

## 2015 Forest Health Highlights: Bighorn National Forest

USDA Forest Service, Rocky Mountain Region, Forest Health Protection  
Rapid City Service Center, 8221 S Highway 16, Rapid City, SD 57702

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### Conditions

- Western balsam bark beetle activity resulted in increased subalpine fir mortality. An estimated 4,300 acres were affected in 2015, an increase of 1,000 acres from 2014 (**Fig. 1 & 3**). In other forests, *Armillaria* root disease contributes to subalpine fir mortality, but is uncommon in subalpine fir in the Bighorn National Forest.



**Figure 1.** From left to right, western balsam bark beetle galleries and western balsam bark beetle stand damage.

- Overall mountain pine beetle caused mortality of pines decreased from 120 acres affected in 2014 to 40 acres affected in 2015 (**Fig. 3**). In 2015 most mortality occurred in lodgepole pine (30 acres), which increased from zero affected acres in 2014. Mortality in ponderosa pine decreased from 90 acres in 2014 to two acres in 2015, and limber pine mortality decreased from 30 acres to four acres.
- Pine engraver beetles (*Ips* sp.) were detected in the southeast in lodgepole and ponderosa pine, affecting 64 and 34 acres, respectively (**Fig. 3**).
- Spruce beetle was detected on the forest in 2015, affecting 70 acres.



- Douglas fir beetle activity increased from one acre affected in 2014 to 10 acres in 2015. There is continued use of MCH to protect high value areas.
- There were some larger areas of lodgepole pine with discolored needles caused by winter desiccation found throughout the forest.
- Within aspen stands, 10 acres were defoliated, which was mostly caused by frost damage, and eight acres were affected by dieback and mortality. Sooty bark canker (**Fig. 2**) followed by Cytospora canker are the most damaging agent in aspen stands. White mottled rot is damaging in select aspen stands (**Fig. 2**).



**Figure 2.** From left to right, sooty bark canker killing an aspen and white mottled rot mortality in an aspen stand on the Bighorn National Forest.

- Dwarf mistletoe continues to be a problem in lodgepole pine stands, but suppression treatments are improving stand conditions.
- Comandra blister rust incidence is slowly decreasing, likely due to low infection rates in the last few years.
- White pine blister rust disease is found in most limber pines stands throughout the forest and is continuing to spread and intensify; with high mortality in Ten Sleep and Shell Canyons.



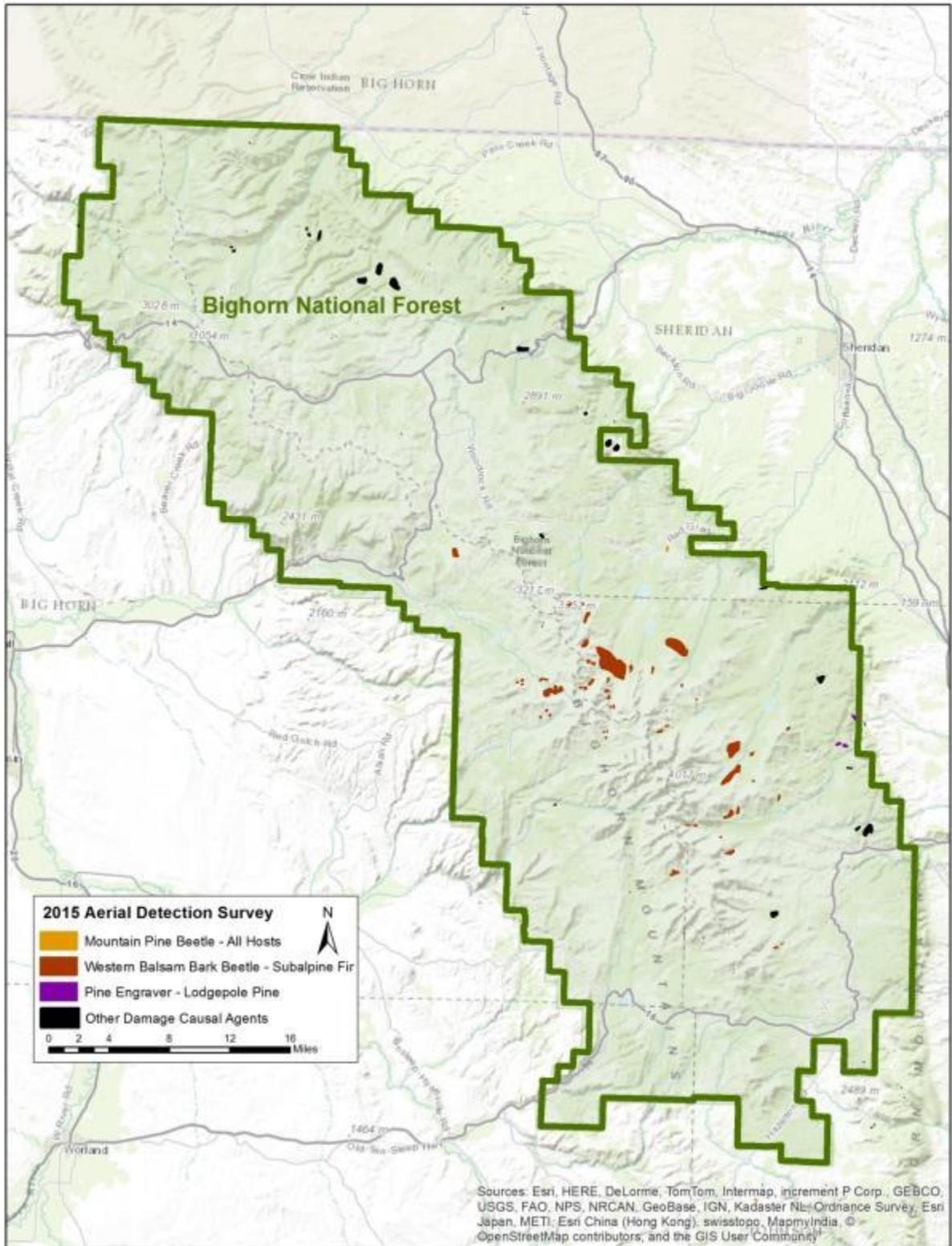


Figure 3. Aerial detection survey map of the Bighorn National Forest: 2015.

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### Conditions

- **Mountain pine beetle continues to be the most frequent damage agent** found across the forest, with 16,000 acres killed in 2015 compared to 16,500 killed in 2014 (**Fig. 5**). These numbers are taken from remote sensing techniques which are a year behind where the beetles are. Based on 2015 ground surveys done in the fall, there will be a sharp decline in mortality in 2016. It appears the mountain pine beetle epidemic in the Black Hills is finally subsiding. Preventive spraying of high value trees in campgrounds and landscape level thinning of forest stands have provided protection to remaining trees where these have been implemented (**Fig. 1**).



**Figure 1.** Thinned versus unthinned stands in the Black Hills. These stands are adjacent to one another.

- **Pine engraver beetles (*Ips sp.*) are frequently found throughout the forest.** They often attack trees simultaneously with mountain pine beetle in addition to attacking other stressed or weakened trees. Mortality caused by engravers has been low the past few years as we have seen normal to above normal spring moisture.
- **Wood borers numbers have been high over the past few years,** largely due to high levels of dead trees created by recent mountain pine beetle mortality. Borers do not attack live trees and actually compete with mountain pine beetles in infested trees for the same food resource.
- **In late summer, *Marssonina* leaf blight resulted in extensive foliage damage (Fig. 2)** and premature defoliation in aspen in much of the forest. Sooty bark canker continues to be the most damaging agent in aspen stands, followed by *Cytospora* canker and bronze poplar borer. White mottled rot is damaging in select aspen stands.





**Figure 2.** Defoliation caused by *Marssonina* on aspen; and

**Figure 3.** Limber pine with white pine blister rust cankers in the stem (this tree will be dead next year).

- Monitoring and pest control efforts continue on the rare limber pine in Black Hills National Forest. The few limber pine are endanger of extinction in the Black Hills due to the exotic white pine blister rust disease.
  - White pine blister rust, and invasive fungal disease, recently killed three of the now 28 known live limber pine (*Pinus flexilis*) on USDA-Forest Service land (on and near Harney Peak).
  - Six of the trees were infected with the rust, but infected branches were removed from four trees. Two trees have stem cankers that cannot be removed (**Fig. 1**).
  - Only two trees are large enough to be infested by mountain pine beetle, so Verbenone pouches were applied to protect the larger trees.

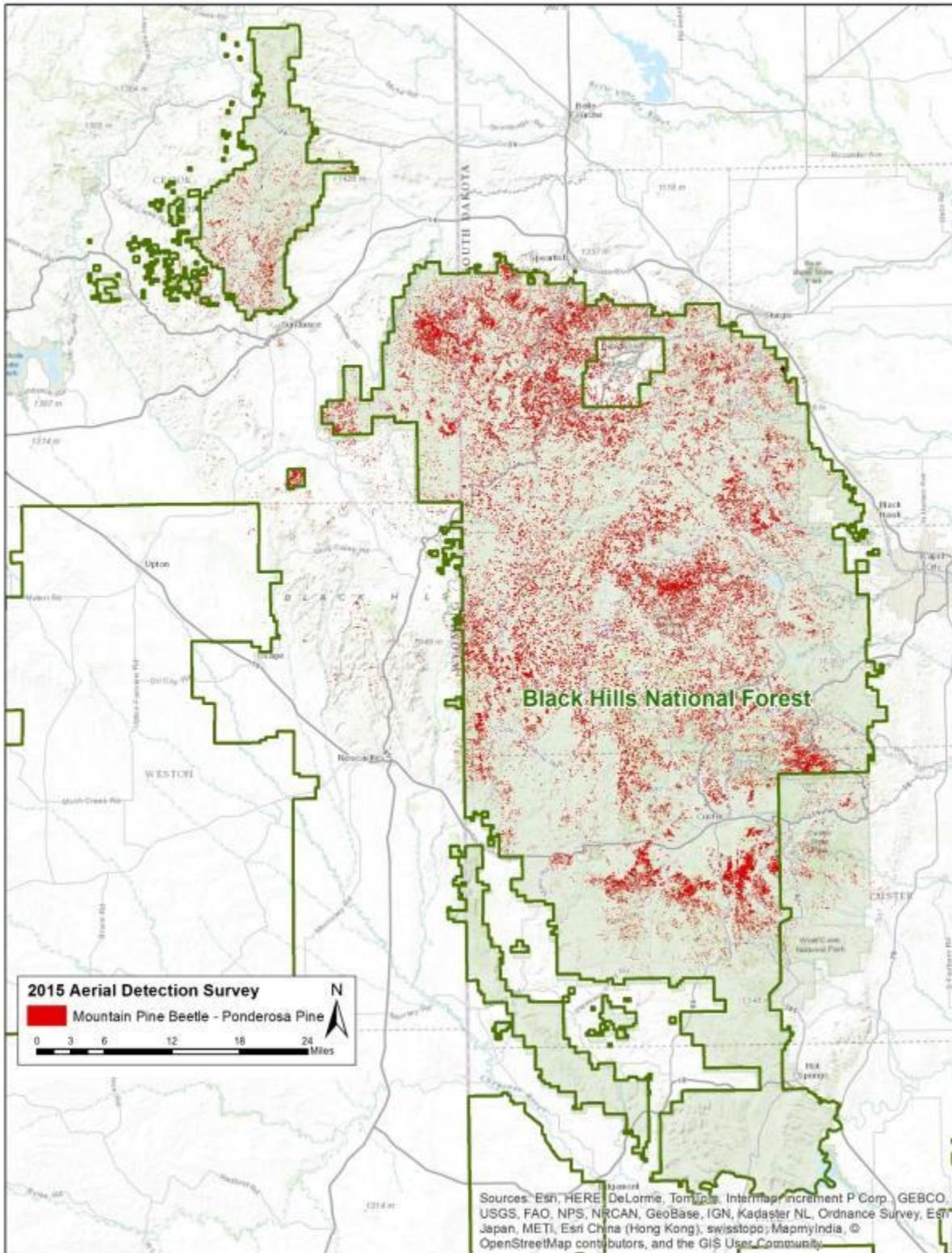




**Figure 4.** Winter desiccation in spring of 2105.

- Winter desiccation resulted in needle mortality in ponderosa pine trees in scattered areas of the forest. Most of the areas affected were small, though several acres were affected in some areas including the Hazelrodt Recreation Residence Tract (**Fig. 4**). Winter desiccation seldom results in direct tree mortality, but it does stress trees, making them more susceptible to some insects and diseases.
- Diplodia shoot blight and canker disease produced scattered branch mortality in crowns and some tree mortality of ponderosa pine throughout the forest. More extensive branch mortality with some tree mortality was observed in the Northern Hills District. This disease can cause tree mortality, but repeated outbreaks are often required.
- Rodent chewing caused branch mortality in ground juniper throughout the forest resulting in striking orange-brown (dead) juniper needles. In spring, *Gymnosporangium* rust disease was very common in juniper and the two damages were frequently observed together. The disease was also common in *Amelanchier* spp., the alternate host. The increased rodent chewing might be related to the increased *Gymnosporangium* rust since rodents often chew rust infected branches.





**Figure 5.** Aerial Photo Interpretation map of mountain pine beetle damages in the Black Hills National Forest: 2015.

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## 2015 Forest Health Highlights: Nebraska National Forest & Bessey Nursery

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### Conditions

- Pine engraver beetle (*Ips* sp.) combined with fire are the most damaging agents in ponderosa and jack pine (**Fig. 1**).



**Figure 1.** Fire and pine engraver affected areas.



- Diplodia shoot blight and canker disease, frequently combined with hail and/or pine engraver beetle, are also damaging ponderosa and jack pine (**Fig. 2**).



**Figure 2.** Widespread Diplodia damage.

- Aerial detection survey identified 930 acres of pine engraver beetle damage in ponderosa pine in the Pine Ridge Ranger District; other districts were not flown (**Fig. 4**).
- There was widespread light defoliation of oaks and chokecherries by the banded tussock moth in north central Nebraska and south central South Dakota.

#### **Forest Health Conditions at Bessey Nursery:**

- Damage agents in conifers at the nursery include *Diplodia pinea*, *Fusarium*, *Phytophthora*, and *Pythium*; and occasionally *Phomopsis*.
- Damage agents in hardwoods at the nursery include black-knot and shot hole in *Prunus*; and occasional foliage diseases including Anthracnose; powdery mildews; *Melampsora* rust on cottonwood; rusts on *Ribes*; and *Gymnosporangium* rust ("cedar apple rust") on *Amelanchier*, *Malus*, and *Crataegus*.
- Diseases at the nursery were controlled with proper watering practices, healthy plants, and timely control applications to reduce significant loss (**Fig. 3**).

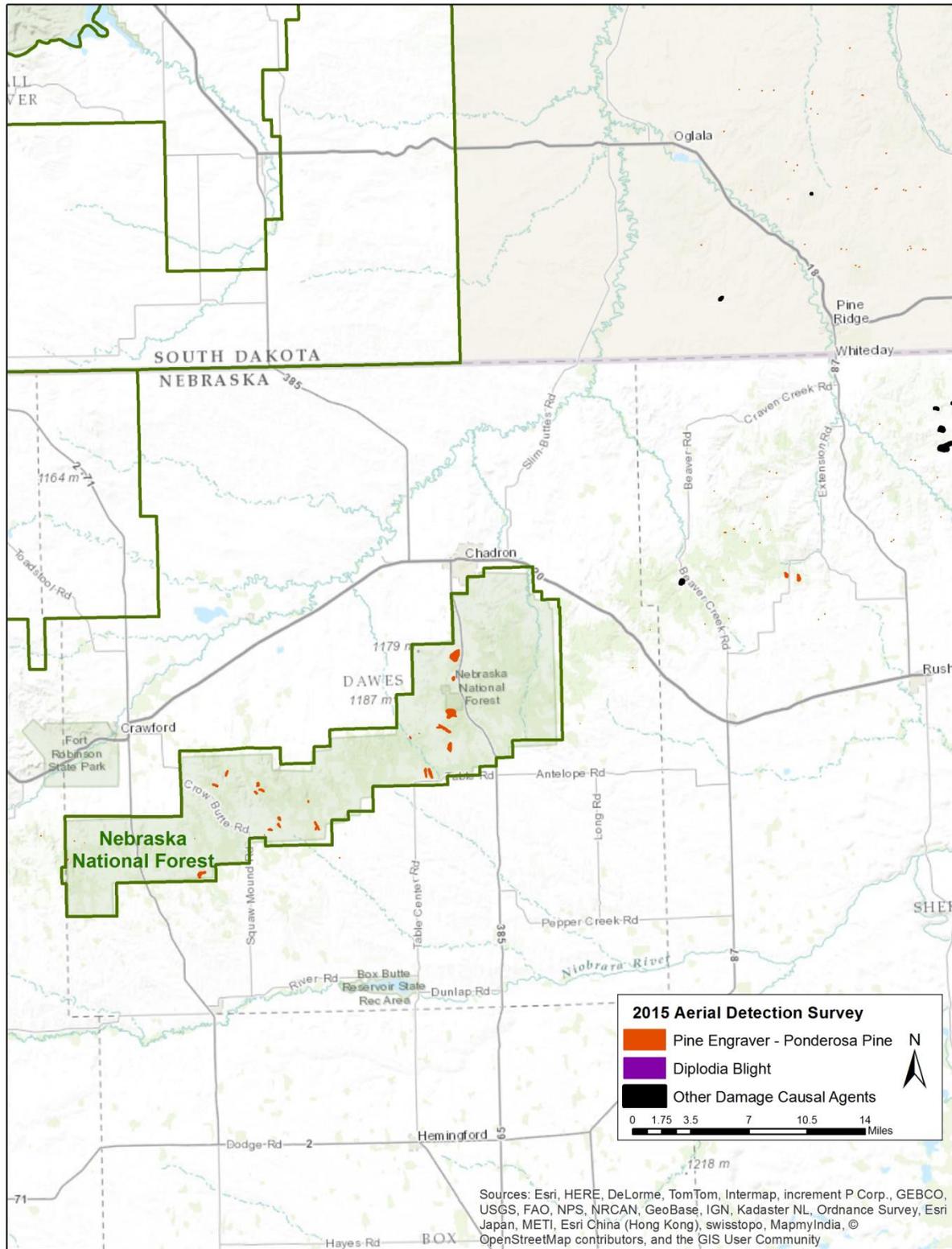




**Figure 3.** Fall colors in bur, swamp white, and red oaks at the nursery.

- Animal damage was minimized with deer fence and woven electric fence for small mammals.
- Weeds at the nursery were controlled with mowing, hand-pulling, and herbicide to maintain weed free fields as well as wind-breaks.





**Figure 4.** Aerial detection survey map of the Nebraska National Forest: 2015. Only Pine Ridge Ranger District was flown.

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## 2015 Forest Health Highlights: Shoshone National Forest

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### Conditions

- There is an ongoing, intense spruce beetle epidemic occurring on the forest. Acreage affected remained relatively constant from 2014 to 2015, with 41,000 acres reported in 2014 and 35,000 acres detected in 2015. The epicenter of the epidemic is on the Wind River Ranger District. The epidemic has appeared to be moving south over the past few years (**Fig. 1** and **5**). Preventive spraying is used to protect trees in campgrounds.



**Figure 1.** Spruce beetle caused spruce tree mortality

- Mountain pine beetle mortality of five-needle and lodgepole pine decreased to 14,000 acres in 2015 down from 58,000 acres in 2014. Eleven thousand acres of the mortality was in 5-needle pines, the other 3,000 acres were in lodgepole pine (**Fig. 2** and **5**). At this point the epidemic is mostly in the south, west of Lander. There are scattered remnant pockets of mortality throughout the rest of the forest. Verbenone is being used to protect 5-needle pines and preventive spraying is used to protect trees in campgrounds.





**Figure 2.** Mountain pine beetle caused mortality in 5 needle pines

- Western spruce budworm affected 11,000 acres, down from 26,000 acres in 2014 (**Fig. 3** and **5**); in the Clarks Fork drainage. The heaviest defoliation is occurring on Douglas-fir, with lesser amounts on spruce and true fir. The defoliation has been heavy in affected Douglas-fir stands, with 50-90% defoliation on mature trees. Seedlings and saplings are also being heavily defoliated in these areas.



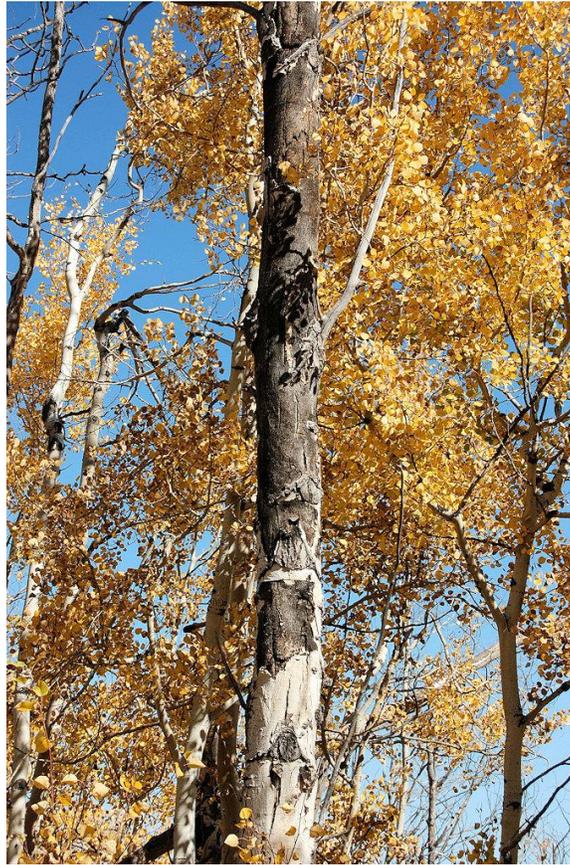
**Figure 3.** Western spruce budworm defoliation

- A decrease in subalpine fir mortality was detected with 3,500 acres affected (**Fig. 5**). Subalpine fir decline is attributed to damage from western balsam bark beetle, Armillaria root disease, and potentially other damage agents.
- In general, aspen is in good shape. As older trees are dying off, the stands are often regenerating back from root suckers. Sooty bark canker continues to be the most damaging agent in aspen stands (**Fig. 4**), followed by Cytospora canker and bronze

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poplar borer. White mottled rot (*Ganoderma*) is causing mortality in select aspen stands.



**Figure 4.** Sooty bark canker killing an aspen

- Persistent diseases problems often not detected during aerial detection survey include:
  1. White pine blister rust, which continues to intensify and cause limber and whitebark pine mortality. White pine blister rust can be particularly damaging on seedlings and small trees, which is exacerbating the widespread mortality that has been caused by mountain pine beetle to the overstory over the past 10 years.
  2. Dwarf mistletoe continues to affect lodgepole, limber, and whitebark pines.
  3. Comandra blister rust disease is found at high levels in lodgepole pines, particularly on the Wind River Ranger District.
  4. Various root diseases including Armillaria root disease, white mottled rot, *schweinitzii* root and butt rot, and *tomentosus* root rot.



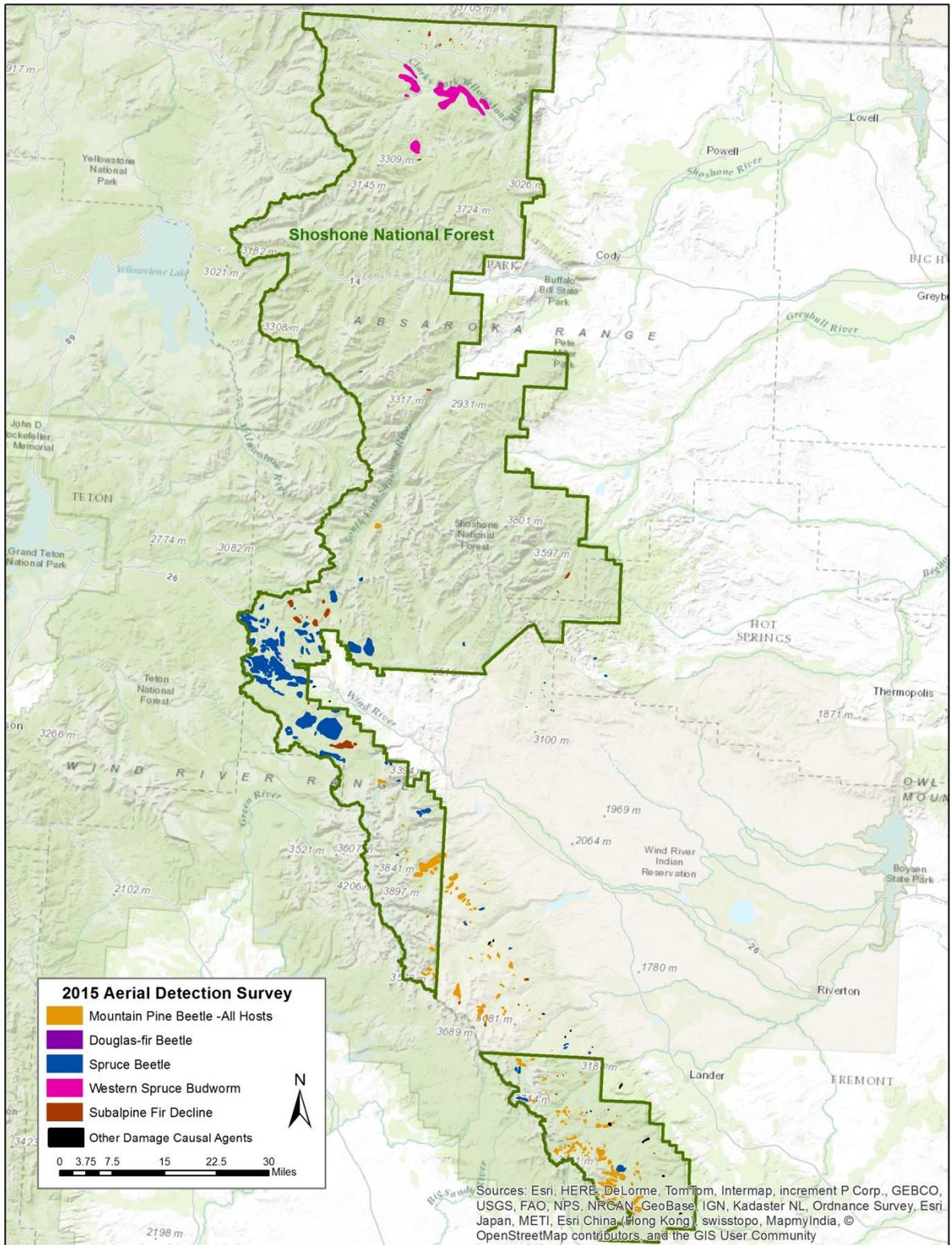


Figure 5. Aerial detection survey map of the Shoshone National Forest: 2015.

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