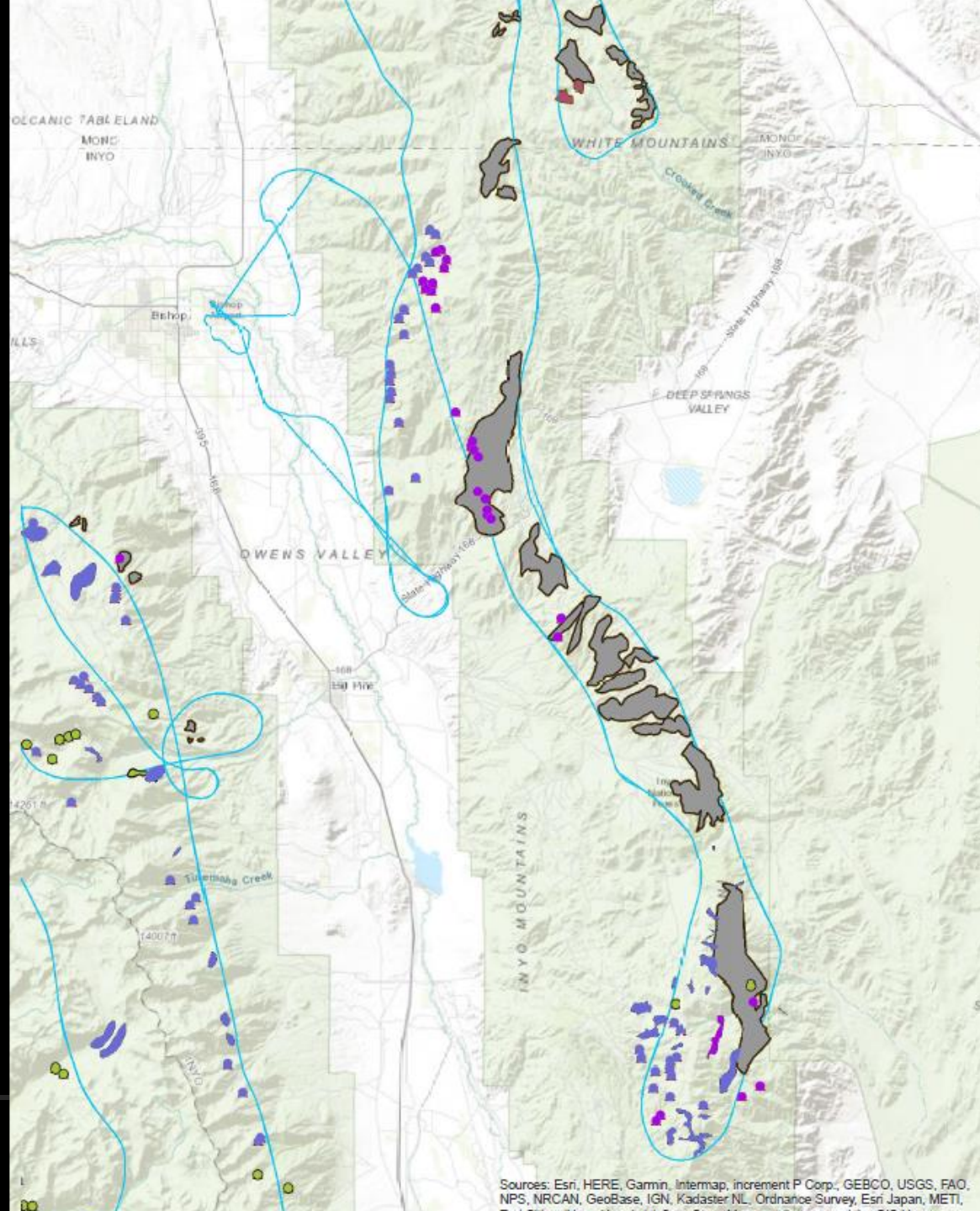


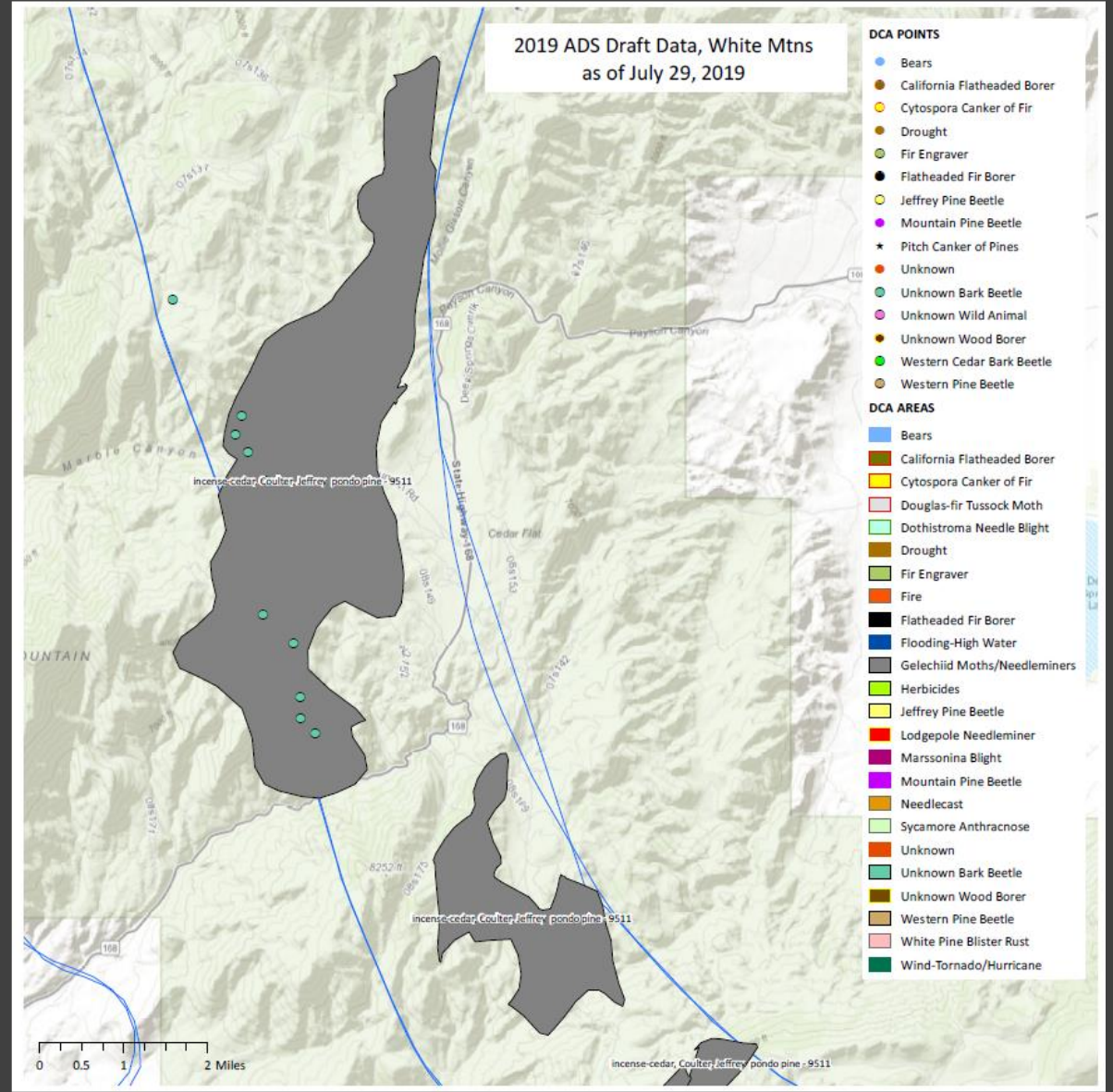
# *BARK BEETLES TO DEFOLIATORS*

*Beverly M. Bulaon  
USDA Forest Service, Forest Health Protection  
South Sierra Shared Service Area*

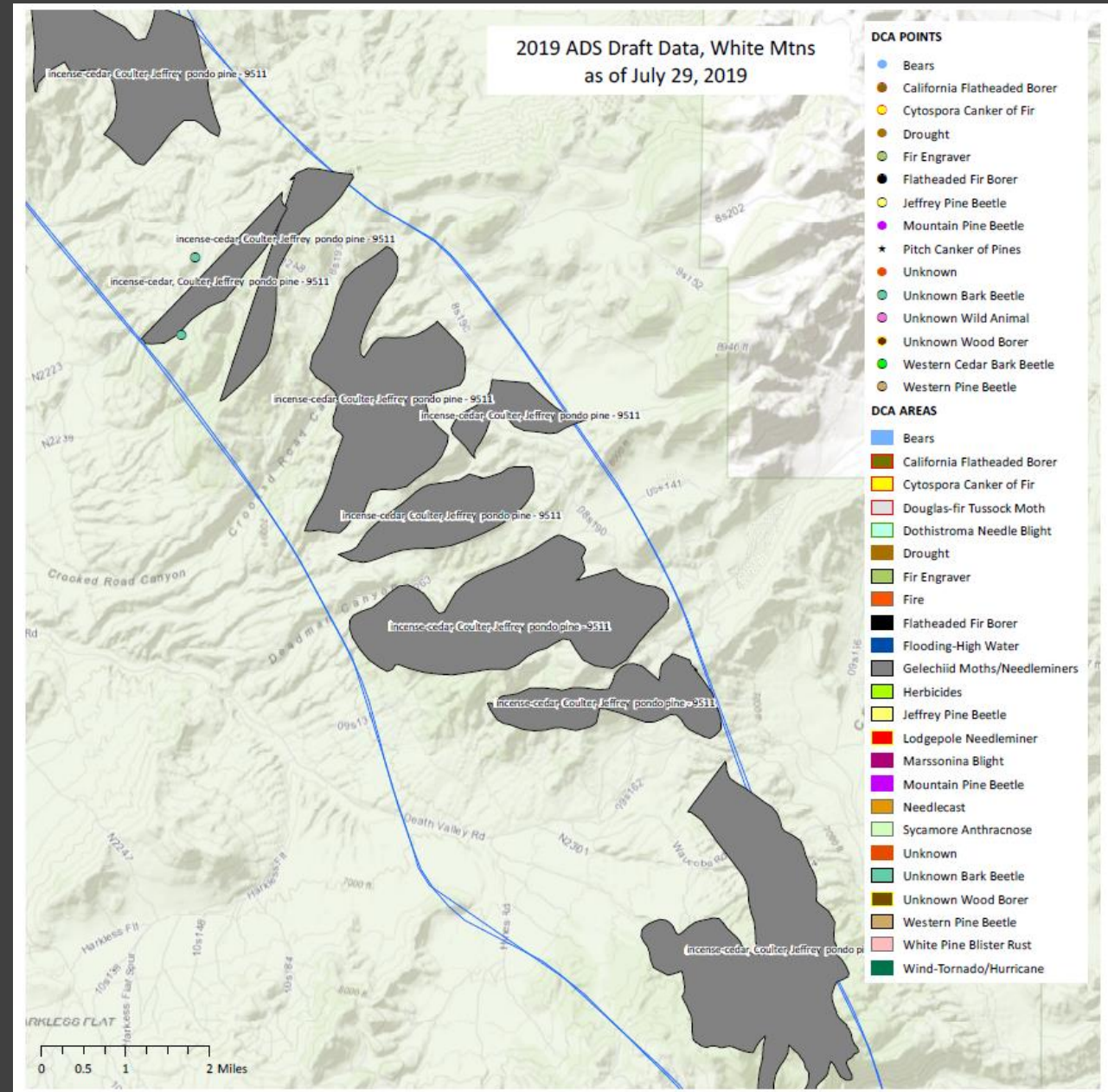


Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI,

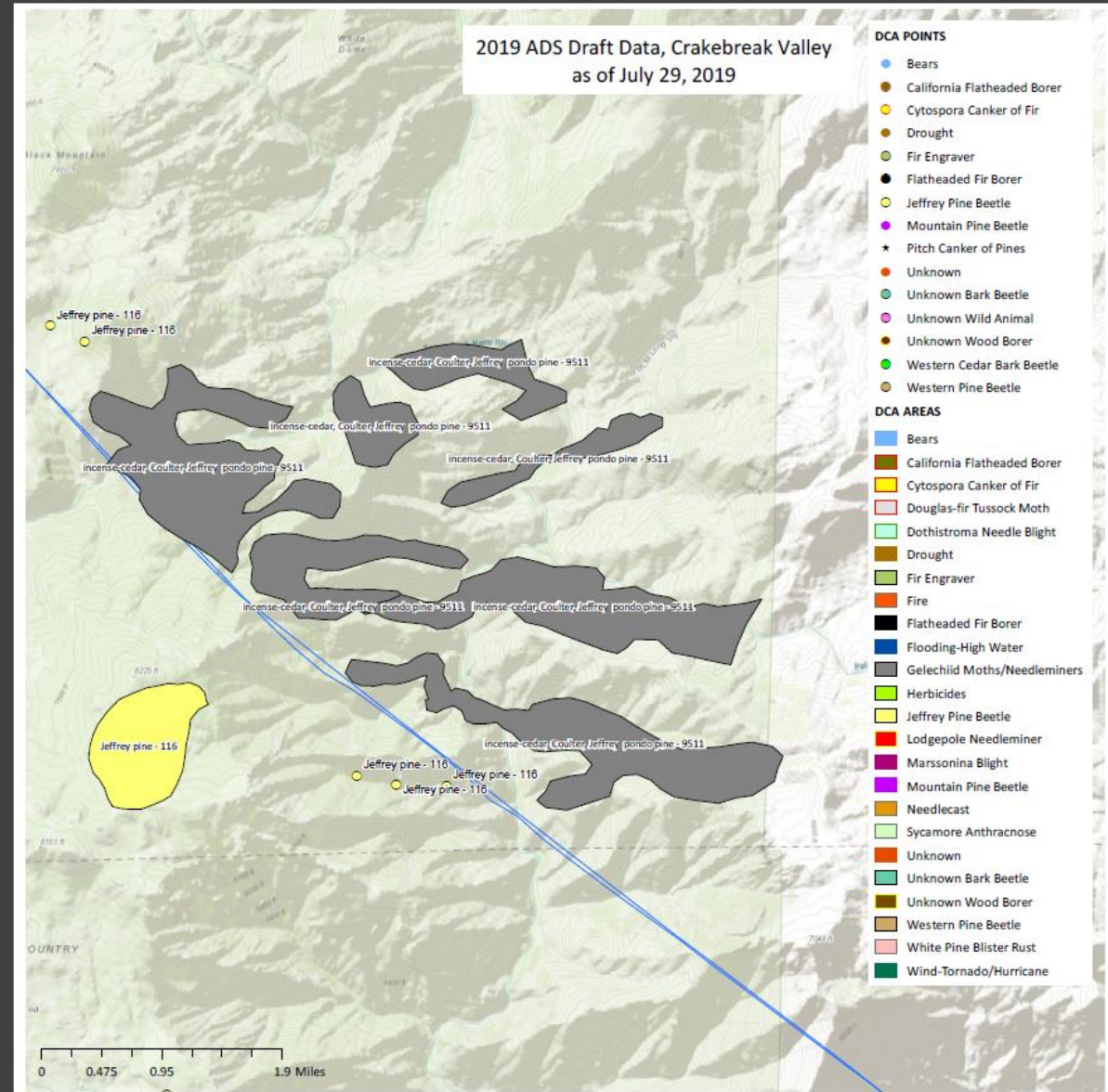
# 2019 ADS: White Mountains



# 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*



Figure 3. Pinyon needle scale crawler.

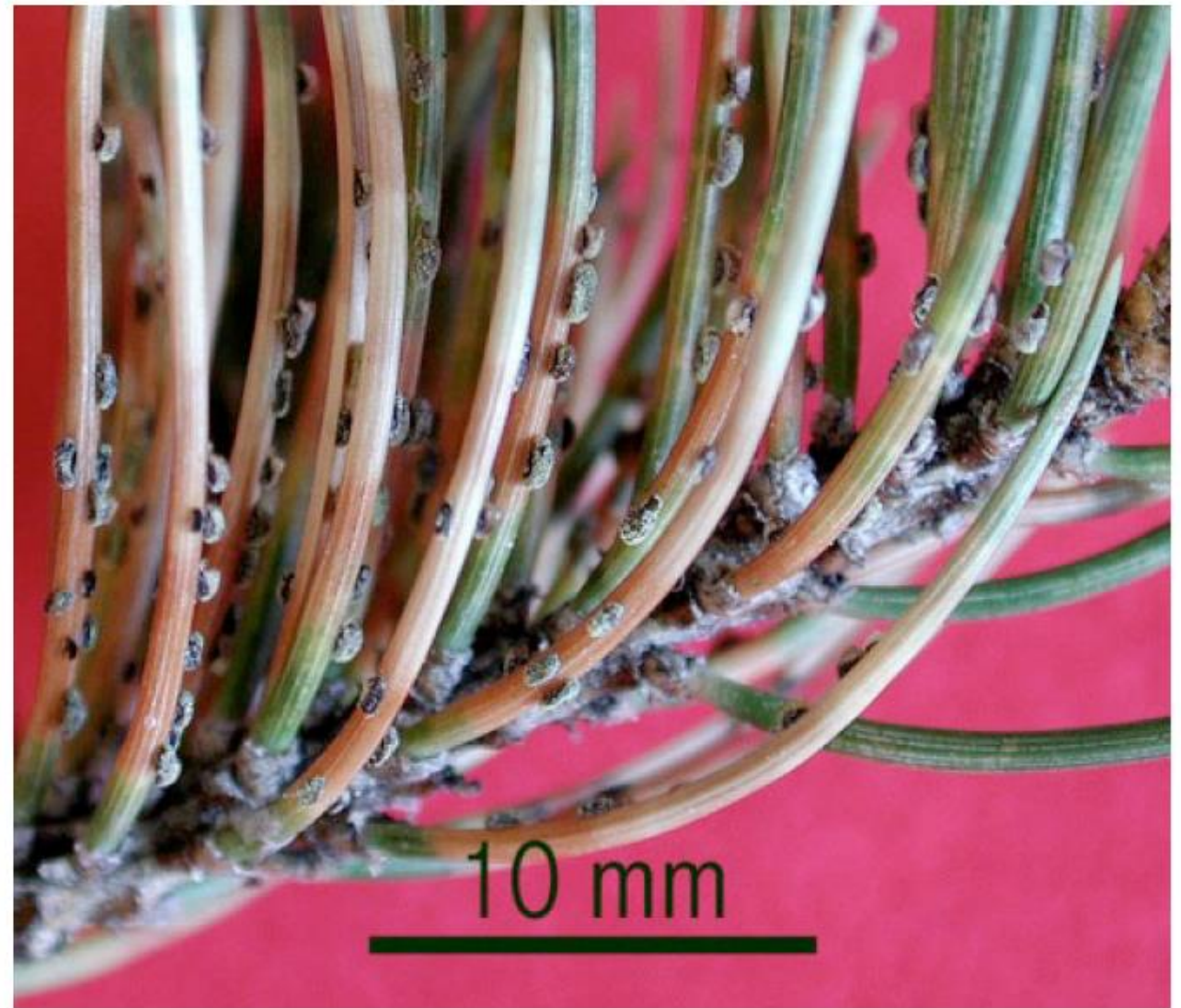


Figure 4. Pinyon Needle Scale in the bean stage.

- ❖ 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***



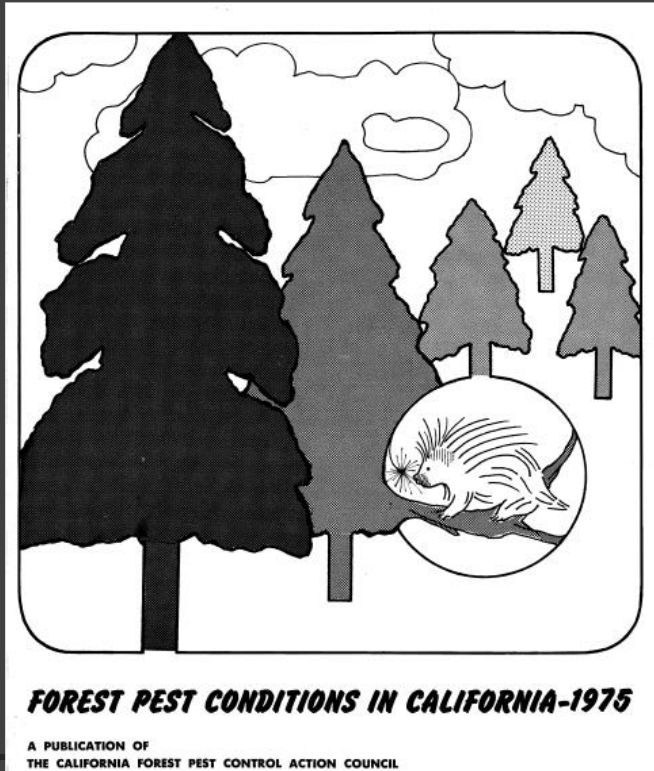


*2019 PNS  
damage*



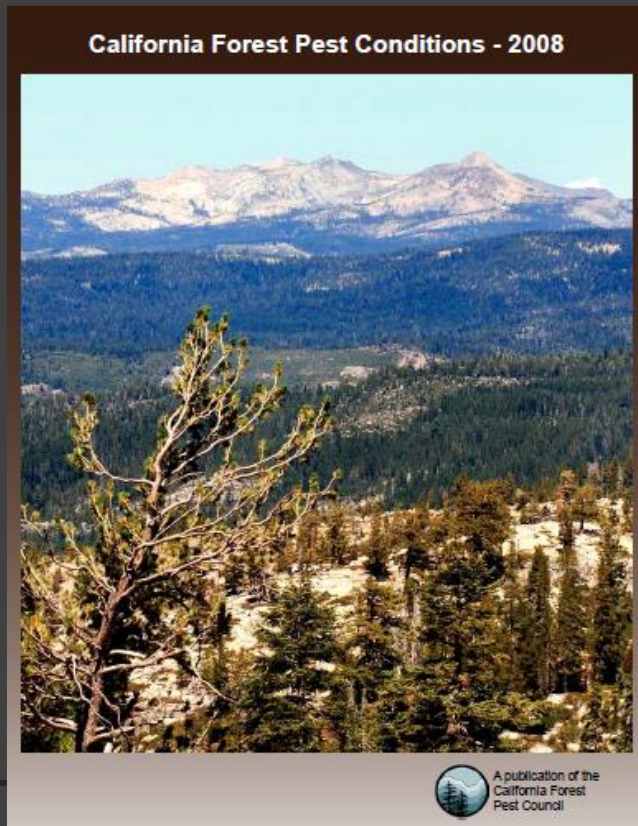


# *Historical CFPC records PNS*



- **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. Coleman<sup>1</sup>, Michael Jones<sup>1</sup>, and Adrian Ackley<sup>2</sup>

<sup>1</sup>USDA Forest Service, Forest Health Protection and <sup>2</sup>DOI, 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 her wax covering, which is attached to a needle of a four-needle pinyon pine (A). The females are flightless. Male PNS have long antennae, wings with reduced venation, and waxy bristles protruding from the abdomen (B).



- The pill-like shapes are females in their waxy covering (C). Note the emerging females 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 circle the base of a tree (D). The egg masses consist of thousands of females and her eggs (E, F). The white is a wax covering produced by the females.



- Thousands of "crawlers" hatching from an egg mass in the lab (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).

## TREE INJURY



- 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 stress to the tree.



- High levels of injury from PNS feeding can be identified by severe crown thinning and dead needles (J). Trees within the outbreak possess varying levels of injury. Feeding from the PNS commonly does not kill trees.

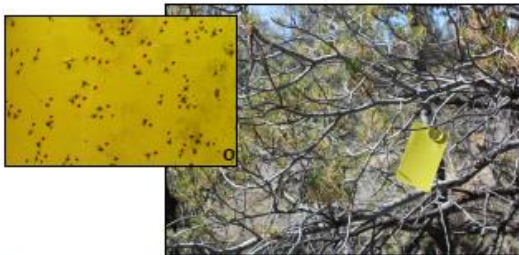


- Different levels of crown thinning from PNS feeding on four-needle pinyon pine (K, & L). No tree mortality has occurred in the PNS outbreak. However, bark beetles may attack the weakened trees, causing tree mortality.

## SURVEYS/MONITORING

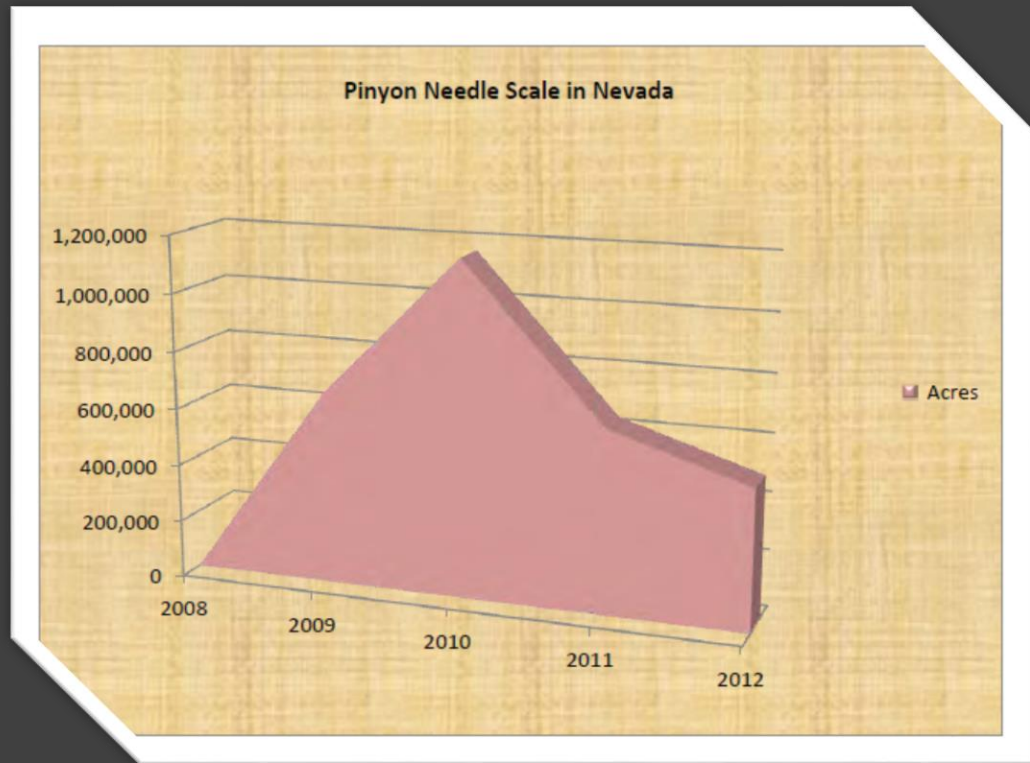


- Forest stand measurements were collected in the PNS outbreak to determine the level of injury and the current forest stand conditions (M). Notice the thin crowns in the picture below (P).



- Yellow sticky cards hung 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*



*Courtesy of 2012 Forest Pest Conditions in Nevada*

**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)

# *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!*

*Acknowledgements: Jeff Moore, Jennifer Weathered,  
Meghan Woods, Martin MacKenzie, Kayanna Warren, Inyo  
National Forest, BLM*

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