


## 1.5.13: Invasive species, pathogens, and diseases

Current Condition	Desired Condition by 2048	
<p><b>Figure 37. Adult Apple Maggot<sup>1</sup></b></p>  <p>Climate change and globalization have increased the impact and costs<sup>2</sup> of invasive species<sup>3</sup>, pathogens, and diseases<sup>4</sup> for agriculture and the environment.</p> <p>Climate change has the potential to exacerbate existing issues with invasive species. For example, knotweed (<i>Fallopia japonica</i>) does not have mandated control above the high-water mark on certain rivers and is not managed at all on others and “recent and projected future flooding could certainly spread invasive knotweeds more widely through the overall landscape and impact agriculture, flood control, and fish habitat.”<sup>5</sup></p> <p>Even without climate change, globalization has added agricultural pressures by increasing the rate of pest and disease migration from ports and other transportation nodes. Recent examples include the spotted wing drosophila that arrived from Asia in the continental US in 2008 and in the Pacific Northwest in 2010;<sup>6</sup> the Asian Giant Hornet that threatens pollinators, first detected in the U.S. and Washington State in 2019, whose sting can also be fatal to humans;<sup>7</sup> and nutria, 12–40-pound rodents spreading quickly in western Washington that feed on wetland plants, “burrow in levees... and embankments, causing bank collapse and erosion.”<sup>8</sup></p> <p>The Washington State Department of Agriculture (WSDA) currently sets up to over 45,000<sup>9</sup> traps annually to track over 120 pests and diseases in the state, including the spongy moth, Asian giant hornet, apple maggot (see Figure 37) and Japanese beetle.<sup>10</sup> Although WSDA has programs to limit the spread of pests and disease arrival, local climate-informed planning can help further reduce future impacts to the Snoqualmie Valley APD.</p>	Farmers, through active involvement in a direct response network, have the information, monitoring systems and scientific network in place to proactively prepare for and mitigate invasive species, pathogens, and diseases arriving in this area.	
	Timeline	
	<ul style="list-style-type: none"> <li>○ 2024: Ongoing outreach and education</li> <li>○ 2028: Develop climate change invasive species strategy for SVAPD agriculture</li> <li>○ 2029: Establish response network</li> <li>○ 2030: Establish pest &amp; disease research and education priorities</li> <li>○ 2031: Continue deploying strategy recommendations</li> <li>○ 2036: All invasive species, pathogen, and disease prevention actions are in place &amp; are updated on a regular basis</li> </ul>	
Background	Service Providers	Priority
Along with much of Western Washington in nearby latitudes, the Snoqualmie Valley APD is predicted, “to have similar growing conditions to Santa Cruz County,	Leads: <ul style="list-style-type: none"> <li>○ WA State Dept. of Agriculture</li> </ul>	Medium/Low

<p>CA...” by 2040.<sup>11</sup> The changing climate will influence crop selection, as well as the pest and disease threats farmers must face.</p> <p>Studies have found that pests and disease on agricultural crops migrate north/south at roughly 1.6 miles annually, very close to the rate of warming caused by climate change (though this rate varies for different groups and species).<sup>12</sup> It should be noted that surface temperatures have been rising since the 1880’s, and the rate of warming has doubled since 1981.<sup>13</sup> As such, pests and diseases have already been advancing towards the Washington, and their rate of travel will potentially increase in coming years.</p> <p>While the arrival of more invasive species in the APD is inevitable, some current, potential invasive species and diseases have already been identified, though determining whether they will migrate to the APD requires further study. Initial concerns include the European Chafer (grass and crops)<sup>14</sup> Fall Armyworm (most vegetable crops, hay<sup>15</sup>), the Western Corn Rootworm (corn)<sup>16</sup> as well as African Swine disease.</p>	<ul style="list-style-type: none"> <li>○ WA Invasive Species Council</li> </ul> <p>Partners:</p> <ul style="list-style-type: none"> <li>○ King County WLRD</li> <li>○ King County Emergency Management</li> <li>○ University of Washington</li> <li>○ Washington State University</li> <li>○ USDA APHIS</li> <li>○ USDA FSA</li> </ul>	
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**Strategies**

- Increase soil health<sup>17</sup> education, cost-share, and incentive programs in order to combat pest and pathogens.
- Provide tools and technical assistance for farmers to develop Integrated Pest Management plans, partnering with WSU Extension and others.
- Encourage farmer to farmer meetings to discuss what they are seeing on farm, pest management strategies, etc.
- Increase SVAPD farmer enrollment with USDA FSA so farmers are eligible for invasive species disaster relief from the federal government.
- Support a population study/inventory of invasive species in SVAPD including pests, pathogens, and diseases.
- Support and participate in development of a direct response network to include the WA State Department of Agriculture, WA Invasive Species Council, USDA APHIS, WA university research and identification testing programs, King County WLRD, King County Emergency Management, and King County farmers to support a climate impacts strategy implementation such as:
  - Monitor pest, pathogens, and disease with expanded network of farmer participation
  - Establish and highlight network of plant pest and disease testing facilities,
  - Mitigate impacts, conduct research to mitigate impacts,
  - Conduct outreach, training, and education on proactive techniques to reduce impacts from pest, disease and pathogens moving into this region, and
  - Liaise with universities, state department of agriculture, WA Invasive Species Council, and USDA APHIS on invasive species, pathogens, and diseases harmful to agriculture.
- Support development of a Western Washington climate change and invasive species (pest, pathogen, and disease) strategy for agriculture. The strategy should utilize climate modelling and anticipated projected crop selection changes due to changing climate conditions<sup>18</sup>, newly detected invasive species, as well as integrating existing tools for mitigation such as pheromones, sterile insects, pest-eating insect releases for pests<sup>19</sup> and pursuing phenotyping to predict pest and disease-resistant traits and proactively breed resistance.<sup>20</sup>

<sup>1</sup> Dupont, Tianna, Jay Brunner, “Apple Maggot Control Options for Washington Apple Growers,” Washington State University, June 2016. [\[LINK\]](#). Accessed 3/24/23.

<sup>2</sup> Nita Bhalla, “Pests on the march as climate change fans spread of crop destroyers,” Reuters, June 2, 2021. [\[LINK\]](#). Accessed 8/23/2021.

<sup>3</sup> Montalvo, “Insects feast on plants, endangering crops and costing billions,” CNBC – Science, May 9, 2015. [\[LINK\]](#). Accessed 10/31/2021

<sup>4</sup> Carroll, Christine et al., “Crop Disease and Agricultural Productivity,” National Bureau of Economic Research (NBER) working paper series, June 2017. [\[LINK\]](#). Page 1. Accessed 10/31/2021.

- <sup>5</sup> Justin Bush, Executive Coordinator, Washington Invasive Species Council, Washington Recreation and Conservation Office, email communication, November 2021.
- <sup>6</sup> Beers, Elizabeth, "Spotted Wind Drosophila," Washington State University (WSU) Tree Fruit site, posted 2010; updated June 2021. [\[LINK\]](#). Accessed 10/31/2021.
- <sup>7</sup> Gamillo, Elizabeth, "The First Living Asian Giant 'Murder' Hornet of 2021 Has Been Found in Washington State," Smithsonian Magazine, August 6, 2021. [\[LINK\]](#). Accessed 11/13/2021.
- <sup>8</sup> Washington Invasive Species Council, "Stop the Invasion: Nutria," June 2016. [\[LINK\]](#). Accessed 1/20/22.
- <sup>9</sup> Lets GrowTogether, "Invasive Insect Detection in Washington State," November 13, 2015. [\[LINK\]](#). Accessed 10/31/2021
- <sup>10</sup> MyEdmonds News, "Department of Agriculture starts invasive pest trapping season," June 7, 2020. [\[LINK\]](#). Accessed 10/31/2021.
- <sup>11</sup> Snohomish Conservation District, "Agriculture Resilience Plan for Snohomish County," December 2019. [\[LINK\]](#). Page x. Accessed 9/7/2021.
- <sup>12</sup> Barford, Eliot, "Crop pests advancing with global warming," Nature, September 1, 2013. [\[LINK\]](#). Accessed 8/23/2021.
- <sup>13</sup> Lindsey, Rebecca and Luann Dahlman, "Climate Change: Global Temperature," National Oceanic and Atmospheric Administration (NOAA) News & Features, March 15, 2021. [\[LINK\]](#). Accessed 10/31/2021.
- <sup>14</sup> Washington Invasive Species Council, "European Chafer," October 25, 2019. [\[LINK\]](#). Accessed 12/7/21.
- <sup>15</sup> Flanders, Kathy, Donald Ball, Patricia Cobb, "Management of Fall Armyworm in Pastures and Hayfields," Alabama A&M & Auburn Universities Extension, Farming, June 24, 2019. [\[LINK\]](#). 10/20/2021.
- <sup>16</sup> de Sousa, Agnieszka, and Michael Hirtzer, "The Six Pests Coming to Eat Your Crops," Bloomberg Green, December 15, 2020, [\[LINK\]](#). Accessed 8/23/21
- <sup>17</sup> Snohomish Conservation District, "Agriculture Resilience Plan for Snohomish County," December 2019. [\[LINK\]](#). Page x. Accessed 9/7/2021.
- <sup>18</sup> USDA, "Climate Change and Agriculture in the United States," February 2013. [\[LINK\]](#). Accessed 8/23/21. Page 49
- <sup>19</sup> Weinberger, Hannah, "Climate change forces WA apple cider industry to adjust," Crosscut, October 12, 2021. [\[LINK\]](#). Accessed 10/20/2021.
- <sup>20</sup> Doody, Alison, "Pests and diseases and climate change: Is there a connection?" International Maize and Wheat Improvement Center (CIMMYT), News Feature, February 27, 2020. [\[LINK\]](#). Accessed 10/27/2021.