
The attack of the urban forest eaters: how a dedicated and educated group of volunteers is responding to the invasion of Asian long-horn beetles and gypsy moths in Chicago

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Abstract

The concept of biodiversity is largely unfamiliar to and unembraced by the general public. The overdeveloped nature of urban habitats and the underdeveloped awareness of their human inhabitants lead to a perception by the general public that one tree is as green as the next, and that most insects should be squashed on sight.

TreeKeepers are trained citizen foresters who volunteered for the Openlands Project to help maintain the health of Chicago's green infrastructure. In a unique partnership with Chicago's Bureau of Forestry and the Chicago Park District, TreeKeepers serves as a national model for interagency cooperation, public-private partnerships, and advocacy on behalf of the urban forest. Since 1991, over 500 people from almost every neighborhood in Chicago have taken the 7-week TreeKeeper training course to learn basic arboriculture skills including tree identification and physiology, soils, planting and pruning techniques, tree disease, and insect problem recognition. Tree Keepers volunteer on workdays in different parks and along Chicago's boulevards to help city crews with tree maintenance and other greening activities.

In January of 1998, TreeKeepers were invited to an informational workshop presented by the Illinois Department of Agriculture (IDA) and Chicago's Bureau of Forestry (CBOF) about the spread of the gypsy moth (*Lymantria dispar*) in Chicago, and on monitoring efforts being launched later in the year. Attendees, including CBOF staff, learned that the gypsy moth had been defoliating its way westward since its accidental release from a lab in Medford, Massachusetts, in 1869. It was identified in Illinois in 1973.

In June of 1998, TreeKeepers were issued delta-styled pheromone traps and agreed to be gypsy moth monitors from July to September. The traps were hardly hanging a week when officials from the USDA declared that Chicago had been invaded by a new non-native insect, the tree-killing Asian long-horn beetle (*Anoplophora glabripennis*). A quarantine was imposed on a 19-square mile area in Chicago. With a menu of preferred host trees comprising some 75% of Chicago's street tree species composition, a sizable portion of the city's urban forest was vulnerable to this pest.

In a unique collaboration, the Openlands project and CBOF partnered to present a series of hands-on educational workshops to train volunteers to become Asian long-horn beetle (ALHB) monitors. Every suspicious tree is called in to Openlands first for investigation. If it appears to be infested with the beetle, authorities at CBOF or the Part District are notified for further evaluation and action.

The gypsy moth and Asian long-horn beetle are new arrivals to Chicago's urban forest. Professionals with the Illinois Department of Agriculture, the USDA, Chicago's Bureau of Forestry, and the Chicago Park District have welcomed the assistance of trained volunteers, such as TreeKeepers. In fact, a volunteer is credited with adding a previously unsuspected tree species to the list of preferred host trees. TreeKeepers are committed to continued monitoring efforts of these 2 entomological aggressors for the duration of the siege.

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BACKGROUND

The term “urban forest” is not an oxymoron to savvy Chicagoans. With nearly one tree growing for each citizen, Chicago boasts a wonderfully green infrastructure. Some 5 million trees in parks and along boulevards helped to create landscape architect Frederick Law Olmsted’s visionary turn-of-the-century (Y2K-100, that is) “green necklace” around the city. Add to this to another 50 million or so trees growing in adjacent counties, forest preserves, cemeteries, and private property; and the greater metropolitan Chicago area thrives beneath a wide (albeit sprawling) canopy. Under the leadership of Chicago’s mayor, Richard M. Daley, who was born on Arbor Day, funding for tree planting and maintenance has become a regular part of the city’s budget. Chicago’s Bureau of Forestry crews plant and maintain 10,000 trees each year. The Chicago Park District (a separate entity) plants and maintains thousands of trees and shrubs annually, as well.

TreeKeepers are trained citizen foresters who volunteer for the Openlands Project, a 35-year old nonprofit organization working to preserve and enhance public open space—land and water—in northeast Illinois. This unique partnership was initiated in 1991 with Chicago’s Bureau of Forestry (CBOF), the Chicago Park District (CPD) and other agencies, organizations, and professional arboriculture firms. TreeKeepers has become a nationally recognized model for interagency cooperation, public-private collaborations, and advocacy on behalf of the urban forest. More than 500 adults from virtually every neighborhood in Chicago have taken the seven-week TreeKeeper training course to learn basic arboriculture skills (tree ID, physiology, soils, planting and pruning techniques), and disease and insect problem recognition. After completing training, TreeKeepers volunteer on workdays throughout Chicago, often specifically organized to help agency crews with routine tree maintenance on public property.

Round 1: Move over, Mothra!

The Illinois Department of Agriculture knew they were coming, and so did Chicago’s Bureau of Forestry. Officials in New York, Pennsylvania, Ohio, Indiana, Michigan, Wisconsin, and even southeast Canada had tracked the spread of gypsy moth (*Lymantria dispar*) from the East Coast to the Midwest over the past several decades. An escapee from a lab in Medford, Massachusetts, this alien insect had been defoliating its way westward since 1869. The first known occurrence of the gypsy moth in northeast Illinois was in 1973; thought to have been brought into southwest Cook County from Wisconsin

by a vacationer. The moth was contained locally after that occurrence. By 1997, government officials warned that the gypsy moth was actively on the move into the area, and could be expected to be a major problem.

In January 1998, TreeKeepers’ reputation as knowledgeable and reliable caretakers of the urban forest facilitated the development of a collaborative monitoring program between the Openlands Project, the Illinois Department of Agriculture (IDA), and Chicago’s Bureau of Forestry. Volunteers were invited to an informational workshop presented by IDA and CBOF on the spread of gypsy moth in the Chicago area, and on monitoring efforts being launched later in the year. A follow-up workshop was held in June where the 27 TreeKeepers in attendance learned gypsy moth and preferred host species identification.

IDA and CBOF representatives distributed color plates illustrating the four stages of gypsy moth life cycle (egg, larva, pupa and adult). The eggs hatch from chamois-colored masses laid on branches and trunks of trees (as well as on lawn furniture) from early spring through mid-May. Larvae are dispersed either naturally when newly hatched larvae hang from host trees on silken threads and are carried by the wind for a mile or more; or artificially when people transport egg masses miles from infested areas on cars, recreational vehicles, firewood, etc.

Gypsy moth larvae have five pairs of raised blue spots and six pairs of raised red spots along their backs. Only the larvae damage trees and shrubs. The larvae reach maturity between mid-June and early July and then enter the pupal stage. During this stage they change into adults, or moths. Pupation takes one to two weeks and can occur under bark, in crevices, on the ground, or anywhere the larvae are left undisturbed. The male emerges first and flies in rapid zigzag patterns searching for the flightless females, which emerge shortly thereafter. Females emit a pheromone to attract males. They mate, she deposits her eggs in July and August close to the spot where she pupated, and both adults die. Four to 6 weeks later, embryos develop into larva, which remain in the eggs over winter. The eggs hatch the following spring, and the cycle repeats.

Gypsy moth larvae have voracious appetites and prefer hardwoods, but may feed on several hundred different species of trees and shrubs including:

- Alder (*Alnus*)
- Apple (*Malus*)
- Basswood (*Tilia*)
- Birch (*Betula*)
- Cottonwood (*Populus*)

- Hawthorn (*Crataegus*)
- Hemlock (*Tsuga*)
- Oaks (*Quercus*)
- Pines (*Pinus*)
- Poplar (*Populus*)
- Spruces (*Picea*)
- Sweetgum (*Liquidambar styraciflua*)
- Willow (*Salix*)

To date, gypsy moth has avoided the following:

- Arborvitae (*Thuja occidentalis*)
- Ash (*Fraxinus*)
- Balsam fir (*Abies balsamea*)
- Black walnut (*Juglans nigra*)
- Butternut (*Juglans cinera*)
- Catalpa (*Catalpa speciosa*)
- Flowering dogwood (*Cornus florida*)
- American Holly (*Ilex opaca*)
- Mountain laurel (*Kalmia latifolia*)
- Red cedar (*Juniperus virginiana*)
- Rhododendron (*Rhododendron maximum*)
- Sycamore (*Platanus occidentalis*)
- Yellow poplar (*Liriodendron tulipifera*)

The effects of defoliation depend primarily on the amount of foliage eaten, the condition of the tree at the time it is defoliated, the number of consecutive defoliations, soil moisture, and the species of host. For instance, if <50% of the crown is defoliated, most hardwoods will experience only a slight reduction in radial growth. If >50% of the crown is defoliated, most hardwoods will re-foliate or produce a second flush of foliage by midsummer. Healthy trees can usually withstand one or two consecutive defoliations of >50%, but trees that are weakened by previous defoliation or subjected to other stresses (e.g., drought) are frequently killed after a single defoliation of >50%.

Although they were expected to and had agreed simply to monitor for gypsy moth, volunteers also learned that there are several ways to effectively control this insect, including:

- Natural enemies:
 - Bacillus thuringiensis* (Bt) a naturally-occurring microorganism (bacteria)
- Parasitic insects *Ooencyrtus kuvanae* (wasp), *Parasetigena agilis* (fly)

- Predatory animals White-footed mouse, chipmunk, ground beetle, chickadee
- Entomophaga* a fungus
- Nucleopolyhedrosis (NPV) a naturally-occurring microorganism (virus)

- Chemical warfare:
 - Diflubenzuron a growth regulator (not available for homeowner use)
 - Sevin a contact poison
- Weather:
 - 20F for 72 hours kills exposed eggs

After the workshop, volunteers were issued delta-style pheromone traps and instructional materials. They were to check the traps 3 times from July through September. Other trained monitors included CBOF employees, Chicago nature center visitors, and concerned park users.

When monitoring began on July 4, TreeKeepers had hung 143 (31%) of the total 454 traps set city-wide. Across Chicago, male moths fluttered into traps (females do not fly) set as part of the most extensive gypsy moth monitoring project in Chicago to date. By Labor Day, 283 male gypsy moths were trapped by volunteers with higher concentrations (>9 moths per trap) appearing on the city's north and far southeast sides. This confirmed that the moths' anticipated movement into Chicago was indeed from Indiana, Michigan and Wisconsin. By themselves, 283 moths don't seem like much of a problem. When added to the other 12,840 trapped elsewhere in Cook County and 38,423 from 15 surrounding north/northeastern Illinois counties this totals 51,546 moths in 1998 (up from 34,841 in 1997 and 2,643 in 1996), the threat becomes apparent.

Round 2: Beetlemania

The gypsy moth traps were hardly hanging a week when, in mid-July, officials from the USDA realized that Chicago had been invaded by another non-native insect, the tree-killing Asian long-horned beetle (*Anoplophora glabripennis*). In early July, Barry Albach, a Skokie Park District employee and the friend of a Ravenswood community homeowner who had installed a backyard swimming pool, was asked to cut some overhanging box elder tree branches that were blocking the sun. Albach tossed the branches into the back of his covered pick-up

truck where they spent the next few days undisturbed. When he eventually pulled back the cover, he noticed several unusual looking insects crawling around the truck. A quick surf on the Internet revealed that the critters emerging from the cut branches in the truck might be the Asian long-horned beetle (ALHB). The informational web site was posted by the U.S. Department of Agriculture and contained images of adult ALHBs, oviposition sites and exit holes, information on its life cycle, and warnings about its preference for certain tree species.

Using the hot line phone number listed on the Web site, Albach contacted the USDA about his find. Wary at first, federal agents were loathe to think that this could be the same insect that caused the demise of more than 2,000 trees in New York's Brooklyn and Amityville communities since 1996, site of the only known (and continuing) infestation in the country up until then. Chicago's own tree horror story began on July 13 when federal agents confirmed that indeed Albach's mystery insect was the ALHB and declared a quarantine zone surrounding the core area where it was discovered. The quarantine area was quickly enlarged to cover a 19-square mile area because evidence of the beetle was being found further and further outward from the epicenter. Within days, 2 separate, smaller, and non-related infestations at remote locations in the metropolitan area (the industrial area of Summit southwest of Chicago, and in Addison 20 miles to the west in DuPage county) were discovered to have affected trees of their own.

Declaring a quarantine imposes restrictions on and carries legal implications for citizens and businesses. For instance, within the quarantine area, conveyance of certain items from the quarantine area are punishable by law, including: ". . . the ALHB in any living state of development (adult or larvae); firewood (all hardwood species), and host material (living, dead, cut or fallen) inclusive of nursery stock, logs, green lumber, stumps, roots, branches and debris more than 1/2 inch in diameter . . . and any other article, product or means of conveyance determined by the director of IDA to risk of spread of the beetle . . .". Citizens witnessing any violations may call the Chicago Police Department's "911" emergency phone number with violators of quarantine regulations being subject to a \$500 fine.

The quarantine meant that nearly 5% of the city's land mass was under scrutiny for the beetle. Federal, state and city officials began asking a lot of questions: How did the ALHB get here? How was it spreading? To what extent would it ultimately impact Chicago's street tree species composition? Chicago's citizens had questions of their own, too, such as: Was finding just one exit hole really a good enough reason to take down a mature tree? How

much were property values going to plummet because some homes had no trees on their lots? And just who was responsible for letting all these beetles into the country, anyway?

Finding Chicago's epicenter was relatively easy, as was finding out how the ALHB got there. In fact, tree sleuths from CBOF plus state and federal Agriculture Department staff swarming the Ravenswood neighborhood got lucky. Using experience gained in New York, officials here knew that the beetle probably arrived via wooden crating material from the Far East. A short distance from the box elder "mother tree" was the Polar Hardware Manufacturing Company whose owner produced documents showing that he had begun importing materials from China in the early 1990s.

Using CBOF information that was updated daily, ALHB distribution and density showed that the beetle could have several mechanisms for movement, including natural (flying, crawling), and artificial (hitching a ride on cars and commuter trains running through Ravenswood—infected trees line the tracks).

Information, please

Using an aggressive, proactive public relations and outreach approach, the City launched a public information blitz, going door-to-door in the neighborhood with ALHB "Wanted" posters, flyers announcing community meetings with Q&A sessions hosted by agency professionals, and invitations for residents to become involved in the reforestation and beautification of Ravenswood. Alderman Eugene Schuler of Chicago's 47th Ward encouraged public participation in re-greening efforts. For weeks, TV and radio programs were devoted to the topic.

Homeowners were cooperative, but heartbroken knowing they would lose many of their trees to the beetle. Their first encounter with a tree pathogen of such devastating proportions was Dutch Elm Disease in the 1960's when thousands of stately American elms in Chicago were removed because of that disease. Ironically, some of the tree species planted to replace the elms (e.g. maples and green ash) were, 30 years later, discovered to be preferred host trees of the ALHB.

Education as a first line of defense

Beyond the posters and flyers, Openlands Project saw a need for providing public education about the beetle in conjunction with other information dissemination methods being used. To engage volunteers in valuable citizen science efforts, Openlands became the first non-profit organization in the country to organize workshops given by professionals from IDA, CBOF, and CPD to teach volunteers to

become ALHB monitors. Forestry staff hosted some of these workshops in its "Beetle War Room" (the 47th Ward Streets and Sanitation office in Ravenswood), while others were held at a neighborhood park, and even at a local coffee shop. Instructors included Joe McCarthy, Chicago's senior city forester and beetle expert; Joe Schaefer, from Animal and Plant Health Inspection Service (APHIS); Brian Williquette, CPD's district forester; Steve Bartram, Openlands' urban forester; and the author, Openlands' volunteer coordinator at that time.

The workshops involved indoor education and field training components. Sessions began with a quick review of "Entomology 101," a slide presentation highlighting tree damage caused by the beetle, vials of pickled larvae to show ALHB's early stage of development, Reiker mounts of adults, bark cuttings pock-marked with oviposition wounds and riddled with ½ inch diameter exit holes, along with frass "sawdust" that mounds in little piles below emergence sites.

Beetle biologists explained the insect's life cycle. ALHB has one generation per year. Adults have a life span of one to two months. An adult female lays 20-80 eggs, each in a shallow depression chewed in the bark then covered with a cement secretion. Eggs hatch in about 2 weeks and the larvae tunnel under the inner bark where the grubs spend autumn feeding. Larval development takes about 9 months. Over-wintering occurs in the larval stage where mature larvae bore into the heartwood creating galleries. In the spring, the larvae pupate in the wood. Emerging adults chew their way out creating circular exit holes and leaving coarse wood fibers below. Sap oozing from the wounds attracts bees, which is a good clue to recent adult beetle emergence.

The adults have shiny, black-patent-leather-looking bodies, 1-1.5 inches long with white spots and white-striped antennae that may be longer than the body. Females are slightly larger than males. Adults seldom fly more than 200 feet if a suitable host tree is nearby, though they can fly up to one-half mile if necessary. Adults generally emerge May-October, though Chicago's warm winter of 1998 allowed adults to emerge into December. Initial attacks to a tree are usually in the upper crown, with succeeding generations infesting lower branches on the same tree; adults tend to swarm a favorite tree and "love" it to death. Repeated attacks cause crown dieback and eventually tree death. The sequence from initial attack to tree death may take 7-10 years, depending on tree size and vigor.

Because the ALHB could be confused with other wood boring insects (e.g. the honey locust borer is a little smaller and sports yellow spots instead of

white), volunteers are encouraged to report any "suspicious" looking insect for further follow-up by officials. A relational database has been created by CBOF that incorporates information on address plus species of healthy, infested, removed and replanted trees, along with dates and digital images of infested trees.

After the in-house training, volunteers take a guided walk through the hardest hit portion of Ravenswood to locate oviposition sites and exit holes up and down the length of host trees, find frass-covered grass and limbs, and watch live adults going about their procreative business. Originally, volunteers were advised to concentrate their monitoring efforts on known host trees, such as:

- Maples (*Acer*)
- Horse chestnut (*Aesculus*)
- Birch (*Betula*)
- Black locust (*Robinia*)
- Elm (*Ulmus*)
- Mulberry (*Morus*)
- Poplar (*Populus*)
- Rose-of-Sharon (*Hibiscus*)
- Willow (*Salix*)
- All fruits including apple (*Malus*), cherry (*Prunus*) and pear (*Pyrus*)

However, it was on one such training walks that a volunteer identified a new host tree, the green ash (*Fraxinus pennsylvanicus*). Dave Wachtel, an ecologist by profession and a binocular-toting avid birder, spotted egg laying sites in a green ash tree that actually had previously been surveyed by officials. He immediately called-in the tree to the Ward Office "War Room," and shortly thereafter USDA agents verified the presence of both oviposition sites and exit holes. This effectively put up to 75% of Chicago's street tree population at risk for infestation. Wachtel's birding skills served the City well again later in the day when he noticed egg laying marks on another discounted species, the tree of heaven (*Ailanthus altissima*). Information from New York shows that while the ALHB larvae may crawl in to that tree species, they don't seem to come back out, suggesting that there may be something about *Ailanthus altissima* that doesn't suit the lifestyle of ALHB. That particular *Ailanthus* was tagged for monitoring through 1999 to see if any adults emerge. Should an exit hole occur on it at any time in the future, another volunteer-found tree species will be added to the preferred host tree list.

TAKING IT TO THE STREETS

Armed with information and ready to meet the enemy face to polka-dotted face, TreeKeepers began monitoring. Volunteers “adopted” 10 of the 20 parks within the quarantine area, a few taking responsibility for monitoring stately Graceland Cemetery at the east end of the zone, and others choosing to trek Ravenswood’s streets surveying each tree on their route. Park and street monitors were often stopped by neighborhood residents asking if the volunteers were hired by CBOF or the USDA to hunt beetles. Many homeowners would talk about the tragic loss of trees that literally grew up before their eyes. Some offered creative suggestions to solve the ALHB problem, including:

- Modifying soil pH in the entire 19-square mile quarantine area supposedly to affect tree growth and palatability to the larvae;
- Draping entire trees with plastic to suffocate the adult beetles;
- Electroshocking the trees to kill the beetles, but presumably not harming the trees;
- “Crop dusting” Ravenswood’s street trees; and
- Exorcising the trees to rid them of the evil spirits causing this infestation.

TreeKeepers monitoring Chicago’s architecturally significant Graceland Cemetery (final resting place for some of the city’s most notable ex-locals) found a very receptive general superintendent, Jim Signoretti, who welcomed volunteers patrolling the cemetery’s grounds for ALHB. He had TreeKeepers sign-in when they came to monitor, gave them maps showing individual plots and roads winding through the sections, and supplied flags to mark the location of any suspected problem trees. During autumn and winter of 1998, two exceptionally motivated TreeKeeper volunteers, Jim DeHorn and Jerry Severino, surveyed each of the 1,800 trees within the cemetery walls (whether on the known host species list or not), and called attention to several suspicious looking ones, including a black locust along 1 wall.

Since September 1998, 4 separate workshops have been attended by nearly 50 volunteers, including TreeKeepers, staff of Chicago Wilderness, The Nature Conservancy, Illinois Department of Natural Resources, Chicago Audubon Society, the Forest Preserve District of Cook County, and others. Workshops will be held in the future to further increase and diversify the volunteer base.

SEARCH AND DESTROY

Though the Asian long-horned beetle was discovered in Chicago in July 1998, tree removal was put on hold until winter when it was thought to be less likely that adult beetles would be inadvertently disturbed enough to escape to a new tree. So, infested tree removal began in Ravenswood on Ground Hog Day, 2 February 1999 after 2 previously delayed scheduled cut dates (once in December 1998 because beetles were still emerging in Chicago’s unusually warm winter weather, and January 1999 because of a New Year’s blizzard). Local and national press were in attendance the first day of cutting to capture the images of huge horse chestnuts and majestic elms being brought down. The scene throughout the neighborhood was part funeral and part carnival. A local church held a memorial service for the lost trees; parents kept their children home from school and adults played hooky from work to witness an historic event.

Gina Bader, a TreeKeeper who lives in Ravenswood, photo-documented the removal of her American elm and her neighbor’s silver maple. She described with sadness the deafening noise of chain saws and wood chippers, the smell of diesel fuel from trucks hauling away amputated branches, the commotion of city, state and federal officials scurrying across lawns collecting samples for research, and the ubiquitous and intrusive media parade. Chicago’s deputy commissioner for Streets and Sanitation, Dr. Steve Bylina, deftly orchestrated public property (parkway) tree cutting so that all of the 350 then known-to-be-infested trees would be removed quickly and efficiently by the end of the week; removal of private property (backyard) trees was targeted for the following week.

With all the tree cutting going on, a few homeowners desirous of having the City incur costs for removing unwanted but otherwise healthy trees called-in their allegedly infested trees. CBOF’s McCarthy immediately responded to the calls only to find what he calls “Black & Decker Beetle” holes created by individuals who had climbed ladders and drilled uniform holes at the same height into several trees. McCarthy reminds Chicagoans that destruction of City property (including trees) is a prosecutable offense, not to mention a waste of taxpayer money and CBOF time.

As of May 1999, the number of infested trees has more than doubled since the initial confirmation in July, 1998: 704 trees in Chicago have been removed, plus 41 in Addison and 8 in Summit. Because Addison and Summit are outside Chicago, TreeKeepers did not monitor there.

REFORESTATION

In the aftermath of the tree removal, reforestation

has begun. With a \$400,000 gift from Commonwealth Edison (Chicago's electric power provider), \$10,000 in donations from Friends of the Parks, and a local radio station (WBEZ) fund raiser supplementing a \$400,000 grant from the U.S. Forest Service, the City has been planting new trees on public parkways and in private backyards, as well as resodding tree-removal areas. A broad palate of non-host trees is being used for the replanting, with homeowners being given the opportunity to choose which species they would like to have planted on their property. Because it is impossible to replace a large, mature tree with another its size, tree planting "mitigation" is being used. For instance, if one 12-inch diameter tree is cut down, then three 4-inch diameter trees (or four 3 inch trees) will be replanted. While this may not be the miracle solution for streets that have lost up to 75% of their mature trees, it seems to be the best alternative for now. The approved non-host tree species planted include:

- Bald cypress (*Taxodium distichum*)
- Catalpa (*Catalpa speciosa*)
- Ginkgo (*Ginkgo biloba*)
- Hackberry (*Celtis occidentalis*)
- Honey locust (*Gleditsia triacanthos*)
- Hornbeam (*Ostrya virginiana*)
- Kentucky coffeetree (*Gymnocladus dioica*)
- Three different Lindens (*Tilia*)
- Bur, English, Skymaster, Swamp white, Swamp-bur hybrid and Columnar English oaks (*Quercus*)
- Tulip tree (*Liriodendron tulipifera*)
- Turkish filbert (*Corylus colurna*), shipped to Chicago from Oregon

Other trees on the tentative list include:

- Serviceberry (*Amelanchier alnifolia*)
- Dawn redwood (*Metasequoia glyptostroboides*)
- Japanese tree lilac (*Syringa amurensis japonica*)
- Sweetgum (*Liquidambar styraciflua*).

The reason these four species are listed as tentative is that, like Turkish filbert, they are not currently available from regional nurseries. As the trees become available, they will be shipped from suppliers. McCarthy estimates the average cost per tree for replanting to be around \$600, which includes the tree plus delivery and labor costs. Given the generous response of city and federal agencies plus corpora-

tions, local businesses, and private donors funding these reforestation efforts; Ravenswood residents looked forward to new greenery in summer and colorful foliage in fall.

In addition to continued monitoring of the ALHB in Ravenswood, TreeKeepers advocate the proper care of these newly planted trees by speaking with local residents and distributing Openlands' new bilingual, illustrated door hanger imprinted with simple tree care instructions. They will also report and monitor trees planted incorrectly by contracted landscapers, so that the landscapers can take corrective action in accordance with their 2-year contract agreement.

RESEARCH EFFORTS

There are no known natural predators of the Asian long-horned beetle in the United States. Even the Chinese are at a loss in this regard. Their control methods largely consist of planting huge stands of "sacrificial" host trees to lure beetles, which are then cut down and destroyed when they become infested. Using cut logs from Ravenswood, U.S. investigators in Massachusetts, Connecticut and Delaware are experimenting with different means of dealing with the ALHB. The USDA wants to see if the insects are attracted by ultraviolet lights, and if so, researchers will place light traps in the field as a survey tool to find where the beetles are. Other work involves the use of acoustical equipment to allow researchers to hear beetles chewing inside trees when egg-laying sites and exit holes cannot be seen. Entomologists in New York are studying pheromone attractants as ways of drawing the insects in to their demise and tracking their spread in the process. Living laboratories where larvae are allowed to grow to adulthood are giving researchers the chance to see the possible relationship of larvae movement within a tree to specific tree species. Results are far from in, yet.

DON'T LOOK NOW, BUT . . .

The Midwest is just the latest stop in the Asian long-horned beetle's world tour, with established breeding populations at 6 known locations in New York and Illinois. The USDA has detected and contained the beetle at warehouses in 26 locations in 14 states, coast to coast:

- California (Hawthorn, Los Angeles, South Gate)
- Florida (Ft. Lauderdale)
- Illinois (*Addison, Chicago, Summit, Martin Grove*)
- Indiana (Indianapolis, Porter County)
- Michigan (Lansing, Lyncoming County, Warren)

- New Jersey (Camden, Cream Ridge, Linden, New Brunswick, Mahway, Secaucus)
- New York (*Amityville, Brooklyn, Jamestown, Rochester*)
- North Carolina (Charlotte)
- Ohio (Cincinnati)
- Pennsylvania (Sinking Springs)
- South Carolina (Charleston)
- Texas (Houston)
- Washington (Bellingham, Seattle)
- Wisconsin (Madison)

(Note: ALHB infestation sites are italicized)

The difference between an ALHB sighting and an infestation is that sightings involve the identification, containment, eradication, and its means of conveyance (e.g. crating material) at the point of discovery. An infestation means that ALHB gained entry via its means of conveyance and proceeded to spread to new locations. To limit new introductions, APHIS, in December of 1998, imposed strict regulations requiring that any wood packing material from China must be treated; kiln dried, fumigated, or treated with preservatives. Even so, it is not unlikely that isolated infestations not yet detected, exist elsewhere in the U.S.

And just when Chicago thought it was safe to go back into the urban forest, citrus long-horned beetles (*Anoplophora chiensis*) were found in mid-April in a Georgia greenhouse with a shipment of crepe myrtle bonsai trees from China. USDA officials say this beetle attacks some of the same trees as its relative the Asian long-horned beetle; plus citrus trees (i.e. orange and tangerine), walnut, oak, catalpa, ficus, and sycamore. News of this new pest threat is unwelcome by Chicagoans already hard-hit by the ALHB (21).

TO BE CONTINUED

The gypsy moth and Asian long-horned beetle are newly arrived stowaways and escapees opportunistically taking up residence in Chicago's urban forest. Professionals with the U.S. and Illinois Departments of Agriculture, Chicago's Bureau of Forestry, and the Chicago Park District have welcomed the assistance of trained volunteers such as TreeKeepers in monitoring the health and well-being of the metropolitan region's 50 million trees. Local community and political leaders have invited TreeKeepers to walk the Ravenswood neighborhood to inspect the parkway trees for signs of the Asian long-horned beetle.

Despite the call for double-duty monitoring of the gypsy moth and ALHB, TreeKeepers have more than

meritoriously risen to the job. They see this as a critical need, and feel privileged to provide support to the agencies responsible for maintaining Chicago's green infrastructure. In circumstances such as these, trained and trusted TreeKeeper volunteers are empowered to put their knowledge and skills to practical use and serve as supplementary surveyors for state and federal agencies. The USDA can train only 10-13 of its staff or state foresters during a three-week site visit, where they learn much of the same information that volunteer monitors do.

The open exchange of "official" information along with the mutual trust and confidence developed over time make TreeKeeper volunteers willing to continue monitoring efforts for the duration of the gypsy moth and Asian long-horned beetle battle. And that's not a commitment made lightly, because the invasion of the gypsy moth has just begun, and the beetle quarantine is in effect for at least the next five to seven years. That time frame is based on whether or not another individual adult ALHB emerges from this day forward).

Right now, despite Mayor Daley's greatest hopes and best efforts, it is unrealistic to think that Chicago has controlled, let alone eradicated, either invader. The original count of 350 infested trees in July 1998 doubled to 709 by May 1999. Particularly disturbing about the latest finds is that they include dozens of previously undetected trees situated at the edge of Lincoln Park (Chicago's 1,212-acre "green gem" along the lakefront with host trees galore) and two infested trees just outside the walls of Graceland Cemetery, not far from the black locust tree that TreeKeepers called attention to in the fall of 1998.

In Chicago's war against the gypsy moth and Asian long-horned beetle, it will take a combination of continued research, education, and monitoring to defeat these 2 entomological aggressors. TreeKeeper recruits remain lined up to enlist in this battle.

REFERENCES

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