

## MARYLAND 2022 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.

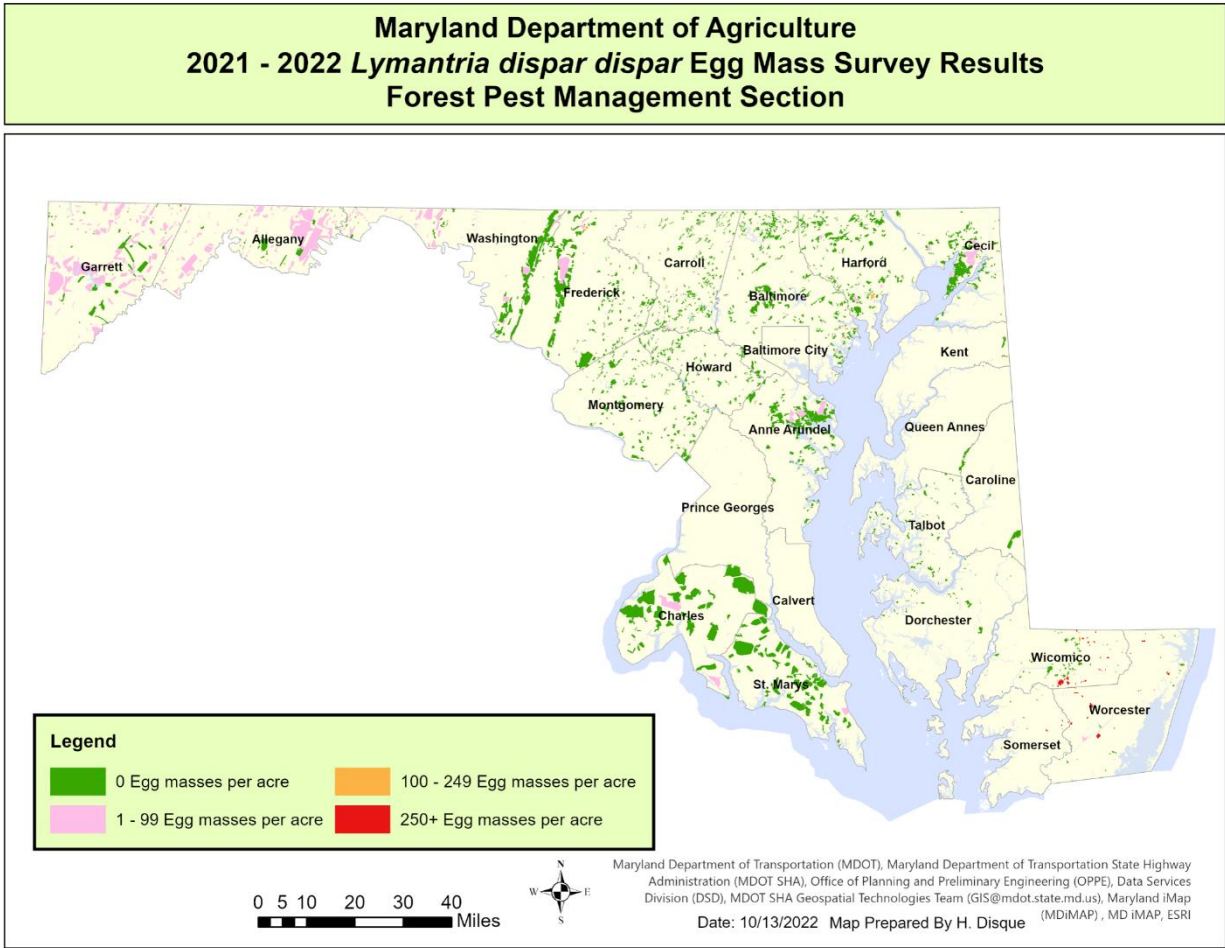
### **Office of Plant Industries & Pest Management:**

### **FOREST PEST MANAGEMENT**

#### **FOREST PEST MONITORING AND SURVEYING**

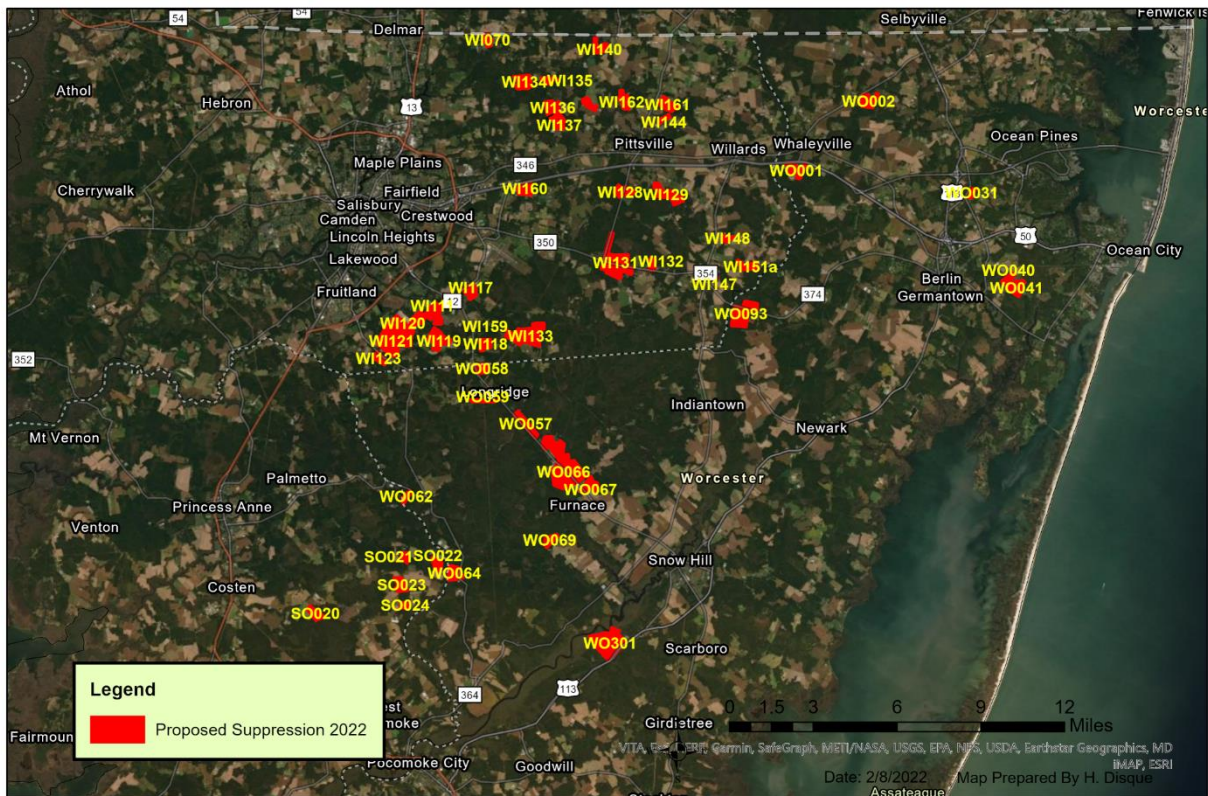
*Lymantria dispar dispar*. *Lymantria dispar dispar* (Ldd), the insect formally known as gypsy moth, is the most serious threat to oak forests in the United States. The first eggs were detected in Maryland in 1971 and the first extensive defoliation occurred in 1981. Each fall and winter, the department conducts an extensive survey for Ldd egg masses to determine potential areas of defoliation. From August 2021 through March 2022, Maryland Department of Agriculture Forest Pest Management (MDA FPM) personnel conducted Ldd egg mass surveys on 509,038 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 7,436 acres in 2022. In May 2022, 7,411 acres that are located on the lower Eastern Shore and were sprayed with *Bacillus thuringiensis*. Ldd defoliation in 2022 totaling 20,513 acres was seen on the lower Eastern shore.

[MDA 2021-2022 MARYLAND GYPSY MOTH SURVEY RESULTS, also in attachment folder]

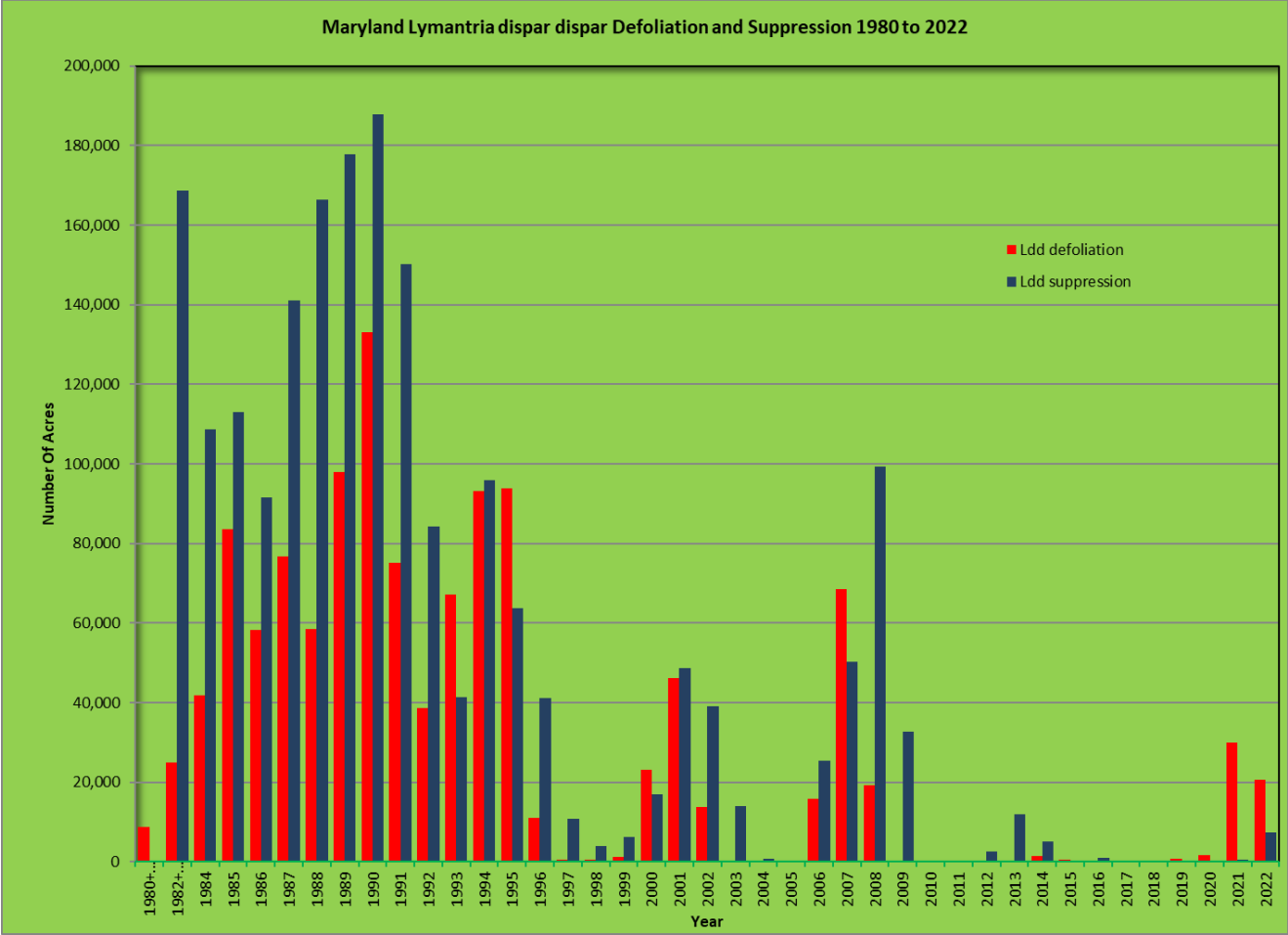


[MARYLAND Ldd SUPPRESSION BLOCKS, also in attachment folder]

Maryland Department of Agriculture  
2022 Proposed *Lymantria dispar dispar* (gypsy moth) Suppression  
Forest Pest Management Section



[MARYLAND GYPSY MOTH DEFOLIATION AND SUPPRESSION 1980 to 2022, also in attachment folder]



[MDA 2021-2022 Maryland Gypsy Moth Egg Mass Survey Summary, also in attachment folder]

Maryland Department of Agriculture  
2021 - 2022 Maryland Gypsy Moth Egg Mass Survey Summary  
Forest Pest Management

County	Total	Private & County	State	# Positive	% Positive	# Blocks	# Acres	% Positive 2020-2021
<b>EASTERN SHORE</b>								
Caroline	41	0	41	0	0.0	6	3,848	0
Dorchester	124	86	38	0	0.0	37	3,140	0.0
Queen Anne's	18	0	18	0	0.0	7	442	0
Somerset	50	50	0	13	26.0	15	792	2
Talbot	184	180	4	0	0.0	69	5,778	0
Wicomico	260	254	6	75	28.8	86	7,460	11
Worcester	145	105	40	68	46.9	44	3,650	6
<b>TOTALS</b>	<b>822</b>	<b>675</b>	<b>147</b>	<b>156</b>	<b>19.0</b>	<b>264</b>	<b>21,262</b>	<b>4.4</b>
<b>SOUTHERN</b>								
Charles	173	155	18	4	2.3	43	36,290	1.6
St Marys	191	183	8	1	0.5	56	39,413	1.6
Anne Arundel	387	385	2	4	1.0	100	27,323	1.3
Prince Georges	0	0	0	0	0.0	0	0	0
Calvert	0	0	0	0	0.0	0	0	0
<b>TOTALS</b>	<b>751</b>	<b>723</b>	<b>28</b>	<b>9</b>	<b>1.2</b>	<b>199</b>	<b>103,026</b>	<b>1.4</b>
<b>NORTHEAST</b>								
Baltimore	779	671	108	7	0.9	199	88,505	1.9
Cecil	478	375	103	7	1.5	88	27,488	0.2
Harford	598	526	72	4	0.7	144	26,304	0.3
Kent	10	0	10	0	0.0	3	808	0
Baltimore City	0	0	0	0	0.0	0	0	0
<b>TOTALS</b>	<b>1,865</b>	<b>1,572</b>	<b>293</b>	<b>18</b>	<b>1.0</b>	<b>434</b>	<b>143,105</b>	<b>0.9</b>
<b>WESTERN</b>								
Allegany	886	400	486	262	29.6	124	50,289	18.2
Garrett	1,039	600	439	105	10.1	152	64,654	17.2
Washington West	334	200	134	96	28.7	53	12,138	18.9
<b>TOTALS</b>	<b>2,259</b>	<b>1,200</b>	<b>1,059</b>	<b>463</b>	<b>20.5</b>	<b>329</b>	<b>127,081</b>	<b>17.8</b>
<b>CENTRAL</b>								
Carroll	554	523	31	17	3.1	229	18,085	0.2
Frederick	790	737	53	13	1.6	237	44,970	0.9
Howard	286	250	36	1	0.3	100	10,147	0.9
Montgomery	581	514	67	3	0.5	183	19,194	0
Washington East	307	253	54	9	2.9	64	22,168	0.5
<b>TOTALS</b>	<b>2,518</b>	<b>2,277</b>	<b>241</b>	<b>43</b>	<b>1.7</b>	<b>813</b>	<b>114,564</b>	<b>0.5</b>
<b>TOTALS</b>	<b>8,215</b>	<b>6,447</b>	<b>1,768</b>	<b>689</b>	<b>8.4</b>	<b>2039</b>	<b>509,038</b>	<b>5.7</b>

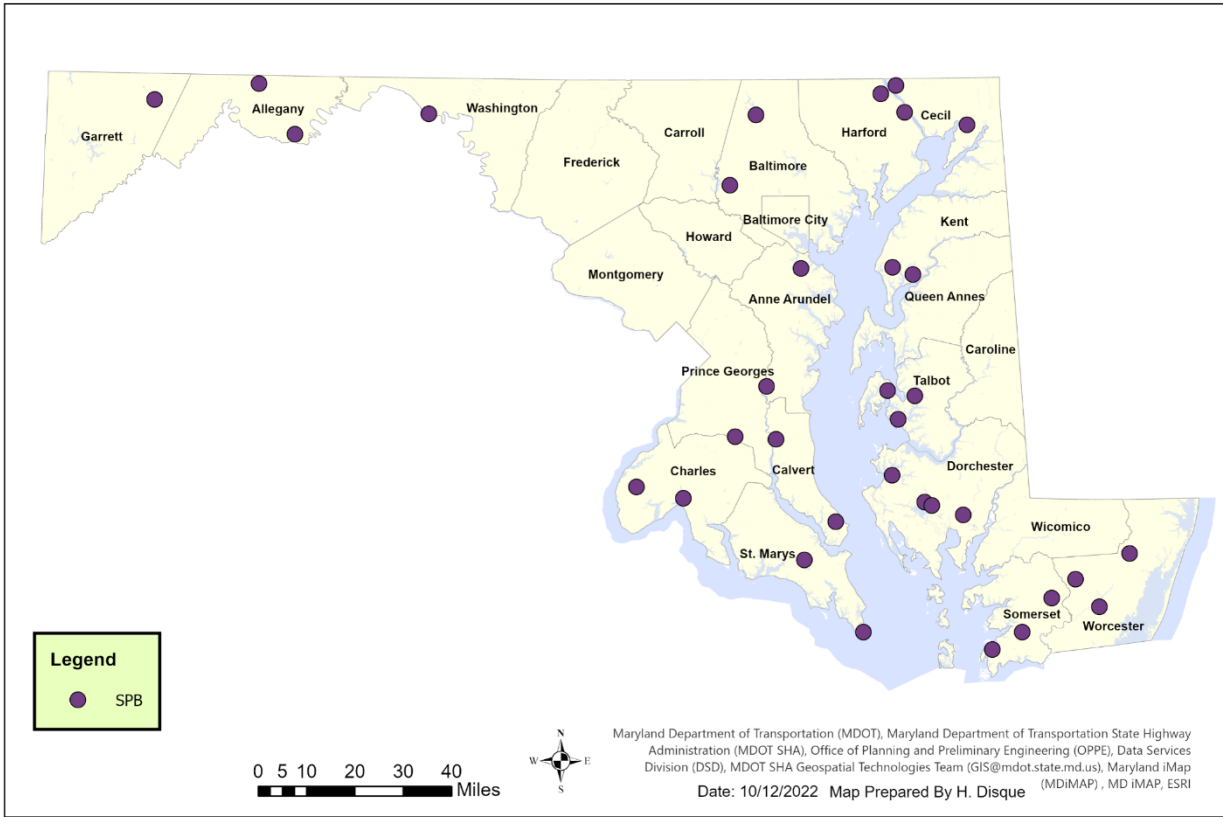
**Southern Pine Beetle.** The Southern Pine Beetle (SPB) is one of the most destructive insect pests of pines. Maryland is at the northern edge of its range and is commonly found on the lower Eastern Shore and Southern Maryland. Since 1989, Maryland has participated in a multi-state SPB survey throughout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

Traps were set up in 16 counties across Maryland. Trap catch of SPB was low across Maryland. Several traps collected beetles in Prince Georges, Charles, and St Marys that were higher than historically found but still low overall. No dieback or damage was seen. One site in Anne Arundel saw mortality of 10-15 loblolly trees in the fall of 2021. SPB was caught at a nearby trap in 2022 but at low levels with very high levels of clerid beetles. 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.

**[MDA 2022 SOUTHERN PINE BEETLE TRAP LOCATIONS, also in attachment folder]**

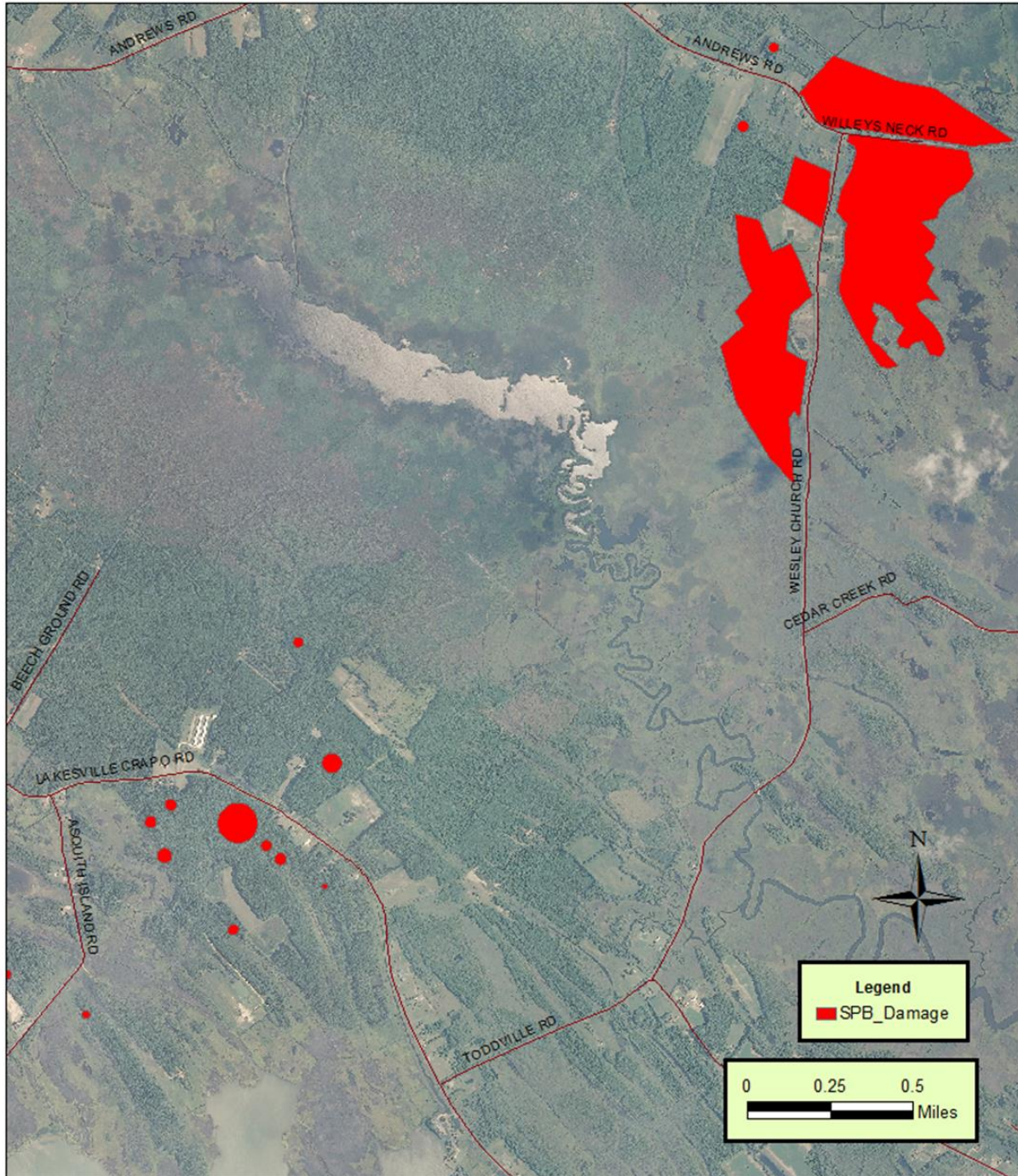
Maryland Department of Agriculture  
2022 Southern Pine Beetle Trapping Locations  
Forest Pest Management Section



**[MDA SOUTHERN PINE BEETLE AFFECTED AREAS 2015-2017 DORCHESTER COUNTY, also in attachment folder]**



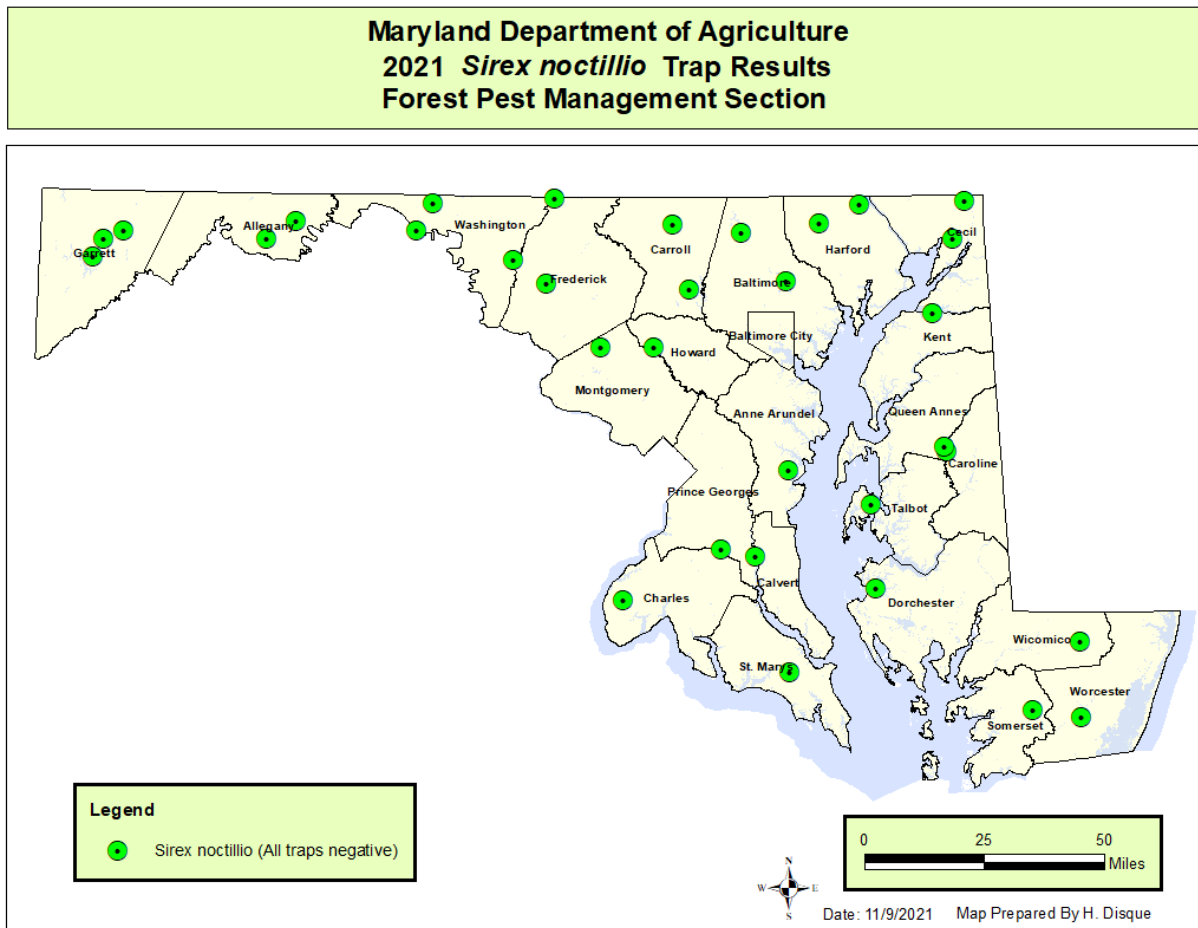
Maryland Department of Agriculture  
Forest Pest Management Section  
Southern Pine Beetle Affected Area 2015-17  
Dorchester County





***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 2021 calendar year. Two native woodwasps were collected. *Urocerus cressoni* was found in Anne Arundel, Cecil, and Harford counties. *Sirex nigricornis* was found in Charles and Allegany counties.

[MDA 2021 SIREX NOCTILLIO TRAP LOCATIONS, also in attachment folder]



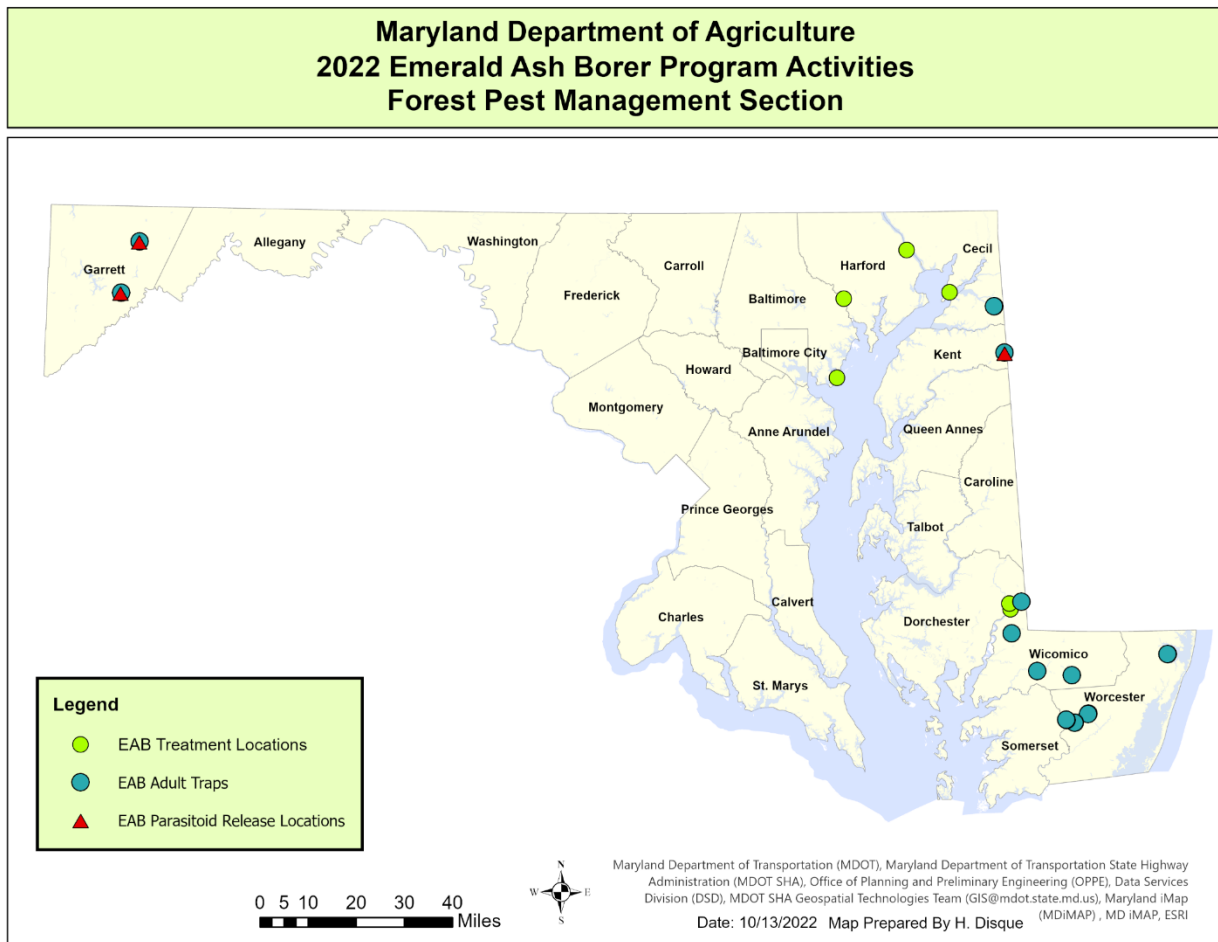
**Emerald Ash Borer (EAB).** MDA’s Forest Pest Management put up 12 green funnel traps in non-positive counties around the state and in the parasitoid release areas to monitor for EAB. EAB was found in Cecil, Kent, and Garrett counties.

Large-scale, rapid tree die off has begun at the Harford, Cecil, Kent, and Caroline parasitoid release locations. Rural forests along the upper Eastern shore are also experiencing rapid mortality.

During the 2022 field season Forest Pest Management released 3,642 parasitoids of the EAB. The parasitoids were released at one state park locations and one state forest in Garrett and Kent counties. Forest Pest Management released 1,600 *Oobius agrili* as pupae in 16 vials. At one site 2,042 *Spathius galinae* adults.

In addition, Forest Pest Management staff supervised treatments of ash trees around the state. This work was done at parks in cooperation with DNR, the Blackwater National Wildlife Refuge, and the Maryland Conservation Corps (MCC). In total around 300 ash trees were treated using Tree-age, emamectin benzoate. Many of the trees treated were in riparian areas targeting rare tree species to provide seed for the future regeneration.

**[MDA 2022 EMERALD ASH BORER PROGRAM ACTIVITIES, also in attachment folder]**



**[MDA EMERALD ASH BORER PARASITOID RELEASE SUMMARY, also in attachment folder]**

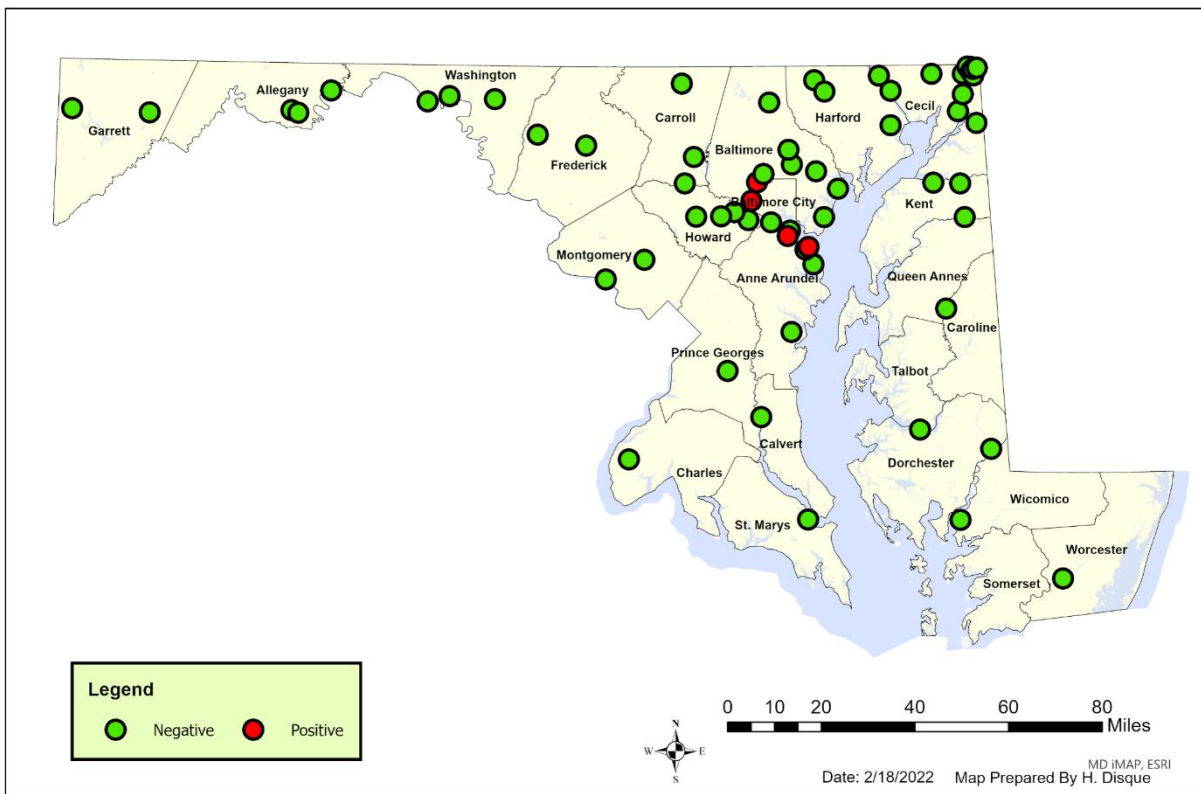
Maryland Department of Agriculture Forest Pest Management 2022 Emerald Ash Borer Parasitoid Release Summary						
Site Name	Latitude	Longitude	Oobius agrili (vials)		Spathius galinae	
			# vials	Total	# females	# males
Savage River State Forest	39.6004	-79.1522	4	400	1574	468
Millington WMA	39.29488	-75.7685	12	1200		
		Totals	16	1600	1574	468

**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.

In 2021, Forest Pest Management staff set 64 Lindgren funnel traps baited with the walnut twig beetle lure across 22 counties and in Baltimore City. Of these traps, 29 were set near previously positive sites in Anne Arundel, 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 samples were sent to the Pennsylvania Department of Agriculture for identification. The previously positive site, trap CE01, was not positive again in 2021. Trees at the original positive site have shown no evidence of decline. One trap in Anne Arundel County and four trap in Baltimore City were found to be positive. The Anne Arundel County find was the first record for the County. The trees are being monitored for decline and samples will be taken when TCD symptoms develop.

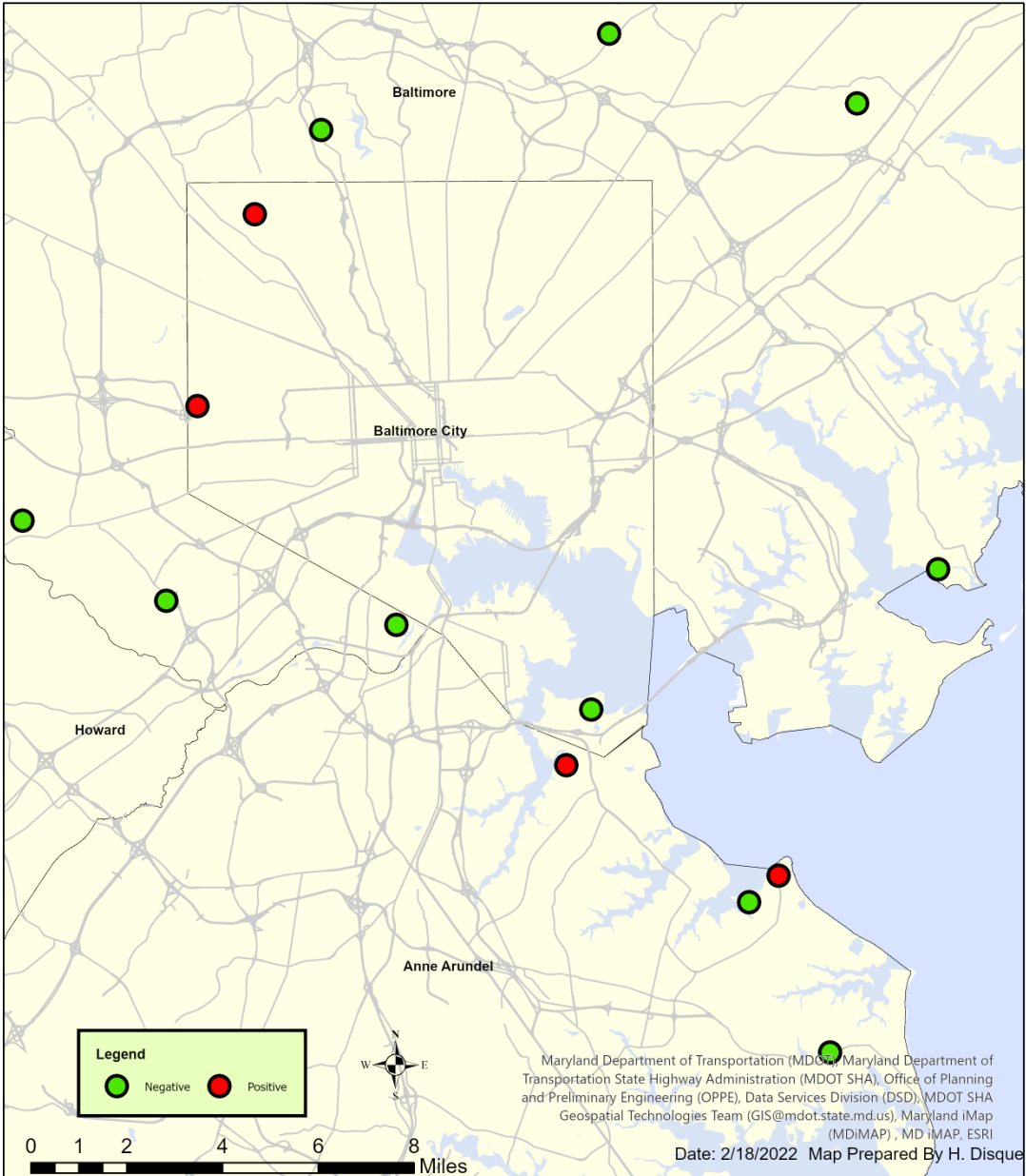
**[MDA 2021 WALNUT TWIG BEETLE TRAP RESULTS, also in the attachment folder]**

Maryland Department of Agriculture  
2021 Walnut Twig Beetle Trap Results  
Forest Pest Management Section



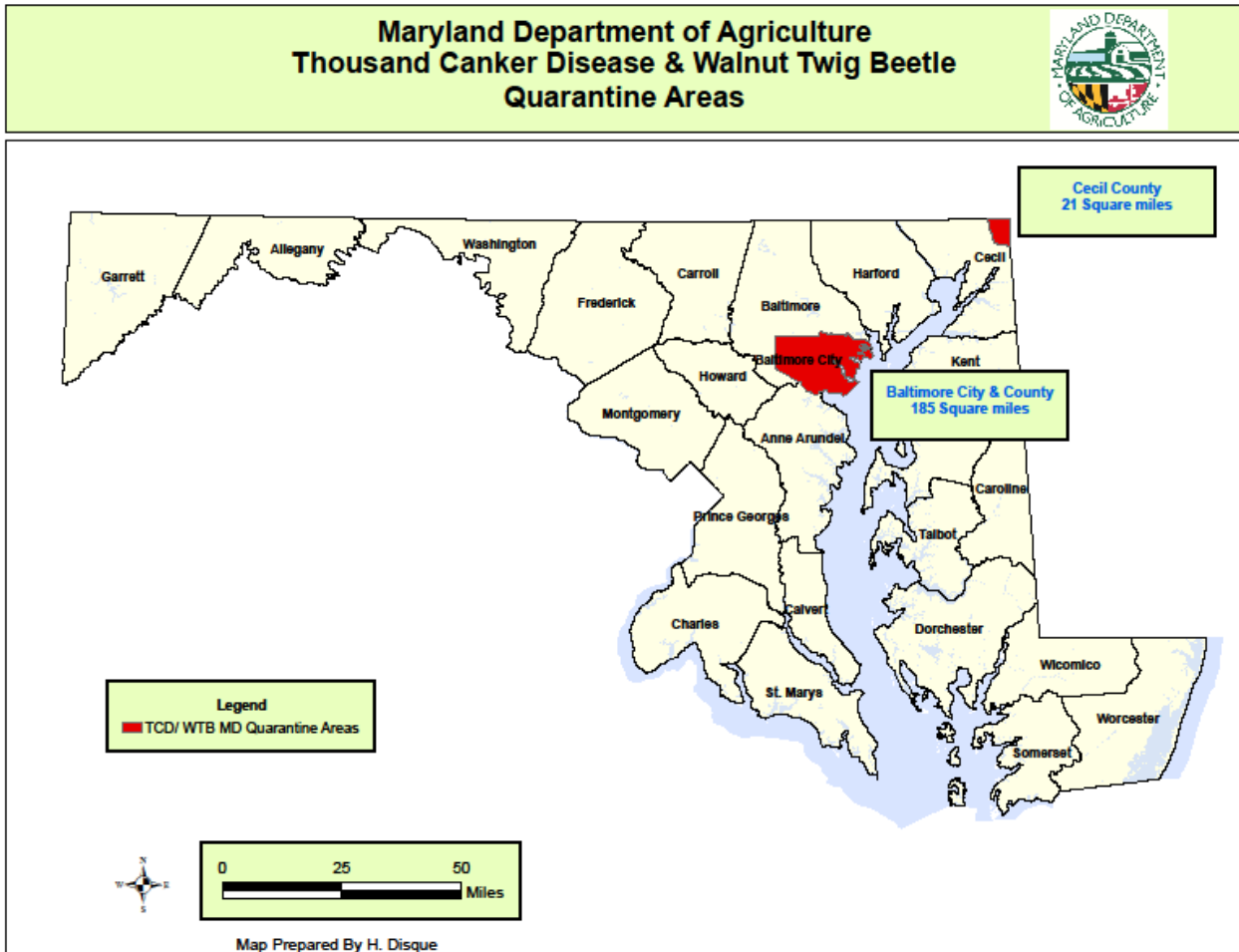
[MDA WTB TRAP RESULTS AND TCD QUARANTINE AREAS also in the attachment folder]

# Maryland Department of Agriculture 2021 Walnut Twig Beetle Trap Results Forest Pest Management Section



[MDA THOUSAND CANKER DISEASE & WTB QUARANTINE AREAS also in the attachment folder]





**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 10,875 hemlock trees and 122,342” DBH were treated in Maryland between July 1, 2021 and June 30, 2022. Of this total, 1,291 trees or 13,982” DBH were trunk injected and 9,145 trees or 107,825” DBH were soil injected. CoreTect was used to treat 377 trees totaling 377” DBH. A foliar application was used on 62 trees or 158” DBH.

**[MDA YEARLY IMIDACLOPRID TREATMENTS FOR HEMLOCK WOOLLY ADELGID CONTROL IN MARYLAND, also in the attachments folder]**

Maryland Department of Agriculture Forest Pest Management Yearly Hemlock Treatments In Maryland 2004 - 2022										
	Trunk Injection (imidacloprid)	Trunk Injection (imidacloprid)	Soil Injection (imidacloprid)	Soil Injection (imidacloprid)	CoreTect (imidacloprid)	CoreTect (imidacloprid)	Dinotefuron	Dinotefuron	Total	Total
Year	#Trees	Inches DBH*	# Trees	Inches DBH*	# Trees	Inches DBH	# Trees	Inches DBH	#Trees	Inches DBH*
2004	166	2,687	0	0	0	0	0	0	166	2,687
2005	106	1,433	1,675	17,623	0	0	0	0	1,781	19,056
2006	38	476	1,015	9,465	0	0	0	0	1,053	9,941
2007	22	325	324	4,279	0	0	0	0	346	4,604
2008	129	1,982	18	257	0	0	0	0	147	2,239
2009	124	1,281	675	6,029	0	0	0	0	799	7,310
2010	724	8,534	3,673	33,701	98	862	0	0	4,495	43,097
2011	1,905	19,468	7,285	81,684	80	610	0	0	9,270	101,762
2012	1,957	20,206	10,086	105,395	4	45	0	0	12,047	125,646
2013	1,980	18,993	11,755	117,604	7	47	0	0	13,742	136,644
2014	1,844	19,047	6,915	75,751	644	7,853	0	0	9,403	102,651
2015	1,474	14,378	8,072	94,099	4	32	0	0	9,550	108,509
2016	1,822	19,791	8008	85,813	64	577	0	0	9,894	106,181
2017	1,435	15,610	8,511	93,997	234	252	0	0	10,180	109,859
2018	1,433	14,647	8,667	93,623	220	557	0	0	10,320	108,827
2019	1,431	14,994	8,386	82,628	27	180	0	0	9,844	97,802
2020	686	7,298	2,970	39,558	5	37	0	0	3,661	46,893
2021	1,252	13,506	7,887	95,175	1	21	62	158	9,202	108,860
2022‡	662	6,804	4,722	53,979	420	476	0	0	5,804	61,259
Total	19,190	201,460	100,644	1,090,660	1,808	11,549	62	158	121,704	1,303,827

‡ Spring only

**Hemlock Woolly Adelgid Predator Releases.** Over 58,597 HWA predators have been released in Maryland since 1999. In 2021, 2,192 *Laricobius nigrinus* and 1,933 *Laricobius osakensis* were released at 7 sites in Baltimore and Garrett counties.

**[MDA MARYLAND HEMLOCK WOOLLY ADELGID PREDATOR RELEASES 2003-2021, also in attachments folder]**

Maryland Department of Agriculture Forest Pest Management Maryland Hemlock Woolly Adelgid Predator Releases 2003 - 2021						
Hemlock Stand	County	<i>Laricobius nigrinus</i>	<i>Laricobius osakensis</i>	<i>Scymnus coniferarum</i>	<i>Scymnus sinuanodulus</i>	<i>Sasajiscymnus tsugae</i>
Rocky Gap State Park	Allegany	3476	0	105	0	5000
Prettyboy Reservoir	Baltimore	4186	0	0	0	0
Cunningham Falls State Park	Frederick	1320	0	0	0	0
Frederick City Watershed	Frederick	3383	0	0	945	0
Broad Creek Scout Camp	Harford	3120	0	0	0	15410
Rocks State Park	Harford	1924	0	0	0	0
Hagerstown Watershed	Washington	1409	0	0	0	0
Big Run (Savage River State Forest)	Garrett	1685	0	0	0	0
Big Run State Park	Garrett	1003	0	0	0	0
Dry Run (Savage River State Forest)	Garrett	150	0	0	0	0
Frostburg Watershed	Garrett	300	0	0	0	0
Laurel Run (Potomac State Forest)	Garrett	2215	0	0	0	0
Lostland Run (Potomac State Forest)	Garrett	1857	500	0	0	0
Poplar Lick (Savage River State Forest)	Garrett	2848	2532	0	0	0
Elk Lick (Savage River State Forest)	Garrett	1691	500	0	0	0
Gunpowder Falls State Park	Baltimore	0	1521	0	0	0
Swallow Falls State Park	Garrett	0	912	0	0	0
Puzzley Run (Savage River State Forest)	Garrett	605	0	0	0	0
<b>Total</b>		<b>31172</b>	<b>5965</b>	<b>105</b>	<b>945</b>	<b>20410</b>

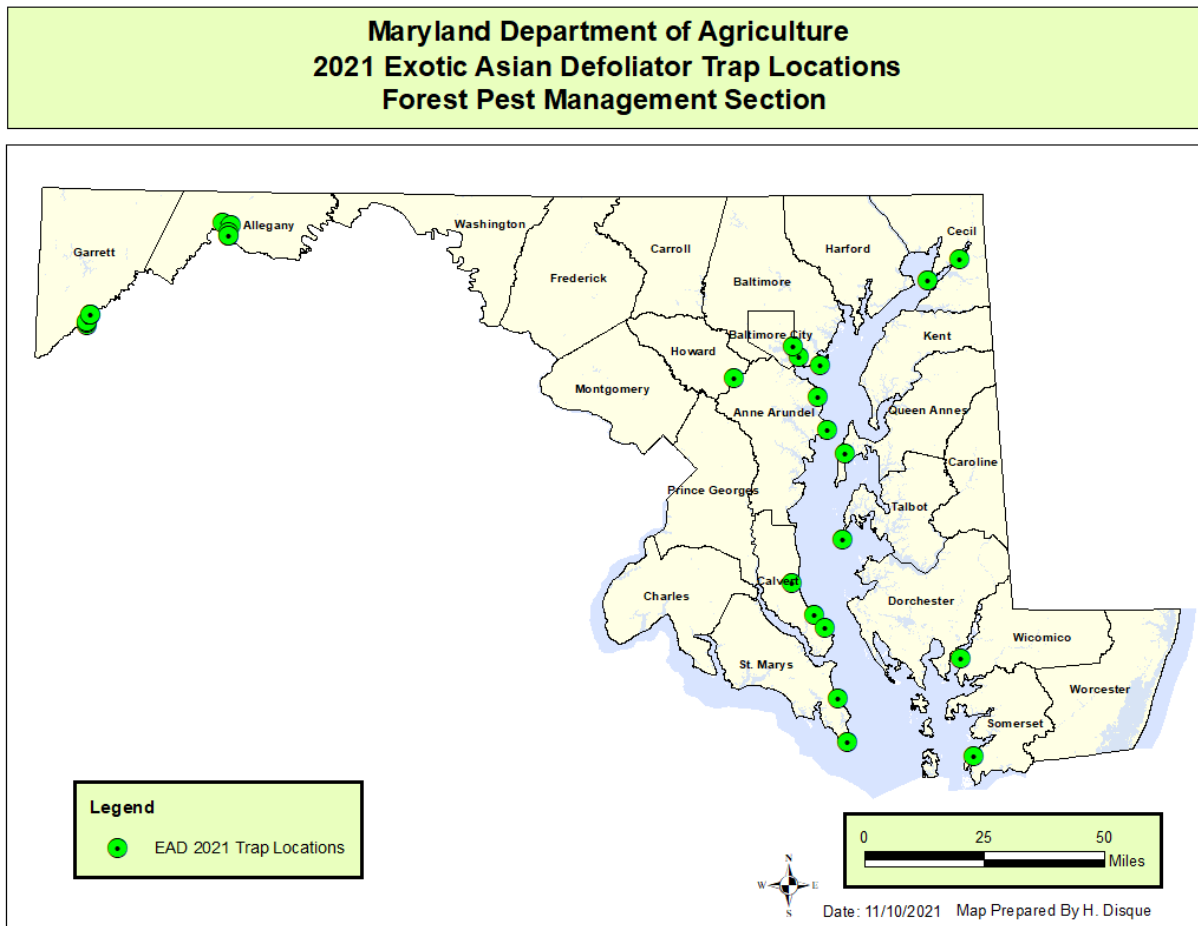
**HWAS Efficacy Surveys.** Treatment efficacy surveys have been conducted annually since 2006. Data analyzed through 2017 shows treated trees averaged a 79% reduction in HWA populations when measured 1-year post treatment and non-treated trees averaged a 24% increase in HWA populations when measured over the same period. . In 2020-2021, efficacy surveys were done at treatment sites in Baltimore, and Garrett counties.

**Exotic Asian Defoliator Survey.** A comprehensive exotic Asian defoliator survey was proposed and funded through the Farm Bill for 2021. 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 19 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 *Lymantria dispar asiatica/japonica* traps have been positive for moths. Specimens were sent to the USDA's Otis laboratory for genetic testing and species determination. All moths that were processed were determined to be *Lymantria dispar dispar*.

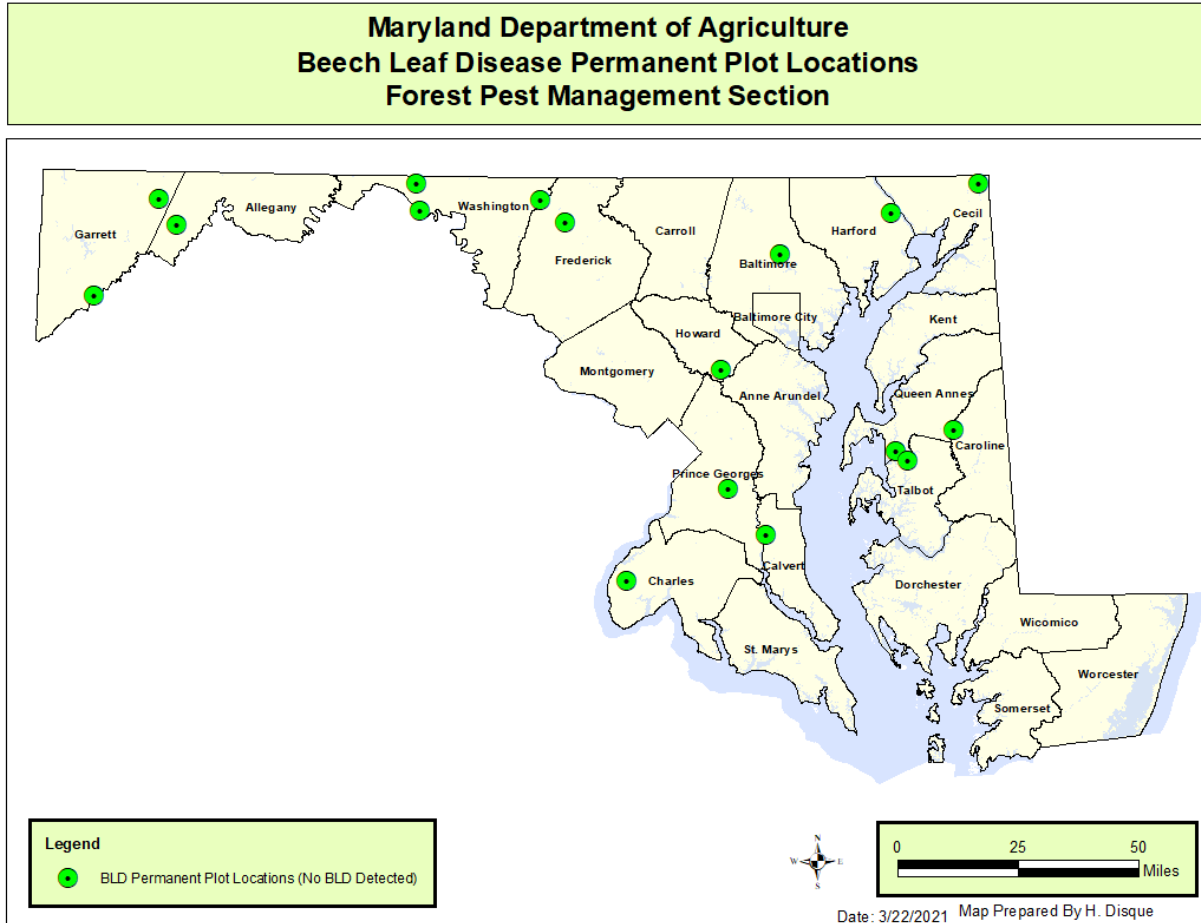
[MDA 2021 EXOTIC ASIAN DEFOLIATOR SURVEY LOCATIONS, also in attachments folder]



**Beech Leaf Disease (BLD).** BLD was first discovered in declining American beech in Ohio in 2012. It has since been found in Pennsylvania, New Jersey, New York, Connecticut, West Virginia, Virginia, and southern Ontario, Canada. This disease which is linked to the nematode *Litylenchus crenatae mccannii* causes mortality of understory American beech saplings and seedlings, and severe decline in mature, overstory trees. FPM set up and monitored 17 permanent plot locations for BLD and conducted 312 site surveys. All sites have been negative for BLD. The survey sites had trees in the following size class: 4-12 inches had 129 surveys, 12-

25 inches had 94 surveys, greater than 25 inches had 38 surveys, and under 4 inches had 51 surveys.

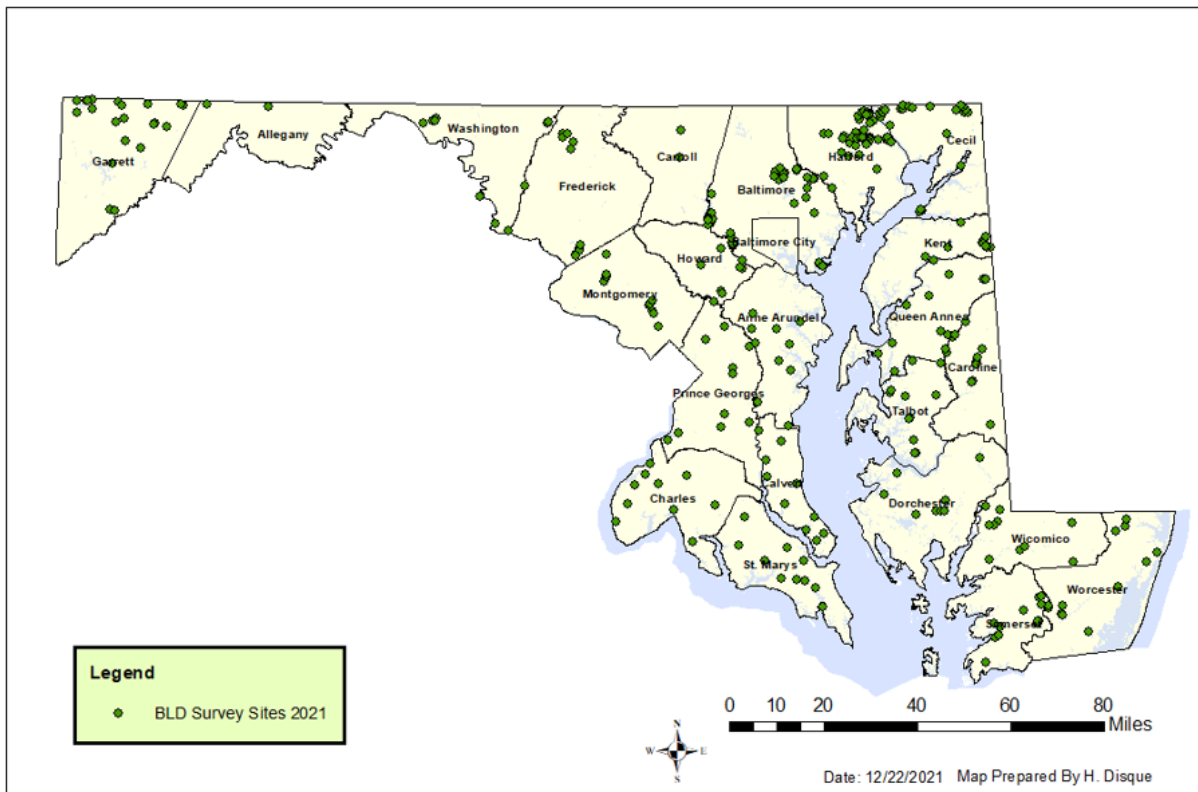
[MDA 2021 BLD PERMANENT PLOT LOCATIONS, also in attachments folder]



[MDA 2021 MDA BLD SURVEY LOCATIONS, also in attachments folder]



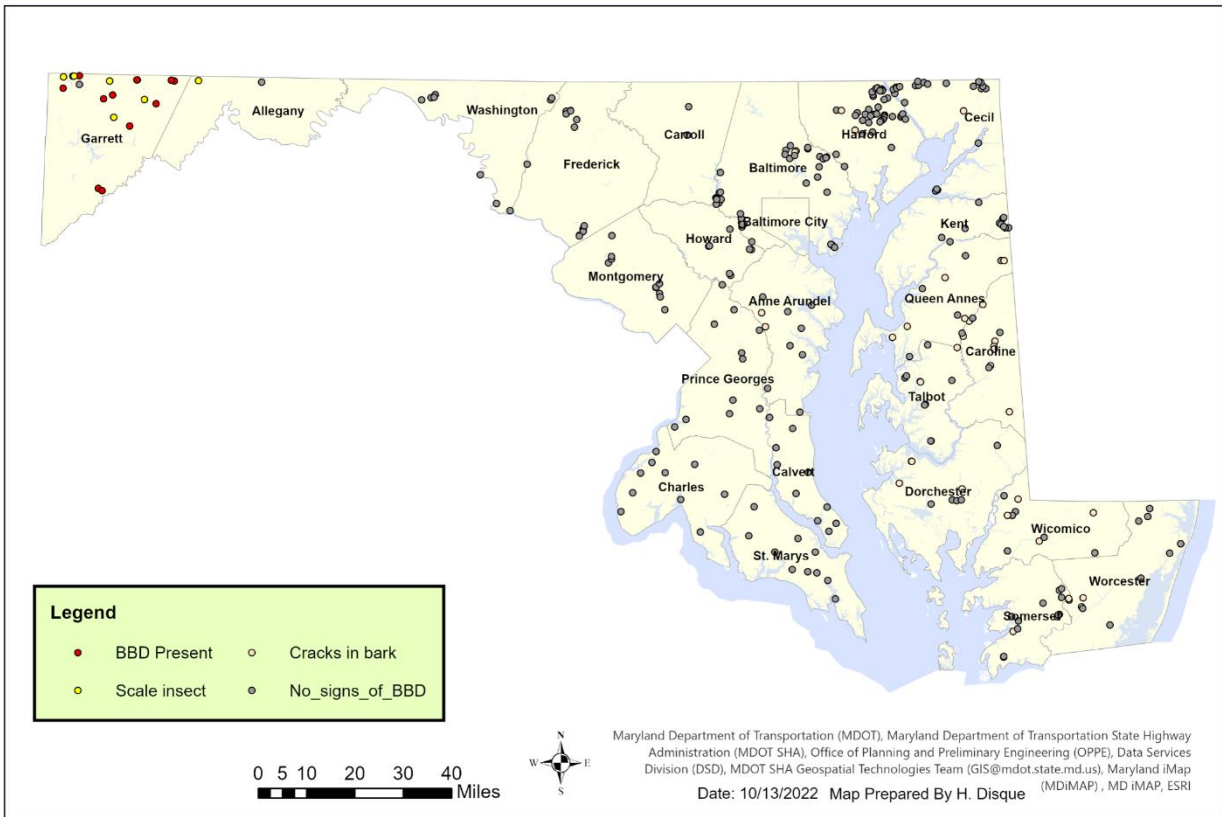
Maryland Department of Agriculture  
2021 Beech Leaf Disease Site Survey Locations  
Forest Pest Management Section



**Beech Bark Disease.** BBD has been found in approximately 160,000 acres in Allegany and Garrett counties. In 2013, four permanent BBD monitoring sites were established. Permanent plots were visited in 2020 for the detection of beech leaf disease. During beech leaf disease surveys, BBD was found in the Frostburg Watershed for the first time. Areas with confirmed BBD are highlighted on the map below.

**[MDA 2021 BEECH BARK DISEASE (BBD) SURVEY RESULTS, also in attachments folder]**

**Maryland Department of Agriculture  
2021 Beech Bark Disease Survey Results  
Forest Pest Management Section**



**Saltwater Intrusion.** In July 2021, 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 84,831 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 2020 when 50,365 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.

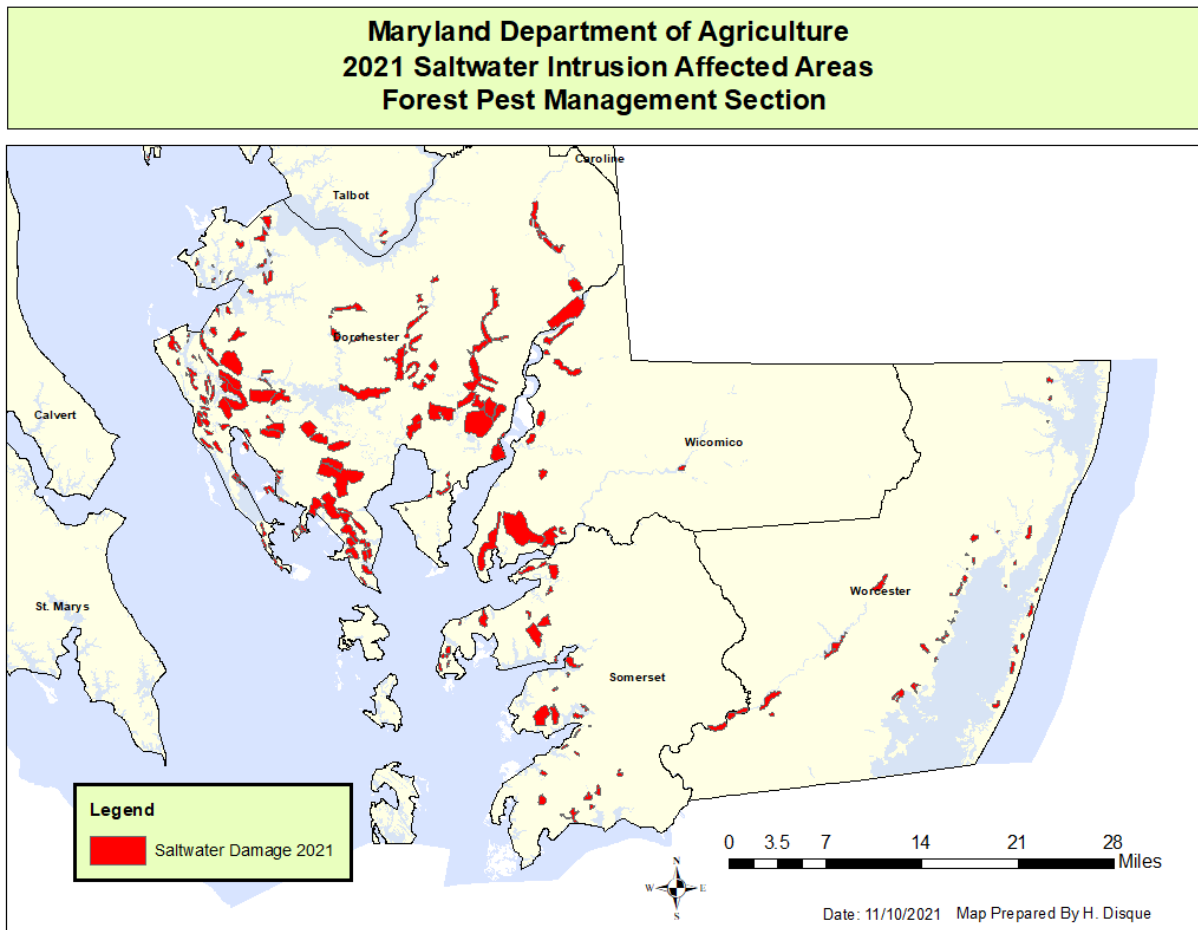
**[MDA SALTWATER INTRUSION FLIGHT SUMMARY COUNTY, also in attachments folder]**

Maryland Department of Agriculture Forest Pest Management 2021 Saltwater Intrusion Flight Summary	
County	Acres
Dorchester	60,575
Somerset	8,249
Wicomico	9,799
Worcester	5,758
<b>TOTAL</b>	<b>84,381</b>

**[MDA SALTWATER INTRUSION SEVERITY, also in attachments folder]**

Maryland Department of Agriculture Forest Pest Management 2021 Saltwater Intrusion Severity	
Percentage of Forest Affected	Acres
Very Light (1-3%)	647
Light (4-10%)	2,853
Moderate (11-29%)	13,386
Severe (30-50%)	24,764
Very Severe (>50%)	42,731
<b>TOTAL</b>	<b>84,381</b>

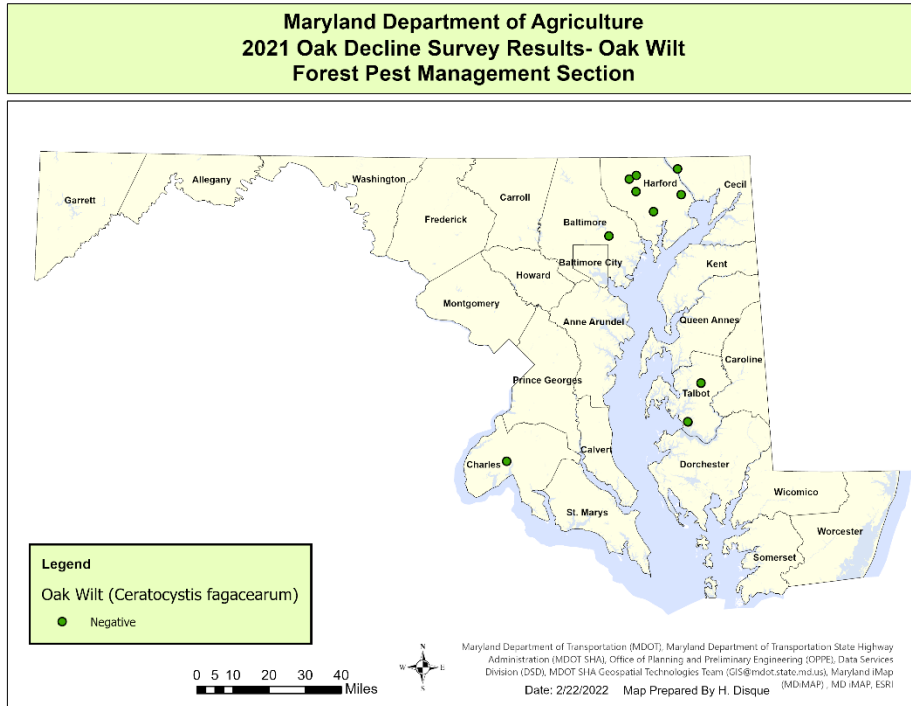
[MDA 2021 SALTWATER INTRUSION, also in attachments folder]



**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 being processed at the University of Maryland Plant Diagnostic Laboratory. Over 35 sites were visited in the summer of 2021, and samples were collected at 12 sites. Samples were taken from leaves, branches, bole, roots, and the soil as available and transported to the UM PDL for testing.

The UM PDL tested for Oak Wilt, and several other fungal and bacterial tree pathogens. Lab results found no positive sites for Oak Wilt, *Bretziella fagacearu*. The results did indicate several other pathogens were found including *Diplodia corticola*, *Diplodia gallae*, and *Xylella fastidiosa*.

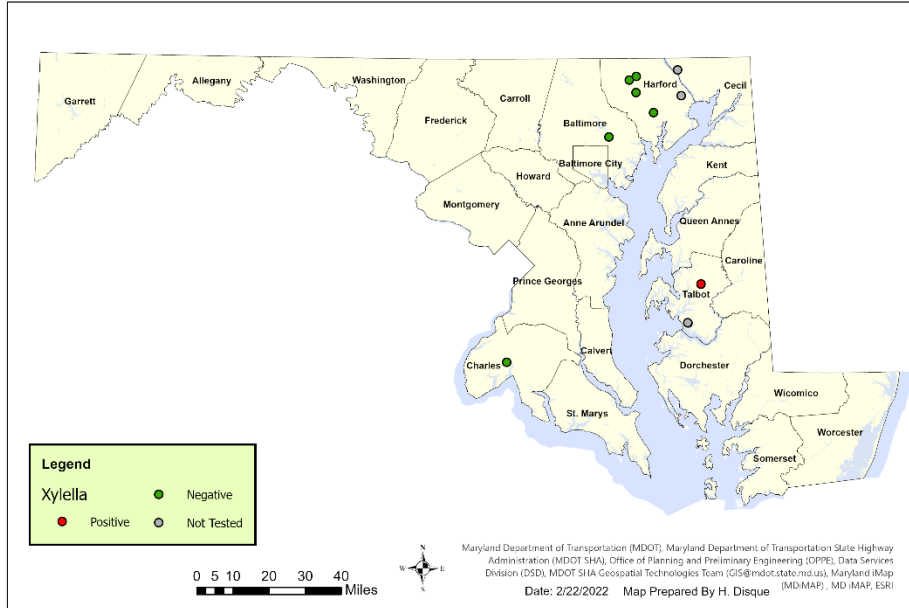
[MDA 2021 OAK WILT DECLINE SURVEY RESULTS – OAK WILT, also in attachments folder]



[MDA 2021 OAK WILT DECLINE SURVEY RESULTS – BLS, also in attachments folder]

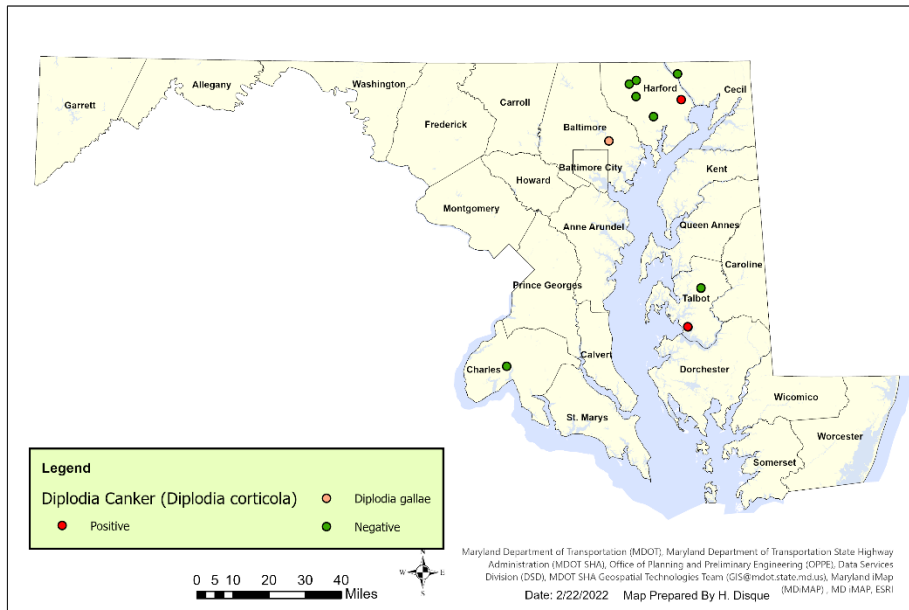


**Maryland Department of Agriculture  
2021 Oak Decline Survey Results- Bacterial Leaf Scorch  
Forest Pest Management Section**

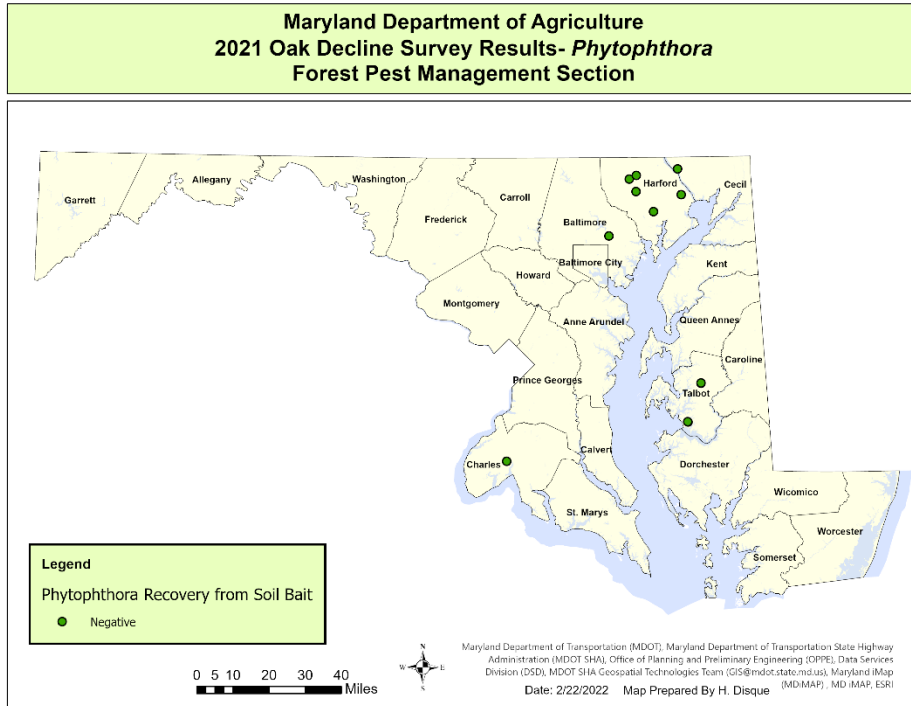


**[MDA 2021 OAK WILT DECLINE SURVEY RESULTS – DIPLODIA CORTICULA, also in attachments folder]**

**Maryland Department of Agriculture  
2021 Oak Decline Survey Results- *Diplodia corticola*  
Forest Pest Management Section**



[MDA 2021 OAK WILT DECLINE SURVEY RESULTS – PHYTOPHTORA, also in attachments folder]

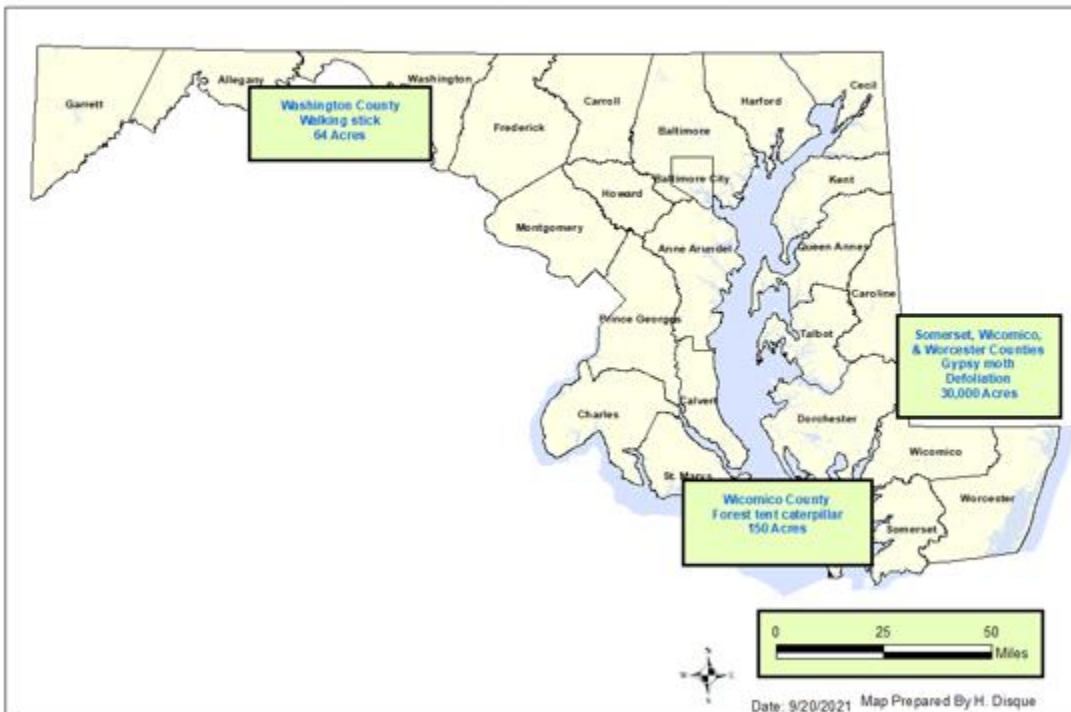


### FOREST HEALTH MONITORING- PEST DAMAGE

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

[MDA FOREST HEALTH MONITORING PEST DAMAGE MAP, also in attachments folder]

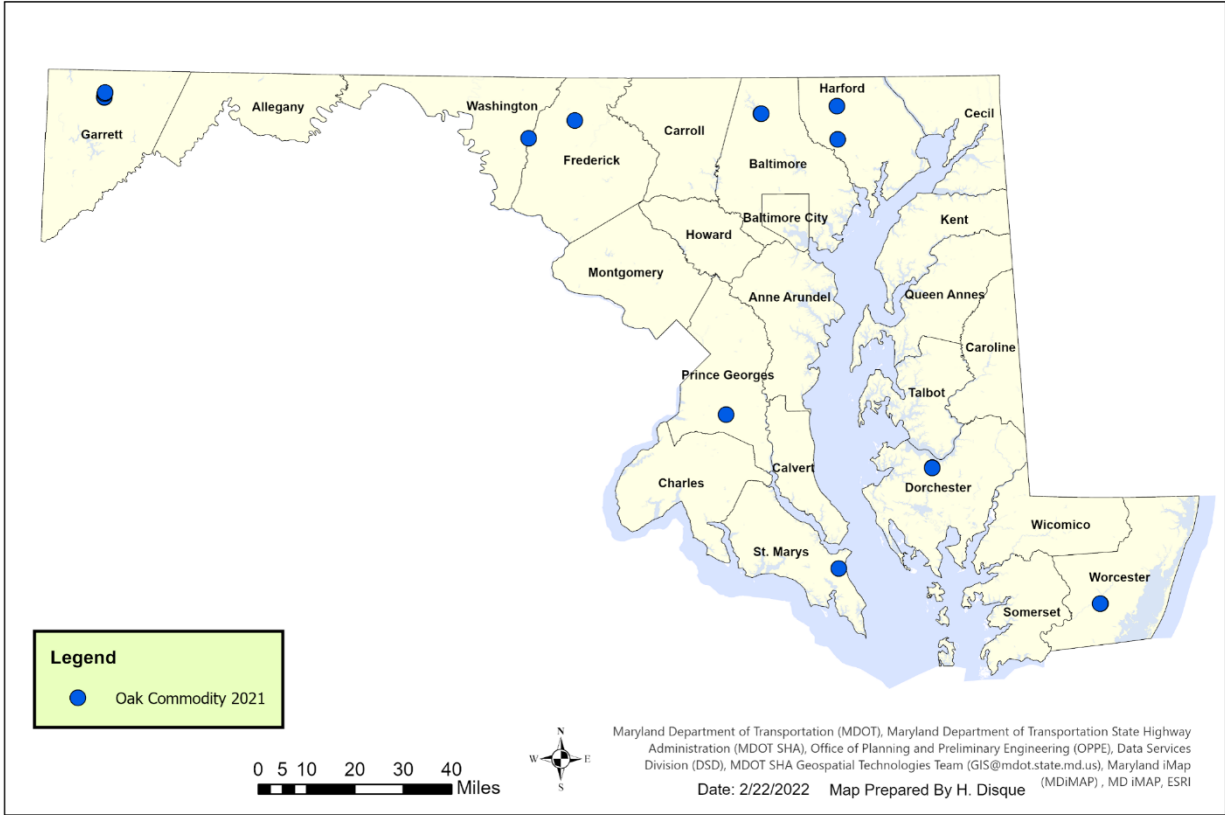
Maryland Department of Agriculture  
Forest Health Monitoring Pest Damage Areas  
Forest Pest Management Section



**Additional Forest Pest Surveys.** Four additional surveys were conducted by FPM. These include a survey for Redbay Ambrosia Beetle, an oak pest commodity survey, and a survey for *Phytophthora ramorum* using a stream bait technique. None of these pests or disease were found in the state in 2021.

**[MDA OAK COMMODITY SURVEY MAP, also in attachments folder]**

Maryland Department of Agriculture  
2021 Oak Commodity Sampling Locations  
Forest Pest Management Section



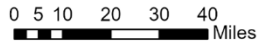
[MDA P. RAMORUM SURVEY LOCATIONS MAP, also in attachments folder]

Maryland Department of Agriculture  
2021 *Phytophthora ramorum* Stream Bait Sampling Locations  
Forest Pest Management Section



**Legend**

- Phytophthora ramorum Stream Bait Sampling



Maryland Department of Transportation (MDOT), Maryland Department of Transportation State Highway Administration (MDOT SHA), Office of Planning and Preliminary Engineering (OPPE), Data Services Division (DSD), MDOT SHA Geospatial Technologies Team (GIS@mdot.state.md.us), Maryland iMap  
Date: 2/22/2022 Map Prepared By H. Disque (MDiMAP), MD iMAP, ESRI