

MARYLAND 2020 FOREST HEALTH HIGHLIGHTS

The Resource

Maryland occupies a land area of 6,264,876 acres. Forestland comprises 2,709,062 acres of which nearly 76 percent is privately owned. Healthy, productive forests are critical in urban and rural areas for soil conservation, clean air and water, wildlife habitat, outdoor recreation, and aesthetics. The forest products industry is the largest employer in Allegany and Garrett Counties and the second largest employer on the Eastern Shore.

Forest Health Monitoring

The Forest Health Monitoring (FHM) Program has two components: plot network and off-plot survey. The USDA Forest Service Northeastern Station Forest Inventory and Analysis Staff administer the plot network in Maryland. The plot network is designed to annually monitor, assess, and report on changes in the long-term condition of trees, soils, lichens, and air quality in forests.

The Maryland Department of Agriculture conducts the off-plot survey component of FHM. The objectives of the FHM Program are delimiting, mapping, and reporting forest pest problems as a supplement to the FHM plot network. Aerial and ground surveys, data collection, and reporting are conducted in accordance with FHM standards for air operations and GIS.

Office of Plant Industries & Pest Management: FOREST PEST MANAGEMENT

FOREST PEST MONITORING AND SURVEYING

Gypsy Moth

The European gypsy moth (*Lymantria dispar dispar*) is the most serious threat to oak forests in the United States. The first eggs were detected in Maryland in 1971 and the first extensive defoliation occurred in 1981. Each fall and winter, the department conducts an extensive survey for gypsy moth egg masses to determine potential areas of defoliation. From August 2019 through March 2020, Maryland Department of Agriculture Forest Pest Management (MDA FPM) personnel conducted gypsy moth egg mass surveys on 483,223 acres of “high value” forested lands. “High value” forested sites include areas with development, recreational use, managed forest and wildlife resources and other site conditions that render dieback and mortality to be economically and socially important. The survey results indicated that the current populations were sufficient to cause moderate to heavy defoliation on 218 acres in 2020. In April, 168 acres that are located on the lower Eastern Shore and were sprayed with *Bacillus*

thuringiensis. The acreage was reduced from 218 to 168 due to a landowner request for exemption. Gypsy moth defoliation in 2020 was seen on the lower Eastern shore and totaled 1,700 acres.

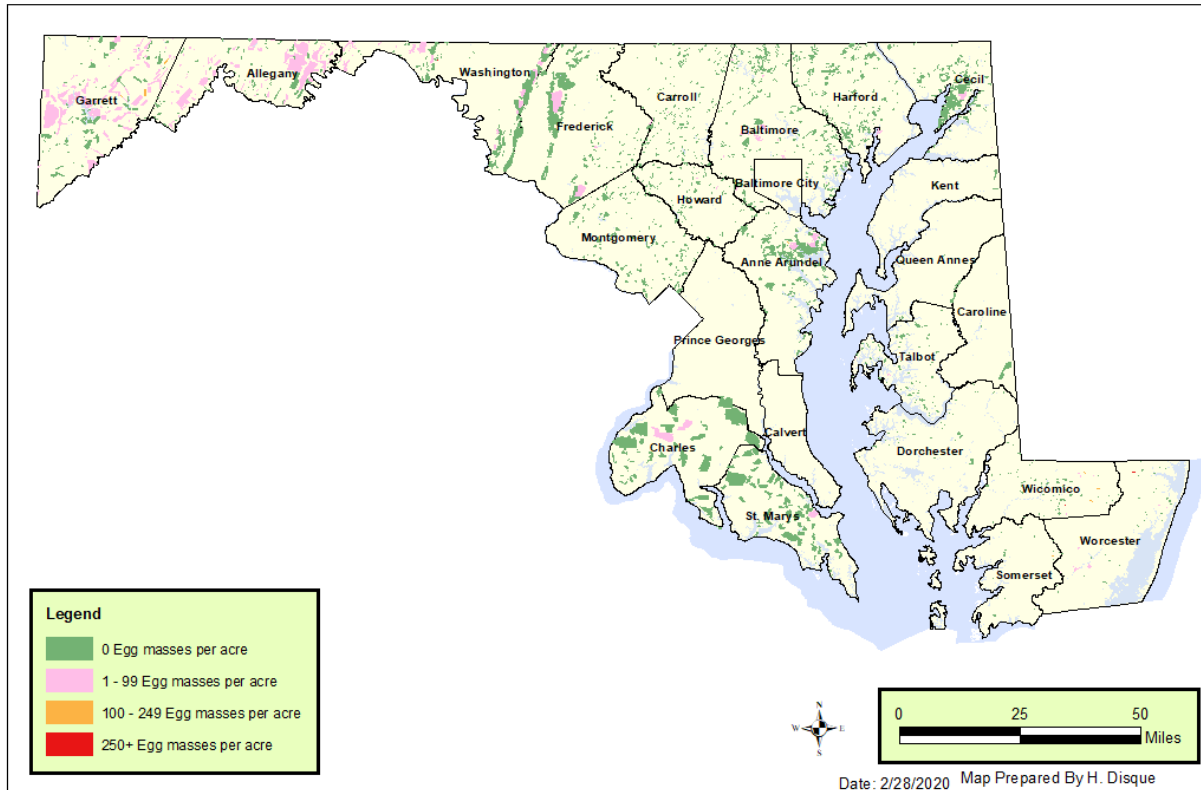
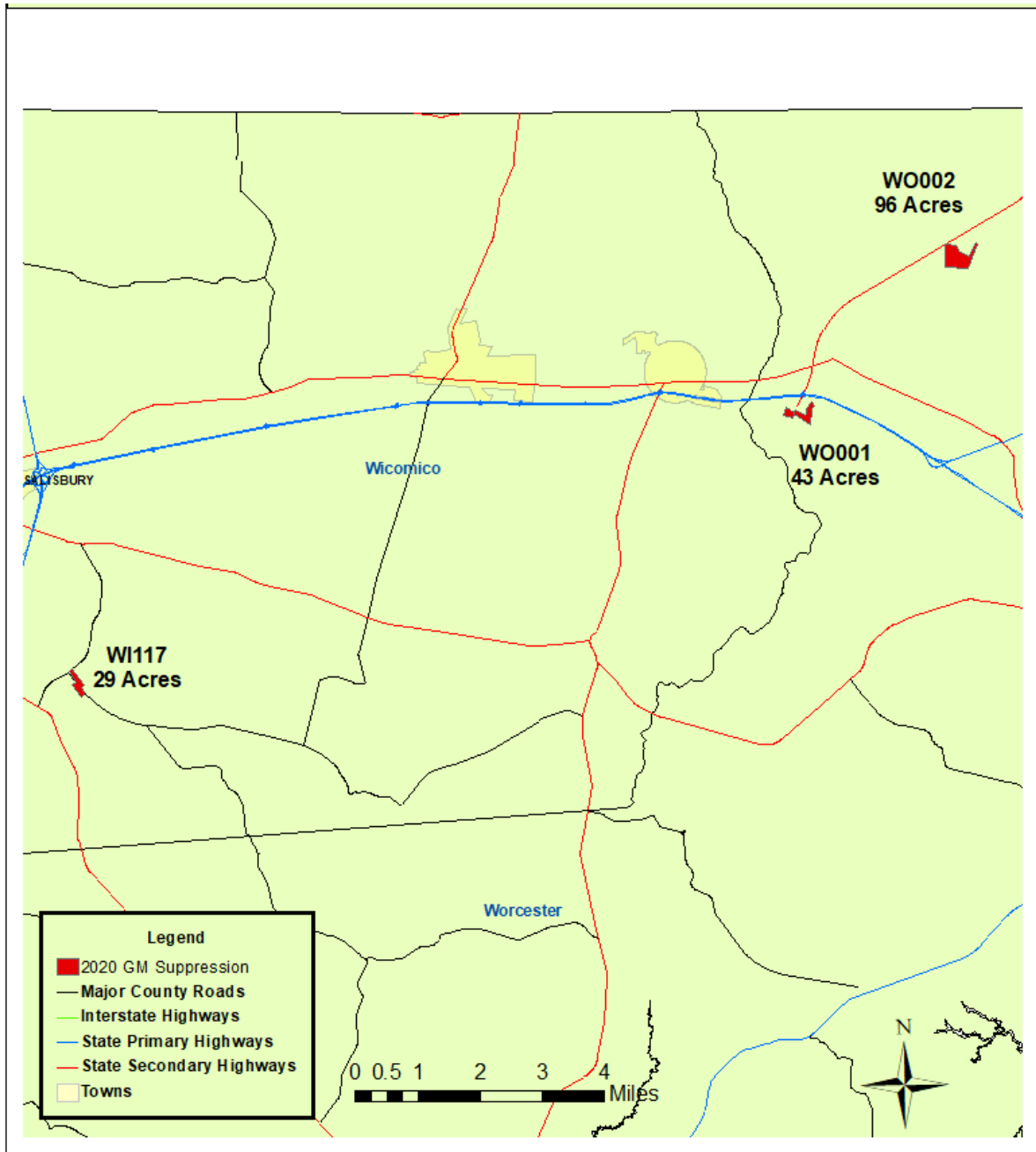


Figure 1. Maryland Department of Agriculture 2019 to 2020 gypsy moth survey results forest pest management section



Date: 3/27/2020
 Map Prepared by H. Disque

Figure 2. Maryland Department of Agriculture forest pest management 2020 gypsy moth suppression blocks on the eastern shore of Maryland

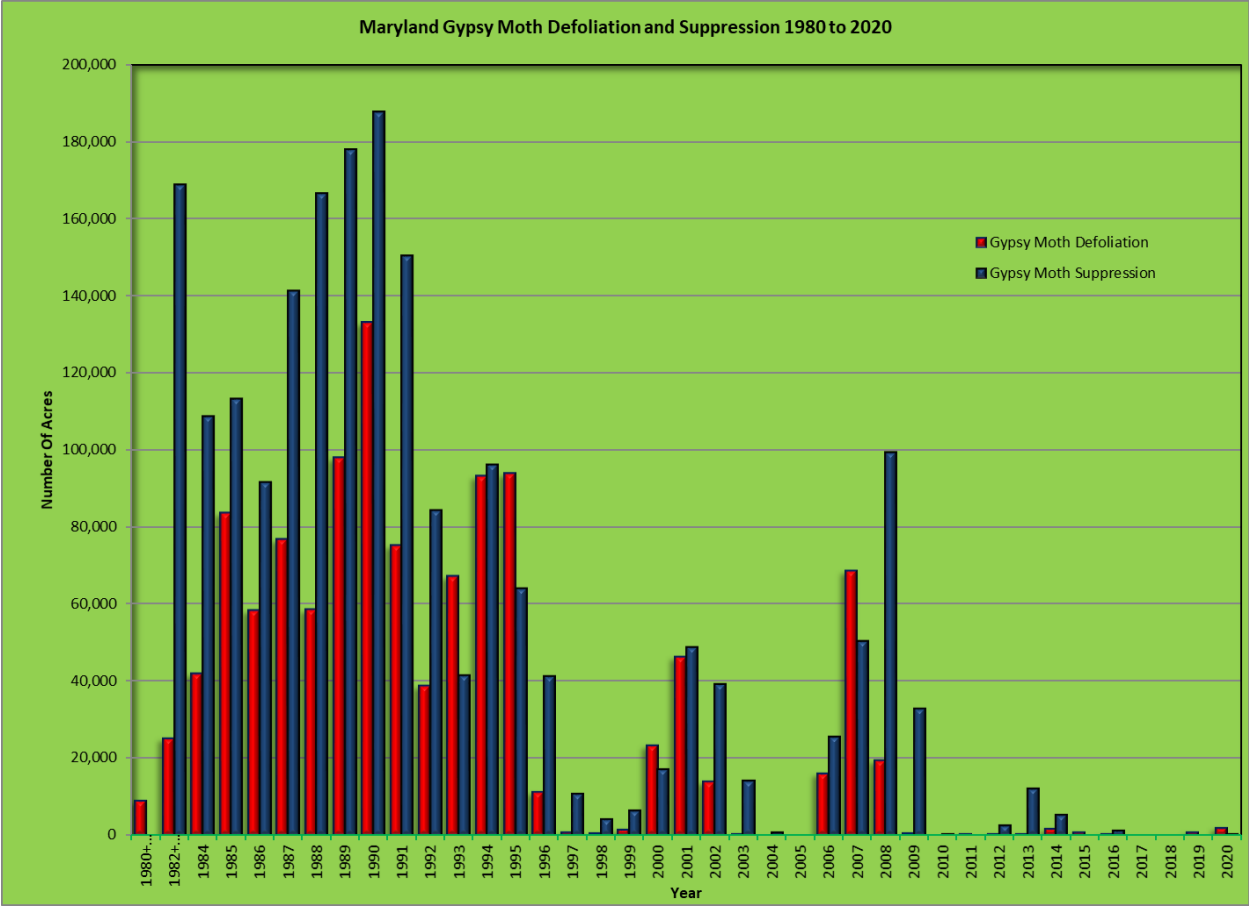


Figure 3. Acres of gypsy moth defoliation and suppression treatments from 1980 to 2020

Table 1. Maryland Department of Agriculture 2019 to 2020 Maryland gypsy moth egg mass survey summary forest pest management

County	Total	Private and County	State	Number Positive	Percent Positive	Number of Blocks	Number of Acres	Percent Positive 2018 to 2019
Eastern Shore								
Caroline	43	0	43	0	0.0	6	4232	0
Dorchester	118	80	38	1	0.8	38	3206	13.6
Queen Anne's	18	0	18	1	5.6	7	442	0
Somerset	51	51	0	1	2.0	17	1121	31
Talbot	191	187	4	2	1.0	66	7583	4
Wicomico	206	200	6	16	7.8	88	5866	17
Worcester	145	105	40	8	5.5	49	3639	5
Totals	772	623	149	29	3.8	271	26,089	10.5
Southern								
Charles	166	148	18	2	1.2	79	59,555	8.2
St. Marys	186	175	11	2	1.1	61	41,274	4.3
Anne Arundel	380	377	2	4	1.1	98	31,742	5.3
Prince George	0	0	0	0	0.0	0	0	0
Calvert	0	0	0	0	0.0	0	0	0
Totals	732	700	31	8	1.1	238	132,571	5.8
Northeast								
Baltimore	791	704	87	19	2.4	216	34,745	1.2
Cecil	459	379	80	4	0.9	99	28,245	0.6
Harford	536	510	26	3	0.6	98	26,143	1.6
Kent	10	0	10	0	0.0	0	808	10
Baltimore City	0	0	0	0	0.0	0	0	0
Totals	1796	1593	203	26	1.4	238	89,941	1.2
Western								
Allegany	807	400	407	168	20.8	148	45,874	6.6
Garrett	1034	600	434	232	22.4	176	64,619	0.9
Washington West	354	229	125	36	10.2	55	11,362	3.1
Totals	2195	1229	966	436	19.9	379	121,855	3.4
Central								
Carroll	438	407	31	2	0.5	174	13,783	0.3
Frederick	761	627	134	4	0.5	183	48,139	0.9
Howard	239	203	36	2	0.8	83	8275	0.0
Montgomery	568	489	79	0	0.0	155	19,034	0.0
Washington East	373	271	102	9	2.4	70	23,536	0.9
Totals	2379	1997	382	17	0.7	665	112,767	0.5
Totals	7874	6142	1731	516	6.6	2012	483,223	2.9

Southern Pine Beetle

The Southern Pine Beetle (SPB) is one of the most destructive insect pests of pines. Maryland is at the northern edge of its range and is commonly found on the lower Eastern Shore and Southern Maryland. Since 1989, Maryland has participated in a multi-state SPB survey throughout the southern United States using pheromone-baited traps.

Traps were set up in 13 counties across Maryland. All traps collected no SPB with the exception

of one trap in Calvert County which only collected 9 beetles during a seven day period. This indicates that populations are to remain low in 2020. The traps were set up shortly after the time of redbud bloom.

The Dorchester County area that had experienced an SPB outbreak in 2015-2017 has no additional mortality due to SPB. Many trees in this area and southern Dorchester County are exhibiting chlorotic needles due to flooding and salt-water intrusion.

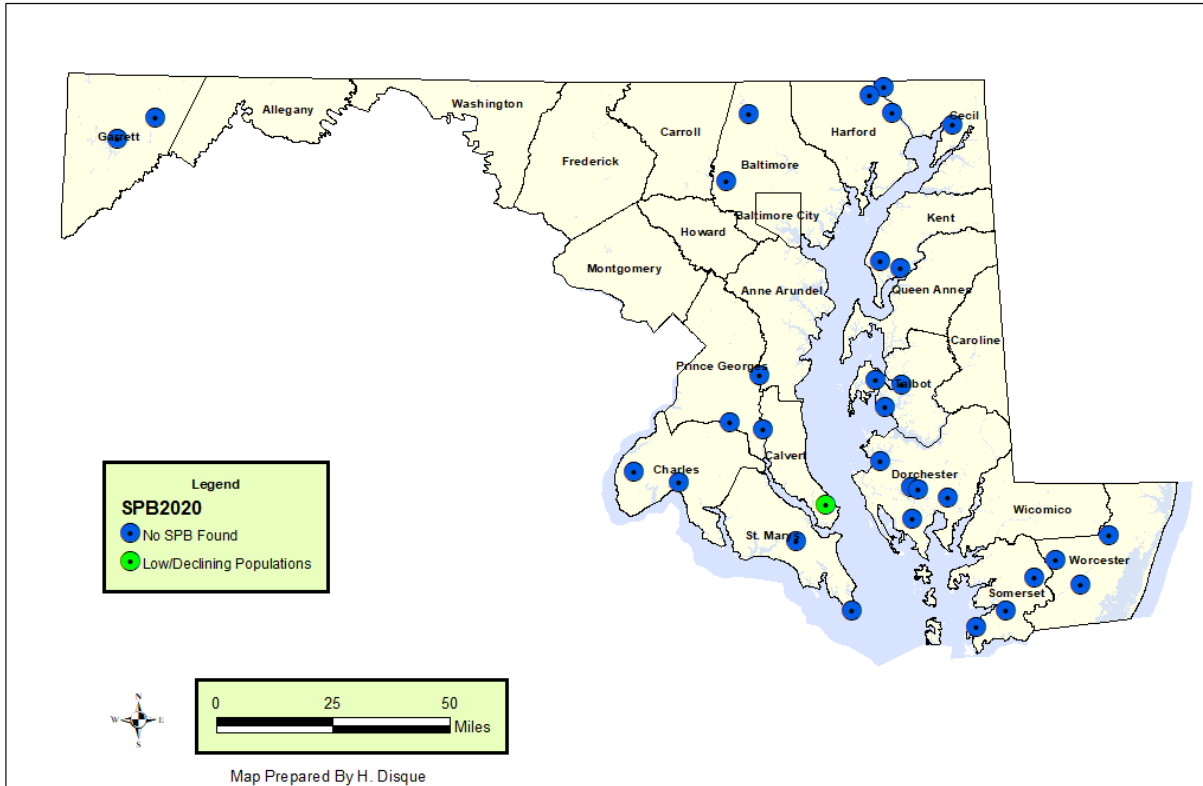


Figure 4. Maryland Department of Agriculture 2020 southern pine beetle survey forest pest management section

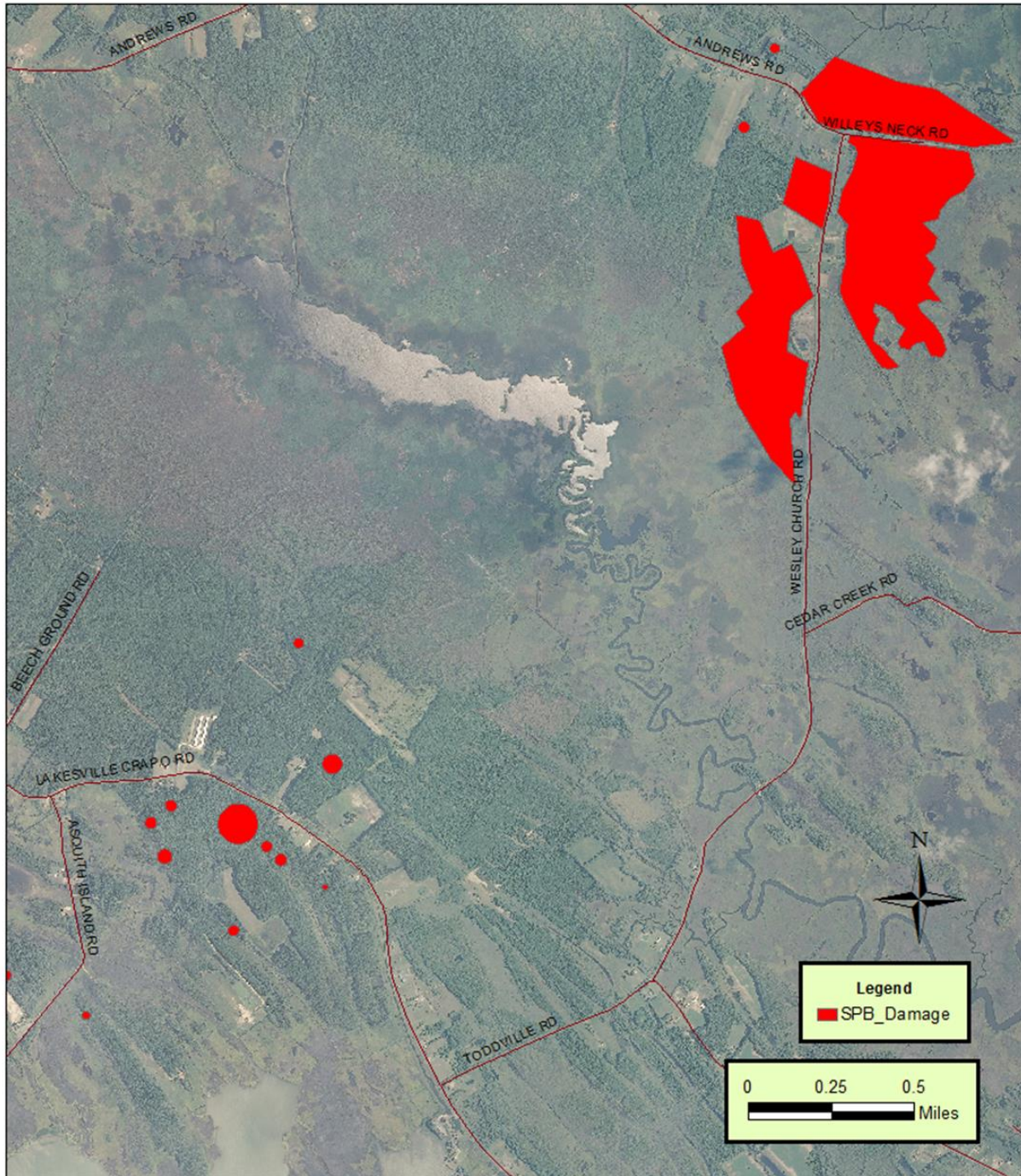


Figure 5. Maryland Department of Agriculture forest pest management section. Southern pine beetle affected area 2015 to 2017 in Dorchester County

Sirex noctillio (Woodwasp)

Sirex noctillio has been the most common species of exotic woodwasp detected at U.S. ports-of-entry associated with solid wood packing materials. Recent detections of this woodwasp outside

of port areas in the United States have raised concerns because this insect has the potential to cause significant mortality of pines. The *Sirex* woodwasp has not been detected in Maryland, but is known to be in Pennsylvania. To detect this insect, the department placed two traps per county on northern tier counties and one trap for all other counties, totaling 33 traps in pine woods. All traps were negative during the 2020 calendar year.

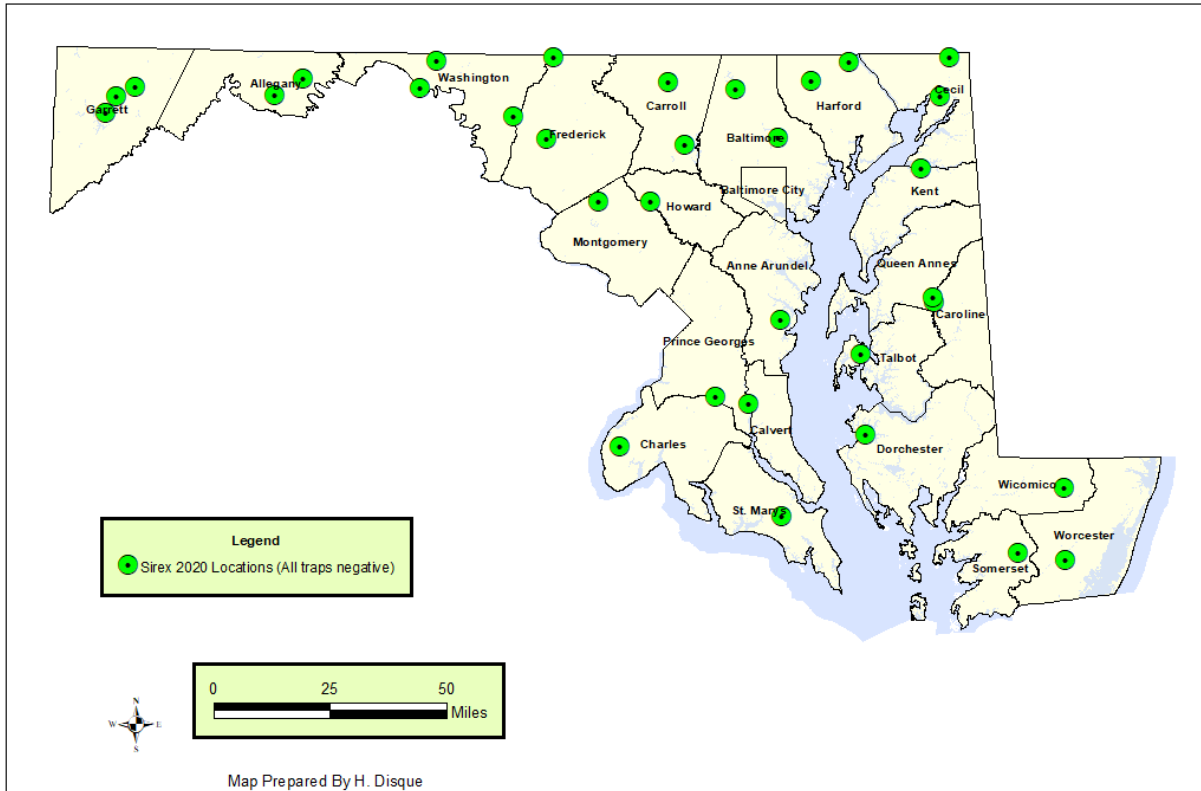


Figure 6. Maryland Department of agriculture 2020 *Sirex noctilio* survey forest pest management section

Emerald Ash Borer (EAB)

The Forest Pest Management program put up 18 green funnel traps in non-positive counties around the state and in the parasitoid release areas. EAB was found in the previously positive counties of Harford, Cecil, Kent, and Baltimore, as well as Baltimore City. EAB was found in Somerset County for the first time in June 2020. Six beetles were caught in a trap along a riparian forest edge. Large scale tree mortality has begun in Baltimore County and City parasitoid release locations. Rural forests along the upper Eastern shore have moderate tree mortality.

During the 2020 field season the MDA FPM released 12,661 parasitoids of the Emerald Ash Borer (EAB). The parasitoids were released at five state park locations, one Arboretum, and one Nature Conservancy property across Maryland including Garrett, Harford, Baltimore, Cecil, Caroline, Dorchester Counties and Baltimore City. FPM personnel released 2,600 *Oobius agrili*,

as pupae in 26 vials. Both *Tetrastichus planipennis* adults and pupae were released consisting of 4,928 individuals. Two species of *Spathius* were released consisting of 564 *Spathius agrili*, and 4,569 *Spathius galinae*. The *Spathius galinae* were provided from the USDA ARS BIIR Unit in Newark, DE.

In addition, FPM personnel supervised and completed treatments of ash trees around the state. This work was done at parks in cooperation with the Maryland Department of Natural Resources (DNR), and the Maryland Conservation Corps (MCC). In total 92 ash trees, 1,409" DBH were treated using 7,805 ml of Tree-age (emamectin benzoate). Treatments were scaled back due to COVID-19 restrictions.

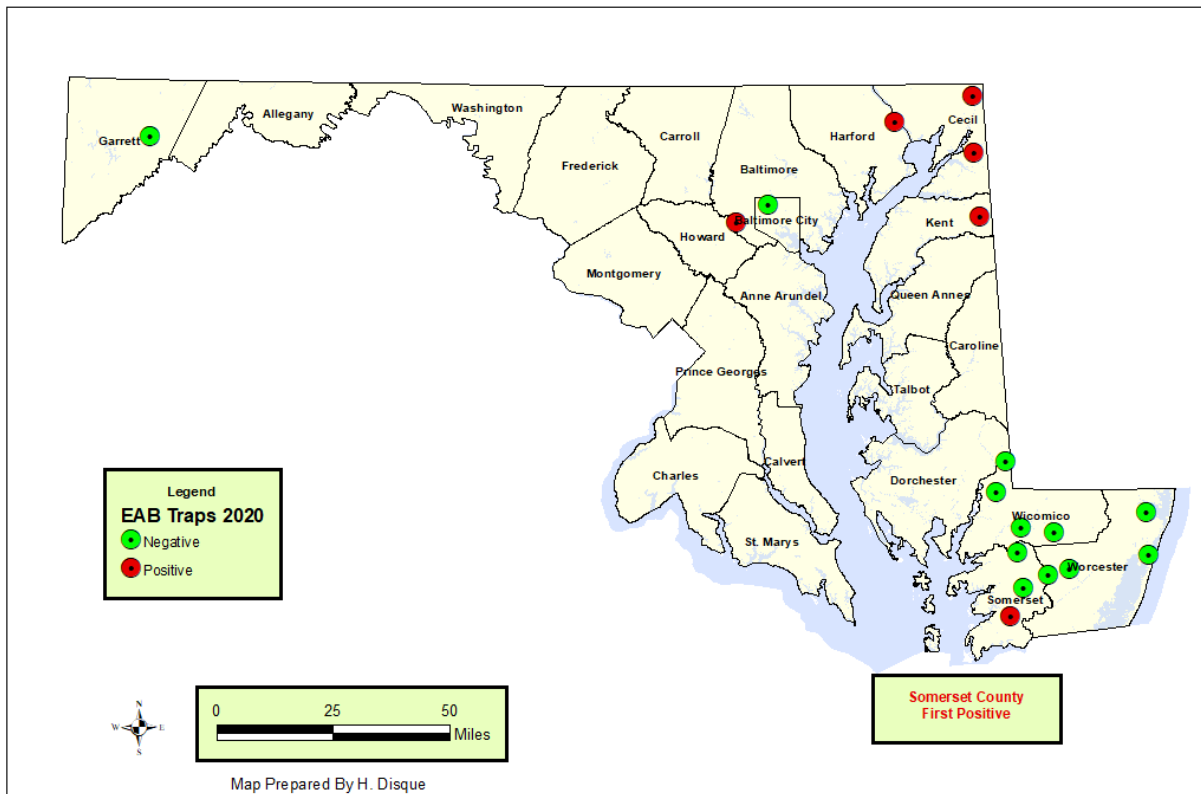


Figure 7. Maryland Department of Agriculture 2020 emerald ash borer trap results forest pest management section

Table 2. Maryland Department of Agriculture Forest Pest Management. 2020 emerald ash borer parasitoid release summary

Site Name	<i>Oobius agrilli</i> Vial count	<i>Oobius agrilli</i> Total	<i>Spathius agrili</i> Females	<i>Spathius agrili</i> Males	<i>Spathius galinae</i> Females	<i>Spathius galinae</i> Males	<i>Tetrastichus planipennisi</i> Bolt count	<i>Tetrastichus planipennisi</i> total
Cylburn Arboretum	0	0	211	68	747	250	0	0
Big Run State Park	0	0	0	0	0	0	38	4928
Martinak State Park	0	0	0	0	905	298	0	0
Susquehanna State Park	0	0	0	0	794	401	0	0
Patapsco Valley State Park	0	0	212	73	0	0	0	0
Fair Hill State Park	12	1200	0	0	769	405	0	0
Walnut Landing	14	1400	0	0	0	0	0	0
Totals	26	2600	423	141	3215	1354	38	4928

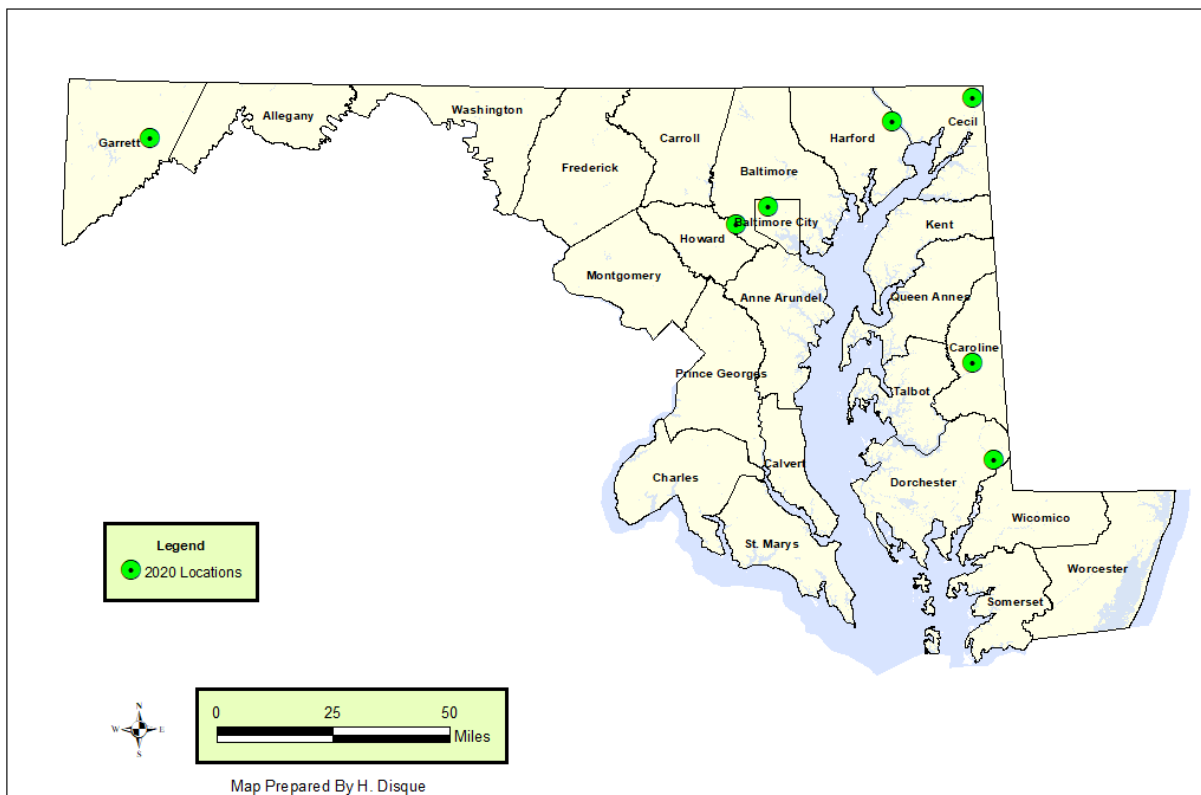


Figure 8. Maryland Department of Agriculture 2020 emerald ash borer parasitoid release locations forest pest management section

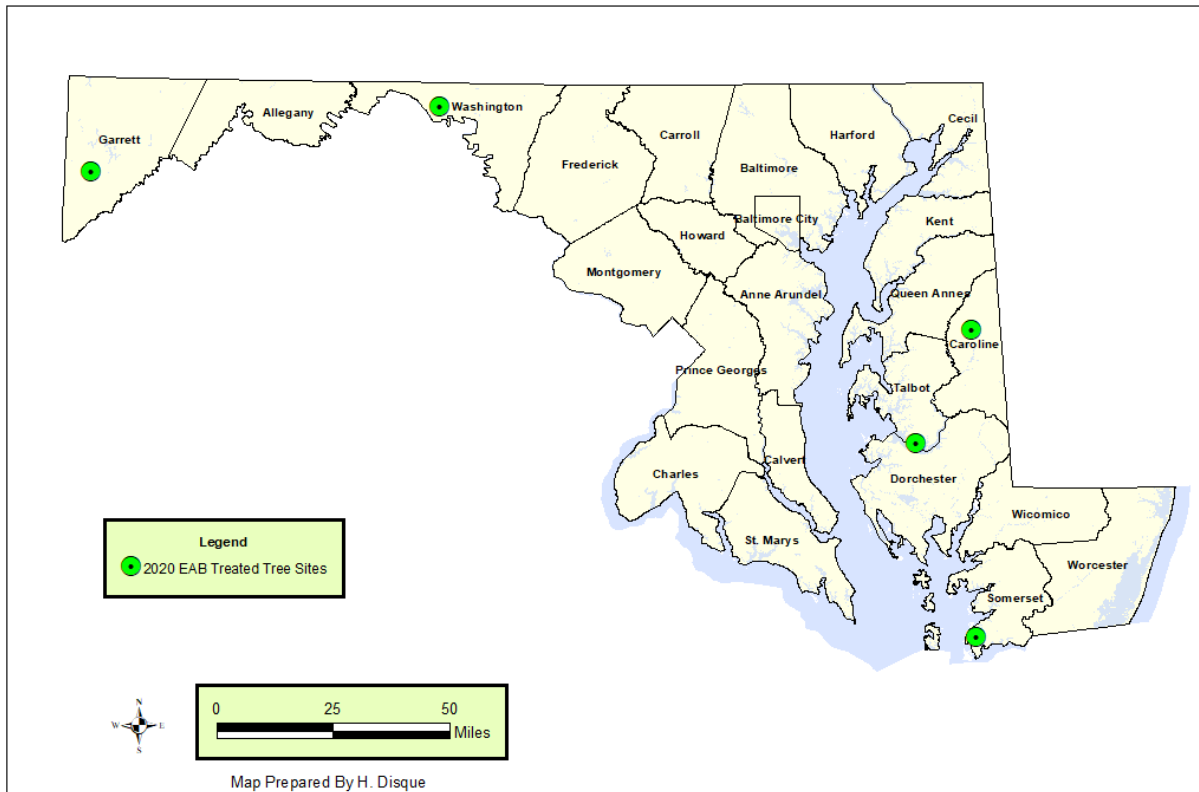


Figure 9. Maryland Department of Agriculture 2020 emerald ash borer treatment locations forest pest management section, MD DNR, MCC

Thousand Canker Disease of Black Walnut and Walnut Twig Beetle

Thousand Canker Disease was first recognized in 2008 as a complex consisting of the walnut twig beetle *Pityophthorus juglandis* and the fungus *Geosmithia morbida*, and is blamed for widespread mortality of eastern black walnut planted in the western United States. It has since spread east and was first reported in the natural range of the eastern black walnut in 2010 when it was discovered in Tennessee. Since then, it has been found in seven eastern states (TN, IN, OH, PA, VA, NC, & MD). In 2011, Maryland along with several other mid-Atlantic states started surveying for this disease. The walnut twig beetle was first detected in Maryland in 2013 and by October 2014 thousand cankers disease was confirmed. A quarantine order for northeastern Cecil County was issued by the Maryland Department of Agriculture in January 2015 to limit the spread of Thousand Canker Disease of Black Walnut. Upon new positive detections in 2018, the quarantine order was updated to include all of Baltimore City and part of Baltimore County. This new quarantine was signed on May 1, 2019 by Maryland's Secretary of Agriculture.

Fifty-nine Lindgren funnel traps baited with the walnut twig beetle lure were set across 20 counties and Baltimore City in 2019. Twenty-six (26) Lindgren funnel traps baited with the walnut twig beetle lure were set near previously positive sites in Cecil and Baltimore Counties and Baltimore City to delimit the infested areas. Traps were checked every two weeks, field

samples were collected, samples were sorted and labeled in office, and then sent to the Pennsylvania Department of Agriculture for identification. The previously positive site, trap CE01, was not positive in 2019. Trees at the original positive site have shown no evidence of decline. One trap in Baltimore County and one trap in Baltimore City were found to be positive. These traps were in the quarantine area.

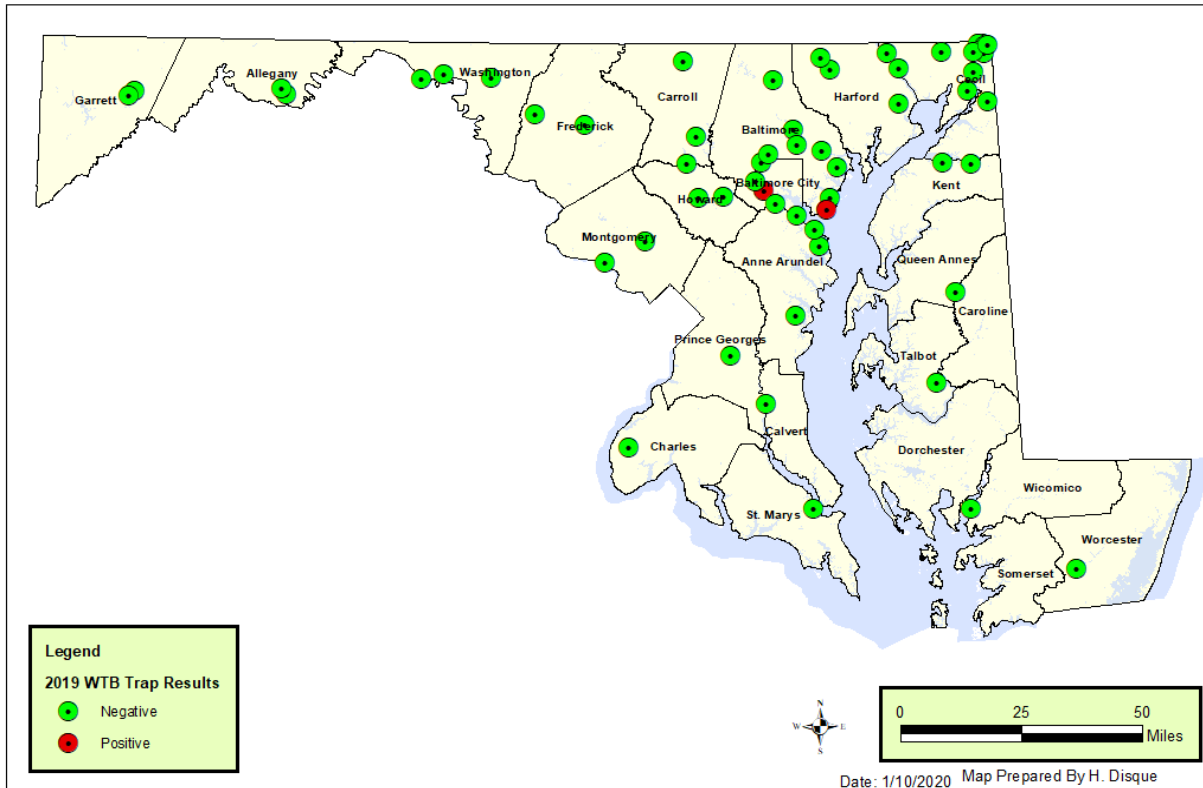


Figure 10. Maryland Department of Agriculture 2019 walnut twig beetle trap results prest pest management section.

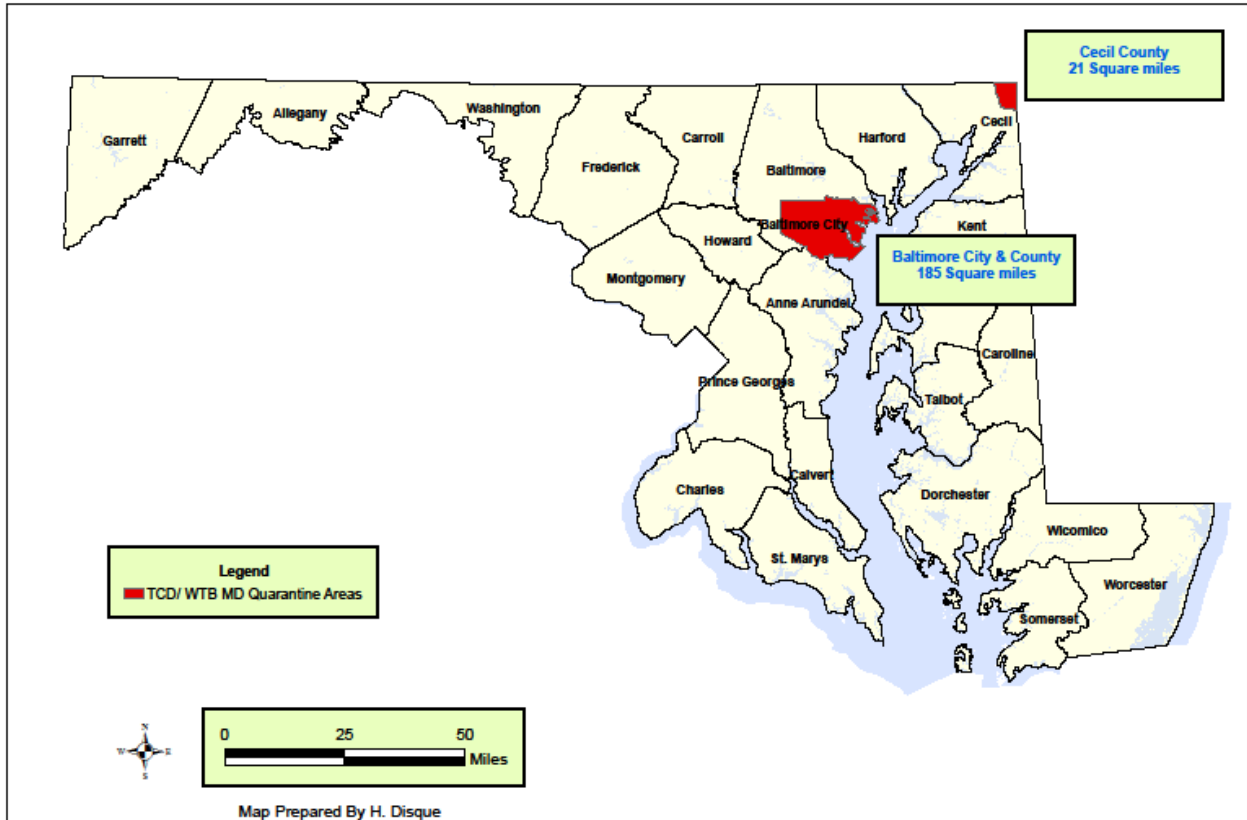


Figure 11. Maryland Department of Agriculture thousand canker disease and walnut twig beetle quarantine areas

Hemlock Woolly Adelgid Suppression

The Hemlock Woolly Adelgid (HWA) remains the major threat to the health of eastern hemlock. Infested hemlocks occur in the metropolitan area between Baltimore and Washington and in natural stands from Cecil to Garrett counties. In 2003 to 2004, a joint task force comprised of the FPM and Maryland Department of Natural Resources (DNR) experts addressed the multi-disciplinary needs of the HWA infestation. The task force prioritized more than 50 hemlock stands and selected them as the sites for joint suppression efforts (chemical and/or biocontrol). Only publicly owned or public use sites would be part of this suppression project. Currently, the chemical option involves treating the hemlock trees with the insecticide imidacloprid by one of two methods – trunk injection or soil injection. The biocontrol option involves releasing HWA predators into the hemlock stands in an effort to reduce HWA populations.

A total of 3,955 hemlock trees and 50,378” DBH were treated in MD between July 1, 2019 and June 30, 2020. Of this total, 724 trees or 8,065” DBH were trunk (stem) injected and 3,222 trees or 42,191” DBH were soil injected. CoreTect was used to treat 9 trees totaling 60”DBH. Treatments efforts in 2020 were severely affected by the COVID-19 pandemic.

Table 3. Maryland Department of Agriculture Forest Pest Management year Imidacloprid treatments for hemlock woolly adelgid control in Maryland 2004 to 2020**

	Trunk Injection	Trunk Injection	Soil Injection	Soil Injection	CoreTect	CoreTect	Total	Total
Year	Num. of Trees	Inches DBH	Num. of Trees	Inches DBH	Num. of Trees	Inches DBH	Num. of Trees	Inches DBH
2004	166	2687	0	0	0	0	166	2687
2005	106	1433	1675	17,623	0	0	1781	19,056
2006	38	476	1015	9465	0	0	1053	9941
2007	22	325	324	4279	0	0	346	4604
2008	129	1982	18	257	0	0	147	2239
2009	124	1281	675	6029	0	0	799	7310
2010	724	8534	3672	33,701	98	862	4495	43,096
2011	1905	19,468	7285	81,684	80	610	9270	101,761
2012	1957	20,206	10,086	105,395	4	45	12,047	125,645
2013	1980	18,993	11,755	117,604	7	47	13,742	136,644
2014	1844	19,047	6915	75,751	644	7,853	9,403	102,651
2015	1474	14,378	8072	94,099	4	32	9550	108,509
2016	1822	19,791	8008	85,813	64	577	9894	106,181
2017	1435	15,610	8511	93,997	234	252	10,180	109,859
2018	1433	14,647	8667	93,623	220	557	10,320	108,827
2019	1431	14,994	8386	82,628	27	180	9,844	97,802
2022**	127	1893	555	13,102	5	37	687	15,032
Total								

** Includes totals from spring only

Hemlock Woolly Adelgid Predator Releases.

Over 51,801 predators have been released in Maryland since 1999. In 2019, 974 *Laricobius nigrinus* were released at sites in Baltimore and Frederick Counties.

Table 4. Maryland Department of Agriculture Forest Pest Management Saltwater Maryland Hemlock Woolly Adelgid Predator Releases 2003 to 2019

Hemlock Stand	County	<i>Laricobius nigrinus</i>	<i>Laricobius osakensis</i>	<i>Scymus coniferarum</i>	<i>Scymus coniferarum</i>	<i>Sasajiscymnus tsugae</i>
Rocky Gap State Park	Allegany	3476	0	105	0	5000
Prettyboy Reservoir	Baltimore	3172	0	0	0	0
Cunningham Falls State Park	Fredrick	810	0	0	0	0
Fedrick City Watershed	Fredrick	3393	0	0	945	0
Broad Creek Scout Camp	Harford	2702	0	0	0	15410
Rocks State Park	Harford	1924	0	0	0	0
Hagerstown Watershed	Washington	853	0	0	0	0
Big Run (Savage River SF)	Garrett	1685	0	0	0	0
Big Run State Park	Garrett	325	0	0	0	0
Dry Run (Savage River SF)	Garrett	150	0	0	0	0
Frostburg Watershed	Garrett	300	0	0	0	0
Laurel Run (Potomac SF)	Garrett	1684	0	0	0	0
Lostland Run (Potomac SF)	Garrett	1857	500	0	0	0
Poplar Lick (Savage River SF)	Garrett	2799	1510	0	0	0
Elk Lick (Savage River SF)	Garrett	1691	500	0	0	0
Gunpowder Falls State Park	Baltimore	0	1010	0	0	0
Total		26821	3520	105	945	20410

HWAS Efficacy Surveys

Treatment efficacy surveys have been conducted annually since 2006. Data analyzed through 2017 shows treated trees averaged a 79% reduction in HWA populations when measured 1-year post treatment and non-treated trees averaged a 24% increase in HWA populations when measured over the same period. . In 2019-2020, efficacy surveys were done at treatment sites in Baltimore, Frederick, Garrett, and Washington Counties.

Exotic Asian Defoliator Survey

A comprehensive exotic Asian defoliator survey was proposed and funded through the Farm Bill for 2020. This survey increases the likelihood that this harmful invader can be detected early and that an appropriate eradication response can be mounted to protect Maryland's forest industry. One of the high-risk areas targeted is the Chesapeake Bay, as it is a major thoroughfare for ships coming into the Port of Baltimore. An increase in the size of ships and ship traffic coming to Baltimore has increased the risk of an accidental introduction of exotic Asian defoliators. Eight moths were chosen to survey based on their biological characteristics that enable them to become successful invaders, for their habitat preference, and prior intelligence that suggests an increased risk of introduction.

Forest Pest Management deployed traps at 17 locations statewide to determine the presence or absence of Asian defoliator moths. At each location six traps were set up to survey for the eight species of moths. Traps ran from May to September and were checked bi-weekly. Forests composed of oak, willow, sweet gum, poplar, beech, pine, and other host trees and shrubs were surveyed. Several Asian gypsy moth (*Lymantria dispar asiatica/japonica*) traps have been positive for gypsy moths. The European and Asian gypsy moths are difficult to morphologically separate, so the specimens were sent to the USDA's Otis laboratory for genetic testing and species determination. Final results are pending, however all of the samples that have been processed were determined to be European gypsy moth (*Lymantria dispar dispar*).

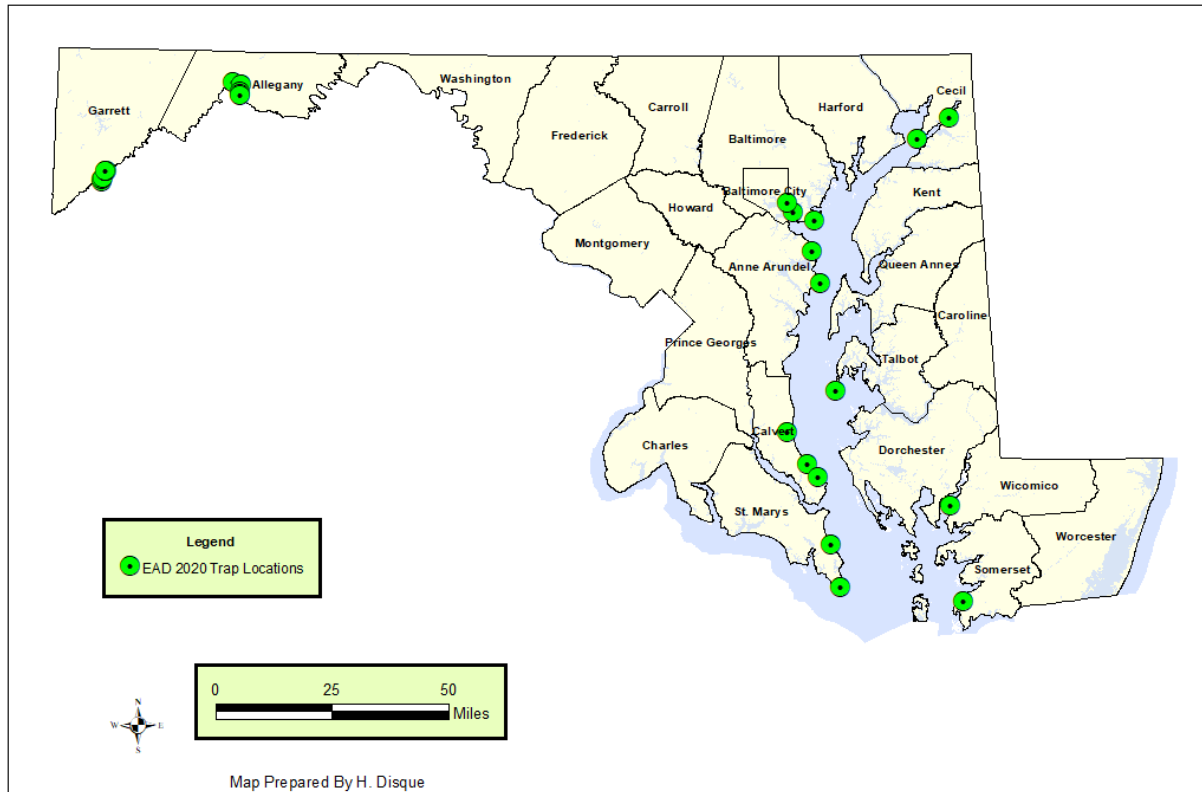


Figure 12. Maryland Department of Agriculture 2020 exotic Asian defoliator survey trap locations forest pest management section

Beech Bark Disease

Beech bark disease (BBD) has been found in approximately 160,000 acres in Allegany and Garrett Counties.

In 2013, four permanent Beech Bark Disease (BBD) monitoring sites were set up. BBD has been found in Allegany and Garrett Counties. Permanent plots were visited in 2020 for the detection of Beech Leaf Disease (BLD). During BLD surveys BBD was found in the Frostburg Watershed for the first time. Areas with confirmed BBD are seen in the map below.

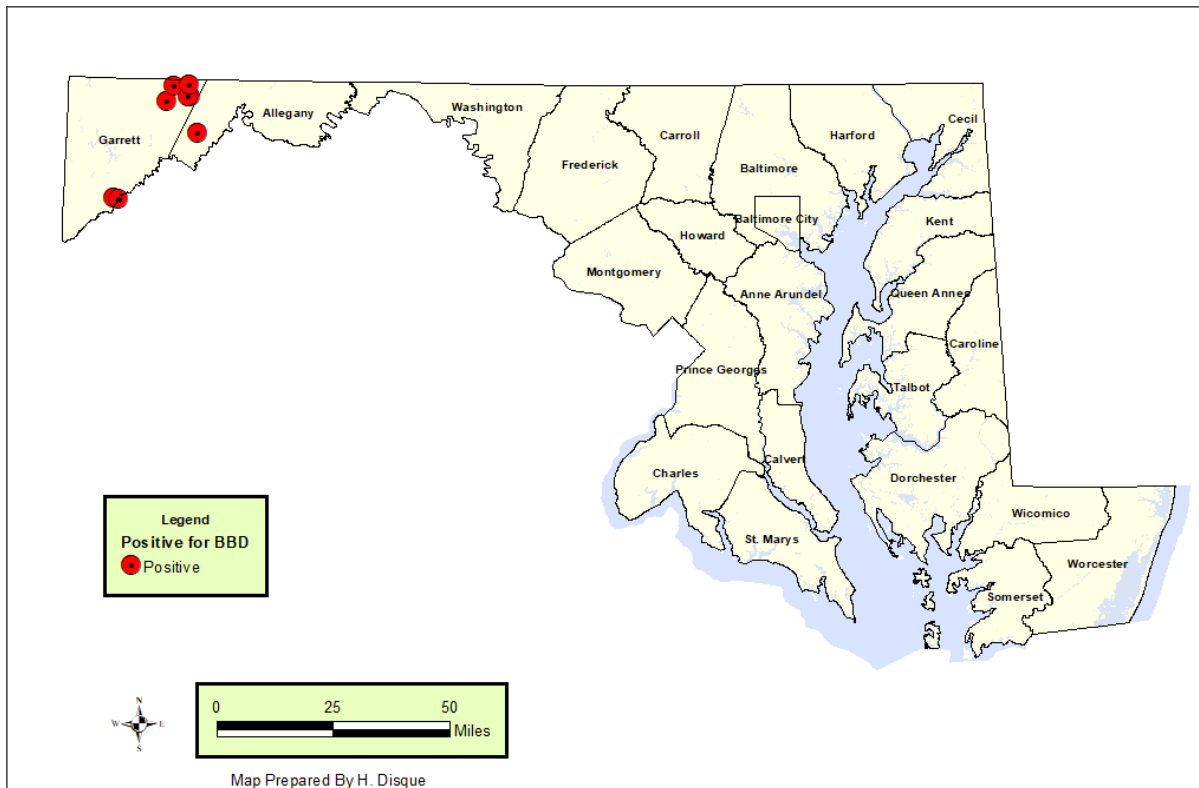


Figure 13. Maryland Department of Agriculture positive beech bark disease locations forest pest management section

Saltwater Intrusion

In July 2020, a saltwater intrusion delineation flight was flown across the Lower Eastern Shore. This flight mirrored the flights taken yearly since 2017 in order to determine the areas affected by saltwater intrusion and to map changes.

In total 50,365 acres of forest were found to be affected by saltwater intrusion. The affected acres were spread across the lower Eastern Shore. Dorchester, Somerset, Worcester, and Wicomico Counties were affected by saltwater intrusion. This is in contrast to 2019 when 10,174 acres were found to be affected by saltwater intrusion. The large majority of the mapped forests were either very severely or severely affected by saltwater intrusion.

Table 5. Maryland Department of Agriculture Forest Pest Management Saltwater Intrusion Flight Summary

County	Acres
Dorchester	33,963
Somerset	6,008
Wicomico	8,627
Worcester	1,767
Total	50,365

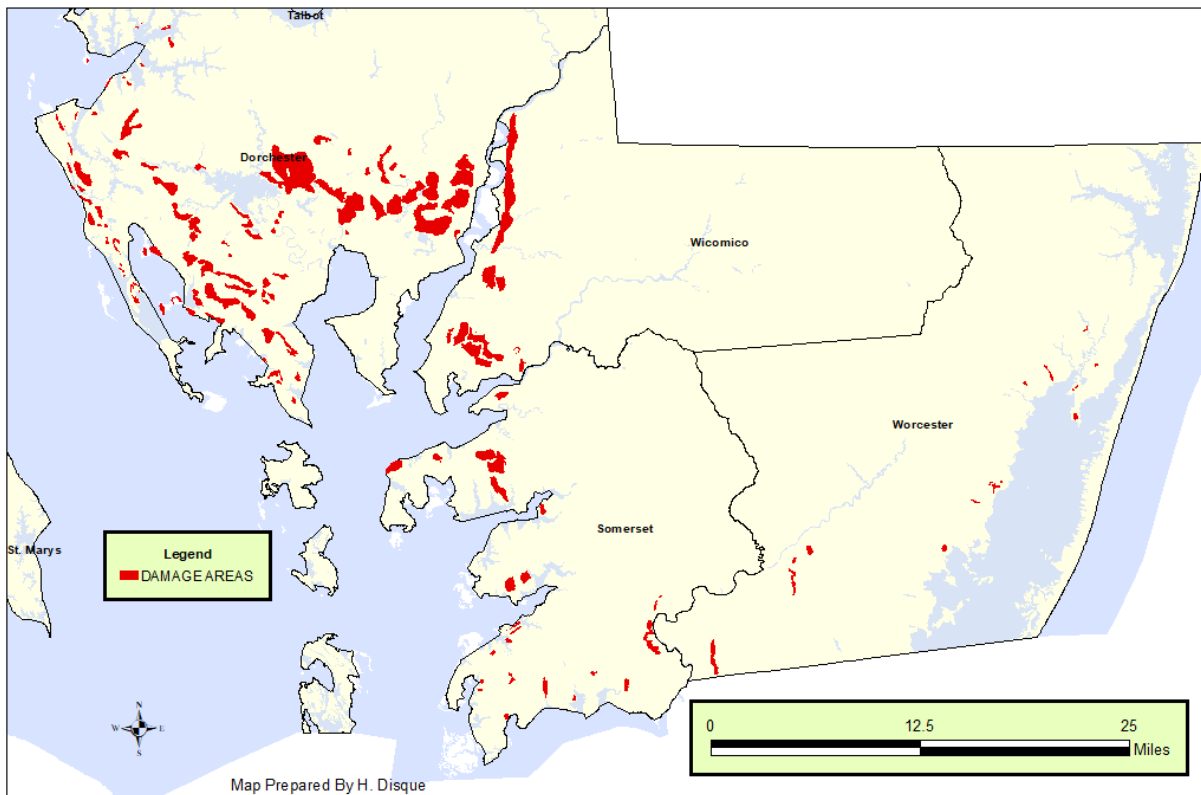


Figure 14. Maryland Department of agriculture 2020 saltwater intrusion affected areas forest pest management section

OAK ISSUES

In Maryland there are significant numbers of mature oak trees in decline and dying. Secondary pests are present, but likely not the cause of mortality. An Oak wilt survey has begun and samples are processed at the University of Maryland Plant Diagnostic Lab. Oak wilt was detected in an area previously positive for the disease. In addition, *Dipoldia corticula*, Bacterial leaf scorch, *Phytophthora* and other fungi were found. A first report for Maryland of *Diplodia quercivora* was detected in Green Ridge State Forest and information is documented by Haines, et al. 2019 “[First Report of Diplodia quercivora Causing Stem Cankers on Chestnut Oak \(Quercus montana\) in Maryland.](#)”

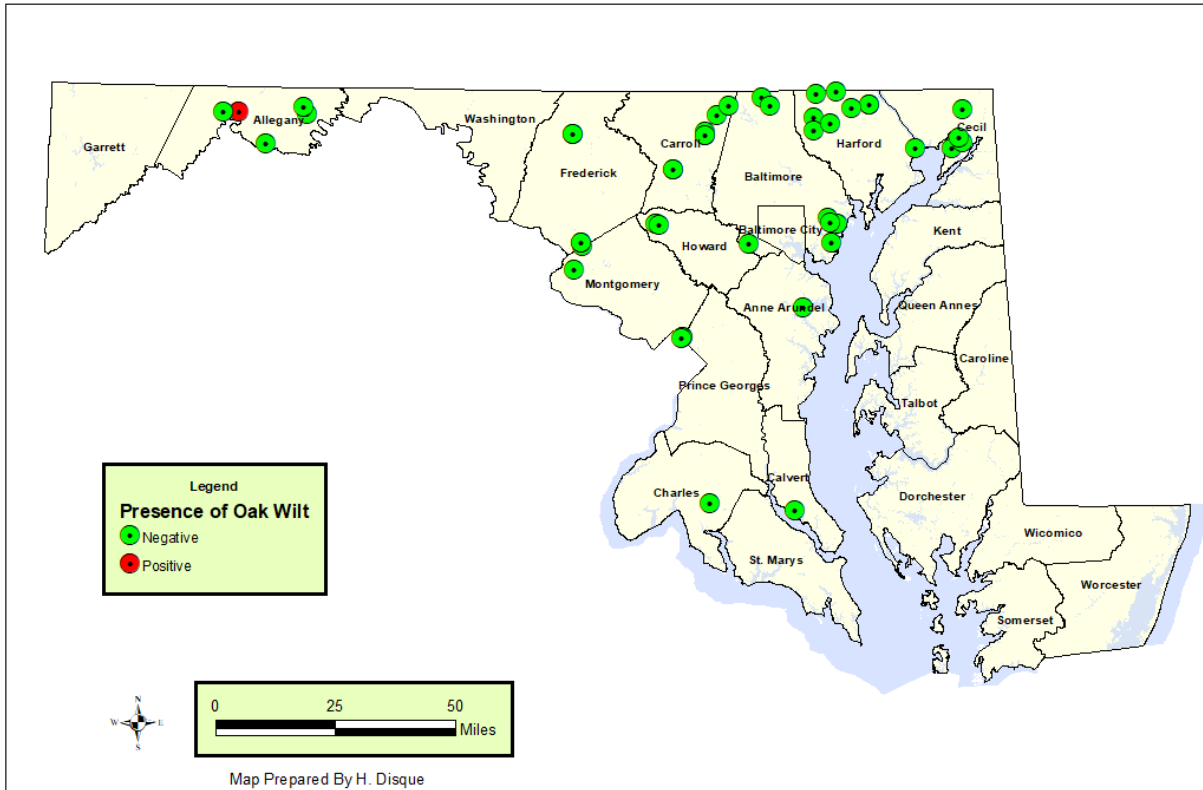


Figure 15. Maryland Department of Agriculture 2019 oak decline survey results, oak wilt forest pest management section

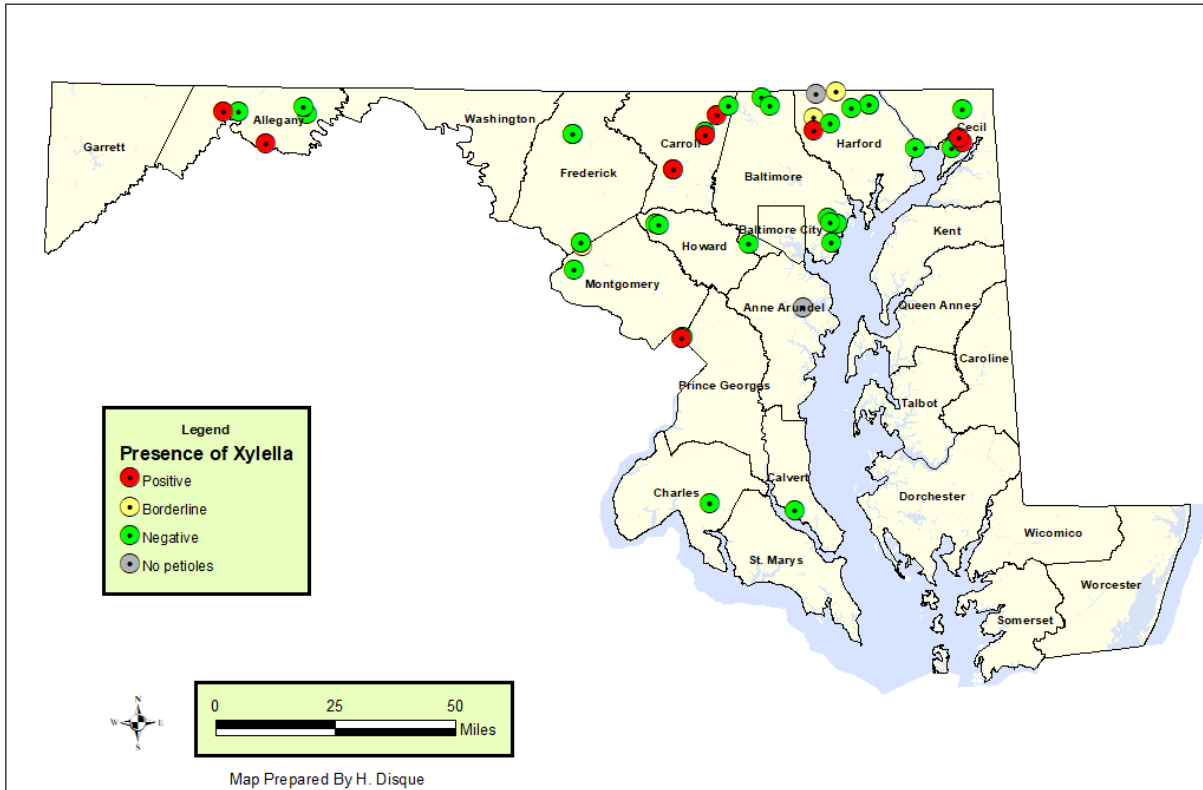


Figure 16. Maryland Department of Agriculture 2019 oak decline survey results, bacterial leaf scorch forest pest management section

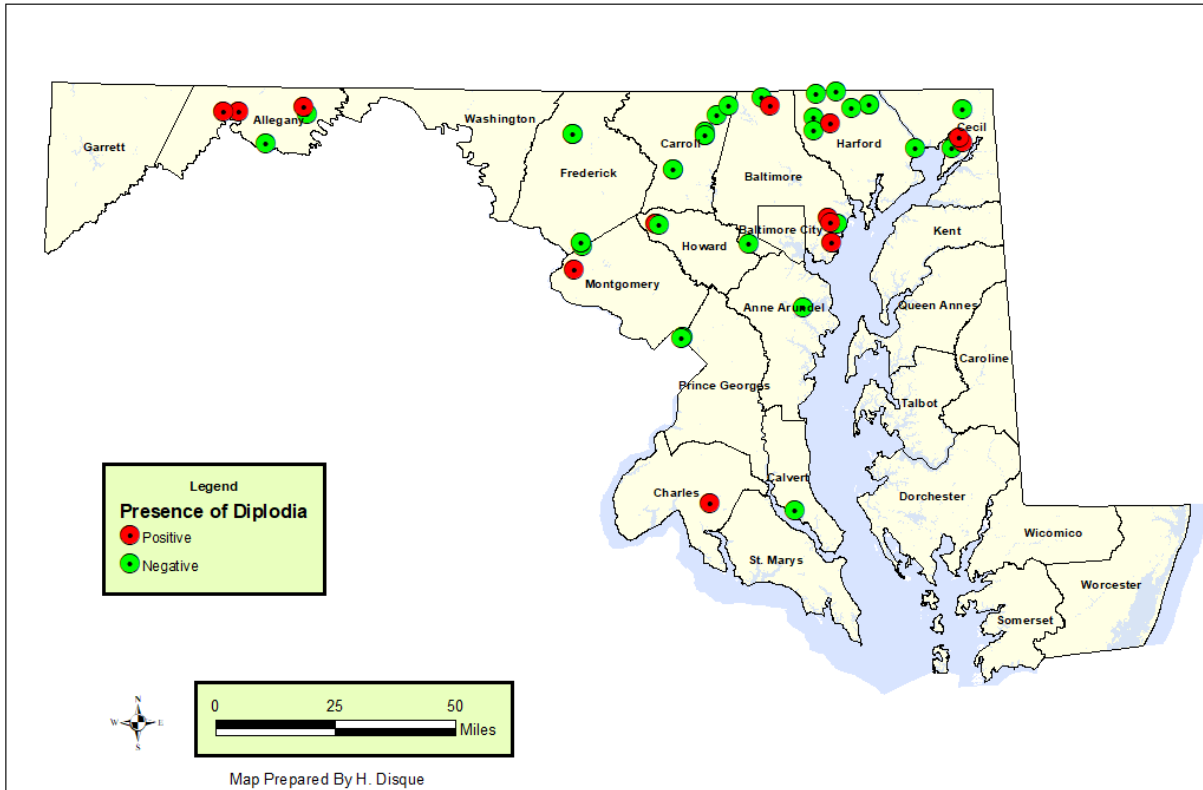


Figure 17. Maryland Department of Agriculture 2019 oak decline survey results of *Diplodia corticola* forest pest management section

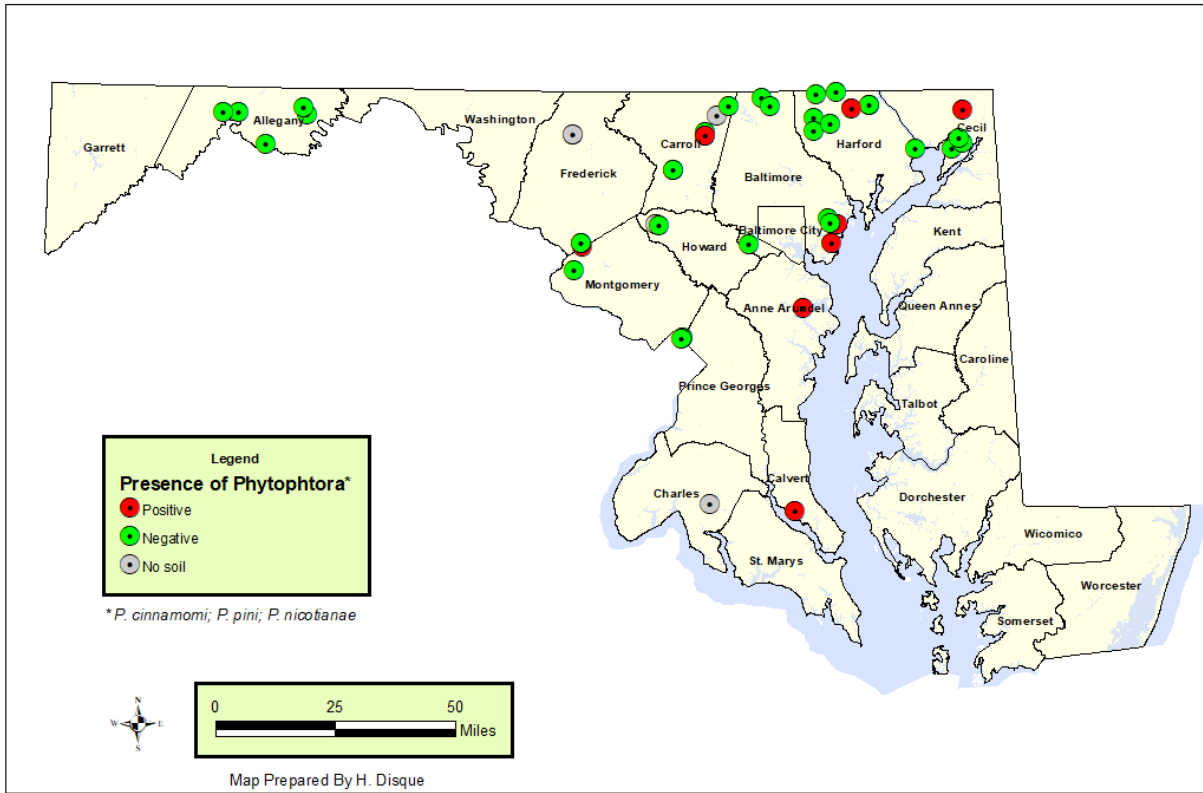


Figure 18. Maryland Department of Agriculture 2019 oak decline survey results of *Phytophthora* forest pest management section

FOREST HEALTH MONITORING- PEST DAMAGE

Defoliation areas were mapped during an aerial flight, a drone flight, and a ground survey.

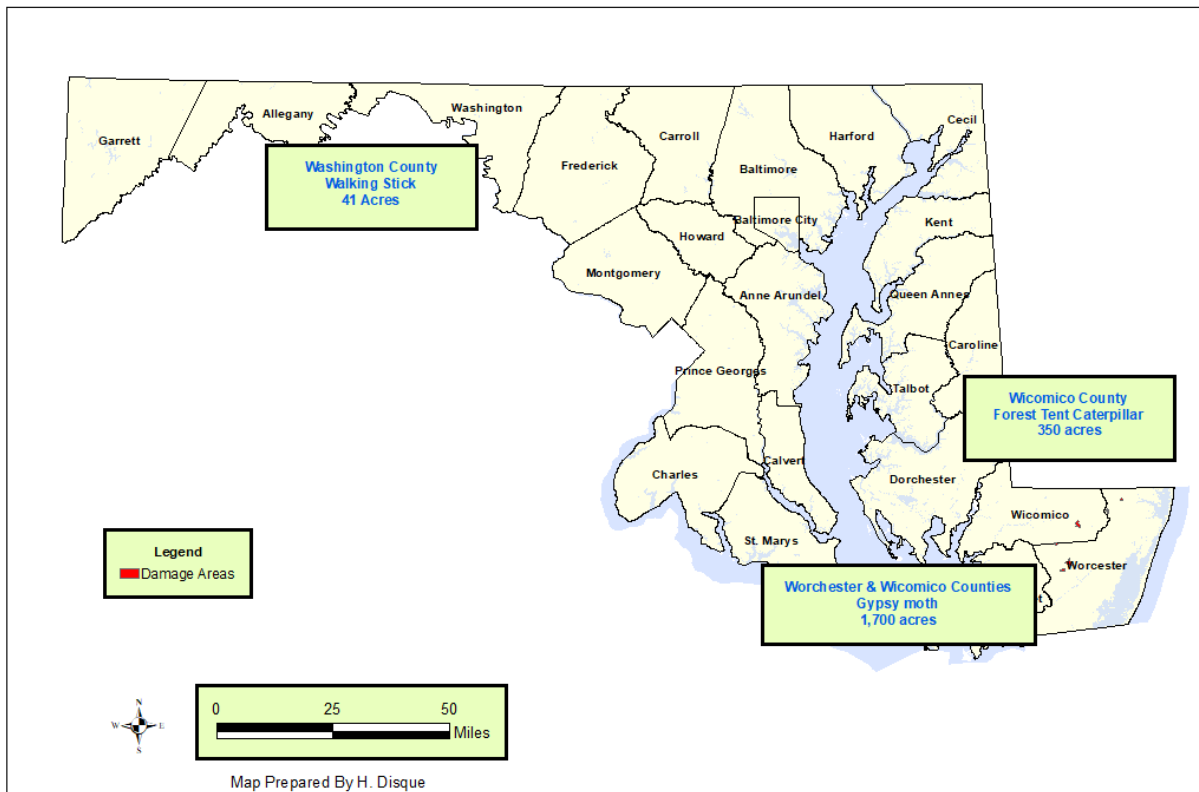


Figure 19. Maryland Department of Agriculture forest health monitoring pest damage map forest pest management section