Part 1: Emerging Insect and Disease Issues

Emerging Issues

Emerald Ash Borer

The emerald ash borer (EAB) (*Agrilus planipennis* Fairmaire*)* is a nonnative insect originally from eastern Russia, northern China, Japan, and Korea that threatens our urban and rural forests. It was unknown on the North American continent until its discovery in the Detroit, MI, area in July 2002. Subsequent surveys showed that it was also present in large numbers in six counties in southern Michigan. This 'core' area was put under quarantine in the fall of 2002. The seven counties adjacent to the core area were quarantined in August 2003. Those seven counties have been designated 'tier 1,' and the Michigan EAB team is aggressively removing both infested and host trees in those areas.

Shortly after EAB was first found in Michigan, an infestation was discovered across the border in Windsor, Ontario, Canada. To contain further spread of EAB there, the Canadian Government has begun cutting and destroying all of the ash trees in a zone 30km x 10km extending from Lake St. Clair to Lake Erie. This "ash free" zone, in concert with an aggressive regulatory program to prevent the artificial movement of infested ash material out of the infested area, is intended to contain the existing infestation so that effective eradication activities can be implemented. In the United States, spot infestations of EAB resulting from the movement of infested nursery stock or firewood from Michigan have been found in Maryland (Prince George's County), Ohio (Defiance, Franklin, Lucas, and Wood Counties), and Virginia (Fairfax County). Efforts are currently underway to eradicate and monitor these spots. The EAB infests walnuts and elms in its native habitat. In North America, EAB is found (so far) only on ash (*Fraxinus* spp.), an abundant tree species in urban areas, rural woodlots, and riparian areas.

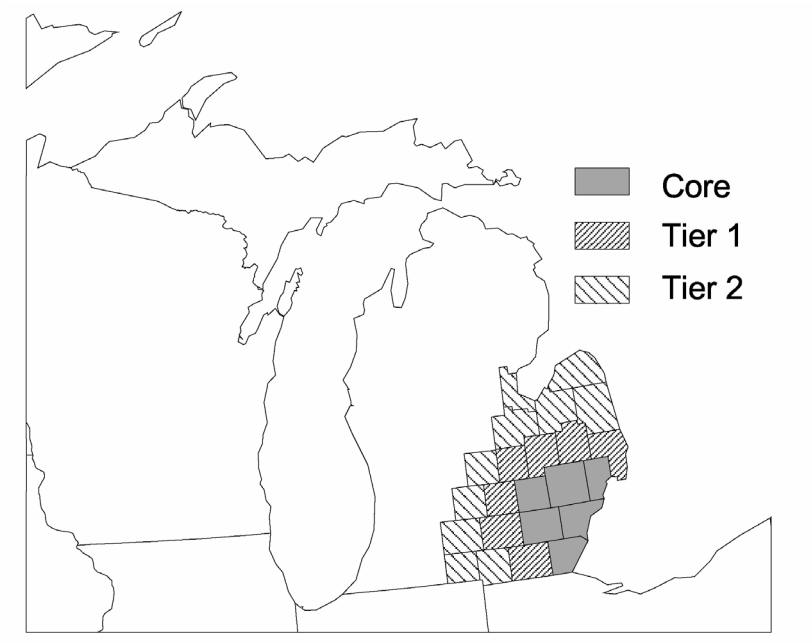
It is estimated that EAB had been present in Michigan for 5-10 years before its discovery. EAB was previously unknown outside of Asia and was not on any exotic pest "watch list."

There was little documentation about EAB biology at first. Evaluations and other studies had to be conducted to fill that information void. Entomologists now know that EAB is more prolific, and has a much longer flight range than another well-known exotic, Asian longhorned beetle, which was found in nearby Chicago, IL, in 1998.

In Michigan, EAB occurs over a broader area than originally estimated. The generally infested area was originally thought to cover about 2,500 square miles. Recent survey data (2003) suggest that the generally infested area probably covers about 4,000 square miles instead. The 10 counties surrounding the current quarantine area have been designated 'tier 2' level. They have an ash species density that is nearly contiguous to the existing EAB infestation and at potential risk. Intensive surveys planned in 2004 will provide a better picture of the scope and location of the EAB generally infested area in Michigan.

The USDA Forest Service is an integral partner, along with the USDA Animal and Plant Health Inspection Service (APHIS) and State authorities, in the eradication effort, providing scientific and technical expertise, including survey, restoration, and public outreach and communications assistance. In 2003, forest health specialists coordinated and implemented EAB surveys outside of Michigan with State forestry and agriculture personnel to examine areas of known ash decline in the States and around nurseries and other places that received infested ash trees from Michigan. EAB detection surveys will be continued and expanded to other States in 2004. Forest Health Protection also supports and conducts critical technology development activities with university and research cooperators to advance our understanding of EAB biology and dispersal habits, chemical control tactics, management strategies, survey techniques, and monitoring among others.

Michigan Counties in the Emerald Ash Borer Quarantine and Control Area (Core and Tier 1) and Tier 2 - 2003



Pinyon Pine Mortality

Pinyon pine mortality reached unprecedented levels in 2003 with more than 3.7 million acres of mortality recorded. Observations in previous years indicated that piyon pines were dying at increasing rates in areas of Arizona, California, Colorado, Nevada, New Mexico, and Utah. Late in the summer of 2002 it became evident that a major bark beetle epidemic was in progress. The extensive, prolonged, and severe drought conditions highly stressed pinyon trees and allowed populations of pinyon ips bark beetle to reach epidemic levels.

In 2003, special surveys were conducted to document this drastic event. Results of these surveys are summarized below.

Acres (in thousands) of Aerially Detected Pinyon Pine Mortality, 2001-2003

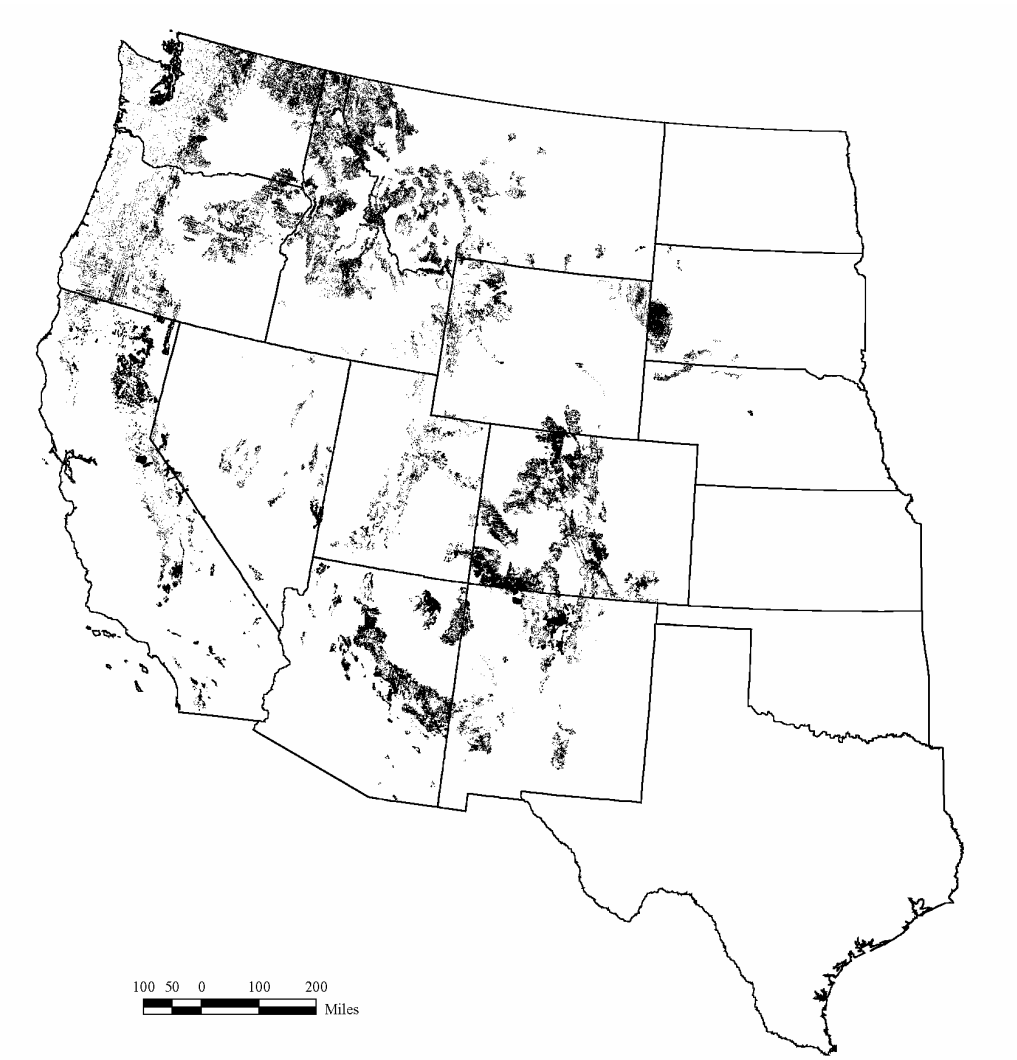
State	2001	2002	2003
Arizona	6.2	60.2	1,031.1
California		1.0	522.6
Colorado		63.6	814.3
Nevada	1.8	64.4	355.7
New Mexico	11.0	71.2	808.9
Utah	4.0	6.2	207.0
Total	23.0	266.6	3,739.6

Aerially Detected Pinyon Pine Mortality, 2003

Western Bark Beetles

Tree mortality from bark beetles increased substantially in many parts of the West in 2003, particularly in forests severely stressed by the widespread and prolonged drought and overstocking. This was especially true in the pinyon-juniper woodlands of the Southwest where analysis of tree ring data indicate that the period from 1996 to 2002 may have been the driest in almost 1000 years. Special pinyon-juniper woodland surveys were conducted and the results are described in more detail in a separate section of this report. Bark beetle activity was also high in areas damaged by fire and weather events. Mountain pine beetle, Douglas-fir beetle, and spruce beetle were the direct cause of much of the mortality, but less commonly seen insects such as fir engravers, pine engravers, western pine beetle, Jeffery pine beetle, round-headed pine beetle, western balsam bark beetle, and red turpentine beetle caused substantial damage on almost 2.5 million acres.

Outbreak Areas of All Bark Beetles in the Western United States, 2003

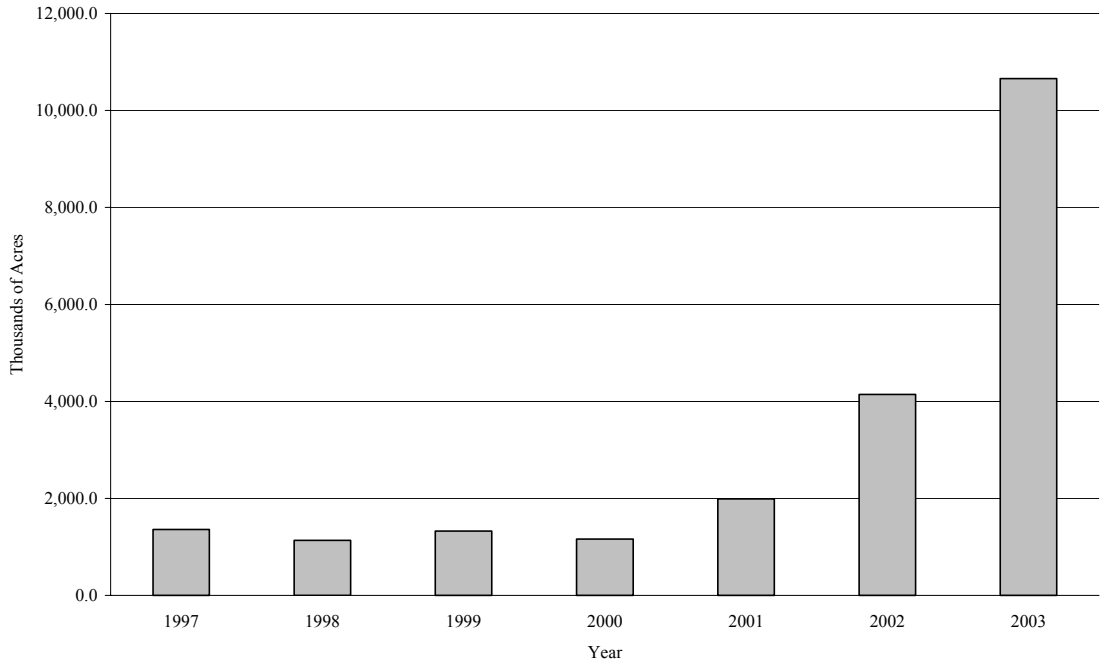


Acres (in thousands) of Aerially Detected Bark Beetle Outbreaks in the Western United States, 1997-2003

Region	1997	1998	1999	2000	2001	2002	2003
1	259.2	281.1	431.7	395.0	546.4	919.6	910.6
2	53.3	141.2	165.6	206.1	446.8	573.3	2,301.7
3	90.7	40.6	20.2	58.7	154.0	716.0	2,596.8
4	170.0	118.4	112.6	95.9	206.0	279.3	918.2
5		47.3	29.0	32.9	77.6	846.6	2,560.2
6	214.2	172.4	279.6	255.6	457.3	750.5	1,255.6
10	573.5	334.8	288.3	120.9	104.2	58.5	115.3
Total	1,360.9	1,135.9	1,326.9	1,165.3	1,992.3	4,143.8	10,658.3

[1)] In 1997, Region 5 mortality data listed causal agent as "Unknown," therefore 1997 does not include data for Region 5.

Acres (in thousands) of Aerially Detected Bark Beetle Mortality in the Western United States, 1997-2003



Sudden Oak Death

Sudden Oak Death is a recently recognized disease that is killing oaks and other plant species in California and a small portion of southwestern Oregon. First reported in 1995, the disease has been confirmed in the coastal areas north and south of San Francisco, and in southwestern Oregon. The pathogen responsible for the disease, a fungus-like organism called *Phytophthora ramorum*, is also found in Europe, where it is causing nursery problems on rhododendron and viburnum, and recently was discovered attacking landscape trees in affected gardens.

On oaks, *P. ramorum* is a bark pathogen; it causes necrotic, often girdling cankers that can lead to mortality on tanoak, coast and canyon live oak, California black oak, and Shreve oak. The pathogen also causes leaf spots and/or twig dieback on California bay laurel, rhododendron, big leaf maple, Pacific madrone, huckleberry, California buckeye, manzanita, toyon, California honeysuckle, wood rose, and California coffeeberry. Under moist conditions, the pathogen sporulates profusely on tanoak, bay, rhododendron, and other species, so these "foliar" hosts serve as important reservoirs of inoculum.

The disease is widespread in coastal California and is found commonly in two forest types: in the understory of coast redwood (*Sequoia sempervirens*) forests on tanoak and in coastal evergreen forests on oaks, madrone, California bay laurel, and other species. In California, Sudden Oak Death has been confirmed in scattered locations along the Pacific coast from Monterey County north into Humboldt County. All confirmations are within 50 miles of the Pacific coast. Marin and Santa Cruz Counties are heavily infested and dead and dying trees are common in the wildland/urban interface in backyards, parks, and open space greenbelts. Special aerial and ground surveys conducted by the USDA Forest Service and Oregon Department of Forestry in July 2001 detected the pathogen on approximately 40 acres in coastal southern Oregon, just north of the California border. A cooperative program involving State and Federal agencies as well as private landowners is underway to eradicate *Phytophthora ramorum* from the known infested sites in Oregon. Since Sudden Oak Death is still a rather new forest disease, there remains much to learn about its host preferences and behavior in new environments.

More information on this disease may be found at www.na.fs.fed.us/SOD or www.suddenoakdeath.org.

Counties Where Sudden Oak Death Was Reported, 2003

Table of Proven Hosts for *Phytophthora ramorum* in the United States, 2003

Scientific name	Common name
Acer macrophyllum	bigleaf maple
Aesculus californica	California buckeye
Arbutus menziesii	madrone
Arctostaphylos manzanita	manzanita
Camellia japonica	Japanese camellia
Camellia sasanqua	sasanqua camellia
Hamamelis virginiana	witch hazel
Heteromeles arbutifolia	toyon
Lithocarpus densiflorus	tanoak
Lonicera hispidula	California honeysuckle
Pieris formosa	Himalaya pieris
Pieris formosa x japonica	pieris 'Forest Flame'
Pieris floribunda x japonica	pieris 'Brouwer's Beauty'
Pieris japonica	Japanese pieris
Pseudotsuga menziesii var. menziesii	Douglas-fir
Quercus agrifolia	coast live oak
Quercus chrysolepis	canyon live oak
Quercus kelloggii	California black oak
Quercus parvula v. shrevei	Shreve's oak
Rhamnus californica	California coffeeberry
Rhododendron spp	rhododendron (including azalea)
Rosa gymnocarpa	wood rose
Sequoia sempervirens	coast redwood
Trientalis latifolia	western starflower
Umbellularia californica	California bay laurel, pepperwood, Oregon myrtle
Vaccinium ovatum	evergreen huckleberry
Viburnum x bodnantense	bodnant Viburnum
Viburnum plicatum var. tomentosum	doublefile Viburnum
Viburnum tinus	laurustinus

Table of Plants Associated with *Phytophthora ramorum* in the United States, 2003

Scientific name	Common name, date, and source of report
Abies grandis	grand fir – June 03 (1)
Aesculus hippocastanum	horse-chestnut – Dec 03 (3)
Arbutus unedo	strawberry tree – Dec 02 (7)
Camellia reticulata	camellia – Oct 03 (3)
Camellia x williamsii	camellia – Oct 03 (3)
Castanea sativa	sweet chestnut – Feb 04 (3)
Corylus cornuta	California hazelnut – Dec 02 (5)
Fagus sylvatica	European beech – Dec 03 (3)
Kalmia latifolia	mountain laurel – Fall 02 (3)
Leucothoe fontanesiana	drooping leucothoe - Oct 03 (3)
Pieris formosa var. forrestii	Chinese pieris – Oct 03 (3)
Pieris formosa var. forrestii x Pieris japonica	pieris – Oct 03 (3)
Pittosporum undulatum	victorian box – Dec 02 (6)
Pyracantha koidzumii	Formosa firethorn – Apr 04 (9)
Quercus cerris	European turkey oak - Feb 04 (3)
Quercus falcata	southern red oak – Nov 03 (3)
Quercus ilex	Holm oak – Dec 03 (3)
Quercus rubra	northern red oak – Nov 03 (8)
Rhamnus purshiana	cascara – Dec 02 (4)
Rubus spectabilis	salmonberry – Dec 02 (4)
Syringa vulgaris	lilac – 2003 (3) updated Oct 03
Taxus baccata	European yew – Aug 03 (3)
Toxicodendron diversiloba	poison oak – Dec 02 (4)
Vaccinium vitis-idaea	lingonberry – Poland, 2002 (reported by 3)
Viburnum davidii	David viburnum - Oct 03 (3)
Viburnum farreri (=V. fragrans)	fragrant viburnum – Oct 03 (3)
Viburnum lantana	wayfaringtree viburnum – Oct 03 (3)
Viburnum opulus	European cranberrybush viburnum – Oct 03 (3)
Viburnum x burkwoodii	burkwood viburnum – Oct 03 (3)
Viburnum x carlcephalum x V. utile	viburnum – Oct 03 (3)
Viburnum x pragense	Prague viburnum – Oct 03 (3)

[1] California Department of Food and Agriculture
[2] Oregon Department of Agriculture
[3] Department for Environment, Food, and Rural Affairs, UK
[4] Everett Hanson, Oregon State University
[5] David Rizzo, University of California – Davis
[6] Mateo Garbelotto, University of California - Berkeley
[7] Eduardo Moralejo, Instituto Mediterráneo de Estudios Avanzados, IMEDEA (CSIC-UIB) - Balearic Islands, Spain
[8] Plant Protection Service, Wageningen, Netherlands
[9] Canadian Food Inspection Agency, Canada