

# Invasive Shot-Hole Borer + Fusarium Dieback

## Identifying Symptoms and Look-Alike Pests on Willow

Various willow species (*Salix* spp.) are severely impacted by the emergent Invasive Shot-Hole Borers – Fusarium Dieback pest-disease complex (ISHB-FD). Other pests produce symptoms that appear to be indistinguishable from ISHB attack. This form was developed to accurately identify ISHB-FD and other pests exhibiting similar symptoms on willow.

### ISHB – Fusarium dieback



### American horned moth (*Sesia tibialis*)

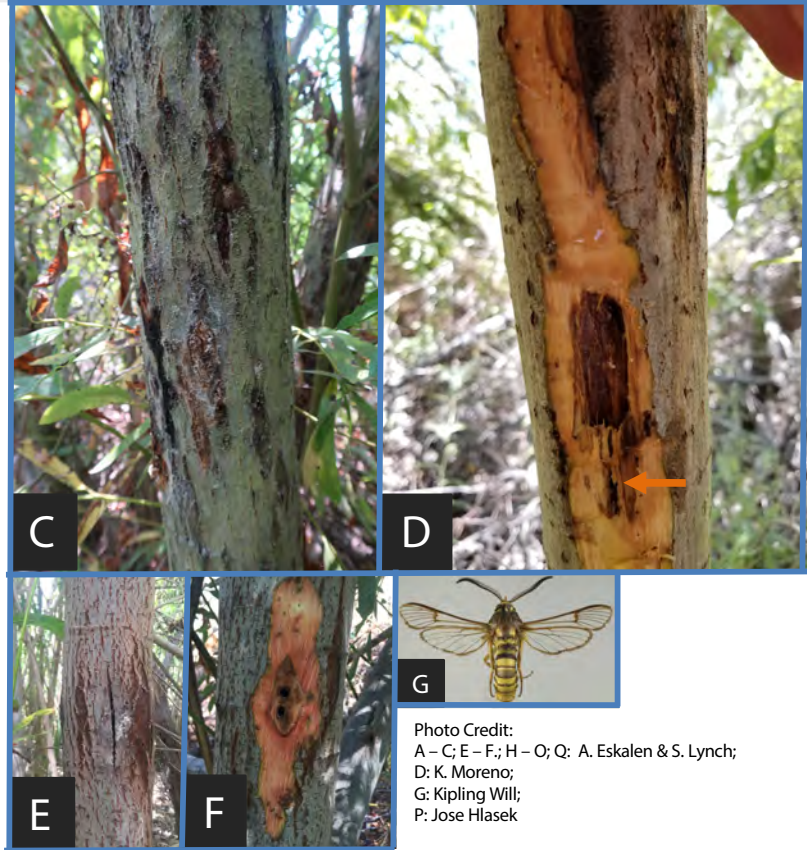
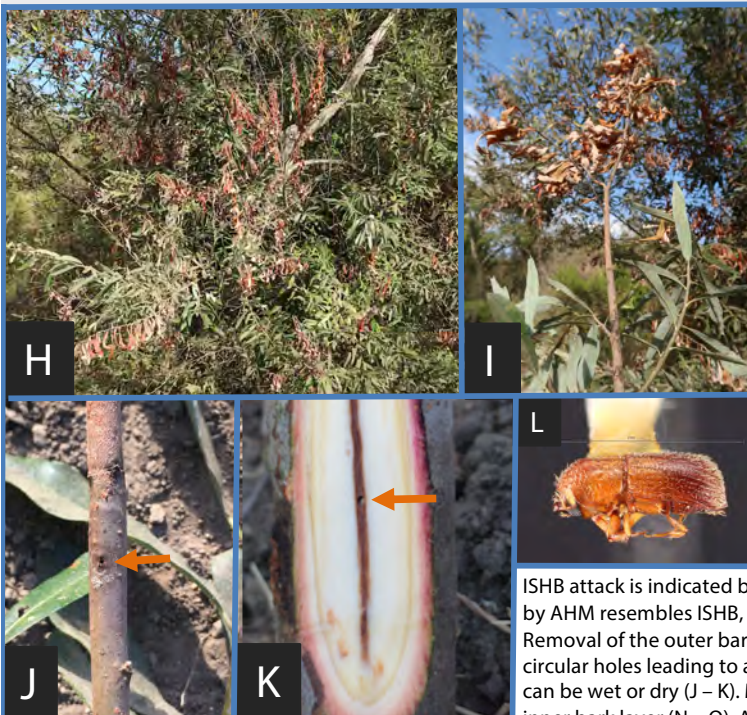


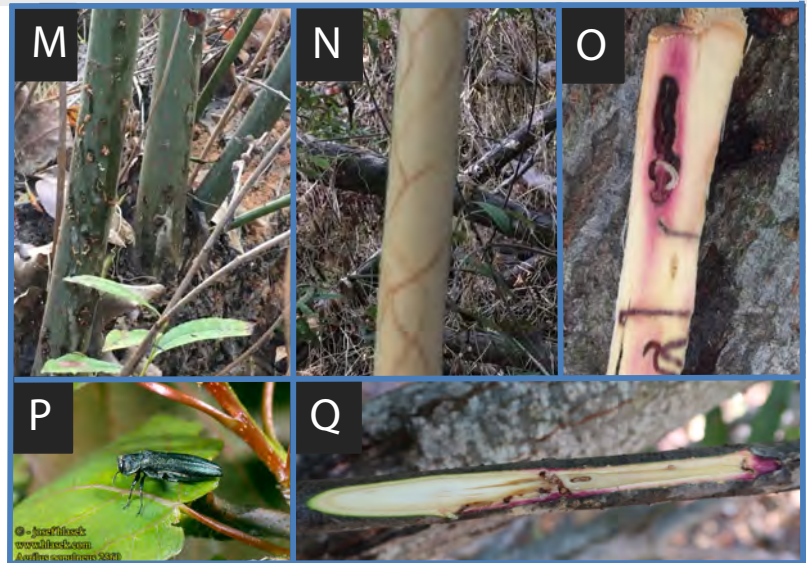
Photo Credit:  
A – C; E – F; H – O; Q: A. Eskalen & S. Lynch;  
D: K. Moreno;  
G: Kipling Will;  
P: Jose Hlasek

Photo: Kipling Will

### Twig beetle (*Micracis swainei*)



### Metallic wood-boring beetle (*Agrilus populeus*)



ISHB attack is indicated by 0.85 mm entry holes and associated galleries in the wood tissue (A – B). Advanced attack by AHM resembles ISHB, but is distinguished by symptoms of sunken and swollen portions of the wood (C & E). Removal of the outer bark reveals a vertical slit and associated cankered tissues that leak water (D), or 3-5 mm circular holes leading to a hollowed stem (F). Twig beetles produce 0.5 mm entry holes on 0.5 – 3 cm stems that can be wet or dry (J – K). Metallic Wood – Boring Beetles are restricted to the cambium at the outer wood layer and inner bark layer (N – O). All pests can occur on a tree simultaneously depending on location.

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Identities of Non-ISHB pests were confirmed by Drs. Richard Stouthamer, Paul Rugman-Jones (UC Riverside), Jiri Hulcr (University of Florida), & Robert Rabaglia USDA-FS

