CITY OF BOULDER
PARKS AND RECREATION ADVISORY BOARD AGENDA ITEM

MEETING DATE: February 24, 2014

AGENDA TITLE: Emerald Ash Borer 2014 Workplan

PRESENTERS:
Jeff Dillon, Director, Parks and Recreation
Alice Guthrie, Recreation Superintendent
Abbie Poniatowski, Senior Business Manager
Kathleen Alexander, City Forester

EXECUTIVE SUMMARY:

In September, 2013, City of Boulder Parks and Recreation Forestry staff discovered an emerald ash borer (EAB) infestation within the city. This is the first known occurrence of EAB in Colorado and is the western-most occurrence of this invasive pest in North America. Eradication and containment efforts across the country have been unsuccessful resulting in the loss of over 50 million ash trees.

EAB management, including tree removal, tree replacement, wood disposal and pesticide treatments, will have an enormous direct budgetary impact to the City of Boulder and private residents over the next 15 years. The loss of tree canopy will have significant economic, social, and environmental impacts for decades.

The Environmental Advisory Board is joining the Parks and Recreation Advisory Board for a presentation and discussion on the pest and the 2014 EAB Workplan.

ATTACHMENTS:
Attachment 1: City Council IP Memo, February 4, 2014: Emerald Ash Borer in the City of Boulder
Attachment 2: 2014 City of Boulder EAB Workplan Outline

INFORMATION PACKET
MEMORANDUM

To: Members of City Council

From: Jane S. Brautigam, City Manager
Paul J. Fetherston, Deputy City Manager
Jeff Dillon, Parks and Recreation Director
Kathleen Alexander, City Forester
Susan Richstone, Community Planning and Sustainability Deputy Director
Lesli Ellis, Comprehensive Planning Division Manager
Rella Abernathy, City Integrated Pest Management Coordinator

Date: February 4, 2014

Subject: Information Item: **2014 Emerald Ash Borer in the City of Boulder**

EXECUTIVE SUMMARY

The purpose of this memo is to update City Council about the status of a newly discovered, federally quarantined ash tree pest, emerald ash borer (EAB), including:

- The background, impact and scope of the issue;
- Information about the federally-mandated and state-enforced quarantine of Boulder County;
- Most current information about the EAB infestation, including detection surveys, and an inventory of ash trees on city-owned properties;
- Staff action to develop a management plan; and
- Education and outreach efforts.

Ash is one of the most abundant tree species comprising approximately 15% of all deciduous trees in urban areas across Colorado, including the City of Boulder. Emerald ash borer is an introduced pest to the US, which was first discovered in 2002 and has since moved across the country to 21 states. North American ash trees have shown little resistance to EAB and over 50 million ash trees have died since 2002 from this pest. Research has shown that specific pesticide products are effective against EAB if used before trees are compromised by the pest and applied per label requirements. Pesticide applications are needed to preserve ash trees through peak EAB infestation; however, as local EAB populations decline due to death of untreated ash trees, it is possible that application frequency may be reduced.[1]

[1] Emerald Ash Borer Management Statement; January, 2011. http://www.emeraldashborer.info/files/conserve_ash.pdf

In late September, 2013, City of Boulder Parks and Recreation Forestry staff discovered an EAB infestation within the city. The infestation was confirmed by the US Department of Agriculture, Animal Plant Health Inspection Service (APHIS). This is the first known occurrence of EAB in Colorado. Ash trees do not show symptoms until several years after initial infestation and as a result, EAB is very difficult to detect until the pest is established within an area. Eradication and containment efforts across the country have been unsuccessful resulting in the loss of over 50 million ash trees.

EAB management, including tree removal, tree replacement, wood disposal and pesticide treatments, will have an enormous direct budgetary impact to the City of Boulder and private residents over the next 15 years. The loss of tree canopy will have significant economic, social, and environmental impacts for decades.

Staff is gathering information and working interdepartmentally with Parks & Recreation, Integrated Pest Management team, Open Space and Mountain Parks, Development Review, and other interested divisions and departments to develop an EAB work plan for 2014, which will be presented to council during the first quarter of 2014.

FISCAL IMPACT

The 2013 US Forest Service (USFS) Metro Denver Urban Forest Assessment Report estimates there are 656,000 trees total in the city of Boulder with an appraised value of $1.2 billion. There are approximately 38,000 total city park and public street rights-of-way trees under the jurisdiction of the Parks and Recreation Forestry Division; 4808 (approximately 13 percent) are either green or white ash trees with an appraised value of $15.4 million. An inventory of ash trees on public property under the jurisdiction of other city departments has not yet been conducted. The exact number of ash on private property is unknown, but generalizing with an estimated 15 percent, the estimated number of public, private and naturalized ash along Greenways within the city is 98,000 trees.

Current non-personnel budget for the Forestry Division is $280,000 for tree pruning, removals, replacement, wood disposal, integrated pest management (IPM) and the commercial tree program. Once EAB populations increase, management costs for EAB alone will exceed existing Forestry funding levels on an annual basis and additional staffing will also be required. Private property owners will also face significant costs over the next decade due to increased tree removal, proper wood disposal, replacement and/or treatment costs.

EAB populations expand exponentially. USFS models for the Midwest indicate that if ash populations within a community are left untreated, nearly 100 percent of ash trees are beyond treatment within 12 to 15 years after initial infestation. Public safety and deferred maintenance for tree species other than ash become major concerns when existing resources are dedicated to EAB management.

COMMUNITY SUSTAINABILITY ASSESSMENTS AND IMPACTS

- Economic: Ash trees are found in commercial areas throughout the city and two blocks of Pearl Street Mall are predominantly green ash. Research has consistently shown that shoppers are more willing to pay for parking, goods, and

Figure 1 Green ash on Pearl Street Mall.

services in business districts with trees. Trees increase residential and business property values and the tax base; attract visitors, businesses, and new residents to an area and increase occupancy and rental rates of apartments and offices. Shading from trees can defer maintenance longer for materials that are degraded by heat such as asphalt and pavement.

- Environmental: Boulder's urban tree canopy provides many environmental benefits to the community. Urban trees help mitigate climate change by contributing to reductions in carbon dioxide and other pollutants, improvements in water quality, stormwater runoff reduction and energy saving through shading surfaces and reduced cooling demand. Although ash trees comprise approximately 15 percent of the total tree population, they are large maturing, long lived trees and therefore contribute more environmental benefits than expected by their percentage in the urban tree canopy.

  If left untreated, it is anticipated that all ash will die during the infestation period from EAB causing high tree canopy losses and subsequent loss of environmental, economic and social benefits. Pesticides are an important component in EAB management programs and are effective in the prevention and spread of EAB. However, pesticide treatments, whether public or private, can have impacts to non-target organisms and the environment; decisions about which pesticide product to apply and which trees to treat must be carefully balanced to provide the least overall harm to the environment.

- Social: Social scientists have shown trees and green spaces within cities provide social and psychological benefits and improve the quality of life for residents. Connection to trees and nature affects moods, activities and emotional health. It can reduce stress and mental fatigue, enhance mental health, enhance recuperation rates in hospitals, reduce psychological precursors to crime, and increase recreational opportunities. A community's urban forest is usually the first impression a community projects to its visitors and is an extension of its pride and community spirit.[2]

BACKGROUND

The Emerald ash borer (*Agrilus planipennis),* an exotic wood boring beetle first discovered near Detroit, Michigan in 2002, has since spread to 21 other states where it has killed over 50 million ash trees. Scientists believe it was unintentionally brought to the US through infested ash crating or pallets from its native range in China.

EAB attacks only ash trees and all North American ash species (*Fraxinus* spp.), including green and white ash, are at risk. EAB larvae feed under the bark on the vascular tissues of the tree, which eventually kills it. EAB kills both stressed and healthy ash trees and at high population levels, can kill mature ash trees within two or three years after initial infestation.

Figure 2 Dead ash tree with emerald ash borer galleries in trunk.

On September 23, 2013, city of Boulder Forestry staff

[2] Landscape and Human Health Laboratory, University of Illinois at Urbana Champaign. http://lhhl.illinois.edu/

found EAB in a dead ash tree in the public right-of-way in northeast Boulder near Iris Avenue and 30th Street. Staff detected the beetles when sampling the ash tree prior to removal. Insect specimens were collected and sent to the USDA Systematic Entomology Laboratory in Michigan where the identity of the insects was confirmed. This was the first time this insect had been found in Colorado and is the western-most occurrence of this invasive pest in North America.

Quarantine

EAB is a federally quarantined pest; APHIS therefore works with State cooperators to detect, control and prevent the human spread of EAB. Both federal and state government prohibits the movement of firewood and other ash wood materials outside the quarantined area. The Colorado Department of Agriculture (CDA) has imposed and will enforce a quarantine on the movement of all ash tree products and hardwood firewood out of Boulder County. After discussions with local trash haulers, CDA also included small portions of Jefferson and Weld Counties to include two landfills within the quarantine area to facilitate movement of flood debris and EAB-infested material. The state quarantine took effect on November 12, 2013; a federal quarantine will be in place by the end of February, 2014. A map of the quarantine area can be found in Attachment A.

Detection Surveys

City Forestry staff and the CDA worked cooperatively to develop protocols for two detection surveys to determine the extent of infestation within the city.

1. Visual assessment: COB Forestry and CDA staff assessed all public and private ash trees within a half mile of the initial infestation. Hundreds of ash trees were assessed from ground level looking for symptoms of infestation, including large branch dieback in the crown, woodpecker damage and excessive sprouting. Symptomatic trees were climbed to view more closely. One dead ash tree and five symptomatic EAB-infested ash trees were removed within the same condominium complex near 30th Street and Iris Avenue.

Figure 3 Symptomatic ash tree in Northeast Boulder

Figure 4 Adult Emerald ash borer

2. Delimitation Survey: EAB is very difficult to detect in early stages. A delimitation survey was conducted to establish the boundaries of the area considered to be infested by EAB. The survey started on November 4, 2013 and was completed on January 15, 2014. The survey was conducted by staff from COB Forestry, CDA, APHIS, CSU Extension and forestry staff from nine nearby cities that graciously offered staff and equipment to assist with the survey.

The city was divided into plots or grids that are one square mile each. Crews removed two small branches from each of 10 public ash trees near the center of each plot. The bark was peeled from the branch samples and the wood examined closely for the presence of EAB larvae. All larvae found were sent to CSU for positive identification. Branch sampling protocols were developed by the Canadian Forest Service (CFS); they found by performing random branch sampling on asymptomatic trees with this technique, they were able to detect EAB several miles away from the original location before trees become symptomatic.[3]

Figure 5 Branch peeling and emerald ash borer larvae.

Public Tree Inventory

The existing public tree inventory was last updated between 1999 and 2001 and updates were planned prior to the discovery of EAB. EAB has increased the priority for updates to the ash tree portion of the inventory. A tree inventory and asset management vendor has been contracted and ash tree inventory updates were recently completed. Information on the current condition class, tree diameter and recommended maintenance action was collected for green and white ash trees on public property under the jurisdiction of the city Forestry Division.

Treatment Options

Since ash trees cannot survive an EAB infestation, the only option available to save the life of a tree is pesticide application. Research has shown that specific pesticide products are effective against EAB if used before trees are compromised by the pest and applied per label requirements. Because the EAB larvae feed under the bark, the most effective pesticides are systemic insecticides. Systemic insectides are transported throughout the tree within its vascular tissues. Feeding by EAB larvae damages the tree's vascular system, as does damage from wounds and other pests. Only ash trees in good condition should be considered for treatment otherwise the pesticide treatments may not be effective. Before pesticides are considered, the impacts and tradeoffs for each product will be carefully weighed with the environmental and economic impacts of tree loss. The city of Boulder has an Integrated Pest Management Policy and any proposed action will be in compliance with the policy. The process for this analysis will be included in the EAB 2014 Work Plan.

[3] Detection of emerald ash borer in urban environments using branch sampling, Canadian Forest Service, Sault Ste. Marie, Technical Note No. 111. http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/32127.pdf

Education/Outreach

Education and outreach is a critical component of any EAB Response Plan. Efforts are underway through city, county, state and federal agencies but many more are planned before the insect emerges in the spring.

- EPIC: A statewide working group, EPIC (Emerging Pests in Colorado), has collaborated over the past four years to raise industry and public awareness about the threat of EAB and other invasive pests through brochures, workshops and presentations. Participants included staff from the CDA, Colorado State Forest Service (CSFS), CSU Extension Service, APHIS, and foresters from several cities including Boulder, Denver and Fort Collins.
- Initial Meetings: In the weeks after receiving official confirmation of the pest in Boulder, city Forestry staff, CDA, CSFS and APHIS participated in meetings with pertinent city of Boulder staff, Boulder County personnel, Front Range city foresters, Boulder County tree care companies and local trash haulers to educate about EAB and gather input on the proposed quarantine.
- News Releases: Although the insect was found in Boulder, CDA took the lead initially on media releases due to the larger potential statewide impact. The City of Boulder has since distributed two news releases on the start of the delimitation survey and the quarantine.
- CDA has posted educational material about EAB on their website: www.EABColorado.com; there is also information posted on the city Parks and Recreation website, https://bouldercolorado.gov/pages/emerald-ash-borer
- Tree Dissections: City Forestry has hosted a series of EAB "tree dissections" in cooperation with CSU Extension, CDA and APHIS staff. The dissections were geared toward forestry staff from other Front Range and Wyoming communities and tree care companies to exhibit the infested trees and demonstrate branch peeling techniques.

Figure 6 Front Range foresters participating in emerald ash borer dissection at city of Boulder Park Operations facility.

ANALYSIS

The results from both the updated public ash tree inventory and the delimitation survey will be analyzed and used to develop a City of Boulder EAB 2014 Work Plan and ultimately an EAB Management Plan to manage the infestation within the city and potentially slow the spread to nearby communities.

Detection Survey

The delimitation survey started November 4, 2013 and was completed on January 15, 2014. Attachment B shows the delimitation survey grid map. EAB was detected in five grids: E3, F3, G3, H3 and H4. EAB was not found in the sampled trees in other grids, but due to the flight ability of the insect and rate of spread in Midwest communities, other parts of Boulder are likely infested at low pest populations. City Forestry staff will continue efforts to monitor for EAB in all parts of the city.

CU Grounds staff also conducted a detection survey and found evidence of EAB in a group of green and white ash in the parking lot adjacent to the Space Sciences building on the CU East Campus (in Grid G3).

Public Tree Inventory

Inventory information for ash trees in public street rights-of-way and in city parks was updated after the discovery of EAB in Boulder. The current inventory has 4,808 ash trees total with an appraised value of $15.4 million; 1,267 trees in city parks and 3,541 in public street rights-of-way. The trees range in size from one to 48 inches in diameter. The Forestry Division has not planted ash trees since 2003, however ash is naturalized and many have seeded into natural areas in city parks or have been planted by adjacent property owners into street rights-of-way. Information on the current tree condition and recommended maintenance needs will be analyzed and presented to City Council during the first quarter of 2014.

Treatment Options

Pesticide products from three different classes of systemic insecticides are available for treatment of EAB:

- Merit (imidacloprid) – a neonicotinoid insecticide that has been on the city's approved pesticide list for several years
- TREE-äge (emamectin benzoate) – a "semi-synthetic" product derived from a soil bacterium that is a restricted use pesticide (may only be applied by a certified pesticide applicator).
- TreeAzin (azadirachtin) – a natural product derived from the seeds of the neem tree – certified for use under the USDA's National Organic Program

Staff is assessing each of these products using documentation from the EPA and other regulatory agencies and open literature. Staff is also consulting with academic researchers, who are considered the leading experts in EAB management. Pesticides are being evaluated for efficacy of EAB control, as well as impacts to non-target organisms and the environment to determine which products will be used under different circumstances.

NEXT STEPS
A 2014 EAB Work Plan will be developed and presented to City Council during the first quarter of 2014.

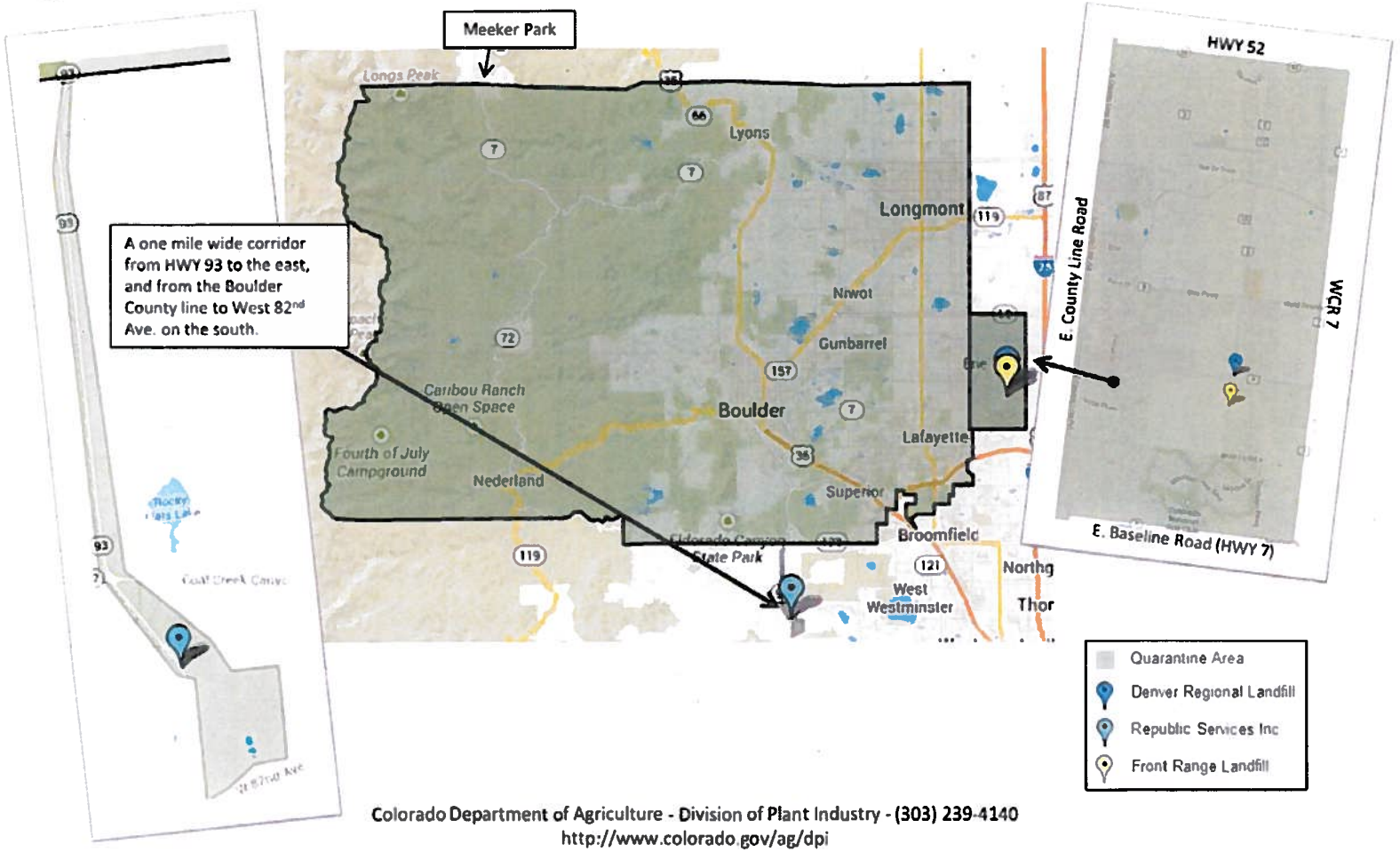
Next steps include:

- Establish an interdepartmental EAB Working Group;
- Develop City of Boulder Communications and Education/Outreach plan for EAB;
- Research and explore wood disposal options with Boulder County and Western Disposal;
- Update City Forestry contractor specifications;
- Research and coordinate with Community Planning and Sustainability's Development Review staff for possible code changes to facilitate EAB management;
- Update and request feedback from the Parks and Recreation Advisory Board and the Environmental Advisory Board.
- Develop the City of Boulder EAB Management Plan.

ATTACHMENTS:
Attachment A – Emerald Ash Borer Quarantine
Attachment B – Emerald Ash Borer Delimitation Survey

COLORADO
DEPARTMENT OF AGRICULTURE

Emerald Ash Borer Quarantine



Colorado Department of Agriculture - Division of Plant Industry - (303) 239-4140
http://www.colorado.gov/ag/dpi

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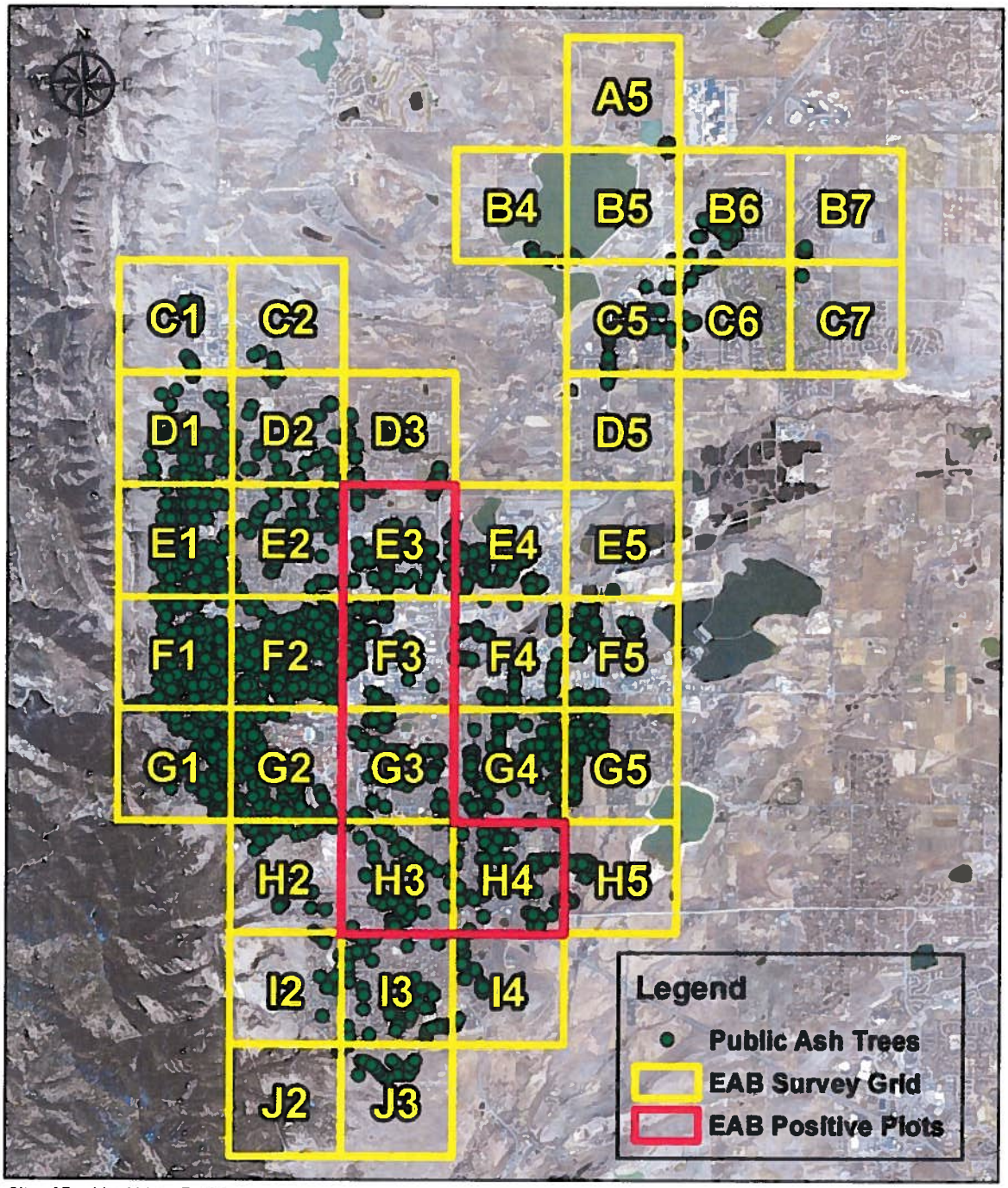
Attachment A

Emerald Ash Borer Delimitation Survey
City of Boulder



City of Boulder Urban Forestry
Aerial Photography 2012 DRCOG 6"
Map Production: January 17, 2014
Author: Kathleen Alexander

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Miles

City of Boulder Emerald Ash Borer 2014 Workplan

- Established the City of Boulder EAB Research Advisory Group
  - Dr. Whitney Cranshaw, Colorado State University
  - Dr. Deb McCullough, Michigan State University
  - Dr. Krista Ryall, Canadian Forest Service
  - Dr. Sky Stephens, US Forest Service

- Continued Coordination with EAB Incident Command Structure working group (comprised of City of Boulder, USDA Animal and Plant Health Inspection Service, Colorado Department of Agriculture, Colorado State University Extension, Colorado State Forest Service, University of Colorado)
  - Public Education/Outreach
  - Industry Trainings
  - Quarantine
  - Dendrochronology

- Establish a City of Boulder Interdepartmental EAB Working group to discuss on-going EAB management and develop the City of Boulder EAB Management Plan. Group will initially include representatives from: Parks & Recreation Forestry, Planning Department, Public Works/Utilities/Greenways, Open Space and Mountain Parks. Group will also include representation from University of Colorado and Colorado State University Extension – Boulder County.

- EAB Monitoring within City of Boulder
  - Completed EAB Delimitation Survey
  - Branch sampling in grids adjacent to known infested area in fall 2014: E2, F2, G2, H2, I4
  - Pheromone trap study with Canadian Forest Service
  - Resident service requests for public ash trees within grids where EAB not detected
  - Sample all ash removals
  - Random sampling of ash trees during rotational pruning
  - Refer private ash tree sampling requests to City of Boulder licensed certified arborists

- Public Education / Outreach
  - Parks & Recreation Advisory Board, Environmental Advisory Board, City Council: memos, presentations, discussion
  - Parks & Recreation Forestry EAB website: www.EABBoulder.org
  - Continued News Releases
  - Continued Dissection/Trainings as requested and as fresh infested material available
  - Postcard to all property owners in known infested grids
  - Public Meetings for property owners in infested grids and adjacent grids (EAB basics, criteria for ash preservation, treatment options, etc)
  - Industry Presentations: Metro Mayor's Caucus Meeting, ProGreen Conference, Greeley Tree Care Workshop

- Public ash tree removals / replacements

- Start ash replacement program; remove/replace 60 public ash trees identified as poor condition during recent tree inventory updates in spring
- Evaluate an additional 200 public ash in poor condition for possible replacement in fall, 2014 or spring, 2015
- Proactive tree planting in 9 city park areas within infested grids
- Extend "Opt Out" Tree Planting program to known infested grids

- Pesticide Treatments
  - Coordinate with Rella Abernathy, City IPM Coordinator on addition of Tree-äge to Approved Pesticide List
  - Continue to research pesticide options moving forward
  - Trap trees per SLAM (SLow Ash Mortality) protocols: girdle 3 public ash trees per known infested grids; treat adjacent public ash trees with Tree-äge. Goal is to reduce beetle populations and slow the spread.
  - Treat approximately 175 public ash trees within infested grids only; will use only Tree-äge and TreeAzin in 2014
  - Evaluate public ash trees in adjacent grids for possible treatments to commence in 2015
  - Negotiate with tree care companies about potential to extend city pricing for private property owners

- EAB Research and Experimentation
  - Testing a new pheromone; collaboration with Canadian Forest Service
  - Testing new monitoring/survey protocols; collaboration with Canadian Forest Service
  - Testing new trapping protocols; collaboration with USDA Animal and Plant health inspection Service (USDA APHIS)
  - Testing viability of degree day models to predict emergence of EAB in Colorado; collaboration with CO Department of Agriculture
  - Research into effects of wounding from trunk injected pesticides on ash trees in Colorado (ash trees grow more slowly in CO and receive less rainfall than in Midwest so wounding may have bigger impact than elsewhere in US); collaboration with CSU
  - Dendrochronology analysis of CO EAB infestation; collaboration with USDA Animal and Plant Health Inspection Service (USDA APHIS)
  - Bee pollen study; collaboration with Colorado state University

- Develop Wood/Mulch Utilization plan in coordination with city LEAD staff and Western Disposal

- Research and coordinate with Community Planning and Sustainability's Development Review staff for possible code changes to facilitate EAB management
  - Tree Protection - protect large non-ash trees through development to maintain urban tree canopy
  - Remove ash from approved street tree list (DCS updates)
  - Research possibility of a resident "Payback program"
  - Research how enforcement for dangerous trees can be facilitated
  - Look into possible updates to City of Boulder arborist licensing program

- Configure and implement Urban Forestry Tree inventory / Asset Management Program (Davey TreeKeeper software) to track all maintenance on public ash trees (and other public trees)

- Explore available grant options
  - Urban Forest Master plan / EAB Management Plan
  - Wood utilization
  - Lease land for collecting, storing and processing wood
  - Assist property owners with control/removal costs