Massachusetts Wildlife

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Tiger Trout,
Fishing Ethics,
Asian Longhorned Beetle

Photos by Troy Gipps/MassWildlife

Photo by J. E. Appleby/USFWS

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FEATURES

On the Cover: John Folger, of East Falmouth, fly casts at Peters Pond in Sandwich in late March. He caught and released five trout that morning, including his first-ever Tiger Trout (see page 11). John has enjoyed fly fishing for over 20 years in Massachusetts and in many western states. Photo by Troy Gipps/MassWildlife

ASIAN LONGHORNED BEETLE:

10 YEARS LATER

Photo by J. E. Appleby/USFWS

By
Felicia Hubacz
Joshua Bruckner

"It's infested," exclaimed my colleague Linda Hubley. "It sure looks like it, but is it our bug?" I asked. We were standing in a small woodlot sandwiched between Interstate 190 and a few homes in Worcester. We had been called out to examine a maple tree with suspicious insect damage, perhaps from the destructive Asian Longhorned beetle (ALB) (*Anoplophora glabripennis*). Approaching the tree, I instantly saw a perfectly round, dime-sized hole. Next to it was a sunken de-barked depression area with a C-shaped hole. It was the exit hole and gallery of a wood boring insect. "Look, here's the egg site with mandible marks," said Linda. Sure enough, as I looked closer, I saw telltale scratch and chewing marks at the egg site. We surveyed nearby maple trees and found a second tree with similar damage. In total, four trees in the woodlot showed classic signs of ALB infestation. It was November 2017 and despite nearly a decade of serious efforts to find and eradicate this tree-killing beetle, another pocket of infestation had been discovered. The beetle's discovery resulted in the felling of thousands of shade trees, dramatically changing the look and feel of affected neighborhoods. Still, thanks to the vigilance and continued actions taken by residents, municipal, state and federal agencies, as well as local businesses, industries, and community partners there are signs that eradication is possible.

Beetle Biology

The ALB is a wood-boring insect native to China and the Korean Peninsula that lives and feeds on a variety of hardwood trees including maple, birch, elm, ash, poplar, horse chestnut, and willow, among others. The beetles are approximately 1 1/2-inches long, shiny black, with white spots on their wing cases and powder-blue feet. Their black and white antennae can grow to twice the length of their body. Beginning in early July and through the summer, adult beetles emerge from inside the woody innards of their host trees, climb into the tree canopy, and feed on leaf veins before mating. The adult female then seeks out a host tree—maples are their preference—and begin chewing a small pit into the bark to lay a single egg in the cambium layer that lies beneath. They can lay up to 90 eggs in their lifetimes. In the insect world, this is a pretty low number, which thankfully is a boon for eradication efforts. Two weeks later, the larvae hatch and begin feeding on the tree's nutrient-rich cambium; the thin layer of living tissue between the bark and sapwood that is responsible for enlarging trunk girth. After several weeks, the larvae tunnel deeper into the tree feeding on woody tissue until pupation. The larvae transforms into an adult beetle, a stage that lasts approximately 2–3 weeks. The new adult beetle then chews its way straight out

Photo © Troy Gipps

of the tree, leaving a perfectly round 3/8-inch exit hole; about the size of a dime. Leaf feeding and mating begins again. Repeated attacks by generations of larvae girdles and eventually kills the tree.

The Threat

It's believed that ALB made its way into the United States inside wood packaging material from Asia. If it were to become established here, it could become one of the most destructive and costly species ever to enter the country. The beetle threatens urban and suburban shade trees, recreational resources such as parks, and forest resources and wildlife. It could also harm industries such as maple syrup production, hardwood lumber processing, nurseries, and tourism. Roughly 30 percent of U.S. trees are hosts. Damage from infestations in Chicago (declared eradicated in 2008), New Jersey (declared eradicated in 2013), and New York City resulted in the removal of more than 30,000 trees. The beetle could cause more than $2 trillion worth of losses in forested areas (per estimates from the Council of Tree and Landscape Appraisers). Additionally, infested trees pose a safety hazard since branches can drop, trees can fall over, and storm damage can be more severe.

The Dreaded Discovery

On a Friday afternoon in August 2008, staff from the Massachusetts Department of Agricultural Resources (MDAR) received a phone call from Donna Massie, a resident of Worcester's Greendale neighborhood. She was convinced there was an ALB infestation in her backyard. She had collected a beetle, placed it in a jar beside her computer and compared her find to pictures of beetles she found on Google. She found a match on a Florida website and the text read, "If you think you've seen this (beetle), contact the government." So she did.

After her call, she emailed a few photos to MDAR which were quickly forwarded to the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) for confirmation.

Photo by Troy Gipps/MassWildlife

Photo by Troy Gipps/MassWildlife

The Asian Longhorned beetle lifecycle (above, right to left): egg, early stage larva, mid stage larva, late stage larva, pupa, and adult beetle. ALB-infested wood (right) showing egg sites, exit holes, and tunneling.

Photo courtesy Mass DCR Archives

The agency professionals were stunned; the beetles appeared to be ALB. The following morning, MDAR, USDA, and the Department of Conservation and Recreation (DCR) staff visited Donna's backyard. The scene was shocking. Dozens of ALBs were crawling all over the mature Norway maple trees shading her property. The trees were riddled with holes and a thick layer of frass (sawdust-like fecal material) covered the fence railings surrounding the yard. This was serious.

The potential for ALB range expansion is much greater in Worcester than previous outbreak locations. Infestations in Illinois, New Jersey, and New York occurred in highly urban areas containing relatively few city trees. These sites were ringed by miles of dense development, like a buffer zone preventing beetle range expansion. Worcester is different, posing a unique ecological scenario. Though mostly urbanized, Worcester contains a very high volume of city trees. Heavily forested areas of the city border the edge of a vast, mostly hardwood-forest landscape. This "natural" expansion corridor stretches from Worcester County through northern New England and into Canada. If ALB was left unchecked, New England forests would look dramatically different, particularly since maple trees, the beetles preferred host tree, are so common.

Eradication Action

With beetle identification officially confirmed, agencies swung into action. Whenever ALB is detected, the USDA APHIS works with state and local agencies on a response effort. USDA and DCR worked closely with the city of Worcester to set up a central office where tree surveys and regulatory tasks could be coordinated. MDAR took on the public outreach role, utilizing its existing pest reporting hotline, updating the agency website, and coordinating media coverage to get the word out. In short order, hundreds of calls from the public report-

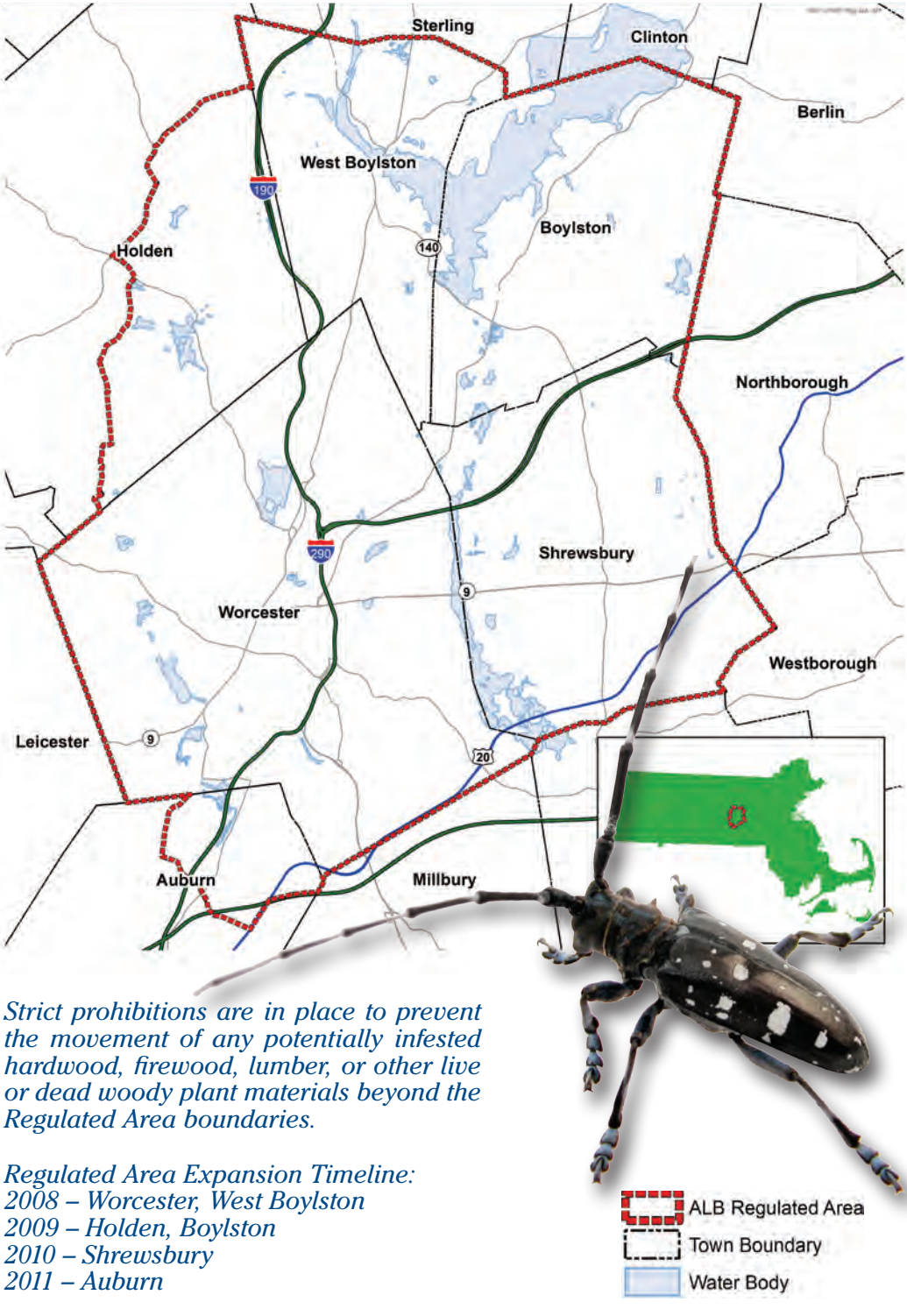
ing insect-damaged trees or ALB sightings poured into the hotline. MDAR rolled out multiple public awareness campaigns with support from USDA for leaders in green industry and environmental education, developed sample lesson plans and educational activities for K–12 students and staffed tables at well over 50 public events per year to raise ALB awareness. Their most important message: **Find it. Report it!** Because many infestations are reported by citizens, it was (and still is) extremely important to spread the word to as many people as possible. There can never be too many eyes looking for the beetle. A decade-plus partnership with The Nature Conservancy's (TNC) Don't Move Firewood campaign allowed MDAR to rely on TNC to provide print and online resources dealing specifically with outreach concerning moving firewood.

The Response

A Regulated Area, essentially a quarantine zone, was established in an effort to contain the spread of the insect. Strict regulations were established, prohibiting transport of any potentially infested hardwood firewood, lumber, and other live or dead woody plant materials from the ALB regulated area. This included nursery trees, stumps, roots, brush piles, and any woody debris one half inch diameter or larger. Initially, the regulated area boundaries included the City of Worcester, and parts of Holden, Shrewsbury, and West Boylston. Subsequent infestation detections in nearby towns expanded those bounds. The Regulated Area in Worcester County is 110 square miles, including parts of West Boylston, Boylston, Holden, Auburn, and Shrewsbury and has remained unchanged since 2011. Companies and private citizens that work with or around host woody material within the regulated area were required to attend regularly scheduled ALB compliance training sessions, and the sessions continue today. The workshops are designed to explain the regulations on proper handling of regulated materials to prevent further spread of the ALB. Companies are issued Compliance Agreements allowing them to move material according to regulations. Firewood processors, arborists, landscaping, waste companies, and waste disposal site companies agree to allow ALB regulatory staff to survey trees on their properties, both within and outside of the regulated area. This helps determine if beetles and/or infested wood were inadvertently moved from the regulated area.

Photo by Troy Gipps/MassWildlife

Asian Longhorned Beetle Regulated Area



Map courtesy of USDA

Illustration courtesy of MassNRC

Strict prohibitions are in place to prevent the movement of any potentially infested hardwood, firewood, lumber, or other live or dead woody plant materials beyond the Regulated Area boundaries.

Regulated Area Expansion Timeline:
2008 – Worcester, West Boylston
2009 – Holden, Boylston
2010 – Shrewsbury
2011 – Auburn

In addition, ALB regulatory staff responded to hundreds of calls reporting potential beetles or infested trees from the public. Every effort was made to visit each location and offer additional information.

Finding ALB

Locating the beetles and infested trees was (and still is) an enormous task. Special ALB traps baited with a combination of pheromones and host tree "perfume" called kairomones hang from trees within and beyond the boundaries of the regulated area. Motorists might see these black traps hanging from a roadside tree with a small ALB information sign posted on the tree trunk. Four-person ground teams, made up of USDA and DCR employees, cover pre-assigned areas to locate, measure, and view—through binoculars—all ALB host trees from top to bottom. Host tree species include: Ash (*Fraxinus*), Birch (*Betula*), Elm (*Ulmus*), Golden raintree (*Koelreuteria*), London planetree/sycamore (*Platanus*), Maple (*Acer*), Horsechestnut/buckeye (*Aesculus*), Katsura (*Cercidiphyllum*), Mimosa (*Albizia*), Mountain ash (*Sorbus*), Poplar (*Populus*), and Willow (*Salix*). Gazing at trees through binoculars may seem like a simple task, but it is quite a challenge. Hold a set of binoculars or a heavy book up to your face for five minutes while looking up and down a tall tree. Now imagine doing that every day, for hours at a time, looking for a dime-sized hole in tree bark! It's not easy on the eyes or neck and shoulder muscles. Tree climbing crews are deployed to inspect host trees reported with suspicious-looking insect damage or inspecting host trees in a buffer zone surrounding an infestation. These folks face even more challenges. Climbers ascend trees of all shapes, sizes, and stability carefully examining the bark of each limb and trunk. Climbers may get tangled in their lines or fall. They too have to deal with the various physical strains that frequent climbing puts on their bodies.


Photo by Ashley Hoffman/DCR

Trees Come Down

The next step is probably the most important and difficult to implement on several levels. The only way to ensure that all beetles in an infested tree are destroyed is to cut the tree down and then chip it until the pieces are one-inch by one-inch or less in two dimensions. People often ask, is there another way to eradicate ALB without cutting down an infested tree? Not really. The beetle spends most of its life deep inside sapwood and heartwood which is impossible to reach with pesticide. The only option is tree removal and chipping. However, if a homeowner's tree is not infested it can be treated with pesticide. A pro-actively treated tree will kill adult beetles when they chew through bark and ingest the living cambium containing the pesticide as they lay eggs or feed on the leaves.

The early days of the eradication program were difficult for everyone. All too often ALB staffers were the bearers of bad news, beloved trees had to come down. In the past 10 years, 24,199 ALB-infested trees on private and public property were found and removed. Additionally, in Worcester's Greendale and Burncoat neighborhoods, the epicenter of infestation, nearly every host tree was removed from backyards, sidewalks, and parks. The dramatic impacts of eradication focused attention on how much trees and their benefits mean to people. What would your neighborhood look like if all hardwood trees were cut down? It wasn't uncommon to see people crying as their

Continued on page 20

Worcester neighborhoods changed dramatically after the removal of ALB host trees.

2009 (before)

2009 (after)

2017 (regrowth)

Photos courtesy USDA APHIS/Ken Law

Photo by Linda Hubley/USDA APHIS


Photo by Mollie Freilicher/DCR

A Forester's Reflection

The ALB Reforestation Program was very popular, but its success came with an unforeseen problem, tree species availability. With the high volume of tree orders the nursery vendor had to make occasional substitutions. One such substitution experience revealed the depth of feeling people can have for their trees. While working during the busy planting season our planting crew visited an elderly couple's home. They had requested a white flowering cherry tree. However, the nursery was unable to acquire that color so a pink flowering cherry was substituted. In most cases, homeowners are happy with a pink cherry, but this woman burst into tears when we explained the change. At first, my team and I were speechless and we stood there awkwardly, not knowing what to do or say. Why was she crying? Were those tears of joy? Did we do something wrong? It took a few minutes for her to calm down and explain. Her husband had ordered the white cherry. He always loved them and wanted one of his own. She recounted how very excited he was about getting the tree planted and often talked about it. Unfortunately, he had passed away before we arrived to plant his white cherry. The tree to be planted and cared for in his name wasn't the color he so passionately wanted and it broke her heart. Deeply moved we promised her to do our best to get her a white cherry. Back at the office, after we shared the sad story, our supervisor called the nursery. A week later a beautiful white flowering cherry tree was found. When we returned to plant the tree, the homeowner cried again, but this time it was easy to see the joy on her face. — Felicia Hubacz

Continued from page 18

trees were felled; trees their kids grew up climbing, trees where birds nested, and trees planted in memory of a lost loved one, now gone forever. Many residents in those areas remembered the 1953 tornado and some recalled the 1938 hurricane, two very destructive events which toppled thousands of trees. With ALB, they were losing their trees once again. No amount of training could have prepared us mentally and emotionally to deal with the pain we witnessed.

Replanting the Urban Forest

Tree replacement and planting has been an important aspect of the ALB experience, and possibly the most gratifying. The DCR ALB Reforestation Program offered free replacement trees to land and homeowners within the regulated area. A forester met with interested landowners, guided them in choosing the best replacement trees for their property (no ALB host tree species!) and provided expert advice on watering and other tree care. Once word of the program spread,

it became extremely popular. The combined efforts of DCR, the Worcester Tree Initiative, the City of Worcester, and the other five municipalities in the regulated area added up to thousands of new trees being planted.

Current Status

So how are we doing in the battle against the beetle? The answer is mixed but hopeful. A surprising July 2010 ALB infestation discovery in Boston of six infested trees across from the nationally-renowned Arnold Arboretum turned out to be an early detection situation. After four years of continuing surveys, no additional ALB evidence was found. The infestation was caught early before it could grow and spread. ALB was officially declared eradicated from Boston in 2014 with only the original six trees requiring removal. In Worcester, scientists determined the infestation was established for at least 10 years prior to its detection in 2008, allowing the beetle population to grow. No live beetles have been found, reported or turned in since 2015. The ALB program has surveyed every host tree in the regulated area and regulatory staff responded to nearly 600 regulatory service calls in 2017. Over the years, fewer and fewer instances of infestations have

Photos by Mollie Freilicher/DCR

ALB TIMELINE
IN MASSACHUSETTS

	Infested Trees	Trees Planted
2008	5,113	
2009	11,716	548
2010	2,232	3,372
2011	1,525	
2012	1,792	1,792

been detected. The 2017 infestation of four trees in Worcester and a December 2018 infestation of 19 in Boylston are the most recent incidents. Today, the replanted young trees are well established and casting some shadows, providing much needed shade, wind breaks, and perching sites for birds and other neighborhood wildlife.

ALB survey teams continue their infestation surveys but with a nuanced, targeted approach. The recent creation of risk modeling maps has helped agencies strategically predict the likelihood of where ALB might be found in the future. The mapping information is derived from the huge database of past surveys. Other data including infestation location, distance from highways, wind direction, density of infested trees, host density, and date of last survey are also loaded into the model which then generates the map. This helps us direct where and when surveys should be conducted. It also helps us utilize limited resources more efficiently, reduces the amount of time spent in one survey area to the next, and allows us to be pro-active with our approach.

While it looks promising, we can't rest on our laurels. The goal is ALB eradica-

Photo by Troy Gipps/MassWildlife

tion. Eradication was declared in Illinois, New Jersey, and in parts of New York, and in Boston and we strongly believe it can happen here in Worcester County. Continued vigilance and action on the part of the public, government agencies, and other partners is the key to ALB eradication. You can make a difference! If you live in or visit the Greater Worcester area, hike area trails, or spend time at backyard barbecues, take a few moments to look around for signs of ALB. Be part of the group of concerned citizens, committed professionals, and conservationists who are working hard every day to protect community trees and our wonderful New England forests. We can't do it without help from each and every one of you. Remember, check a tree for ALB. **Find it. Report it!**

To learn more about the Asian Longhorned beetle visit mass.gov.

About the Authors

Felicia Hubacz has worked as a forester for the Mass. Dept. of Conservation and Recreation since 2010, focusing on Forest Health issues. Joshua Bruckner is the ALB Outreach Coordinator for Mass. Dept. of Agricultural Resources.

773	2013	2,428
627	2014	627
230	2015	405
112	2016	126
59	2017	
19	2018	

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