution of Classification below:



Total area for each height class was calculated. Refer to table:

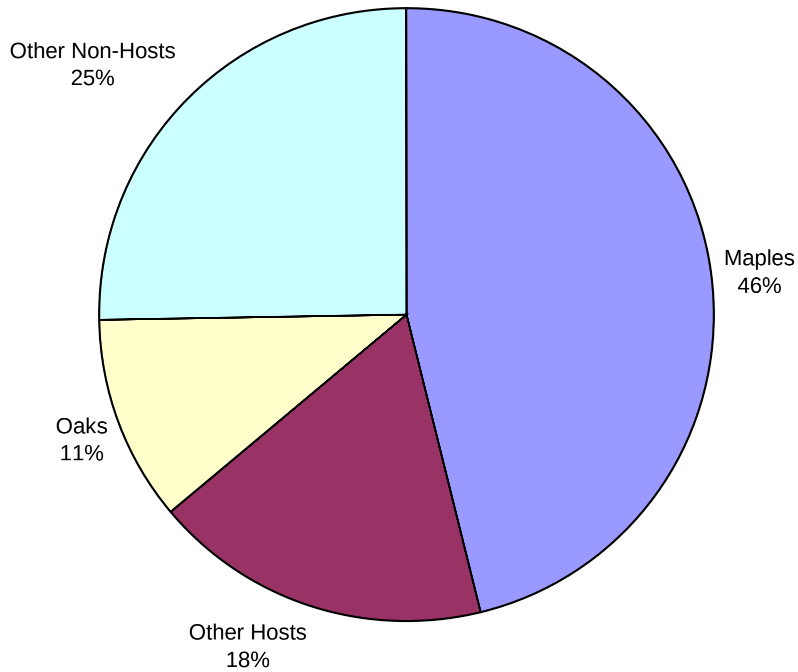
| **Height class** | **Height range (feet)** | **acres** |
|---|---|---|
| 1 | 0–10 | 25.52 |
| 2 | 10–30 | 292.73 |
| 3 | 30–65 | 1979.51 |
| 4 | 65–90 | 2503.09 |
| 5 | 90–130 | 943.29 |
| | | **5,744 acres** |

## **Results and Discussion**

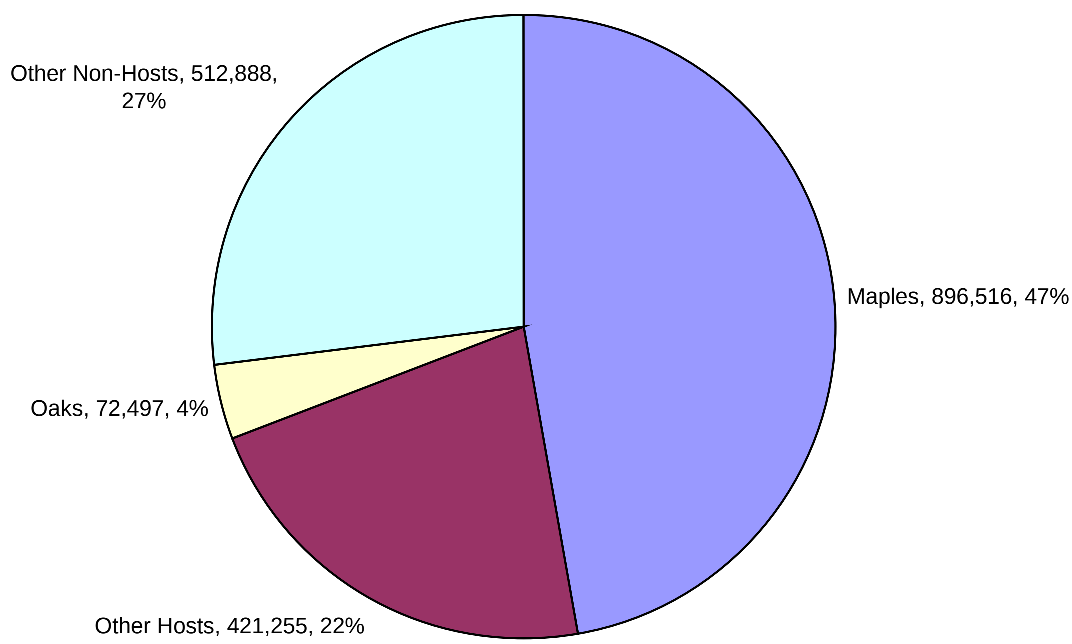
The Ohio Department of Agriculture had identified 6,069 acres of forest within the 25 square mile area. Based on the LiDAR data several areas were identified as non-forest within these polygons and were removed from data analysis leaving a forest area of 5,744 acres. It is worth noting that there are portions of small acreages outside the "forest polygons" that will likely require treatment such as fencerows. These areas were not analyzed.

All datasets clearly show a high amount of host species both in number of stems and proportion of total forest cover in all forest age classes. The areas of the most mature forest present have a slightly lower percentage of host species. The figures below indicate relative average basal area in square feet per acre and the total number of stems by species group for the entire 25 square mile study area.

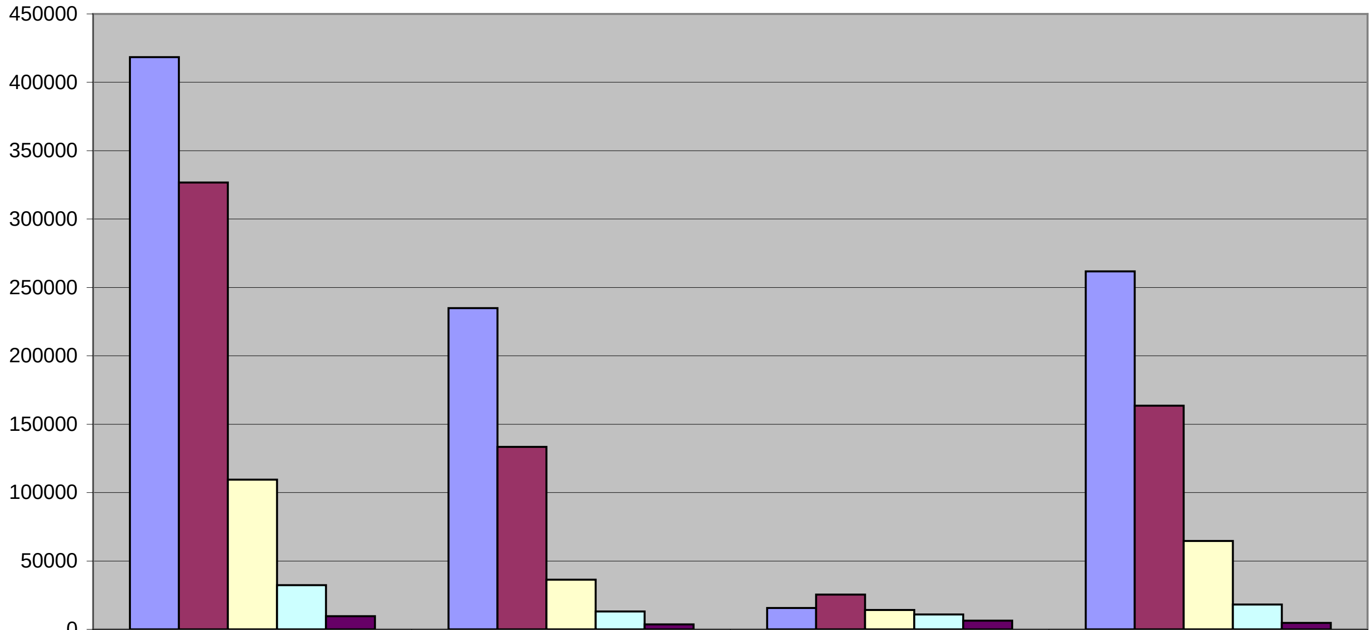
## Average Basal Area/Acre - Entire Project Area




## Stems by Species Group - Entire Project Area

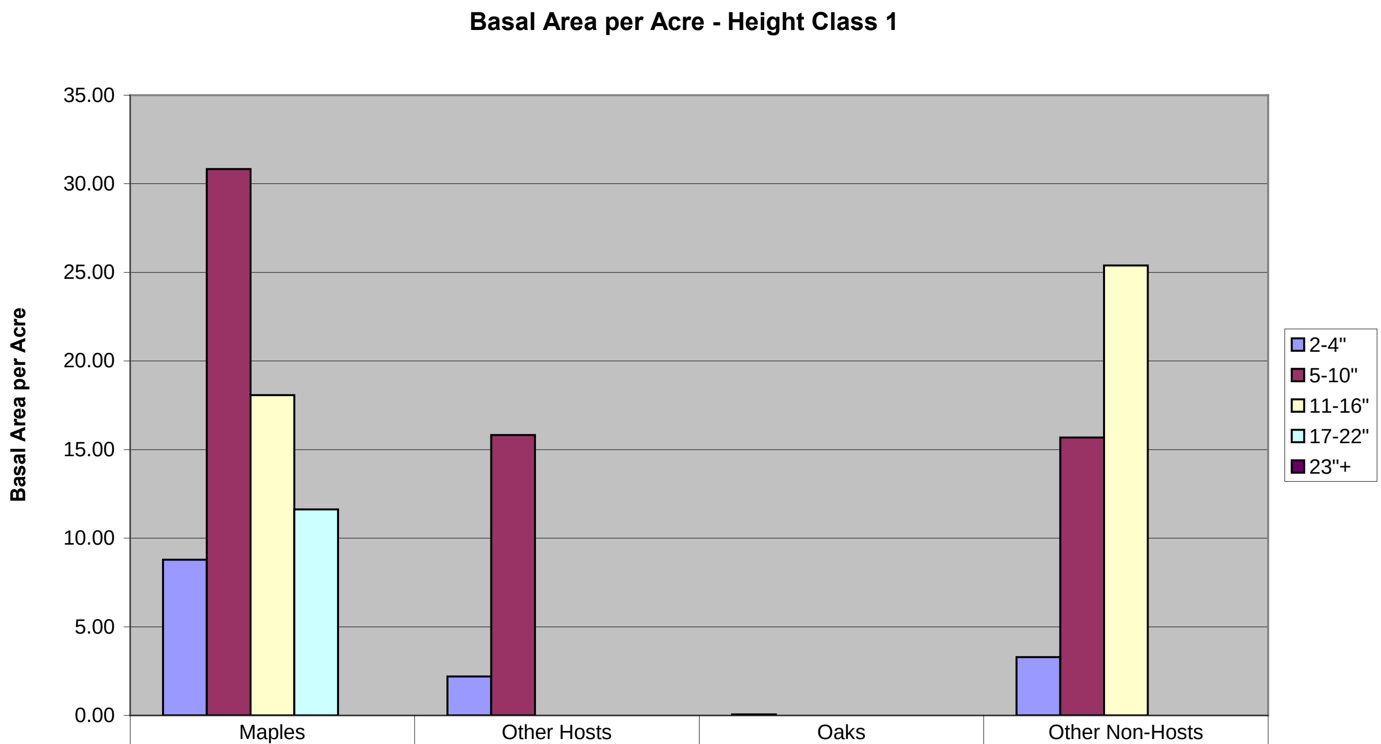


**Total Number of Stems - Entire Project Area**



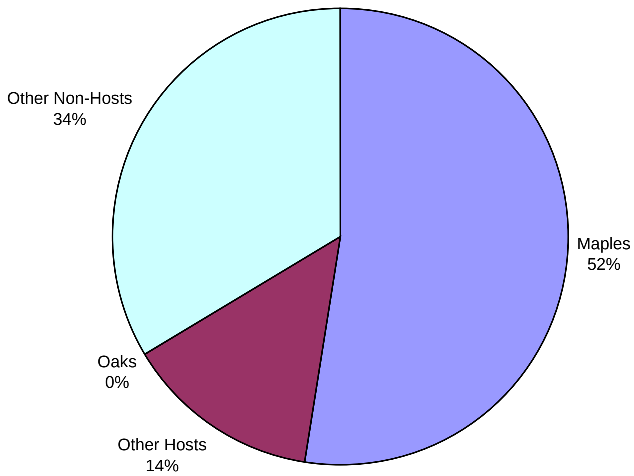

| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 418394 | 234897 | 15696 | 261831 |
| 5-10" | 326791 | 133362 | 25356 | 163624 |
| 11-16" | 109371 | 36267 | 14120 | 64661 |
| 17-22" | 32317 | 13066 | 10887 | 18140 |
| 23"+ | 9643 | 3662 | 6438 | 4631 |

**Height class 1** (0-10 feet tall average tree height) contains only 25.5 acres within the study area. Seventy-eight percent of stems within this group are potential hosts representing 66 percent of the basal area (expressed in square feet per acre).

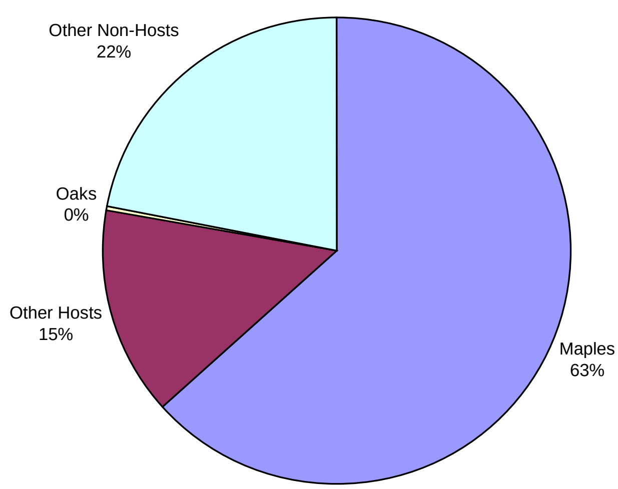


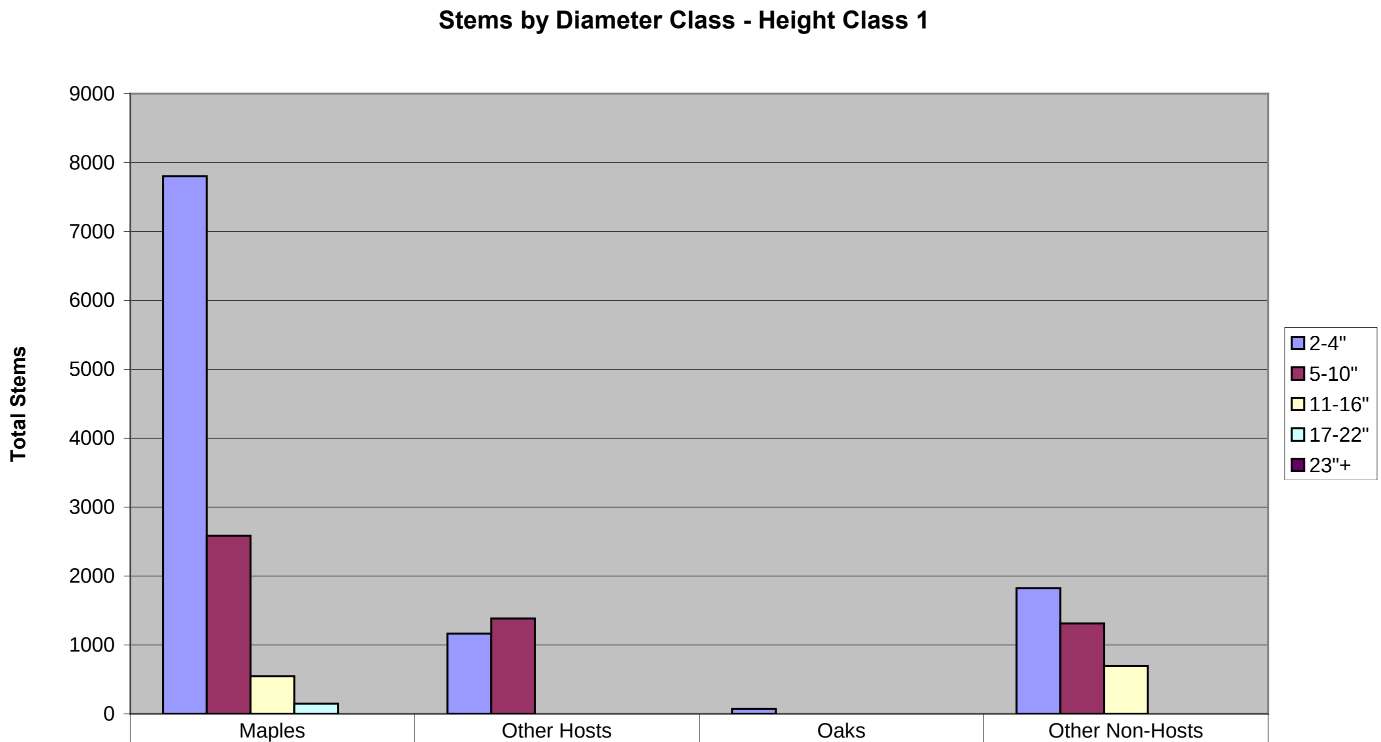

| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 8.78 | 2.19 | 0.06 | 3.29 |
| 5-10" | 30.83 | 15.82 | 0.00 | 15.68 |
| 11-16" | 18.07 | 0.00 | 0.00 | 25.39 |
| 17-22" | 11.63 | 0.00 | 0.00 | 0.00 |
| 23"+ | 0.00 | 0.00 | 0.00 | 0.00 |

**Basal Area - Height Class 1**




**Stems by Species Group - Height Class 1**

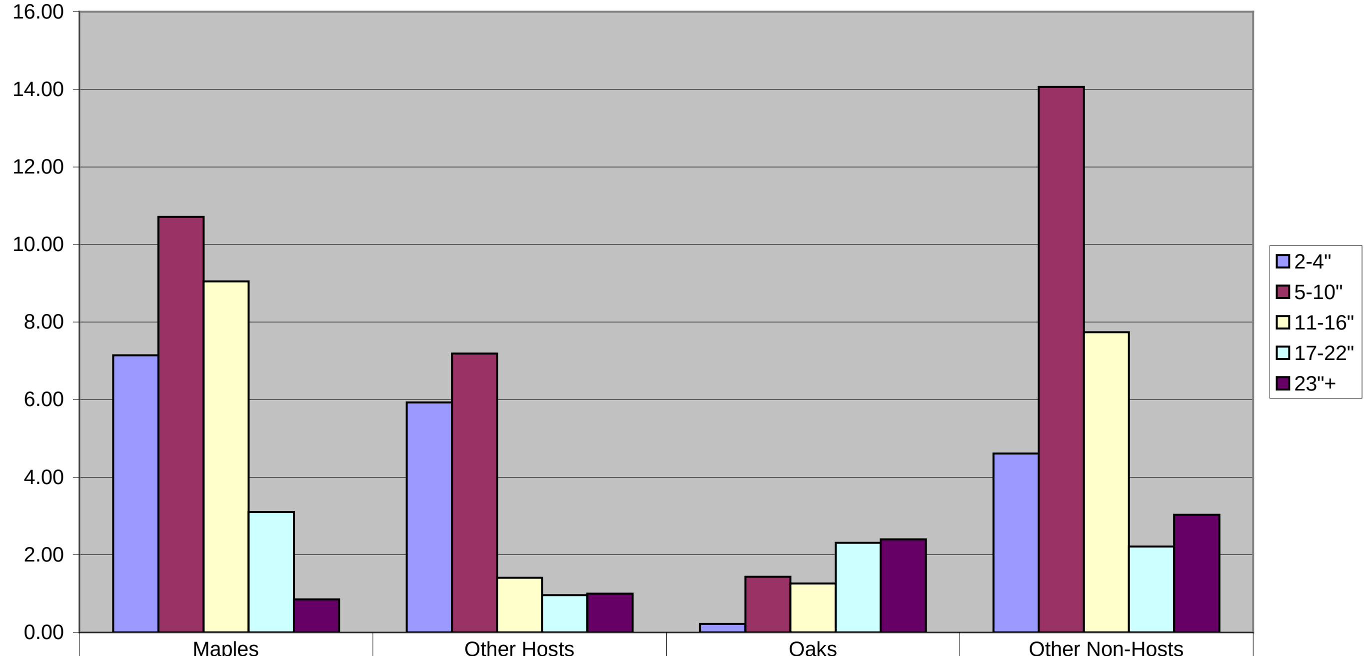





| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 7802 | 1167 | 73 | 1823 |
| 5-10" | 2588 | 1385 | 0 | 1312 |
| 11-16" | 547 | 0 | 0 | 693 |
| 17-22" | 146 | 0 | 0 | 0 |
| 23"+ | 0 | 0 | 0 | 0 |

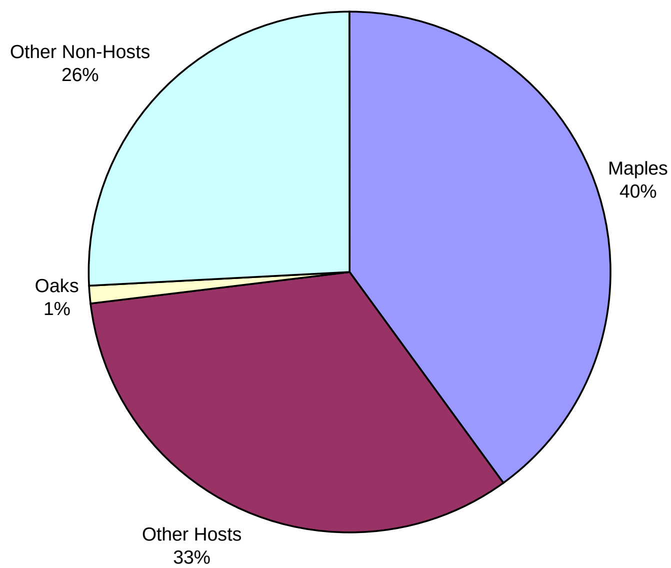
**Height class 2** (10–30 feet tall average tree height) contains only 292.7 acres within the study area. Seventy-three percent of stems within this group are potential hosts also representing 73 percent of the basal area (expressed as square feet per acre).

## Basal Area by Species Group - Height Class 2

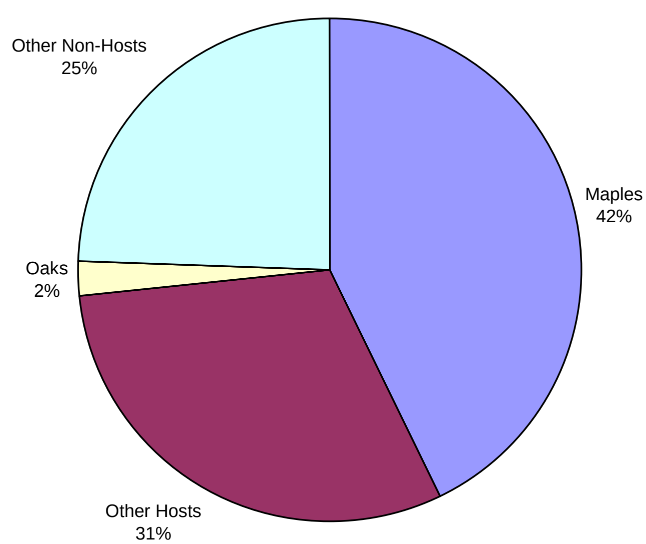



| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 7.14 | 5.93 | 0.22 | 4.61 |
| 5-10" | 10.71 | 7.19 | 1.43 | 14.06 |
| 11-16" | 9.05 | 1.41 | 1.26 | 7.74 |
| 17-22" | 3.10 | 0.96 | 2.31 | 2.21 |
| 23"+ | 0.85 | 1.00 | 2.40 | 3.03 |

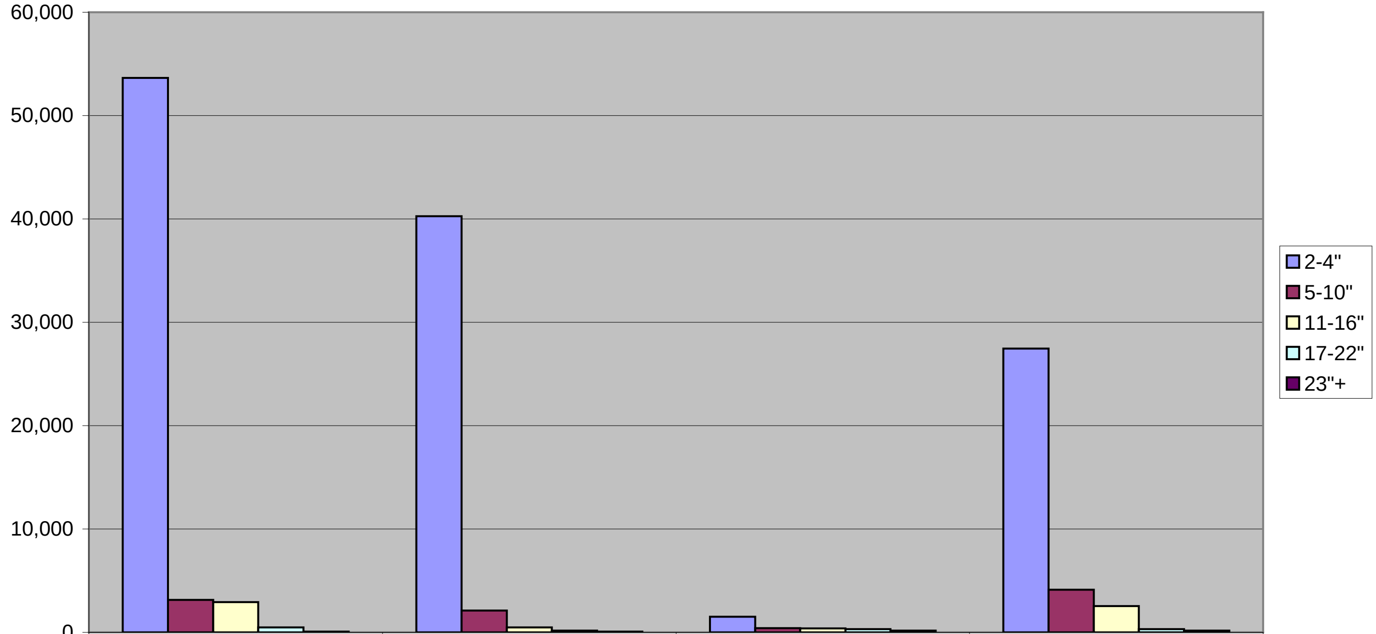
## Basal Area by Species Group - Height Class 2




## Total Stems - Height Class 2

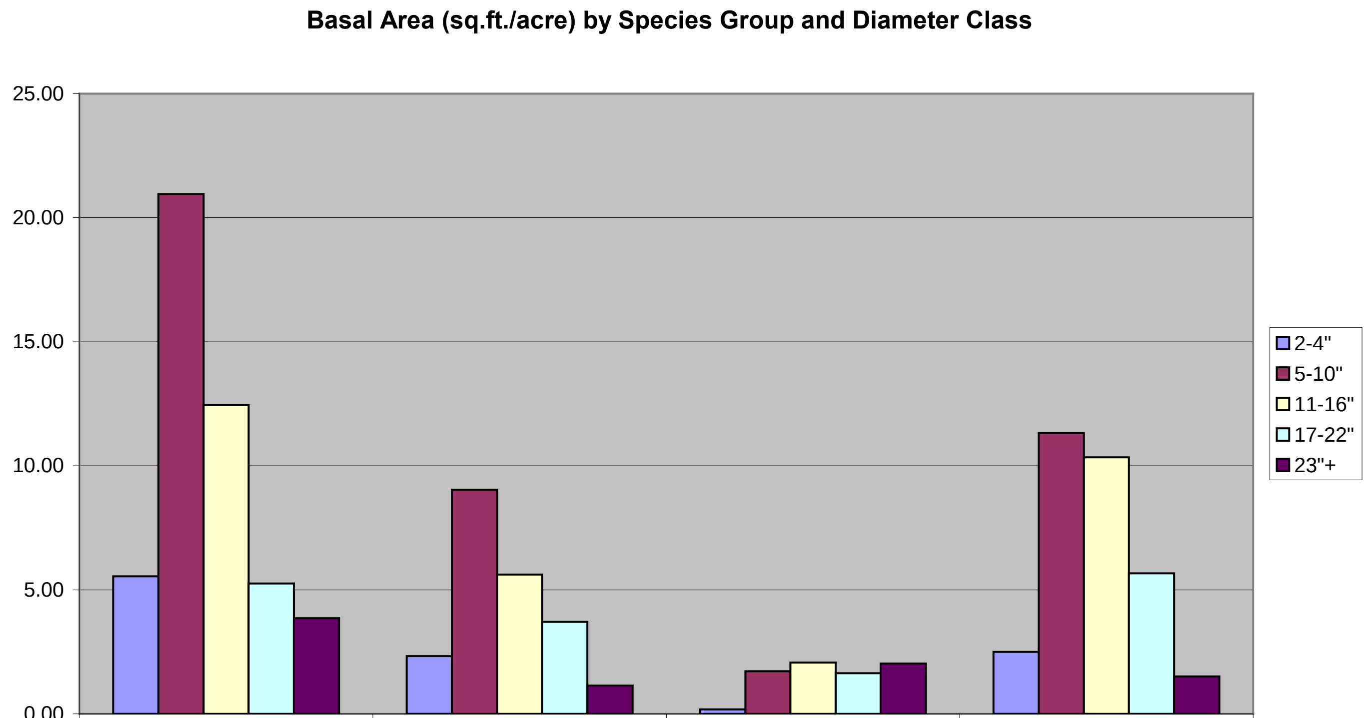


**Total Stems - Height Class 2**



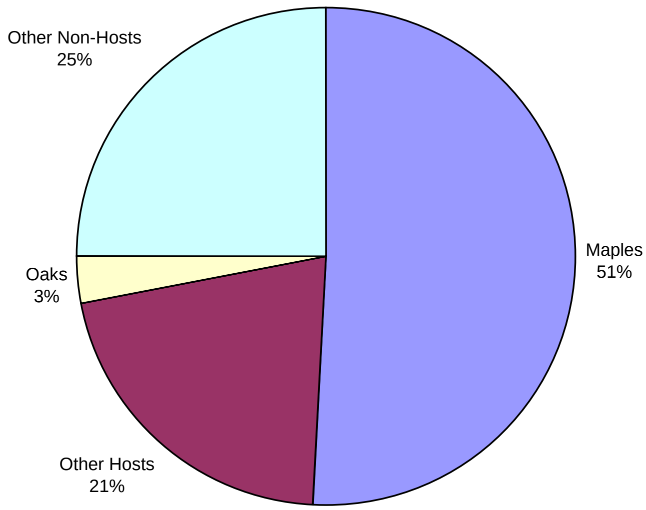

| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 53,640 | 40,271 | 1,505 | 27,452 |
| 5-10" | 3,135 | 2,105 | 419 | 4,116 |
| 11-16" | 2,927 | 474 | 395 | 2,532 |
| 17-22" | 474 | 158 | 316 | 316 |
| 23"+ | 79 | 79 | 158 | 158 |

**Height class 3** (30–65 feet tall average tree height) contains 1979.5 acres within the study area. Seventy-two percent of stems within this group are potential hosts also representing 64 percent of the basal area.

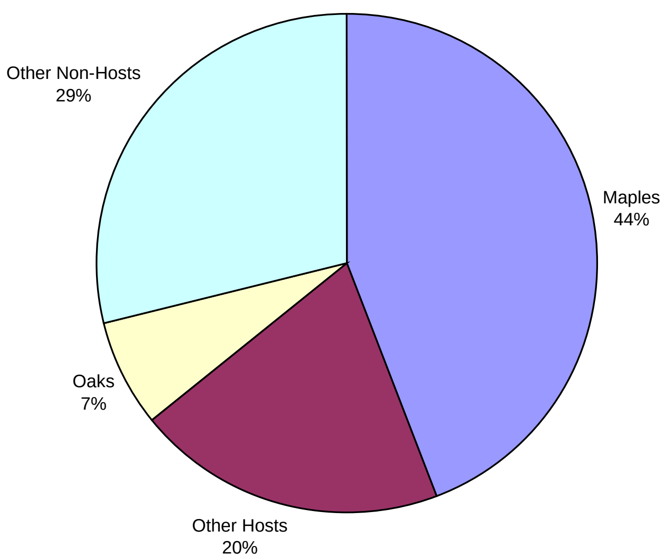



| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 5.55 | 2.33 | 0.18 | 2.50 |
| 5-10" | 20.95 | 9.03 | 1.72 | 11.32 |
| 11-16" | 12.45 | 5.62 | 2.07 | 10.34 |
| 17-22" | 5.26 | 3.71 | 1.64 | 5.67 |
| 23"+ | 3.86 | 1.14 | 2.03 | 1.51 |

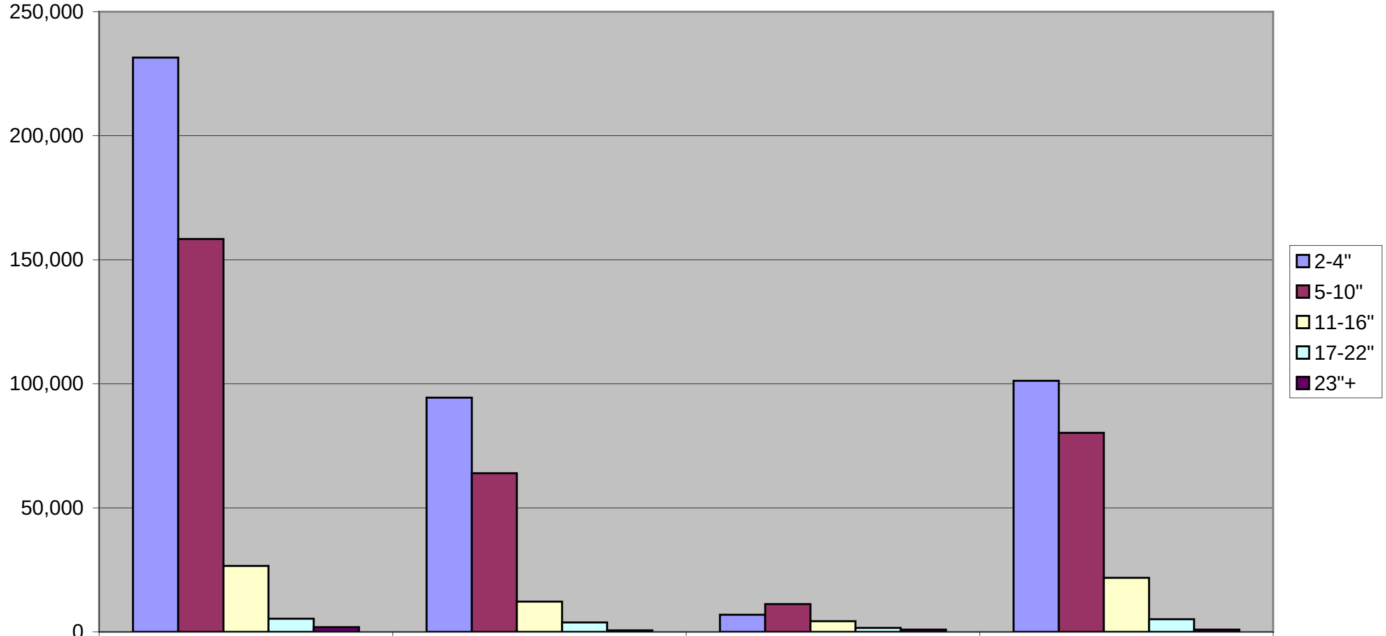
**Stems by Species Group - Height Class 3**




**Basal Area by Species Group - Height Class 3**



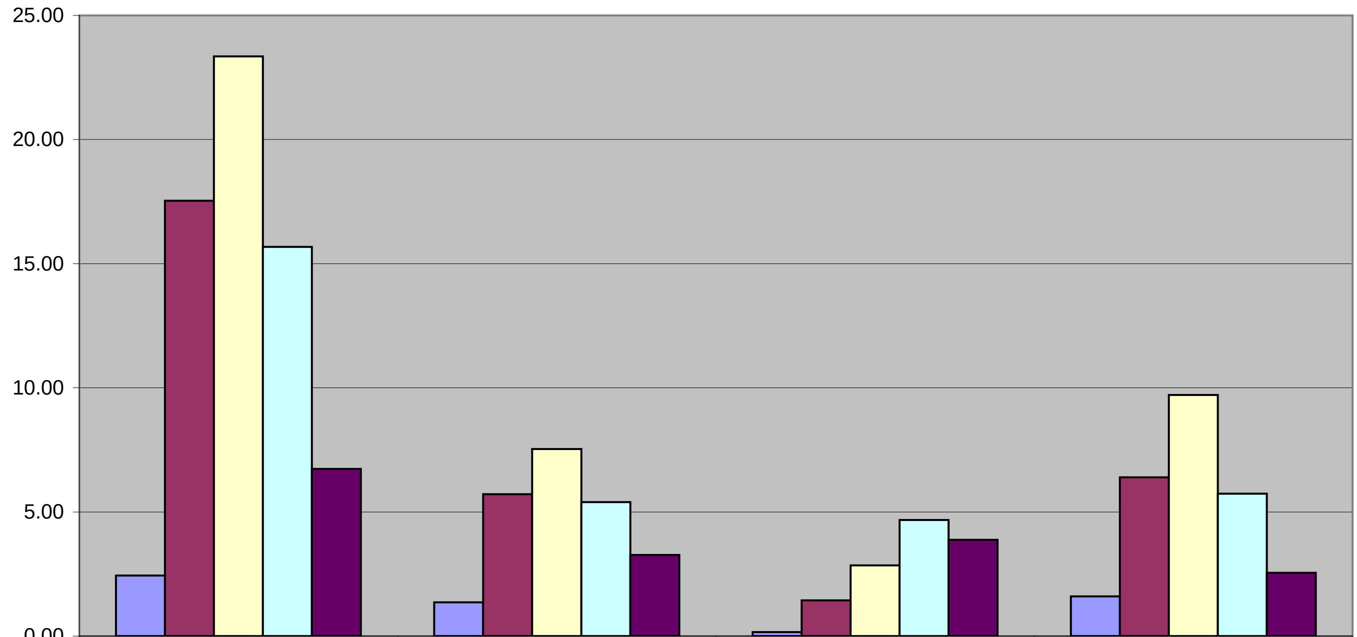
**Total Stems by Species Group and Diameter Class - Height Class 3**




| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 231,523 | 94,383 | 6,889 | 101,193 |
| 5-10" | 158,361 | 63,978 | 11,224 | 80,249 |
| 11-16" | 26,605 | 12,194 | 4,335 | 21,735 |
| 17-22" | 5,305 | 3,801 | 1,584 | 5,127 |
| 23"+ | 1,861 | 614 | 891 | 891 |

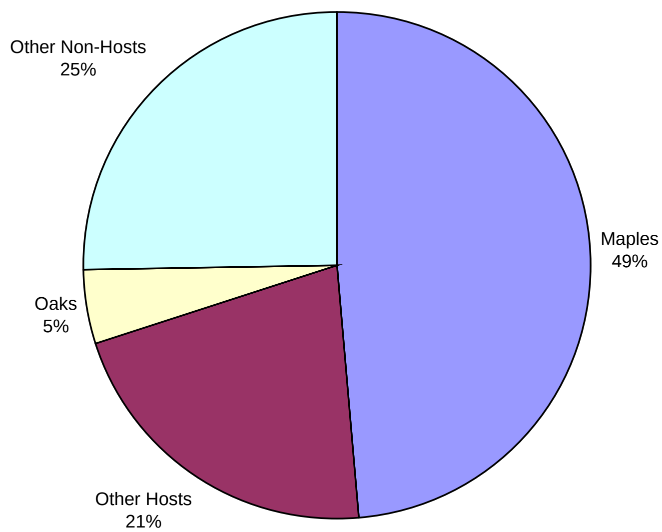
**Height class 4** (66–90 feet tall average tree height) contains 2503.1 acres within the study area. Seventy percent of stems within this group are potential hosts also representing 70 percent of the basal area.

**Basal Area (sqft/acre) - Height Class 4**

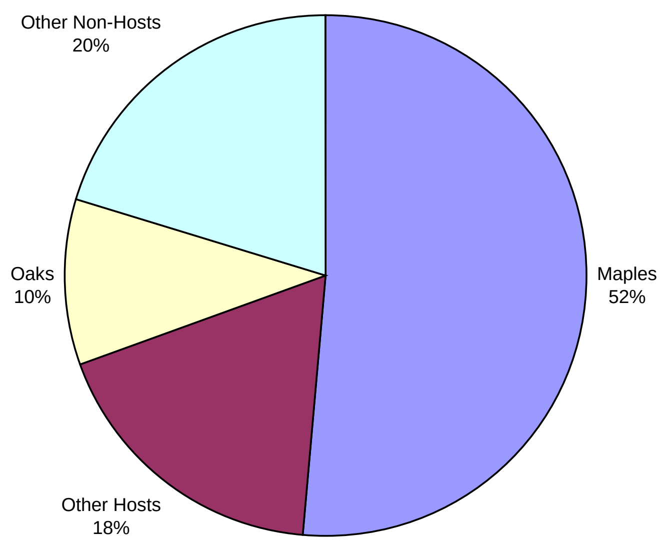


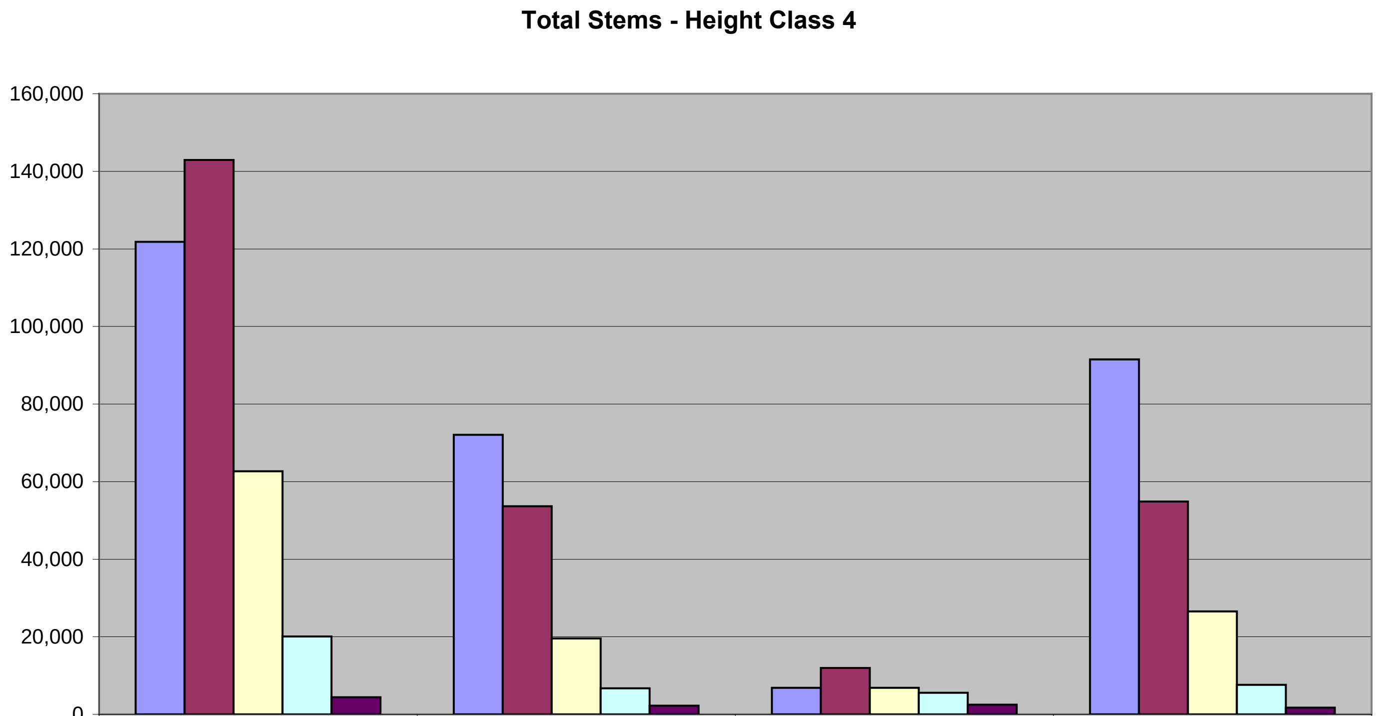

| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 2.44 | 1.36 | 0.16 | 1.60 |
| 5-10" | 17.54 | 5.72 | 1.44 | 6.39 |
| 11-16" | 23.35 | 7.53 | 2.85 | 9.71 |
| 17-22" | 15.68 | 5.40 | 4.68 | 5.74 |
| 23"+ | 6.73 | 3.27 | 3.88 | 2.55 |

**Stems - Height Class 4**




**Basal Area - Height Class 4**

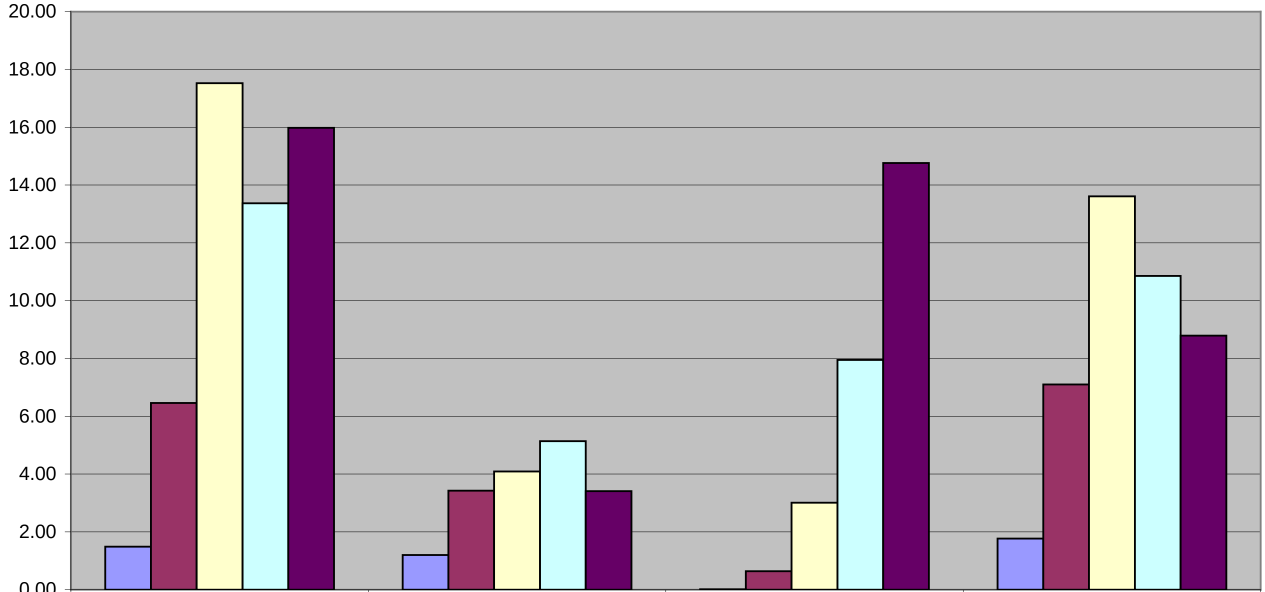





| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 121,825 | 72,089 | 6,833 | 91,538 |
| 5-10" | 142,926 | 53,641 | 11,940 | 54,893 |
| 11-16" | 62,652 | 19,599 | 6,833 | 26,533 |
| 17-22" | 20,100 | 6,683 | 5,582 | 7,584 |
| 23"+ | 4,430 | 2,253 | 2,503 | 1,752 |

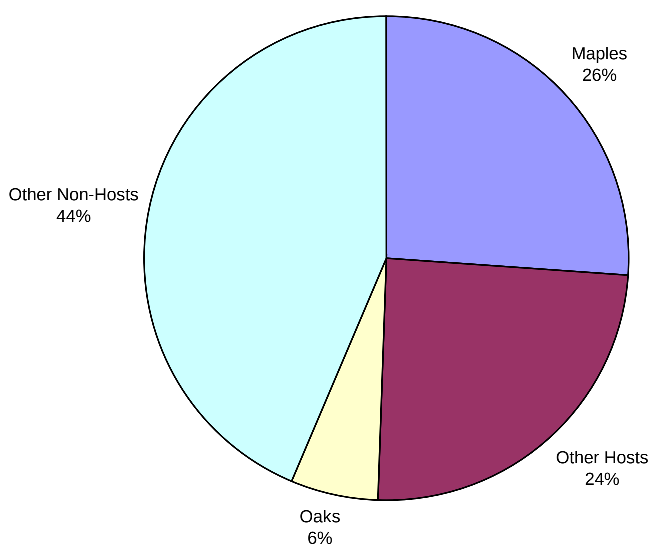
**Height class 5** (90–130 feet tall average tree height) contains 943.3 acres within the study area. Fifty percent of stems within this group are potential hosts also representing 51 percent of the basal area.

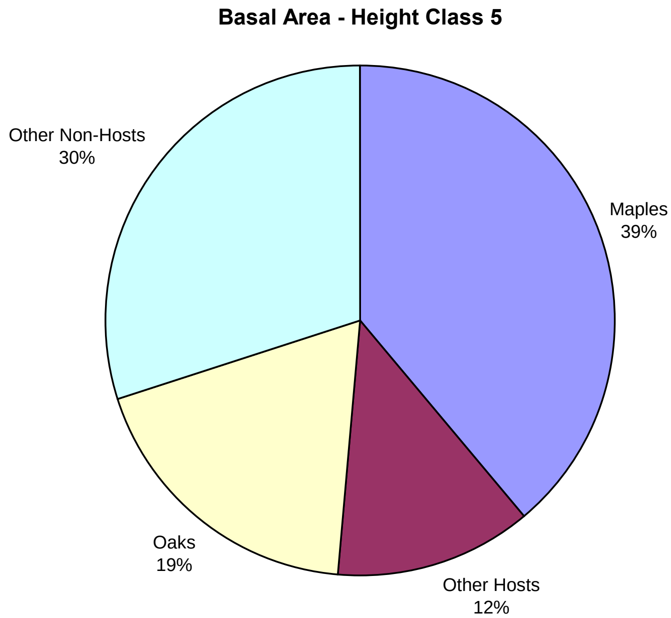
**Basal Area (sqft/acre) - Height Class 5**

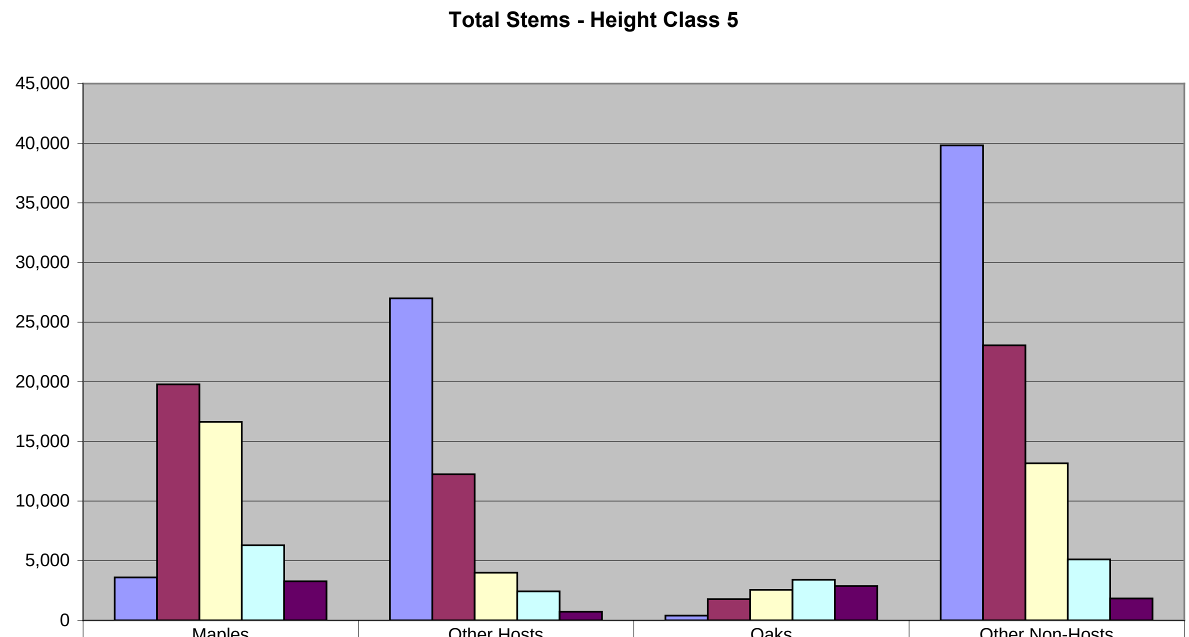



| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 1.49 | 1.20 | 0.02 | 1.77 |
| 5-10" | 6.46 | 3.43 | 0.64 | 7.10 |
| 11-16" | 17.53 | 4.09 | 3.01 | 13.61 |
| 17-22" | 13.37 | 5.14 | 7.95 | 10.86 |
| 23"+ | 15.98 | 3.41 | 14.76 | 8.79 |

**Stems - Height Class 5**






| | Maples | Other Hosts | Oaks | Other Non-Hosts |
|---|---|---|---|---|
| 2-4" | 3,603 | 26,988 | 396 | 39,826 |
| 5-10" | 19,781 | 12,253 | 1,773 | 23,054 |
| 11-16" | 16,640 | 4,000 | 2,556 | 13,168 |
| 17-22" | 6,292 | 2,424 | 3,405 | 5,113 |
| 23"+ | 3,273 | 717 | 2,886 | 1,830 |

## Error Values for Data

For each stratum standard deviation and standard error were determined for total stem count per plot as an indicator of overall data quality. Eighteen plots were not assigned to a stratum due to inaccurate GPS coordinates and are not included in any of the strata. Height classes 3, 4, and 5 (representing over 90 percent of the total forested area) were combined to give error estimates for the strata as a group, and all strata were combined to give total area error estimates. Error estimates are higher for height classes 1 and 2 due to low sampling numbers, but these sampling numbers were established based on the percentage of the total area covered by these strata following the field sampling protocol. For this reason, all strata together were analyzed for error, as well as strata 3, 4, and 5 alone to give a more accurate representation of the overall error.

| height class | N | % of plots | Average | SD | SE of Mean | SE % | Acres | % of total area |
|---|---|---|---|---|---|---|---|---|
| **1** | 7 | 0.96% | 69 | 42.824 | 16.18599 | 23.56% | 25.5 | 0.44% |
| **2** | 37 | 5.07% | 57 | 43.784 | 7.198077 | 12.66% | 292.7 | 5.10% |
| **3** | 224 | 30.68% | 42 | 24.833 | 1.659242 | 3.94% | 1979.5 | 34.46% |
| **4** | 300 | 41.10% | 28.757 | 16.274 | 0.939582 | 3.27% | 2503.1 | 43.58% |
| **5** | 144 | 19.73% | 23.1389 | 11.472 | 0.956037 | 4.13% | 943.3 | 16.42% |
| **unassigned height class** | 18 | 2.47% | | | | | | |
| **3, 4, 5** | 669 | 91.64% | 33 | | 1.31579 | 4.03% | 5425.9 | 94.46% |
| **all (not including unassigned)** | 712 | 97.53% | 36 | | 3.71896 | 10.32% | 5744.2 | 100.00% |

**unassigned = plot located outside of lidar data extent resulting in no reference to assign height.**

# Appendix C.  Imidacloprid

APHIS is proposing the use of imidacloprid, that is available in various formulations, as a means to control ALB in susceptible tree species.  The product will be applied according to label requirements by injection into soil at a rate of 1.42 grams (g) active ingredient diluted in ½-cup of water per inch of tree diameter, or directly into susceptible trees at a rate of 0.22 g active ingredient per inch of tree diameter for host trees measuring 24 inches or less, and 0.44 g of active ingredient per inch of tree diameter for host trees over 24 inches.  Imidacloprid is a systemic insecticide in the neonicotinoid insecticide class which is used on a variety of crops to control a large number of pests including certain beetles, leafhoppers, and whiteflies.

## I.  Effects

### A.  Human Health

Technical and formulated imidacloprid has low to moderate acute oral mammalian toxicity with median toxicity values ranging from 400 to greater than 2,000 mg/kg.  The technical material, and several formulations, are also considered practically nontoxic from dermal or inhalation exposure (USFS, 2005; USDA, APHIS, 2002a).  Acute lethal median toxicity values are typically greater than 2,000 mg/kg and 2.5 mg/L for dermal and inhalation exposures, respectively.  Available data for imidacloprid and associated metabolites suggest a lack of mutagenic, carcinogenic, or genotoxic effects at relevant doses.  Developmental, immune, and endocrine related effects were observed in some mammal studies.  In all developmental studies the effects to the offspring occurred at doses that were maternally toxic (USFS, 2005).

### B.  Terrestrial Nontarget Organisms

Imidacloprid has low to moderate acute toxicity to wild mammals based on the available toxicity data.  Imidacloprid is considered toxic to birds with acute oral median toxicity values ranging from 25 to 283 mg/kg (USDA, APHIS, 2002a; EPA, 2008; USFS, 2005).  Reproduction studies using the mallard and bobwhite quail have shown no effect concentrations of approximately 125 ppm for both species.

Technical and formulated imidacloprid is considered acutely toxic to honey bees and other related bee species by oral and contact exposure.  Median lethal toxicity values range from 3.7 to 230 nanograms (ng)/bee (Schmuck et al., 2001; Tasei, 2002; USFS, 2005; EPA, 2008).  Acute sublethal effects in laboratory studies have shown that the no observable effect concentrations (NOEC) may be less than 1 ng/bee (USFS, 2005). Imidacloprid metabolite toxicity to honey bees is variable with some of the metabolites having equal toxicity to imidacloprid while other metabolites are considered practically nontoxic (USFS, 2005). Due to concerns regarding the potential sublethal impact of imidacloprid to honey bees, several studies were conducted to determine potential effects in laboratory and field situations. Studies to assess the effects of imidacloprid on homing behavior, colony development, foraging activity, reproduction, wax/comb production, colony health, as well as other endpoints, revealed that there was a lack of effects, or effects were observed at test concentrations above those measured in nectar and pollen in the field under various application methods (Tasei et al., 2000; Tasei et al. 2001; Tasei, 2002; Bortolloti et al., 2003; Maus et al., 2003; Morandin and Winston, 2003; Stadler et al., 2003; Schmuck, 2004; Nguyen et al., 2009). Concerns regarding the impact of sublethal exposure to imidacloprid by honey bees in the presence of other stressors has also been evaluated in laboratory studies. Recent data suggests an interaction between imidacloprid, as well as other neonicitinoids, and pathogens such as *Nosema* that result in colony and immune function impacts to honey bees (Pettis et al., 2012; Vidau et al., 2011; Alaux et al., 2010).

### C. Aquatic Nontarget Organisms

Imidacloprid has low toxicity to aquatic organisms including fish, amphibians, and some aquatic invertebrates. Acute toxicity to fish and amphibians is low with acute median lethal concentrations typically exceeding 100 mg/L (EPA, 2008; USFS, 2005). Chronic toxicity to fish is in the low parts per million range depending on the test species and endpoint. Aquatic invertebrates are more sensitive to imidacloprid when compared to fish with acute median toxicity values in the low parts per billion range to greater than 100 mg/L depending on the test species (USDA, APHIS, 2002a; EPA, 2008; USFS, 2005).

## II. Exposure and Risk

Imidacloprid is soluble in water and is considered to have moderate mobility based on soil adsorption characteristics for several soil types. Based on field dissipation studies, the foliar half-life is less than 10 days while the persistence in soil can range from 27 to 229 days, (CA DPR, 2006; USFS, 2005). In water, imidacloprid is stable to hydrolysis at all relevant pH values but breaks down rapidly in the presence of light with aqueous photolysis half-life values typically less than 2 hours. The low volatility and proposed method of application in this program minimizes the potential for exposure to imidacloprid by air.

## A. Human Health Exposure and Risk

Based on the expected use pattern for both types of imidacloprid applications, potential exposure will be primarily for applicators and workers. Exposure to applicators will be reduced by following label directions, including recommendations for personal protective equipment, resulting in minimal risk to applicators.

There is the potential for dietary exposure to the public in cases where sugar maple trees that may be treated are used in the production of maple syrup, or if residues leach into groundwater supplies that are used as a drinking water source. In regard to treatment of sugar maple trees, USDA, APHIS will tag each sugar maple tree to inform the public not to tap these trees since they were treated with imidacloprid. Exposure to groundwater is expected to be minimal, based on the proposed method of application and monitoring data that was collected in association with ALB eradication efforts in other states. Groundwater sampling between 2003 and 2006 in Suffolk County, New York, demonstrated that approximately half of the samples had no detectable levels of imidacloprid and, of those where detections occurred, the average concentration was 3.2 parts per billion (ppb) which is below levels of concern for human health (USDA, APHIS, 2007). Samples with detectable levels of imidacloprid do not suggest a contribution from the ALB eradication program because other uses of imidacloprid occurred in these areas, and there did not appear to be a significant correlation between ALB related treatment activities and increased residues (USDA, APHIS, 2007).

## B. Terrestrial Nontarget Organisms

Exposure and risk to terrestrial vertebrates such as birds and mammals is expected to be minimal, based on the proposed method of application and available effects data. Exposure from drift is not expected, nor is any significant runoff, since applications are made as direct tree injections or soil applications. There is the possibility of imidacloprid exposure to mammals and birds that may feed on insects or vegetation from treated trees. Imidacloprid leaf and twig residue values measured from previous monitoring studies demonstrate that most birds and mammals would have to consume several times their daily intake to reach an acute or chronic toxicity threshold value. Residues in insects that may be consumed from contaminated trees are currently unknown; however, they are expected to be low since insects would not forage exclusively on treated trees without mortality occurring and being unavailable as a prey item. Imidacloprid is also specific to certain groups of insects and would not be expected to have broad spectrum effects on all insects that may be present on treated trees.

Applications are made to individual trees so insects on other surrounding vegetation would not be impacted and would be available for consumption by insectivores.

Imidacloprid exposure to terrestrial invertebrates, especially honey bees, is also not expected to result in significant risk to pollinators. Pollinator exposure to imidacloprid will be reduced since only treated trees and their associated flowers and pollen could have residues while other flowering plants that have not been treated will not contain residues. Exposure and risk would increase in cases where large numbers of trees, as proposed in one of the alternatives in this EA, are treated over large areas prior to flowering. Concentrations of imidacloprid in pollen from trees that were treated for ALB is unknown; however, based on data for crops levels are expected to be below effect levels. Previous studies have shown that imidacloprid levels in pollen and flowers are low compared to other parts of the plant. Schmuck (2004) found that levels of imidacloprid and associated metabolites were below the level of detection (0.001 mg/kg) in sunflowers. Laurent and Rathahao (2005) found average imidacloprid residues from sunflower pollen of 13 micrograms (µg)/kg, while Bonmatin et al. (2005) found average imidacloprid levels of 6.6 and 2.1 µg/kg in flowers and pollen, respectively, from treated maize seed. These reported sunflower and corn pollen residues are within the range of values from other studies and are similar to imidacloprid residue levels found in the nectar and pollen for rape (Maus et al., 2003). Chauzat et al. (2006) found that approximately 50 percent of the pollen samples collected from pollen traps in apiaries contained measurable levels of imidacloprid with an average concentration of 1.2 µg/kg. As part of its environmental monitoring program, APHIS analyzed imidacloprid residues in flowers collected from imidacloprid-treated willow, horse chestnut, and maple trees from New York during and after ALB eradication efforts (USDA, APHIS, 2002b; USDA, APHIS, 2003). With the exception of one maple flower sample (0.13 mg/kg), all residues were below the level of quantification or detection (level of detection = 0.03 mg/kg) over a 2-year sampling period. Residues in flowers were lower than in twig and leaf residues, which is similar to observations in other plant species, such as corn and sunflowers. Due to the uncertainty in the characterization of risk to honey bees from the proposed treatments in this program APHIS is funding a multi-year study that will provide more use specific information for imidacloprid exposure and effects to honey bees. APHIS is working cooperatively with the University of Maryland-Baltimore and the USDA, Agricultural Research Service, a research branch of USDA, to determine the potential for exposure to honey bees from the types of applications proposed in the ALB program as a means to supplement the available data regarding honey bee impacts and potential imidacloprid exposure. Preliminary results suggest that these types of applications do not adversely impact honey bees and their hives, and that imidacloprid residue data collected from maple trees is below levels where adverse impacts would be expected to occur. APHIS recognizes the importance of honey bees and the myriad of threats posed to their general health, and will continue to collect data to evaluate the potential for individual, or cumulative impacts, to honey bee health from ALB eradication activities.

Exposure of imidacloprid to soil invertebrates, in cases of soil injection, is possible. Soil dwelling invertebrates that are sensitive to imidacloprid would be impacted however the effects would be localized to the areas of treated soil and would be transient, based on available data (USFS, 2005). In cases where imidacloprid is tree-injected, there would be reduced exposure and risk to soil-dwelling terrestrial invertebrates; exposure would occur primarily from leaves that drop in the fall from trees that have been treated in the spring. These risks would be proportional to the number of trees treated in a given area.

### C. Aquatic Nontarget Organisms

Imidacloprid exposure in aquatic environments is also expected to be minimal and to not pose a significant risk to aquatic biota. The method of application eliminates the potential for drift, and in the case of tree injections eliminates the probability of off-site transport via runoff. Another potential pathway of exposure to aquatic organisms is imidacloprid residues in leaf litter in the fall from treated trees that can be transported to aquatic environments. Sublethal impacts to some aquatic invertebrates that feed on leaf litter containing imidacloprid have been observed as well as impacts on decomposition rates (Kreutzweiser et al., 2009; Kreutzweiser et al., 2008; Kreutzweiser et al., 2007). Exposure and risk to aquatic organisms will increase in situations where large numbers of trees may be treated within a watershed. The risk to aquatic organisms from this type of exposure can be reduced by not treating trees or treating a small number of trees, and avoiding treatments in proximity to surface water. There is a potential for subsurface transport of imidacloprid to aquatic habitats for applications made directly into soil. This type of exposure will be minimized by only making applications where the ground water table is not in proximity to the zone of injection and avoiding soils that have a high leaching potential. Any aquatic residues that could occur would be below effect levels for aquatic biota due to the low probability of off-site transport and environmental fate for imidacloprid.

## III. Summary

Imidacloprid risks to human health are expected to be low regardless of the extent of use since toxicity is low and exposure to the general public is low due to the methods of application. Exposure is greatest for applicators and would increase in cases of large scale treatment since trees are treated individually. Risk to applicators will be reduced by following label directions regarding personal protective equipment. Risks to most non-target organisms is expected to be low under a range of use scenario's however there is the potential for increased risk to some aquatic invertebrates as well as pollinators if large numbers of trees are treated.

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# Appendix D. Triclopyr/Imazapyr/Metsulfuron

APHIS proposes the use of two triclopyr formulations in the treatment of stumps and their associated sprouts from host trees that were removed as part of the ALB Eradication Program. As part of the ALB eradication effort host trees may be physically removed along with the stumps to prevent re-infestation; however, under certain circumstances physical removal of the stumps may not be possible. Areas where trees were removed but the stumps cannot be physically destroyed may require herbicide applications to ensure that stumps and associated sprouts do not allow for ALB re-infestation. APHIS proposes the use of two triclopyr formulations for the treatment of stumps, Garlon® 3A, that contains the active ingredient triclopyr triethylamine salt (TEA), and Pathfinder® II, that contains the active ingredient triclopyr butoxyethyl ester (BEE). Pathfinder® II allows more flexibility in being able to treat the bark instead of direct application to cut areas of the stem. In addition, APHIS is proposing some foliar applications of Garlon® 3A that will be tank mixed with two other herbicides, Arsenal® and Escort® XP, to treat sprouting foliage from stumps that that have been removed as part of the eradication efforts. This use is considered minor compared to physical removal and treatment of stumps and would only occur in areas where older stumps have not been removed or treated and have began to resprout. All applications will be made by hand either by painting undiluted material on the stump or directly spraying stumps and/or sprouting foliage using a backpack sprayer.

The purpose of this assessment is to summarize the available response data for each triclopyr formulation, as well as other herbicides that may be used, and discuss the potential for exposure and risk to human health and the environment under the proposed use in the ALB program.

## A. Herbicide Response Data

Garlon® 3A contains the active ingredient, TEA, which is a pyridine systemic herbicide commonly used for control of woody and broadleaf plants. This formulation can cause significant eye irritation but has low acute inhalation and dermal toxicity. Acute oral median lethal concentrations range from approximately 600 to 1000 mg/kg suggesting low to moderate toxicity (USFS, 2003). Long term toxicity studies have shown that triclopyr TEA is not a carcinogen or mutagen and that toxicity in developmental and reproductive studies primarily occurs at high doses and at levels that are also maternally toxic (EPA, 1998). The other proposed triclopyr formulation, Pathfinder ® II, can cause slight temporary eye irritation during application as well as some skin irritation in cases of prolonged exposure. Acute oral median lethal concentrations are 1,000 mg/kg with acute inhalation and dermal toxicity median lethality values greater than the highest test concentration suggesting low acute mammalian toxicity under various exposure pathways. Triclopyr BEE is not considered carcinogenic or mutagenic, and in cases where developmental and reproductive studies demonstrate effects, doses were at levels considered to be maternally toxic.

The primary degradation product of triclopyr TEA and BEE is triclopyr acid, which was also evaluated and found to have a similar mammalian toxicity profile to the amine and ester.

Triclopyr TEA toxicity to terrestrial non-target organisms is considered low with the exception of terrestrial plants. Toxicity to avian species is low for triclopyr TEA with oral and dietary median lethal toxicity values greater than 2,000 mg/kg and 10,000 ppm, respectively (USFS, 2003; EPA, 2008). Chronic toxicity to birds is also expected to be low with reproductive toxicity No Observable Effect Levels (NOEL) of 100 and 500 ppm for the mallard and bobwhite quail, respectively, when exposed to triclopyr acid (EPA, 1998). Triclopyr TEA is considered practically non-toxic to honey bees based on acute contact studies (EPA, 1998). Triclopyr TEA does exhibit toxicity to terrestrial plants, as expected, based on results from seedling emergence, germination and vegetative vigor studies. The primary degradation product of triclopyr TEA, triclopyr acid, is similar in toxicity to terrestrial non-target organisms based on the available toxicity data. Available avian toxicity data for triclopyr BEE demonstrates slight toxicity with median lethal dose values ranging from 735 to 849 mg/kg for the bobwhite quail (EPA, 1998).

TEA toxicity to aquatic organisms is low for fish and aquatic invertebrates. Available acute fish toxicity data demonstrates median lethal concentrations greater than 100 mg/L for Garlon® 3A and technical triclopyr TEA (EPA, 2008; Wan et al., 1987). Triclopyr TEA is considered practically non-toxic to aquatic invertebrates in freshwater and marine environments with toxicity values exceeding 300 mg/L. Chronic toxicity to fish and aquatic invertebrates is also low with chronic toxicity NOEC ranging from approximately 80 mg/L to greater than 100 mg/L depending on the test organism and endpoint. Triclopyr BEE is considered slightly to highly toxic to aquatic invertebrates and fish with median lethal concentrations ranging from approximately 0.36 mg/L to 12.0 mg/L (USFS, 2003). The primary metabolite of triclopyr TEA and BEE, triclopyr acid, is considered practically non-toxic to aquatic organisms based on available toxicity data (EPA, 1998; 2010).

For foliar treatments, Garlon® 3A is proposed for use as a tank mix with the active ingredients imazapyr and metsulfuron-methyl. Imazapyr is an imidazolinone herbicide while metsulfuron-methyl is a sulfonylurea herbicide with both products being a common tank mix partner with triclopyr in the control of woody vegetation. The toxicity of imazapyr and metsulfuron-methyl is considered low for mammals. The formulation containing metsulfuron-methyl, Escort® XP, is considered practically non-toxic to mammals via inhalation, dermal and oral exposures. All toxicity values were reported as greater than the highest test concentration. In addition metsulfuron-methyl is not considered to be carcinogenic nor has it been shown to be a reproductive, teratogenic or developmental hazard (USFS, 2005). Escort® XP is considered a slight eye irritant but is not considered a skin irritant or sensitizer. The other tank mix partner, Arsenal®, containing the active ingredient imazapyr, has a similar mammalian toxicity profile to metsulfuron-methyl and is considered practically non-toxic in acute inhalation, dermal and oral exposures. Imazapyr is not considered to be a carcinogen or mutagen and is not known to be a reproductive, teratogenic or developmental hazard (USFS, 2004).

The toxicity of imazapyr and metsulfuron-methyl is low to all non-target organisms with the exception of some aquatic and terrestrial plants. Both products are considered practically non-toxic to wild mammals, birds and terrestrial invertebrates based on the available acute and chronic toxicity data (EPA, 2010; USFS, 2004; 2005). Toxicity to fish and aquatic invertebrates is very low with median lethal acute concentrations typically exceeding 100 mg/L for both chemicals (EPA, 2010; USFS, 2004; 2005). Chronic toxicity to fish and aquatic invertebrates is also considered low based on the available No Observable Effect Concentrations (NOECs) that were reported from standardized toxicity studies.

## B. Herbicide Exposure and Risk

Exposure to humans and the environment from the triclopyr amine or ester is expected to be minimal based on the environmental fate and use pattern proposed in this program. Triclopyr TEA is considered mobile based on the available information regarding water solubility and soil adsorption, but breaks down in soil (~12 days) and water (< 1 hr) to triclopyr acid, and to a lesser extent triethanolamine. Triclopyr BEE has low water solubility and adsorbs more strongly to soil when compared to the amine. Triclopyr BEE also breaks down quickly to triclopyr acid in soil and water with hydrolysis half lives of less than one day (CA DPR, 1997). Triclopyr acid is considered slightly mobile based on soil adsorption values however the mobility appears to decrease with time (CA DPR, 1997). Half-lives of the acid in water are short ranging from 0.5 to 2.5 days, while in soil half lives range from 8 to 18 days (EPA, 1998). The other minor metabolite, triethanolamine, also has a short half life in the environment under most conditions with soil and water half-lives ranging from 5.6 to 13.7 days in soil, and 14 to 18 days in water under aerobic conditions (EPA 1998). The acid can break down to 3,5,6-trichloro-2-pyridinol (TCP) in soil and water, and available toxicity data suggests TCP is more toxic to aquatic non-target organisms than either triclopyr TEA, BEE or the acid. Although this metabolite is more toxic than the parent, its rate of development is such that environmental concentrations will not reach levels that would pose a risk to non-target organisms. Triethanolamine is less toxic than the parent or acid to aquatic organisms based on limited toxicity data. Volatilization is not expected to be a significant exposure pathway due to the low vapor pressure that has been measured for triclopyr TEA, BEE, and the associated acid (CA DPR, 1997).

Imazapyr and metsulfuron-methyl, which are proposed for use as a tank mix with Garlon® 3A to treat some foliage from sprouting host plant stumps, will also result in minimal exposure in the environment. Imazapyr is water soluble and does not appear to bind readily to soil based on soil adsorption coefficient values that range from 30 to 100 (USFS, 2004). Imazapyr degradation and dissipation half-lives are variable, ranging from approximately 25 days to greater than 300 days. Metsulfuron-methyl half-lives in soil range from 17 to 180 days. Reported soil adsorption and water solubility values suggest that metsulfuron-methyl has some mobility. Off-site transport of these two herbicides, as well as Garlon® 3A, is not expected since the products are being directed by hand specifically to small sprouts originating from the host plant stumps. Material is applied using a large droplet size under low volume to minimize drift and insure application and uptake directly to the sprouting plants. In addition, this use is minor and will generally only be used in larger wooded areas where physical removal of the stump is not possible. Based on the proposed use pattern and rate for these products, and their favorable toxicity profile, no significant risk to surface water or groundwater resources is expected.

Significant risk to human health from applications of Garlon® 3A alone, or as a tank mix, as well as Pathfinder® II is not expected based on the available use pattern and mammalian toxicity data. Exposure will be limited to applicators since treatments are made directly to stumps or sprouting foliage. Adherence to required personal protective equipment and other label directions will minimize exposure and risk to workers as well as the environment. Risk is not expected to be significantly greater from the proposed foliar applications that may be made using the tank mix of Garlon® 3A with formulations containing the active ingredients imazapyr and metsulfuron-methyl. This use pattern is minor compared to physical removal of the stumps or the treatment of stumps since they are the preferred method of stump treatment. This application will occur to those stumps that have re-sprouted in areas where physical removal was not possible or a previous stump treatment with an herbicide did not occur. Exposure to humans is limited to applicators; however, adherence to label requirements regarding personal protective equipment will minimize exposure and risk. The low potential for exposure and favorable mammalian toxicity profile for each active ingredient suggests that significant risk to applicators is not expected.

Exposure to terrestrial and aquatic non-target organisms is also expected to be minimal from each proposed formulation and tank mix. Significant drift or runoff is not expected since applications are not broadcast applied but are made using either a backpack sprayer to deliver a coarse droplet size or by painting the material on individual stumps and associated sprouting vegetation. The low probability of off-site transport for any of the products is expected to result in very low exposure to non-target organisms. The low probability of exposure and the favorable available effects data demonstrate that all products have a very low risk of causing adverse ecological risk. Risk to non-target organisms is greatest for plants since they are the most sensitive group to each application; however, impacts to terrestrial plants is expected to be minimal and will only potentially occur for those plants that are immediately adjacent to treated stumps or sprouts. Impacts to terrestrial plants immediately adjacent to treated stumps will be minimized by following label directions for each herbicide treatment. Significant exposure to aquatic plants is not expected based on the method of application and adherence to label restrictions regarding applications near aquatic areas. Exposure in aquatic systems is not expected to occur at levels that could result in any direct impacts to aquatic plants or at levels that would suggest indirect impacts to aquatic organisms that depend on aquatic plants as a food source or as habitat.

## C. Summary

The selective use of herbicides that are proposed for this program will have minimal human health and environmental risks. Applications are directed specifically at stumps or sprouting vegetation from cut stumps using methods that minimize off-site transport of the proposed formulations. The low potential for off-site transport and favorable toxicity profile for each herbicide to most non-target organisms minimizes risk to human health and the environment.

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