so I went to Kansas State University to get my turf degree. I was lucky to get my first job out of Kansas State at Medina Golf & Country Club. After one year there, I obtained a position at Rush Creek Golf Club and stayed for nine years.

During this time I had the opportunity to host a USGA event and participate in a greens renovation, a bunker renovation and the building of a 9 hole-par 3 course, as well as experience the summer that was 2011 (only quick flashbacks remain). Also, during my time at Rush Creek, I completed my Masters in Applied Plant Science at the University of Minnesota (thanks Rush Creek). After the completion of my Masters, I joined PBI-Gordon as the Professional Products Rep in MN, WI, ND & SD. It was a new challenge that opened my eyes to a side of the turf industry I had never seen before. It was a great experience and I probably learned more about turf and myself during this time than ever before. My time at PBI has certainly made me a better student of the turf industry.

I'm very excited to be joining the great turf group at the University of Minnesota. I look forward to working with all of you more in my new role. Please do not hesitate to reach out with questions and especially ideas. The passion this group has for turf is infectious and we want you all along for the ride.

Emerald Ash Borer:
Where Are We Now?

Dr. John Lloyd, Plant Health Doctors

Where Are We Now?

It's been five years since Emerald Ash Borer (EAB) was discovered in the Saint Anthony Park neighborhood of Saint Paul. At that time we had no idea of whether that was just one of many infestations, or if the infestations had spread throughout the region. In the following years the Minnesota Department of Agriculture (MDA) has identified EAB infestations in Saint Paul, Falcon Heights, Shoreview and Minneapolis. Outside the Twin Cities, infestations have been identified near Winona and LaCrescent, across the river from Lacrosse, Wisconsin and down the Mississippi River to the Iowa border. (Online map of Minnesota infestations available at: gis.mda.state.mn.us/eab/)

Now that we are entering our fifth year post initial discovery, we have a better idea of where active EAB infestations are and we know what tools are available to help us manage the problem. Fortunately, new EAB discoveries have only occurred in areas geographically close to the original infestation and the new finds are limited in scope. We have moved past the reactive panicked stage of "it's here, what do we do," to a more proactive mitigation and management perspective.

Invariably, the ash trees in your golf course will be attacked by EAB.

That's not an "if" statement. It will happen. The more important question is "when?" If all unnatural spread (humans moving infested wood) is prevented, we likely will have up to five years in the suburbs and ten to twenty years before outstate courses bear the brunt of an infestation. Already there are stories of MDA inspectors showing up at suspect locations to find the wood has been removed from site by firewood hunters, so maybe twenty years is a long shot. The "when will they get onto my course question," has everything to do with location and proximity to current infestations. The odds are pretty good that courses in and around the Twin Cities will have to deal with EAB before those up north, while those around Winona should keep their eyes open. Wherever the location, this year is the year courses should start planning for the inevitable.

The first step in planning is to determine how many ash trees are on the property. Many golf courses have tree inventories and for those that do, it's a great opportunity to update the inventory. The threat of EAB is also the perfect opportunity to begin building an inventory if one does not currently exist.

Ash Inventories

Inventories can be done in house, as an intern project and/or by hiring professionals. The quality of the data on the inventory will vary based on the approach. Sometimes misidentifications are made by volunteers, but even that start will provide a base from which to build a more professional inventory.

The key points to any EAB ash inventory are:

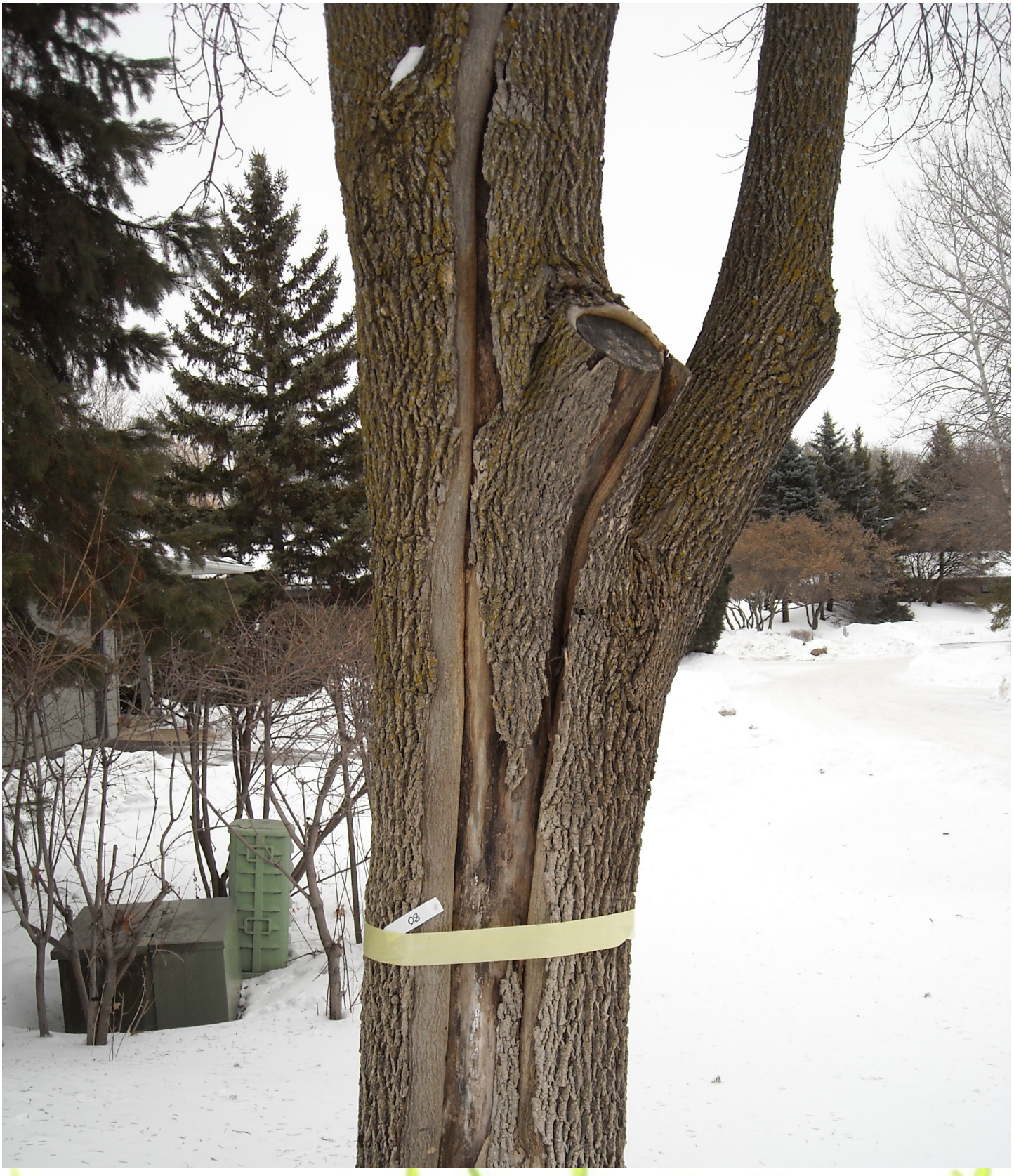
#1. Identify ash trees. While this may sound obvious, mistakes in identification do happen. In many "professional" inventories boxelder, black walnut and even poplars have been misidentified as ash. Worse yet are ash that are misidentified as another species. Photo documentation of the bark and the foliage of each tree identified in the inventory is helpful at following up on issues of misidentification.

#2. Size of ash trees. The size of the ash tree is described as diameter at breast height (DBH). This measurement can be examined by using a DBH tape or by using a tape measure. The size is very important because it will impact the cost of removal as well as the cost for treatment of the tree. While mismeasurements on one tree won't break the bank, cumulative mismeasurements can add up. It can be especially frustrating when re-assessments of tree sizes are required after an inventory has already been completed.

#3. Health of ash trees. This assessment is required to determine the "value" of the trees in regards to placing them into categories for preservation or removal and replacement. It involves understanding tree structure, tree physiological health and diagnosing tree stresses. Expertise is required at this stage of the inventory.

Action Timelines

The information provided by the inventory can then be utilized to create a planning timeline for EAB mitigation efforts. Questions can now be addressed as to how many trees are at risk, how much it will cost to remove



the trees and how much will it cost to treat the trees. In addition, knowing the health and structure status of the trees will assist managers in determining whether or not the trees should be candidates for preservation or if they should be removed in a more efficient manner.

The remediation efforts can now also be staged over timelines of several years to alleviate the "clear cut" prospective that many infested communities were stuck with back in the early days of EAB infestations. These timelines may be more rapid in suburban golf courses, five years, versus those that have more distance from the epicenters of infestation. Either way the funds for remediation and the labor required to perform the services can now be budgeted over a period of years to reduce the long-term impact of the EAB problem.

Treatment Options

Unless your course has been infested or is within five miles of an active infestation the need to apply preventative treatments to save trees is not as big an issue as it was thought to be previously. New university research data from infested areas illustrates that treatments made to newly infested trees are effective at killing borers and preventing decline of the trees. Other insecticides are showing promise for control and the products that have been tested over the last five years appear to continue to be effective and are saving trees when they are reapplied according to label directions in infested areas.

Insecticides can also be used to extend the removal and replacement cycles of ash trees on courses when infestations occur. So even if you are in the five year range, you can extend removal cycles by treating trees until you are ready to remove and replace them.

Further Information

With the potential for EAB to impact golf courses throughout the US and Canada, many sources of information are available on the web. Some of the sites are good at hiding marketing within the guise of assisting managers and practitioners. Fortunately, Minnesota golf course managers can access information from the Minnesota Department of Agriculture, Minnesota Department of Natural Resources and University of Minnesota that links to all the information that is currently known about Emerald Ash Borer in Minnesota. In addition, the Emerald Ash Borer Network (http://www.emeraldashborer.info/) has all the information available on EAB, including webinars from the experts in the field. All of these sites provide unbiased research based information on the emerald ash borer problem throughout the US and Canada.
EAB Information on the Web

University of Minnesota (http://www.myminnesotawoods.umn.edu/)
Minnesota Department of Agriculture (http://www.mda.state.mn.us/eab)
Emerald Ash Borer Network (http://www.emeraldashborer.info/)

About the author

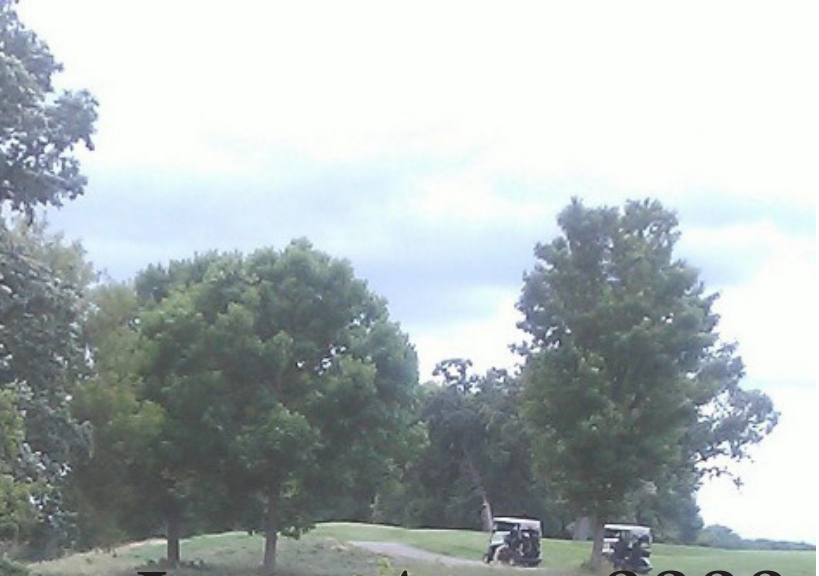
John Lloyd is President of Plant Health Doctors an educational consulting and advising firm located in the Twin Cities. He received his Ph.D. from Ohio State University and his M.S. from the University of Minnesota and develops and teaches Plant Health Care strategies for the Landscape Industries throughout the United States. His website is www.PlantHealthDoctors.com and his e-mail is DrJohn@PlantHealthDoctors.com

What?

There is Maintenance to No-Mow, L

Matt Cavanaugh, Univer

Many newer golf courses have designed areas to be maintained as no-mow areas and many established golf courses have been converting heavily maintained areas to no-mow areas. The vast majority of these areas would have been or once were established with Kentucky bluegrass. The popularity of no-mow areas has been growing in response to reducing the inputs needed to maintain Kentucky bluegrass rough, but also to provide a contrast to the heavily maintained areas of a golf course. Kentucky bluegrass is widely used due to its dark green color, high turf density, recovery potential (through rhizomes) and improved pest resistance with the newer cultivars. However, in order to maintain turf quality and performance, Kentucky bluegrass requires high levels of water, fertilizer, pesticides and mowing frequency. These inputs have caused turf managers to reduce the amount of mowed Kentucky bluegrass rough. Many no-mow areas are seen around tees, behind greens and in "out-of-play" areas along fairways. When initially established, many stakeholders envision areas that require no inputs, provide aesthetic value through waving grass, no weeds and of course it is easy to find one's golf ball and play from it. Those of you with no-mow areas know this is not often the case (I can see you shaking your head right now). The resulting information will provide some insight on the issues and maintenance involved with no-mow, low-input areas based on the University of Minnesota research and my person-



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al experience with these areas.

Species to use in no-mow, low-input areas

Kentucky bluegrass is not ideal for no-mow, low-input areas. Kentucky bluegrass in a no-mow setting will often develop large amounts of rust (not ideal for the individuals that like to wear white), fall over and become difficult to play out of and over time become thin out allowing for weed invasion. In the Upper Midwest, warm-season grasses are slow to start and enter dormancy early in the fall allowing for increased weed pressure (3). Warm-season species are also often too tall for no-mow areas resulting in slow play and frustrated golfers.

Research has shown that in the Upper Midwest, the cool-season species of fine fescue are the most useful species to use in a no-mow, low-maintenance situations due to their appropriate height and aesthetic value (1). The fine fescue species include Chewing's fescue, hard fescue, sheep fescue, strong creeping red fescue and slender creeping red fescue.

Broadleaf & grassy weed invasion.

Broadleaf weed invasion is often the biggest issue turf managers face in no-mow, low-input situations. Some of the best cultural practices at reducing weed invasion are mowing, fertilization and irrigation, all of which are often not utilized in these areas. Broadleaf weeds seen in no-mow areas include legumes like white clover, black medic and birdsfoot trefoil and other hard to control weeds like Canada thistle and milkweed. Proper timing is critical for weed management. If weeds become too large, successful weed control should not be expected. Getting to these weeds when they are young and actively growing will be crucial. However, weed management is often put on the back burner for more pressing issues allowing weeds to get out of hand. In this case, it is recommended to mow the area down,

Picture perfect placement and well maintained low maintenance turf

let it establish again for 2-3 weeks and then provide proper weed control. This will allow for the weeds to reestablish, but are much smaller and easier to control. Keep in mind that if weed control is done in the spring, tire tracks made when driving through these areas to control weeds may persist and can be unsightly. However, this is often not as bad as the weeds that will develop without a herbicide application. For perennial weeds, fall applications are always best as they will move herbicide down into the roots with movement of nutrient and carbohydrates needed for winter survival. Grassy weeds such as reed canarygrass, quackgrass and orchardgrass are often a problem in these areas as well. Cool-season grassy weed control in other cool-season grasses is often very difficult to obtain (case in point, poa annua control in creeping bentgrass). However, the fine fescues are very tolerant of two grassy weed herbicides which may allow for controlling these grassy weed species. Sethoxydim and fluazifop are grassy weed herbicides originally developed for use in broadleaf cropping systems like soybeans. Both are from the same family of herbicides, but there are differences between the two that should be recognized before using them to obtain proper weed control. These differences are outlined in Table 1. Preemergent herbicides can also be used such as dithiopyr, pendimethalin and