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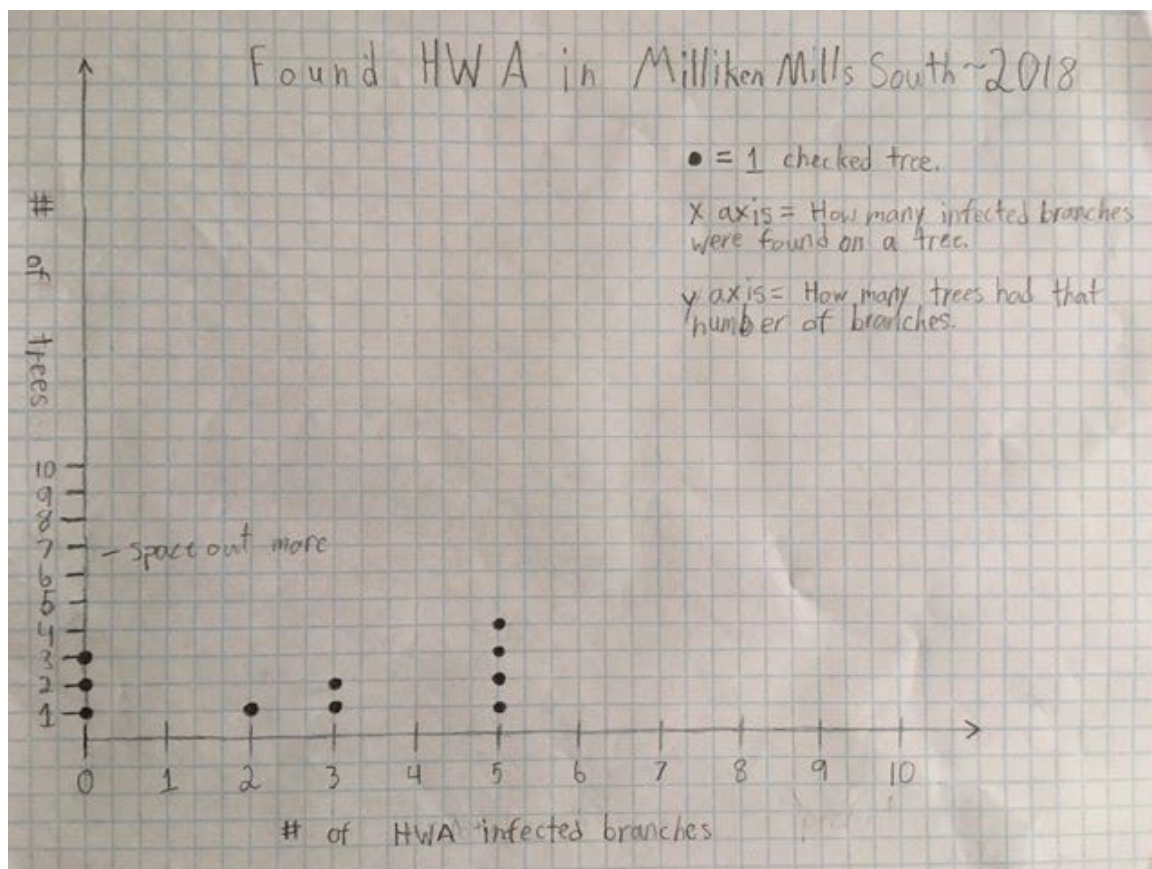
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## Hemlock Woolly Adelgid (HWA) Found in Old Orchard Beach Research Highlights Grade 6

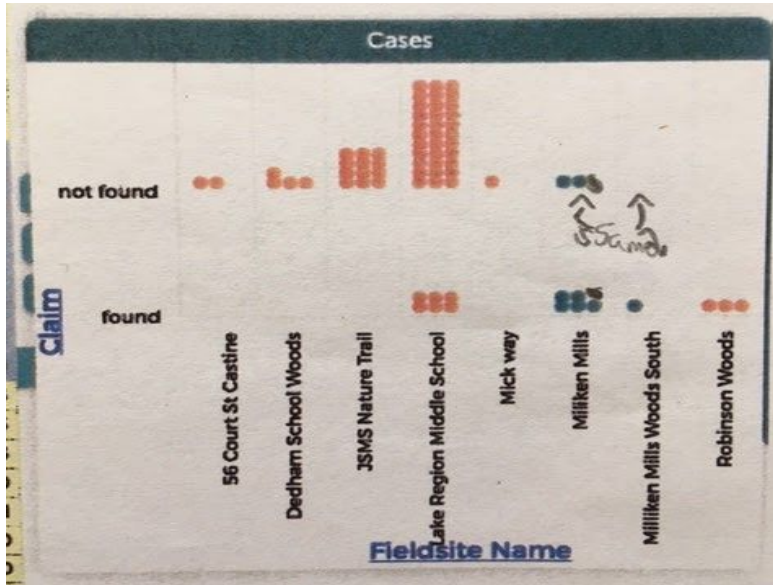
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### Results

Our research question was, How is HWA affecting forests in our area, including Milliken Mills Woods? When we looked in Milliken Mills Woods, we found HWA.

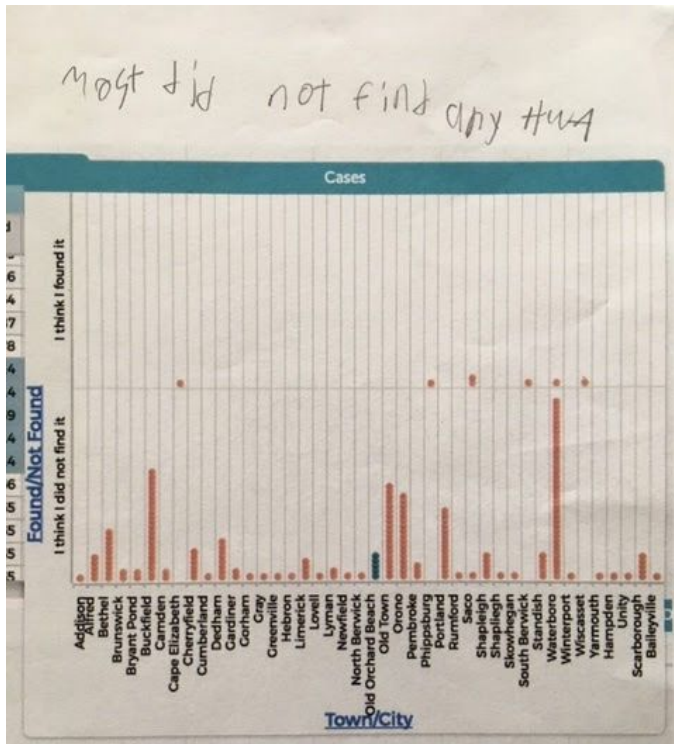


We looked at 4 trees and all the groups together looked at 10 trees. Each dot on our dot plot represents a tree. The x axis shows how many branches were infected with HWA. Our data shows that most groups found none or 5 branches with HWA specimens out of the 10 branches they checked on their tree. No 1's were found, or 4's. However, 5 was a very common data point, meaning that some trees had at least 5 branches infected with HWA. None of the data points extended past 5, despite most teams managing to examine 10 branches maximum. The median was 3 branches with HWA.

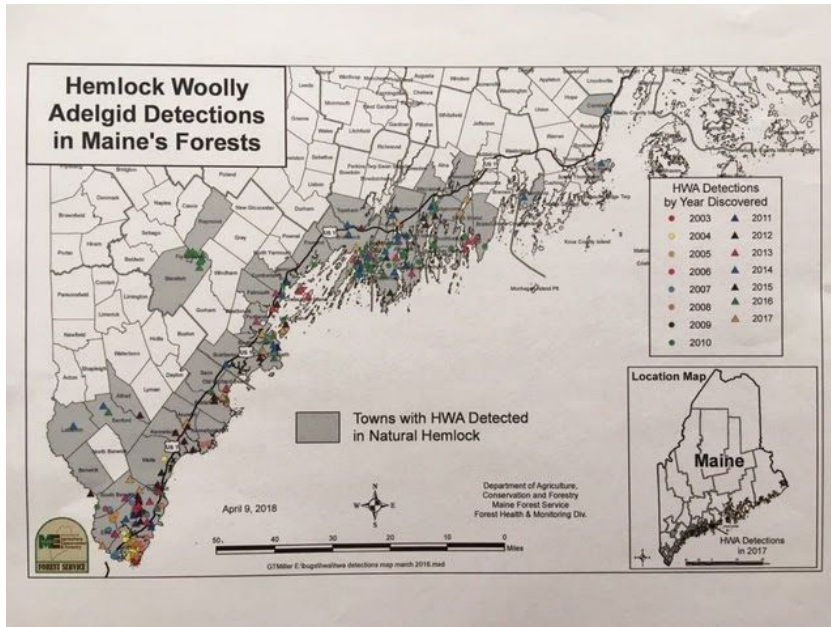


We looked at 2018 Vital Signs data on CODAP to see the data collected in 6 sites in Maine that did the investigation when we did. The graph shows 8 places but we know that Milliken Mills and Milliken Mills Woods South are the same and we found out that Mick Way and Dedham are the same. Three sites found HWA: Milliken Mills Woods, Robinson Woods and Lake Region Middle School. In Lake Region,

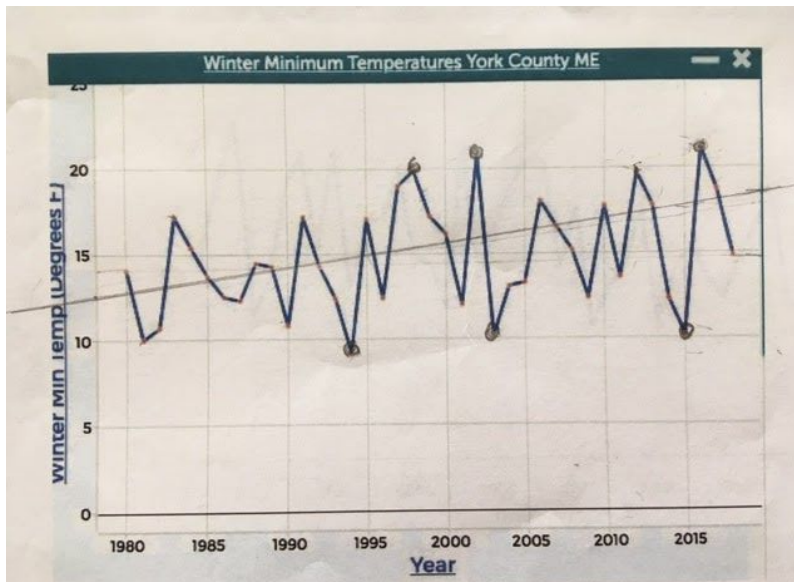
39 trees in all, 6 found, 33 not found. In Milliken Mills, 8 trees in all, 7 found, 2 not found. In Robinson Woods, 3 trees checked, 3 found it, 0 not found. Three sites didn't find HWA: Dedham, JSMS, Castine.



We checked Vital Signs data from 2009-2017 on CODAP. We saw that 38 towns looked for HWA and most did not find any HWA. Five trees were checked in OOB with no HWA found.



We found a map on Maine.gov called HWA Detections in Maine's Forests. The map shows everywhere in Maine (up to 2017) with HWA. This data shows that HWA in Maine is mostly on the coast. It's in about 6-7 counties on the coast. When we zoomed in, we could see that HWA was found in OOB in 2013 and 2016.

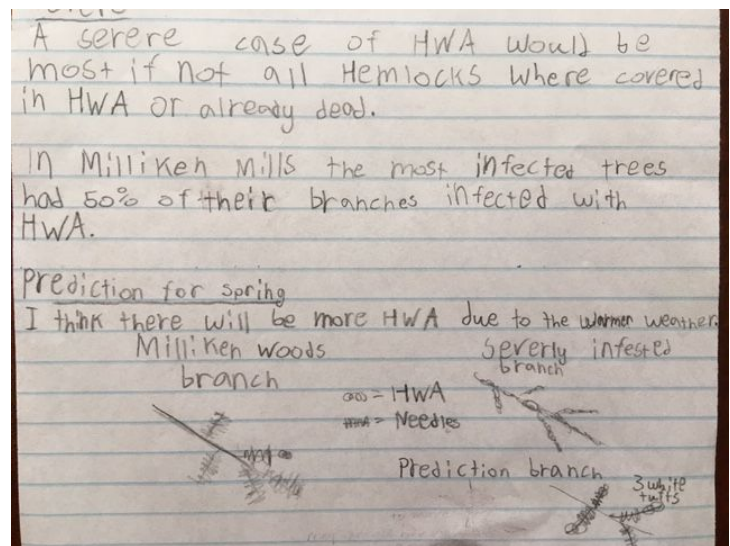


We looked at a graph Winter Minimum Temperatures in York County Maine. This data shows the winter minimum temperatures in York County ME, from 1980 to 2018. The trendline rises from 13 to 18 degrees fahrenheit. They have gone up about 5 degrees in 38 years.

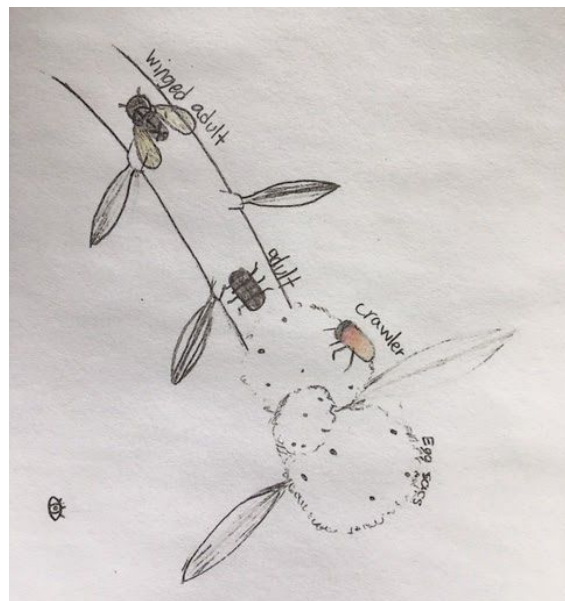
## Discussion and Conclusions

We think that Milliken Mills Woods has a mild to moderate infestation of HWA. We are confident in our data because we've done research and have gone places and seen HWA. Our most common finding was a cluster of data at 5 branches having HWA. The maximum was 5 branches. The second most common finding was 0 branches. Our photos show one or two HWA spots or none on the branches. We wouldn't have found so many branches with no HWA if it was a severe infestation. We didn't check every branch or every tree, so there could be more or not. We think there probably are more infected trees but we don't know. The trees looked healthy because they were intact and none were dead.

When we went to Ferry Beach State Park in Saco we saw a severe infestation of HWA and lots of dead hemlock trees because of it. The park is only about 3 miles away, so we know there is already a lot of HWA in our area. We know that one HWA has 22,500 offspring in 2 generations (Vital Signs species sheet). This means it can spread quickly. Also 50% of adults have wings so they can fly and infect more trees in the area. We have evidence from Vital Signs data and the Maine.gov map that HWA is being found in new places, so we know it's spreading.



We know that HWA survives through the winter if it doesn't get really cold, and we have evidence that the winter minimum temperature is going up so that means more HWA will survive through the winter. We predict that if we go back to Milliken Mills in the spring, we will find more HWA. Maybe the spots we saw will have nymphs or adults near or in them and the patches might be bigger.



The Maine.gov map shows that HWA was discovered in OOB in 2013 and 2016, earlier than Vital Signs. We think that's because the Maine Forest Service data was collected by scientists and Vital Signs was collected by students. The scientists might have looked in more places. Both places where they found it are near Goosefare Brook, on the southern border. That is near Ferry Beach State Park, which has a severe infestation of HWA. We found it in Milliken Mills, which is in the northern part of OOB.

Our research indicates that Milliken Mills has a mild infestation of HWA now but it will probably spread and get more severe. Also we will probably find HWA in more places in OOB if we keep looking for it. Last year we made a flyer to tell people what to look for and what to do if they find HWA. This year we made a list of tips to tell people what they can do to treat HWA or slow it down. Homeowners have options like spraying trees with soap and water to knock off the adelgids so they will die on the ground. There is not much we can do in the woods yet except try to avoid spreading it. We are going to give our list to the Conservation Commission so they can share it with the public.

We want to ask the rangers at Ferry Beach State Park if needles can grow back after they fall off and if there are other solutions we can try. We wonder if HWA or hemlock trees can be genetically modified to stop HWA.