12/7/2015
Subject: PERAL Wood Packaging Material Tool Background
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Background

Wood boring and bark beetles (WBBB) transported on wood packaging material (WPM) pose a risk to tree species throughout the U.S. As such they also threaten the U.S. forestry sector, places of great natural or scenic value, residential landscapes and important ecosystem processes. To lessen the likelihood of WBBB entry, ISPM 15 was recently implemented, which requires the treatment of WPM before goods are exported. While ISPM 15 has been successful in reducing WBBB detection rates on WPM by 52% (Haack et al. 2014[1]), WPM still presents a considerable risk to the U.S.

WPM Tool Aids Surveillance Detection

To further reduce the likelihood that WBBB could successfully be introduced to the U.S., we developed a WPM Tool that identifies high risk areas where pest entry is likely to occur. The output WPM maps are intended to be used as an information piece that pest survey specialists or other survey personnel can use to help inform survey locations.

How the WPM Tool Was Created

Developing Input Data

To determine the types of goods (referred to as articles in AQAS database) most frequently associated with WPM and WBBB, we first analyzed the Emergency Action Notifications. Importantly, we filtered these data for records that had a timber pest or WPM violations, excluding those with non-compliance. We found that machinery and machine parts, metal products and raw metals, and stone products had the greatest number of EANs (Table 1). We used this list to develop a set of data on the location of businesses and industries that were likely to import these types of goods. We also supplemented this list with information from pest survey specialists and other APHIS personnel on other high risk sectors. For example, wood pallet and container repurposing or recycling facilities are not included on the list of EANs, but these facilities are high risk because they are locations where wood pallets are likely to reach their final destination and be exposed to the environment for a long period of time.

Table 1. Emergency Action Notifications. Data on Emergency Action Notifications (EANs) were used to determine the highest risk businesses that were likely locations for the entry of wood boring and bark beetles on the wood packaging material pathway.

Rank	Article	EANs Pest interceptions (5 year average)	EANs Pest interceptions 2013
1	Machinery and Machine Parts	226	191
2	Metal Products and Raw Metals	131	154
3	Stone Products – Other Stone Products	56	67
4	Electronics and Electric Components	47	34
5	Glass and Glass Products	31	14
6	Pallets/Crates/Spools	28	30

[1] Haack RA, Britton KO, Brockerhoff EG, Cavey JF, Garrett LJ, Kimberley M, Lowenstein F, Nuding A, Olson LJ, Turner J, Vasilaky KN (2014) Effectiveness of the International Phytosanitary Standard ISPM No. 15 on reducing wood borer infestation rates in wood packaging material entering the United States. PLOS ONE. Vol. 9, e96611.

7	Stone Products – Ceramic Tile	26	72
8	Plastic and Plastic Products	21	36
8	Stone Products – Granite Products	18	9
10	Stone Products – Marble Tile	17	14

We used the list of articles from the EAN database to next develop the list of businesses that are likely to import, store, or sell commodities with WPM and therefore transport WBBB. These data elements were obtained from Hoovers (http://www.hoovers.com/), which provides a robust database of over 17 million businesses throughout the U.S. Using the EAN list, we selected businesses in industries that were most likely to transport WPM (Appendix 1). For example, we selected businesses involved in machinery manufacturing, stone product manufacturing, and building construction (Appendix 1). In total, there were 9 categories of data, referred to as data elements, that we used. These captured 218,171 individual point locations for businesses for which we also have important information that can be a useful proxy for the risk of pest entry, revenue and facility size. The idea is that businesses with greater revenue or larger facility sizes would be more likely to handle more goods and therefore present greater risk for pest entry.

Separating Importers and Non-Importers

Hoovers also provides attribute information on whether or not a business is an importer. We analyzed all the records in our database and found that 19,407 businesses were importers whereas 198,764 were not. Because so few businesses were importers and importers are likely higher risk for pest entry, we accounted for this in our risk mapping approach by dividing the nine data elements into two additional categories - importers and final destination (non-importers). This ensures that in subsequent risk mapping steps, businesses that are importers or the final destination of the product have equal influence on the risk model even though there are relatively few importers.

Mapping the Input Data

Spatially, Hoovers data is provided as a point feature, where each point represents the precise location of a business. Typically, the location of these data correspond to the address of a businesses where activities involving WPM occur, but they can also include corporate offices where WPM would not be transported. In addition, there is some uncertainty in mapping these data to a precise address location, thus introducing spatial error into our assessment. To account for this, we aggregated all point features for importers and final destination in each of the 9 data elements to 10 km grids by summing the value of revenue. If information on revenue was unavailable, we used facility size. For example, if in one 10 km cell, there were 3 businesses that imported machinery manufacturing goods, each with a total revenue of $3, $5, and $8 million, the value in that cell would reflect the sum of the revenue from those businesses, $16 million. This was repeated for each of the 9 categories of data for their status as importer or final destination.

Risk Mapping Methods

We used the Multi-Attribute Frontier (MAF tool developed by Denys Yemshanov, CRC, Yemshanov et al. 2013[2]) to map the risk of pest entry. MAF is an approach that derives risk

[2] Yemshanov D, Koch FH, Ben-Haim Y, Downing M, Sapio F, Siltanen M (2013) New multicriteria risk mapping approach based on a multiattribute frontier concept. Risk Analysis, v33: p1694-1709.

scores from the ranks of data elements plotted in multidimensional space where each axis corresponds with a single data element. For example, using the data aggregated to the 10 km cell, the cells with the largest value for a particular category would have the highest rank. The cell or cells with the smallest value would have the lowest rank. The risk score is computed by first plotting the ranks for each 10 km grid cell for each of the 9 categories as axes in multi-dimensional space. Each axis corresponds with a data element and each point corresponds with a particular grid cell for a particular category. Next, the MAF algorithm finds points that are furthest from the axis origin (i.e. have the highest rank) and selects them as the highest risk. This method is analogous to peeling layers off an onion and assigning the same risk to all points in a layer; the first layer would have points that are the highest risk, the second layer would have points with the second highest risk, and so on. MAF is not a compensatory method, where high risk values of a particular data element may be averaged by other data elements. Instead, the highest ranked frontiers include points that have extreme values for *at least* one data element (Figure 1).

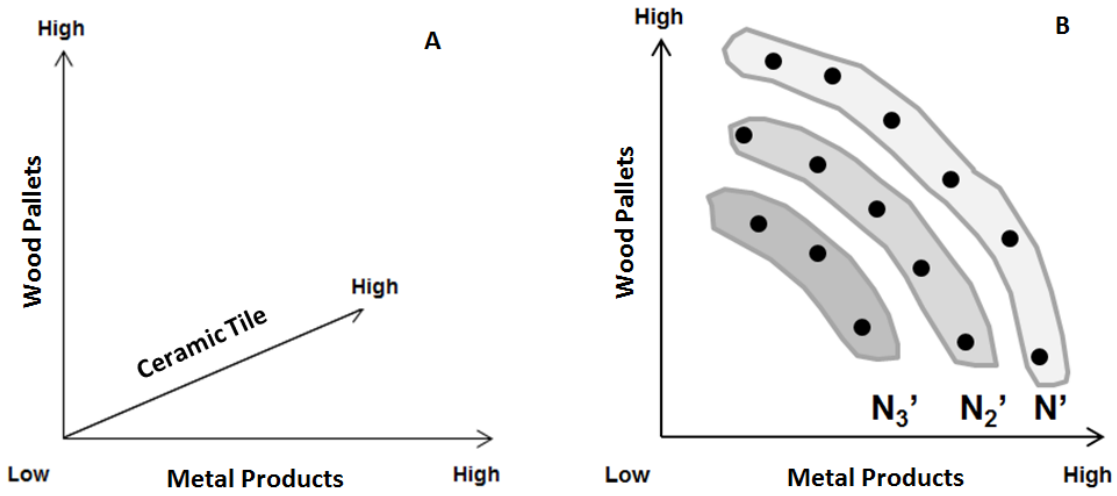

Figure 1. Multi-Attribute Frontier. Replicated from Yemshanov et al. 2013. (A) Each risk element is assigned an axis in multi-dimensional space. We use three sub-elements along three axes in this example to visualize the multi-dimensional space. Along each axis the rank values are plotted, generating a 3 dimensional point cloud. (B) MAF is used to find the highest ranks – in this example for two risk elements. Points furthest from the axis origin in the first frontier are selected as highest risk, N'. These points are removed and the process is repeated to delineate the second frontier, N_2'. This process is repeated until all points are removed from the point cloud.

Previously we divided the data into two classes - importers and final destination - to ensure that risk was equally represented with businesses that were importers even though they had relatively fewer records. We now use that division to apply the MAF approach in two stages. In the first stage, we estimated the risk scores for each of the 9 data elements for importers only and final destination. The outputs of the first stage, which reflect the risk for importers and final destination independently, were then used in the second stage to determine a risk score that

evenly balanced these two groups. MAF also rescales the output risk scores between 0 – 1, so the output risk map is presented in this relative range.

Outputs from the WPM Tool

The WPM tool results in a risk map displaying likely entry locations for WBBB throughout the U.S. scaled between 0 -1 (Figure 2). High risk areas are typically aggregated in metropolitan areas and low risk areas in more rural areas.

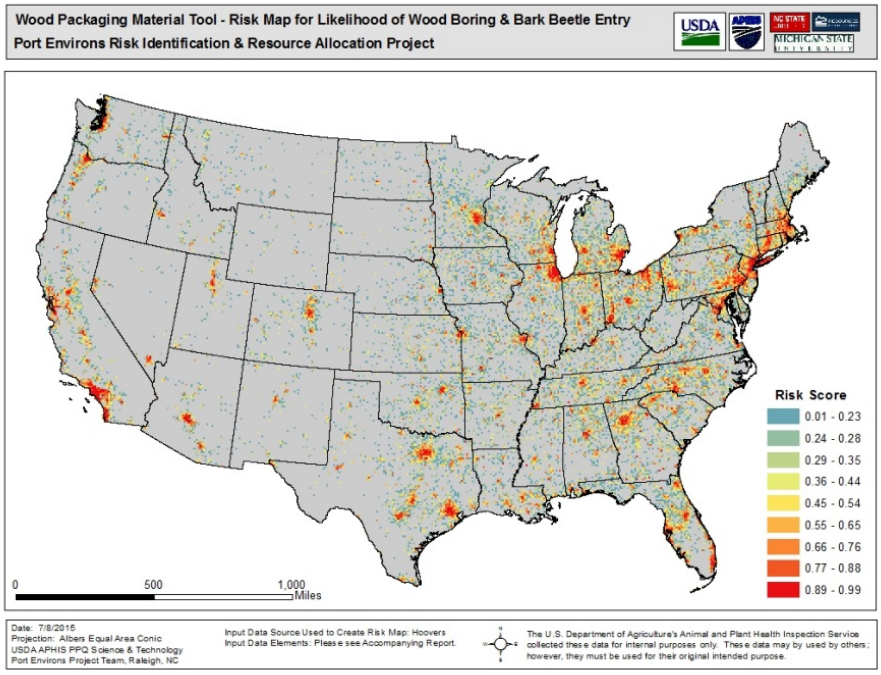

Figure 2.National WPM Map. High risk areas for wood boring and bark beetle introductions in 10KM grids.

State Level Risk Maps

State level maps depict the risk of WBBB entry in each state independent of the other states. At the state level, we also disaggregated the WPM maps to display the likelihood of WBBB entry in each county (Figure 3). However, maps at the 10 km grid are preferred because county risk scores are biased in relation to their size and also obfuscate important fine scale patterns. Simplistically, the state level maps represent rescaled risk scores for each 10 km grid cell such that the maximum value reflects the maximum value in that state, not the entire U.S.

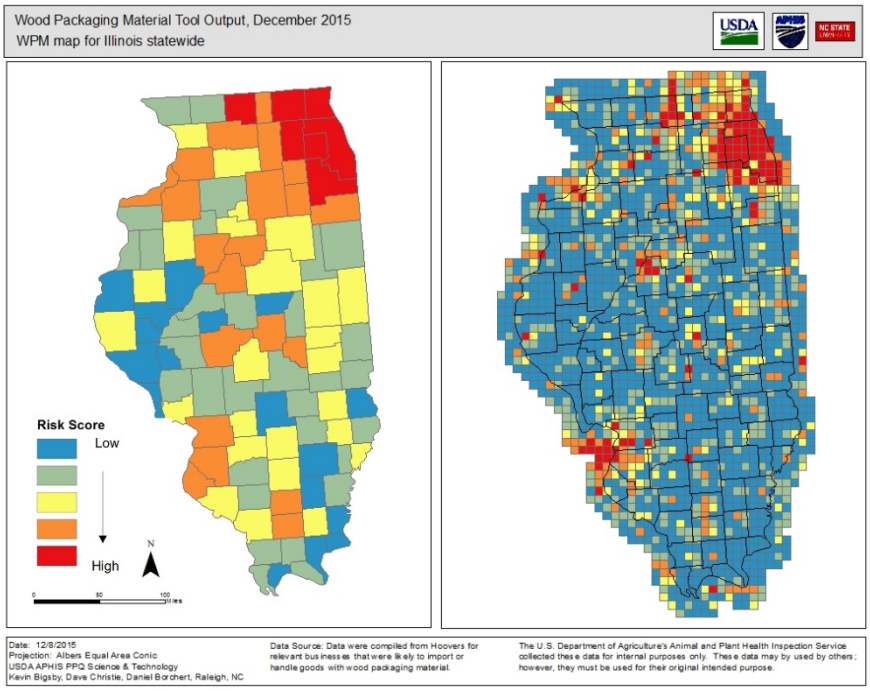

Figure 3. State WPM Map. High risk areas for wood boring and bark beetle introductions in Illinois and a 30 km buffer around Illinois.

Management Zone Risk Maps

Management Zone maps depict the risk of WBBB entry in different regions or management zones in a state independent of all other zones (Figure 4). This information can be useful especially when not much is known about the entry potential in a particular region of a state.

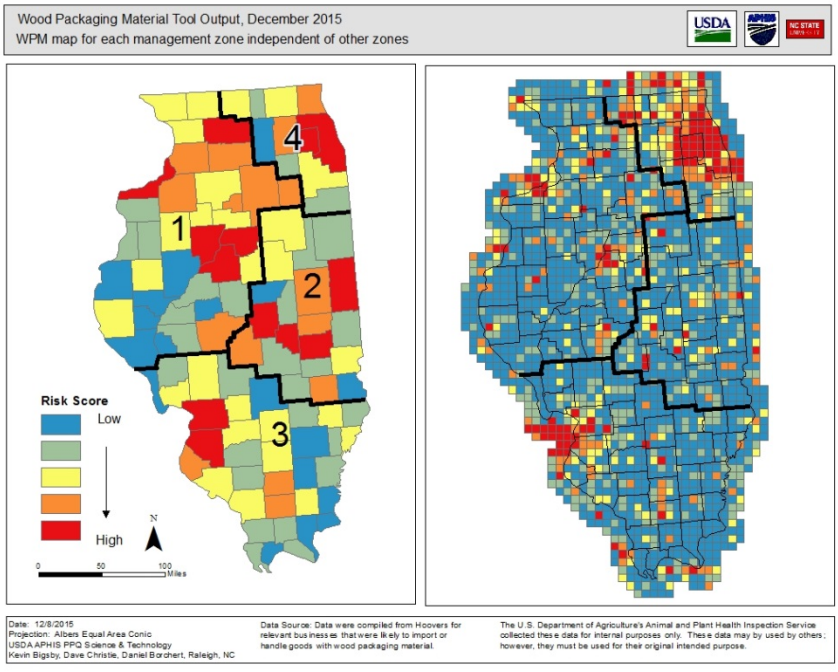

Figure 4. Management Zone WPM Map. High risk areas for wood boring and bark beetle introductions in 10KM grids divided into 4 management zones in Illinois. The risk of WBBB entry on WPM in each zone is independent of all other zones.

Potential Applications

Aside from being used to identify the risk of WBBB on WPM in each state or zone in a state, the WPM tool can be used to:

Examine Grid Cells

By clicking on any grid cell, all the information about that grid cell is displayed, allowing the user to see why each cell has its score (Figure 5). For example, in the grid cell selected in Figure 5, the user can see values for each input data element and how they contribute to the WPM risk score. This information can also be used to test ones assumptions about the risks in particular grid. For example, you might find it surprising that a particular grid cell is high or low risk based on your experience, but by providing the underlying data the user can understand why that grid is rated high or low in this framework.

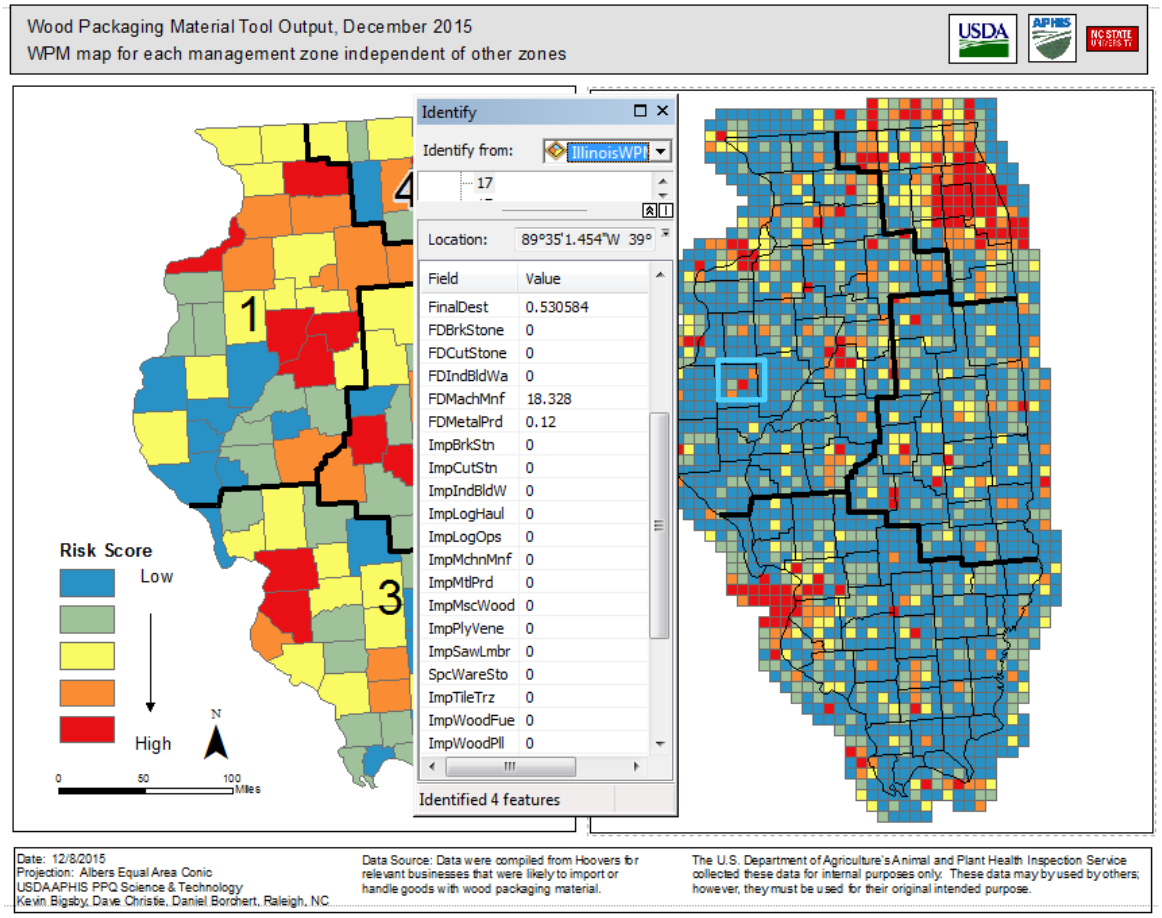

Figure 5. Examine Underlying Data. The user can navigate around the map and select cells to evaluate why the cell has a particular risk ranking. The blue box indicates the cell that was selected and the information in the table displays the values for each of the input data elements for that cell.

Display Particular Data Elements and Overlap with Ancillary Information

If the user believes that a particular input data element is important or they simply want to view the map for a particular input data element, they can adjust the map to view the risk score for only that data element (Figure 6a). For example, we display the location, and revenues associated with only cut stone businesses only.

When faced with limited funding for survey detection, the WPM tool can be used to intersect with routes that are commonly travelled to place or service other traps to identify high risk areas along that route (Figure 6b). For example, we selected Interstate 55 in Illinois, assuming this was a route commonly traveled to service other traps. We then selected only grid cells along this route, which can be used to identify the highest risk areas.

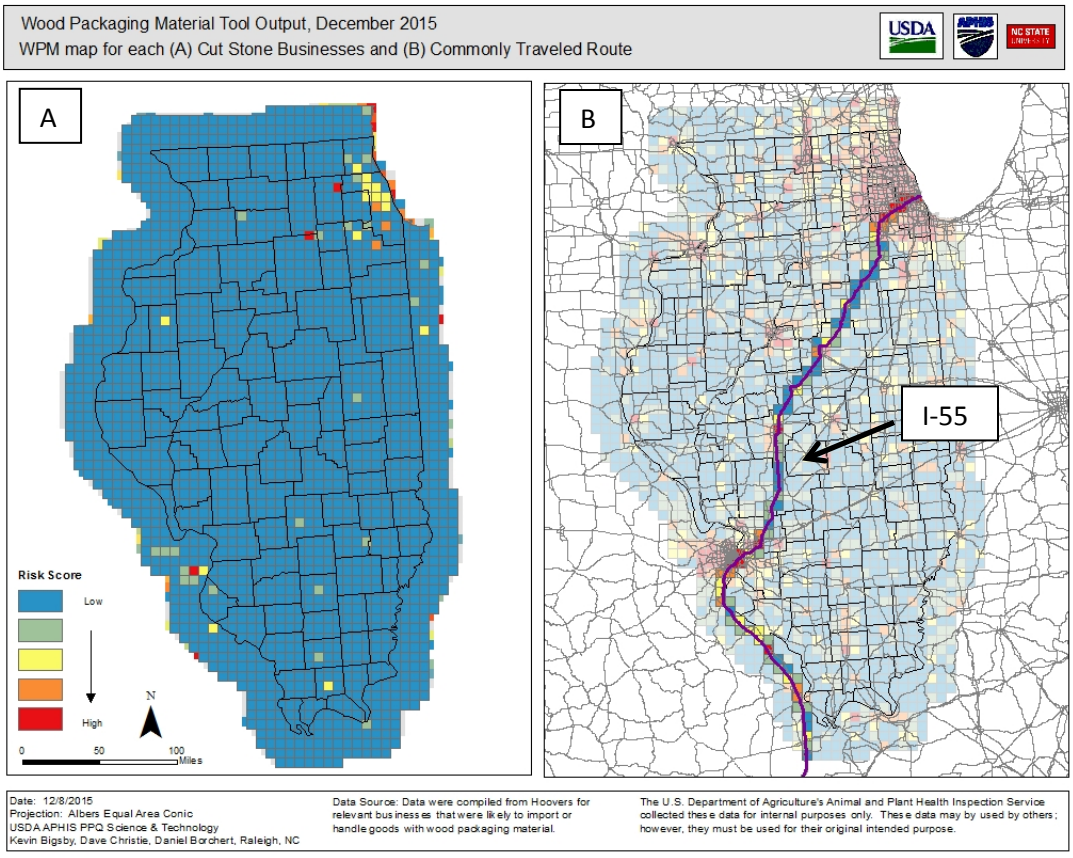

Figure 6. Risk Score for Particular Data Element and Routes. (A) The user can adjust the map display to view the risk score for each of the input data elements. Here the distribution of cut stone businesses is displayed. (B) The WPM grid cells can be interested with other data, for example routes commonly traveled, to identify WBBB survey locations in these areas. The WPM grid cells could also be interested with other input data layers that are associated with locations trapping personnel commonly spend time.

Identify Trap Locations within Cells

After the user identifies a particular cell in which to place a trap they can zoom into the cell to identify a suitable area (Figure 7). With underlying imagery on, available in ArcGIS online as a base map, the user can identify areas within the high risk cells that are suitable to place a WBBB trap. For example, we identified a forest patch in a high risk cell that might provide suitable host for WBB.

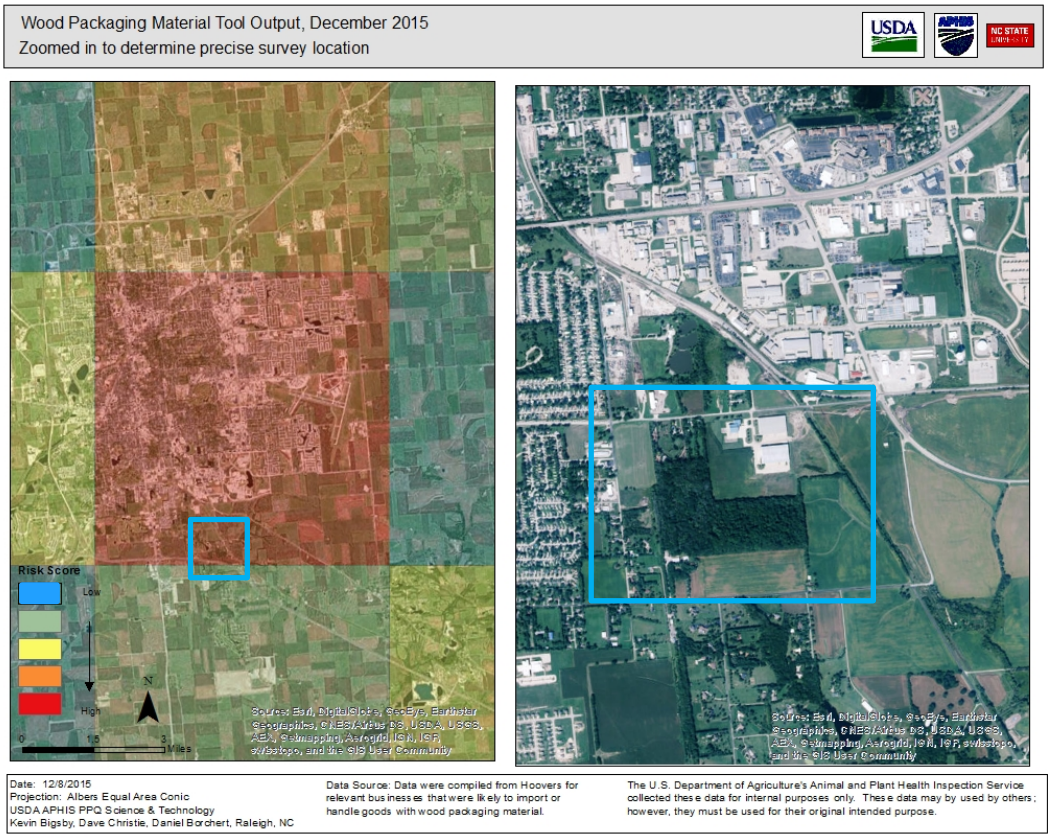

Figure 7. Zoom into High Risk Cell. More precise trapping areas can be identified by zooming into high risk areas to identify locations that are ideal for a trap. The forested area enclosed in blue polygon could provide a suitable location to place a trap.

Next Steps

Remove Business Headquarters

Business headquarters are currently included in the WPM risk maps, which could bias survey efforts towards core urban areas that are not at risk for WBBB entry. However, in many instances the business headquarters are also the location that presents a risk to WBBB entry. This occurs with smaller businesses where the headquarter is also the location that goods and packaging material are transported. To account for this source of error, we are developing statistical methods to remove headquarters that do not present a risk to WBBB entry.

Include Forest and Pest Assemblage Data

There are also efforts to make these maps more robust by including information on the tree genera found in each state and the assemblage of pests from exporting countries. These revised maps would provide a more nuanced examination of risk in each state and allow survey specialists to further focus their trapping efforts.

Appendix

Business Data Input to the WPM Tool. Using data on EANs associated with timber pests or wood packaging material, we identified high risk goods likely to have WPM and wood boring and bark beetles. Using these data, we next identified the types of industries and businesses that are most often associated with these goods and obtained data on the location of these businesses across the U.S. from Hoovers.

Data Element Attribute Name (Shape-file)	Data Element	Number of Records		Quantitative Attribute (Revenue or Facility Size)	Description	NAICS Code	Year Obtained
		Import	Final Destination				
ImpBrkStn	Brick, Stone, and Related Construction Material Merchant Wholesalers	1,612	10,710	Revenue	Establishments primarily engaged in the merchant wholesale distribution of stone, cement, lime, construction sand, and gravel; brick; asphalt and concrete mixtures; and/or concrete, stone, and structural clay products.	423320	2015
ImpCutStn	Cut Stone and Stone Product Manufacturing	331	2,318	Revenue	Establishments primarily engaged in cutting, shaping, and finishing granite, marble, limestone, slate, and other stone for building and miscellaneous uses. Stone product manufacturing establishments may mine, quarry, or purchase stone.	327991	2015
ImpTileTrz	Tile and Terrazzo Contractors	387	21,928	Revenue	Establishments primarily engaged in setting and installing ceramic tile, stone (interior only), and mosaic and/or mixing marble particles and cement to make terrazzo at the job site. The work performed may include new work, additions, alterations, maintenance, and repairs.	238340	2015
ImpWdPalle	Wood Pallet and Containers	3,947	N/A	Revenue	Establishments primarily engaged in manufacturing wood pallets, wood box shook, wood boxes, other wood containers, and wood parts for pallets and containers.	321920	2013
ImpMtlPrd	Metal Products	2,783	31,783	Revenue	Industries in the Fabricated Metal Product Manufacturing subsector transform metal into intermediate or end products, other than machinery, computers and electronics, and metal furniture, or treat metals and metal formed products fabricated elsewhere. Important fabricated metal processes are forging, stamping, bending, forming, and machining, used to shape individual pieces of metal; and other processes, such as welding and assembling, used to join separate parts together. Establishments in this subsector may use one of these processes or a combination of these processes. The NAICS structure for this subsector distinguishes the forging and	332	2015

					stamping processes in a single industry. The remaining industries in the subsector group establishments based on similar combinations of processes used to make products. The manufacturing performed in the Fabricated Metal Product Manufacturing subsector begins with manufactured metal shapes. The establishments in this subsector further fabricate the purchased metal shapes into a product. For instance, the Spring and Wire Product Manufacturing industry starts with wire and fabricates such items.		
N/A - Metal Products Input 1	Architectural and Structural Metals Manufacturing	1,174	20,016		Establishments primarily engaged in fabricating metal products for structural or architectural purposes.	3323	2015
N/A - Metal Products Input 2	Boiler, Tank, and Shipping Container Manufacturing	131	1,361		Establishments primarily engaged in cutting, forming and joining metal to manufacture products, such as power boilers, heat exchangers and tanks of heavy gauge metal, and cans, boxes and other light gauge metal containers.	3324	2015
N/A - Metal Products Input 3	Spring and Wire Product Manufacturing	366	1,839		Establishments primarily engaged in (1) manufacturing steel springs by forming, such as cutting, bending, and heat winding, metal rod or strip stock and/or (2) manufacturing wire springs and fabricated wire products from wire drawn elsewhere (except watch and clock springs).	3326	2015
N/A - Metal Products Input 4	Other Fabricated Metal Product Manufacturing	1,112	8,567		Establishments primarily engaged in manufacturing fabricated metal products (except forgings and stampings, cutlery and handtools, architectural and structural metals, boilers, tanks, shipping containers, hardware, spring and wire products, machine shop products, turned products, screws, and nuts and bolts).	3329	2015
ImpMchnMnf	Machinery Manufacturing	3,892	36,007	Revenue	Industries in the Machinery Manufacturing subsector create end products that apply mechanical force, for example, the application of gears and levers, to perform work. Some important processes for the manufacture of machinery are forging, stamping, bending, forming, and machining that are used to shape individual pieces of metal. Processes, such as welding and assembling are used to join separate parts together. Although these	333	2015

					processes are similar to those used in metal fabricating establishments, machinery manufacturing is different because it typically employs multiple metal forming processes in manufacturing the various parts of the machine. Moreover, complex assembly operations are an inherent part of the production process. In general, design considerations are very important in machinery production. Establishments specialize in making machinery designed for particular applications. Thus, design is considered to be part of the production process for the purpose of implementing NAICS. The NAICS structure reflects this by defining industries and industry groups that make machinery for different applications. A broad distinction exists between machinery that is generally used in a variety of industrial applications (i.e., general purpose machinery) and machinery that is designed to be used in a particular industry (i.e., special purpose machinery). Three industry groups consist of special purpose machinery--Agricultural, Construction, and Mining Machinery Manufacturing; Industrial Machinery Manufacturing; and Commercial and Service Industry Machinery Manufacturing. The other industry groups make general-purpose machinery: Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing; Metalworking Machinery Manufacturing; Engine, Turbine, and Power Transmission Equipment Manufacturing; and Other General Purpose Machinery Manufacturing.		
N/A - Machinery Manufacturing Input 1	Agriculture, Construction, and Mining Manufacturing	872	9,316		Establishments primarily engaged in smelting copper from the ore, and in refining copper by electrolytic or other processes.	3331	2015
N/A - Machinery Manufacturing Input 2	Metalworking Machinery Manufacturing	1,029	11,106		Establishments primarily engaged in manufacturing metal cutting and forming machine tools (except hand tools), and related products. The machine tools included in this industry are those not supported in the hands of an operator when in use. Establishments primarily engaged in manufacturing industrial	3335	2015

					moulds; tools, dies, jigs and fixtures; machine tool accessories and attachments; and rolls are included.		
N/A - Machinery Manufacturing Input 3	Engine, Turbine, and Power Transmission Equipment Manufacturing	302	2,101		Establishments primarily engaged in manufacturing turbines and turbine generator sets; internal combustion engines (except automotive gasoline and aircraft); and speed changers, industrial high-speed drives and gears. Establishments primarily engaged in manufacturing wind- and solar-powered turbine generators and windmills for generating electric power are included.	3336	2015
N/A - Machinery Manufacturing Input 4	Other General Purpose Machinery Manufacturing	1,689	13,484		Establishments, not classified to any other industry group, primarily engaged in manufacturing machinery that is not designed for use in any specific industry.	3339	2015
ImpCnstBld	Building and Construction	214	12,836	Revenue		N/A	2013
N/A - Building and Construction Input 1	Commercial and Institutional Building and Construction	162	9,919		Establishments primarily responsible for the construction (including new work, additions, alterations, maintenance, and repairs) of commercial and institutional buildings and related structures, such as stadiums, grain elevators, and indoor swimming facilities. This industry includes establishments responsible for the on-site assembly of modular or prefabricated commercial and institutional buildings. Included in this industry are commercial and institutional building general contractors, commercial and institutional building for-sale builders, commercial and institutional building design-build firms, and commercial and institutional building project construction management firms.	236220	2013
N/A - Building and Construction Input 2	Industrial Building Construction	52	2,915		Establishments primarily responsible for the construction (including new work, additions, alterations, maintenance, and repairs) of industrial buildings (except warehouses). The construction of selected additional structures, whose production processes are similar to those for industrial buildings (e.g., incinerators, cement plants, blast furnaces, and similar nonbuilding structures), is included in this industry. Included in this industry are industrial building general contractors, industrial building for-sale builders, industrial building	236210	2013

					design-build firms, and industrial building construction management firms.		
N/A - Building and Construction Input 3	Lessors of Non-Residential Buildings except mini-warehouses	0	1		Establishments primarily engaged in acting as lessors of buildings (except miniwarehouses and self-storage units) that are not used as residences or dwellings. Included in this industry are: 1. owner-lessors of nonresidential buildings; 2. establishments renting real estate and then acting as lessors in subleasing it to others; and 3. establishments providing full service office space, whether on a lease or service contract basis. The establishments in this industry may manage the property themselves or have another establishment manage it for them.	531120	2013
N/A - Building and Construction Input 4	Other heavy and civil engineering construction	0	1		Establishments primarily engaged in heavy and engineering construction projects (excluding highway, street, bridge, and distribution line construction). The work performed may include new work, reconstruction, rehabilitation, and repairs. Specialty trade contractors are included in this group if they are engaged in activities primarily related to engineering construction projects (excluding highway, street, bridge, distribution line, oil and gas structure, and utilities building and structure construction). Construction projects involving water resources (e.g., dredging and land drainage), development of marine facilities, and projects involving open space improvement (e.g., parks and trails) are included in this industry.	237990	2013
ImpWareSto	Warehousing and Storage	29	1,278	Facility Size	Establishments primarily engaged in operating general merchandise, refrigerated and other warehousing and storage facilities. These establishments provide facilities to store goods for customers. They do not take title to the goods they handle. These establishments take responsibility for storing the goods and keeping them secure. They may also provide a range of services, often referred to as logistics services, related to the distribution of a customer's goods. Logistics services	4931	2013

					can include labelling, breaking bulk, inventory control and management, light assembly, order entry and fulfillment, packaging, pick and pack, price marking and ticketing and transportation arrangement. However, establishments in this industry group always provide storage services in addition to any logistics services. Furthermore, the storage of goods must be more than incidental to the performance of a service such as price marking.		
N/A - Warehousing and Storage Input 1	Special Warehousing and Storage	5	64		Establishments primarily engaged in operating merchandise warehousing and storage facilities. These establishments generally handle goods in containers, such as boxes, barrels, and/or drums, using equipment, such as forklifts, pallets, and racks. They are not specialized in handling bulk products of any particular type, size, or quantity of goods or products.	493110	2013
N/A - Warehousing and Storage Input 2	Other Warehousing and Storage	24	1202		Establishments primarily engaged in operating warehousing and storage facilities (except general merchandise, refrigerated, and farm product warehousing and storage).	493190	2013
N/A – Warehousing and Storage Input 3	Refrigerated Warehousing and Storage	0	12		Establishments primarily engaged in operating refrigerated warehousing and storage facilities. Establishments primarily engaged in the storage of furs for the trade are included in this industry. The services provided by these establishments include blast freezing, tempering, and modified atmosphere storage services.	493120	2013
ImpWdPrd	Wood Products	234	Not Considered	Facility Size			
N/A - Wood Products Input 1	Logging	16			Establishments primarily engaged in one or more of the following: (1) cutting timber; (2) cutting and transporting timber; and (3) producing wood chips in the field.	113310	2013
N/A - Wood Products Input 2	Sawmills	63			Establishments primarily engaged in sawing dimension lumber, boards, beams, timbers, poles, ties, shingles, shakes, siding, and wood chips from logs or bolts. sawmills may plane the rough lumber that they make with a planing machine to achieve smoothness and uniformity of size.	321113	2013
N/A - Wood Products Input 3	Specialized Freight, Log Hauling	2			Establishments primarily engaged in providing local, specialized trucking. local trucking establishments provide trucking within a metropolitan area that may cross state lines. generally	484220	2013

					the trips are sameday return.		
N/A - Wood Products Input 4	Fuel Dealers, Wood Fuel	2			Establishments primarily engaged in retailing heating oil, liquefied petroleum (lp) gas, and other fuels via direct selling.	454310	2013
N/A - Wood Products Input 5	All Other Miscellaneous Wood Products	1			Establishments primarily engaged in manufacturing wood products (except establishments operating sawmills and preservation facilities; establishments manufacturing veneer, engineered wood products, millwork, wood containers, pallets, and wood container parts; and establishments making manufactured homes (i.e., mobile homes) and prefabricated buildings and components).	321999	2013
N/A - Wood Products Input 6	Hardwood Veneer and Plywood Manufacturing	56			Establishments primarily engaged in manufacturing hardwood veneer and/or hardwood plywood.	321211	2013
N/A - Wood Products Input 7	Truss Manufacturing	11			Establishments primarily engaged in manufacturing laminated or fabricated wood roof and floor trusses.	321214	2013
N/A - Wood Products Input 8	Reconstituted Wood Products manufacturing	31			Establishments primarily engaged in manufacturing reconstituted wood sheets and boards.	321219	2013
N/A - Wood Products Input 9	Cut Stock, Resawing Lumber, and Planing	33			Establishments primarily engaged in one or more of the following: (1) manufacturing dimension lumber from purchased lumber; (2) manufacturing dimension stock (i.e., shapes) or cut stock; (3) resawing the output of sawmills; and (4) planing purchased lumber. these establishments generally use woodworking machinery, such as jointers, planers, lathes, and routers to shape wood.	321912	2013
N/A - Wood Products Input 10	Other Millwork (including flooring)	3			Establishments primarily engaged in manufacturing millwork (except wood windows, wood doors, and cut stock).	321918	2013
N/A - Wood Products Input 11	Engineered Wood Member	1			Establishments primarily engaged in sawing dimension lumber, boards, beams, timbers, poles, ties, shingles, shakes, siding, and wood chips from logs or bolts. sawmills may plane the rough lumber that they make with a planing machine to achieve smoothness and uniformity of size	321213	2013
N/A – Wood Products Input 12	Support Activities for Forestry	1			Establishments primarily engaged in performing particular support activities related to timber production, wood technology, forestry economics and marketing, and forest protection. These	115310	2013

					establishments may provide support activities for forestry, such as estimating timber, forest firefighting, forest pest control, and consulting on wood attributes and reforestation.		
N/A – Wood Products Input 13	Softwood Veneer and Plywood Manufacturing	14			Establishments primarily engaged in manufacturing softwood veneer and/or softwood plywood.	321212	2013

*Because wood pallets commonly end up at these facilities to be repurposed, we consider all businesses to be an importer because they present a similar level of risk for primary pest entry.