BARK BEETLES TO DEFOLIATORS

Beverly M. Bulaon
USDA Forest Service, Forest Health Protection
South Sierra Shared Service Area
2019 ADS: White Mountains
2019 ADS: Inyo Mountains
2019 ADS: Chimney Peak Wilderness
Defoliator or other?

- Pinyon Needle Scale
- Pinyon Sawflies
- Pinyon Pitch Mass Borers
- Twig Beetles
- Pinyon Blister Rust
- Biotic/Abiotic
Pinyon Needle Scale
*Matsuccoccus acalyptae*

Photos courtesy of Jeff Schalau, Arizona Cooperative Extension, Yavapai County Extension, Agricultural and Natural Resources
PNS widely distributed in the range of pinyon species: Western and Southwestern US

- Outbreaks persist for years
- Prolonged feeding can kill or severely injure developing trees

- *Creates susceptible conditions for more aggressive insects*
2019 PNS damage
**Historical CFPC records PNS**

- **1968** – 2200 acres, Ventura County
- **1969** – 22,000 acres, Ventura & Kern Co, some mortality
- **1970** – No mention
- **1971** – continues 22,000 ac, Ventura & Kern Co
- **1972** – Ventura & Kern Co; new 900 ac in Tulare County (Kennedy Mdws Cmgd)
- **1981** – 40 ac, Ventura
- **1991** – Tulare Co., 25-50% def in burn
Historical CFPC records PNS

- **2008** Outbreak in San Rosa Reservation, Southern CA; observations in Chimney Peak Wilderness, BLM Bakersfield District
- **2009** populations continue monitoring
- **2010** No mention

- **2019** ADS detection in east Inyo NF, BLM
Pinyon Needle Scale Outbreak on the Santa Rosa Reservation

Tom W. Coleman¹, Michael Jones¹, and Adrian Ackley²
¹USDA Forest Service, Forest Health Protection and ²DOI, Bureau of Indian Affairs

OBJECTIVES
Our objectives were to determine the life cycle of the pinyon needle scale (PNS) and the level of injury from the PNS outbreak on four-needle pinyon pine.

PINYON NEEDLE SCALE LIFE STAGES

- A female PNS emerging from its wax covering, which is attached to a needle of a four-needle pinyon pine (A). The females are hirsute. Male PNS have long antennae, wings with reduced venation, and ovipositor protruding from the abdomen (B).

- The pinyon needles are lined with a waxy covering (C). Notice the emerging female in the center of the picture. A fully emerged female is noted by the arrow.

- Females move to the base of host trees to lay eggs. PNS egg masses commonly occur on the bases of trees (D). The egg masses consist of thousands of females and their eggs (E, F). The waxy covering produced by the females.

- Thousands of "cremets" hatching from an egg mass on the leaf (G, noted by the arrow). The crawlers will move from the base of the tree to the needles where they will begin to feed on four-needle pinyon pine (H).

- During outbreaks, the PNS can reach very high densities on trees. Extensive feeding from the PNS can cause premature needle loss (I). The scale sucks nutrients from the tree causing areas of the tree.

TREE INJURY

- High levels of injury from PNS feeding can be identified by sparse crown thinning and dead needles (J). Trees within the outbreak possess varying levels of injury. Feeding from the PNS commonly causes 80% tree mortality.

- Different levels of crown thinning from PNS feeding on four-needle pinyon pine (K, L). No tree mortality has occurred in the PNS outbreak. However, bark caddis may attack weakened trees causing tree mortality.

SURVEYS/MONITORING

- Forest stand measurements were conducted in the PNS outbreak to determine the level of injury and the current forest stand condition (M). Notice the thin crowns in the picture below (N).

- Yellow sticky cards hanging in the pines were used to monitor the flight activity of the males (O). The red dots on the sticky cards identify the PNS males. This card shows a high density of males.
Historical records PNS

2008-2012 Nevada recorded over one million acres infested with PNS
- Mortality was low, associated with Pinyon Ips
- Other damage agents noted in association PNS
- Counties: Douglas, White Pine, and Lander (>50K acres); Nye (>220K acres)

Courtesy of 2012 Forest Pest Conditions in Nevada
Ecological significance

• Classen et al. 2005 (Soil Science Society Am. Journal 69)
  – Studied differences in microclimate effects btw Pinyon Scale vs. Pitch Mass Borer on Pinyon
  – PNS reduced LAI by 39% and decreased crown water interception by 51%
  – PNS increased soil moisture and temperature by 35 and 26%

➢ Reduces radial growth & causes dieback
➢ During drought, slight increased moisture buffers hosts from stress
➢ Areas w PNS were not attacked by Pinyon Ips
Will Keep Monitoring

- Secondary insects may also be benefiting due to changing climate
- Alter, contribute, or compound stress on hosts during drought/disturbance events
Please contribute to CA Forest Pest Conditions!

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