

**Evaluation of Willow Scale (*Diaspidiotus gigas*) on Aspen (*Populus tremuloides*)
in the Wood River Valley, Idaho**

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In 2006, Bill Josey of ArborCare Resources, Inc., collected scale samples of a scale insect infesting aspen trees within an urban landscape in Hailey, Idaho. He contacted Forest Health Protection (FHP) personnel at the Boise Field Office. We collected samples of scales to identify species during July 2006. Subsequent field visits and correspondence with Mr. Josey indicated the scales were infesting aspen on urban/planted trees in and between Ketchum and Hailey, Idaho in the Big Wood River Valley. ArborCare Resources, Inc., and other tree care companies are successfully treating the infestation if found early.

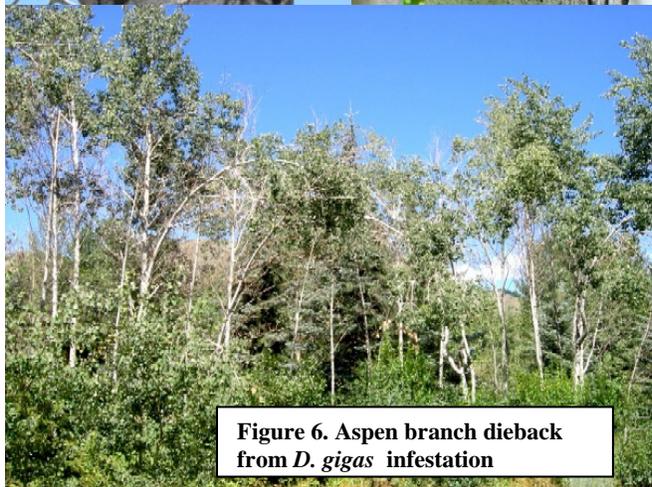
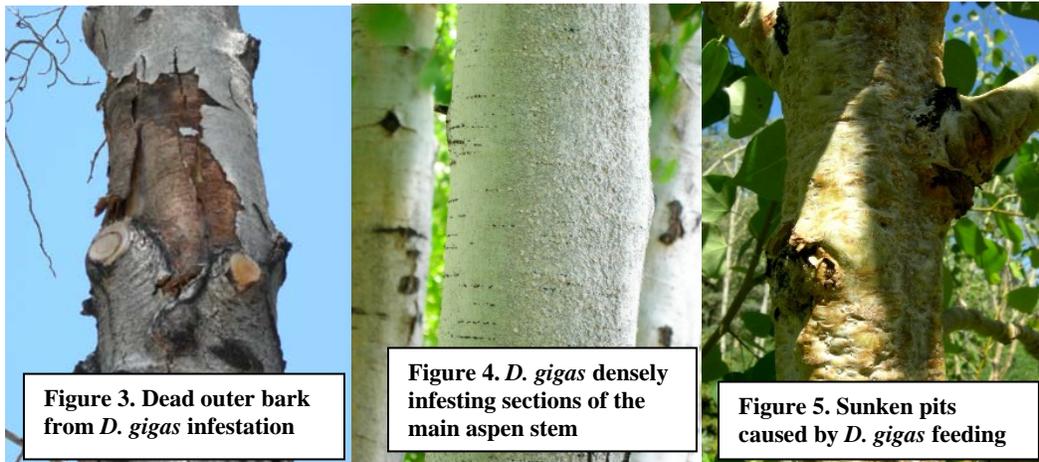
These scales have been identified as *Diaspidiotus gigas*, by Dr. Whitney Cranshaw, Colorado State University and by Dr. Ferenc Kozar, Plant Protection Institute, Hungarian Academy of Sciences. *D. gigas* is a nonnative species introduced, most likely, from Europe. The pest is widely distributed in the U.S. (ID, MT, NY, OH, OR, PA, RI, UT, WA, WI, WY) and in several Canadian provinces (Miller and Davidson 2005), and has several common names: willow/armored poplar/poplar/aspen scale. The insect has also recently been found on aspen trees in Aspen and Durango, Colorado. Until recently, it was thought that willow was the favorite host in the United States (Baker 1972). *D.gigas* will also infest *Tilia spp.* and *Populus spp.* (Miller and Davidson 2005).

Armored scales, such as *D. gigas*, comprise the largest family of scaled insects and contain a number of very important insect pest species. The female scales are small, soft-bodied and concealed beneath a scale covering comprised of wax secreted by the insect and the cast skins of the early instars. Eggs are laid under the scale cover. First-instar young, called crawlers are very active and may travel long distances. Dispersion occurs in the crawler stage, either by locomotion of the crawler itself or by transport on the feet of birds or by other means (Borer, Triplehorn and Johnson 1989). Eventually, the crawlers settle down and insert their mouthparts into a host plant and begin feeding. The female remains sessile the rest of its life. Scales injure plants by sucking sap from the phloem tissues. In large numbers, they may kill the tree.

Aspen is host to 33 native insect species that use aspen as a food source (Furniss and Carolin 1977). An introduced species can drastically affect the ecosystem in which it becomes established (Simberloff 1996). We found no documented evidence of any other nonnative introduced insect using aspen as a host.

Diaspidiotus gigas males and females overwinter in the second instar and are thought to have one to several generations per year (Miller and Davidson 2005, Polavarapu et al 2000). Reproduction is sexual and each female lays 86-215 eggs. Eggs are laid and hatch shortly to crawlers, or nymphs, from June to September (Miller and Davidson 2005, B. Josey pers. comm.). The crawlers, or nymphs, are the active and feeding lifestages.

Diaspidiotus gigas were moderately to densely distributed along the entire tree bole (figures 1, 2, and 4). Damages caused by scale feeding include crown thinning, bending at mid-upper bole, top-kill, and extensive branch mortality and breakage (figures 3 and 6). Other symptoms were deep pits or sunken areas underneath the scale and dead bark surrounding the feeding area (figure 5).



D. gigas has the potential to have a detrimental impact on aspen in central Idaho. Nonnative introduced scale insects have been shown to have large negative impacts in commercial orchards. Balsam woolly adelgid, a related, sap feeding insect has nearly eliminated all fir trees from the southeastern United States (Simberloff 1996) and is killing all fir species in northern Idaho.

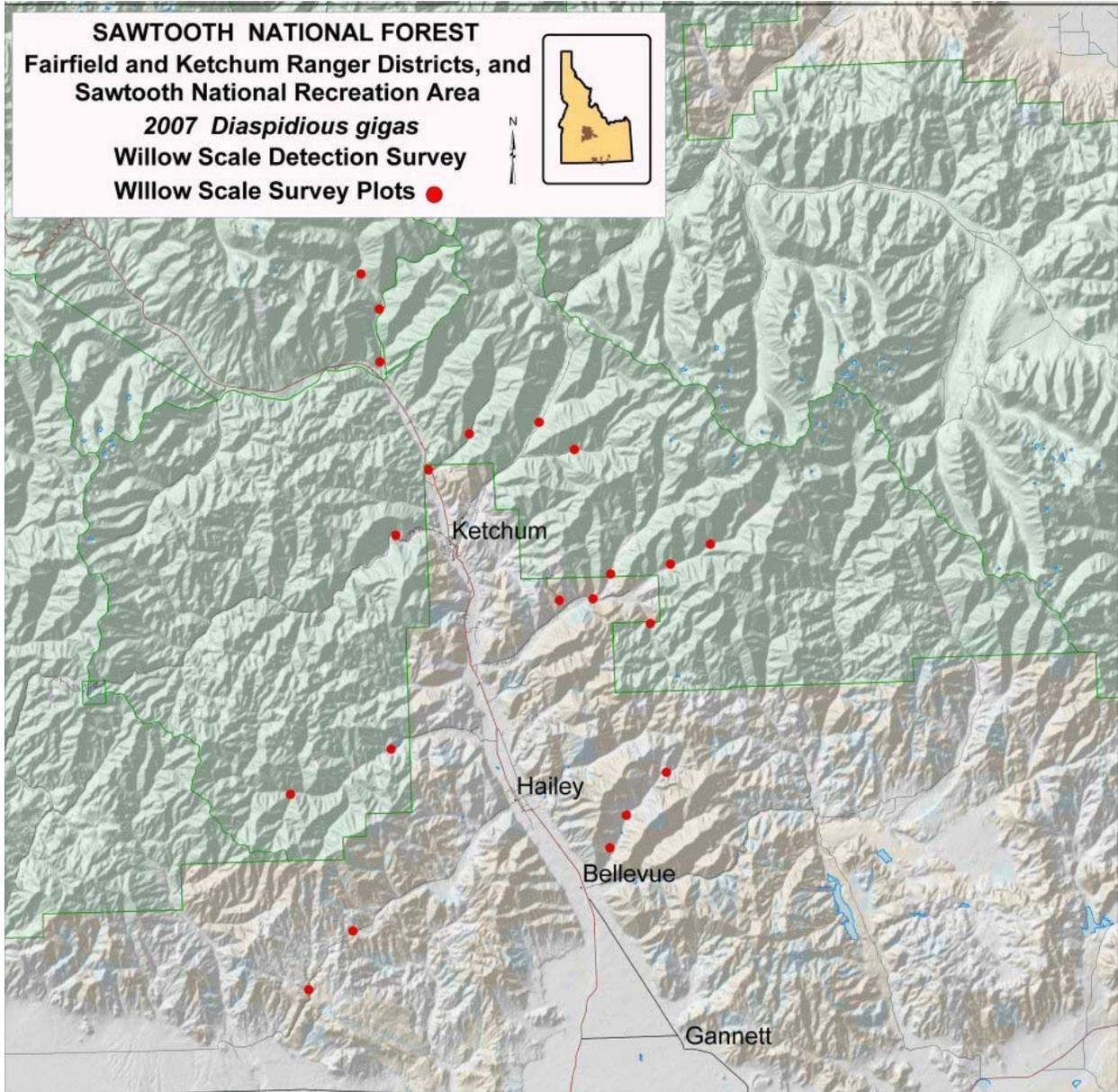
Once armored scales secrete their protective waxy covering, insecticide applications are rarely effective, and control measures are best applied during the more vulnerable immature stage (Fondren and McCullough 2005). Currently, local arborists are recommending a suite of treatments for *Diaspidiotus gigas*-infested aspen. However, none of these treatments have been scientifically tested specifically for this particular scale. There are treatments recommended generally for piercing/sucking insects on urban shade trees. Dormant oils may be applied to tree stems and branches, but are only effective when the insects are in the crawler stage. Additionally, water mechanically removes the adult scales from stems when sprayed at high pressure, and systemic pesticides may be injected into stems or soil to kill adults feeding on aspen.

Initial observation of *Diaspidiotus gigas* have been on aspen in the suburbs surrounding Ketchum and Hailey. There is concern the scale may disperse from the current known urban infestations encompassing the area between Ketchum and Hailey to infest naturally-growing clones of aspen on public lands nearby.

In the fall of 2007, FHP personnel conducted a preliminary roadside detection survey in the Big Wood River Valley to address this concern. The survey strategy was to evaluate the aspen in all cardinal directions from the currently known infested area. Aspen clones were located and georeferenced plots were established about every 2 miles apart. We preferred to establish plots in large clones or groupings of clones near roads to optimize survey time. At each plot, up to 10 minutes was spent visually inspecting all size-classes of aspen for *Diaspidiotus gigas*. Presence or absence of the scale was recorded for each plot. A plot was considered "infested" if one or more scales was found and uninfested if no scales were found after 10 minutes of inspecting the aspen. Additionally, willow and cottonwoods were also evaluated, if these other hosts were near the plot. All plots were recorded and located in a GPS database and mapped to determine the geographical distribution of the insect.

No scales were found on aspen in any of the 21 plots during the 2007 survey (figure 7). The results of the preliminary survey indicate that the *Diaspidiotus gigas* scale has not dispersed to public lands to date. FHP personnel will continue the detection effort during summer 2008 and will work with Idaho Department of Lands and Sawtooth National Recreation Area personnel to monitor and further delimit the currently established scale populations between Ketchum and Hailey.

Figure 7. 2007 *Diaspidiotus gigas* detection survey on aspen of the Big Wood River Valley, Idaho. Georeferenced plot locations indicated by red dots. No *D. gigas* populations were found on NFS or BLM lands in 2007.



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