A History of Forest Insects and Diseases on the Gila National Forest

Daniel Ryerson
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Forest Health Protection
New Mexico Zone Office

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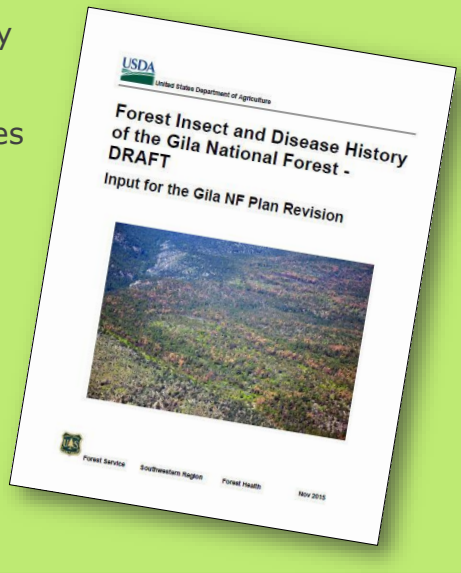
Forest Health Protection Staff

- Technical assistance
- Monitoring and detection
- Prevention / suppression projects
- Technology transfer
- State Cooperative Forest Health program

Reference for NF Plan Revision

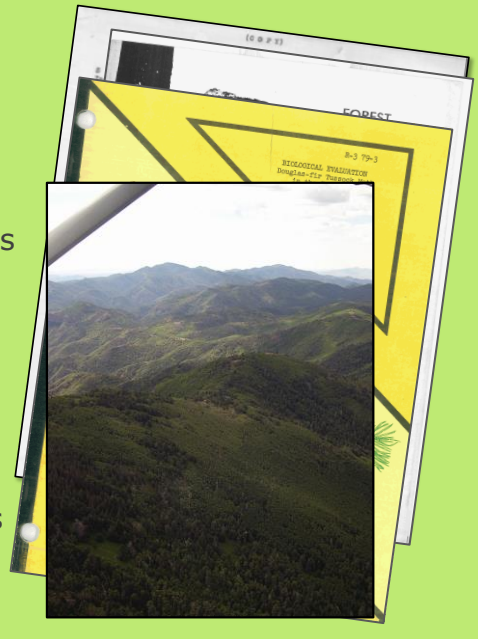
- Major forest insects & diseases
- Describe overall history
- Current conditions
- Potential future changes



Historical Reports / Data

Forest Health Records

- Regional annual reports
  - Back to 1918
  - Summary of conditions
- National condition reports
- Other SW reports
  - Evaluations back to 1917
  - Agent summaries
  - Site reports
- Aerial detection surveys
- Published journal articles

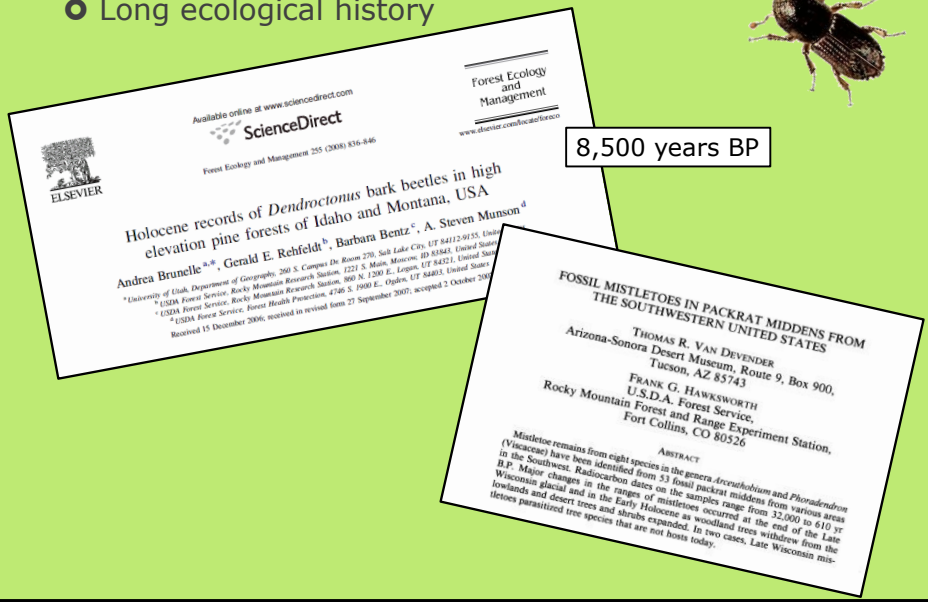


Most are Native

- Paleoecological *(site specific)*
  - Fossil evidence
  - Dendrochronology (~back to 1700s)
    - Defoliating agents – WSBW *(Swetnam et al. 1998; 1993 Swetnam and Lynch)*, pandora moth *(Speer et al. 2001)*
    - Piñon ips / tree mortality in late 1500s *(Swetnam et al. 1998)*
    - Spruce beetle in CO *(Eisenhart and Veblen 2000)*
      - Outbreaks back to 1716
  - Lake cores
    - Direct – insect remains (bark beetles, caterpillar larvae)
    - Indirect – pollen records (vegetation abundance)

Most are Native

- Long ecological history



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Holocene records of *Dendroctonus* bark beetles in high elevation pine forests of Idaho and Montana, USA

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8,500 years BP

FOSSIL MISTLETOES IN PACKRAT MIDDENS FROM THE SOUTHWESTERN UNITED STATES

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ABSTRACT

Mistletoe remains from eight species in the genera *Arceuthobium* and *Phoradendron* (Viscaceae) have been identified from 53 fossil packrat middens from various areas in the Southwest. Radiocarbon dates on the samples range from 32,000 to 610 yr B.P. Major changes in the ranges of mistletoes occurred at the end of the Late Wisconsin glacial and in the Early Holocene as woodland trees withdrew from the lowlands and desert trees and shrubs expanded. In two cases, Late Wisconsin mistletoes parasitized tree species that are not hosts today.

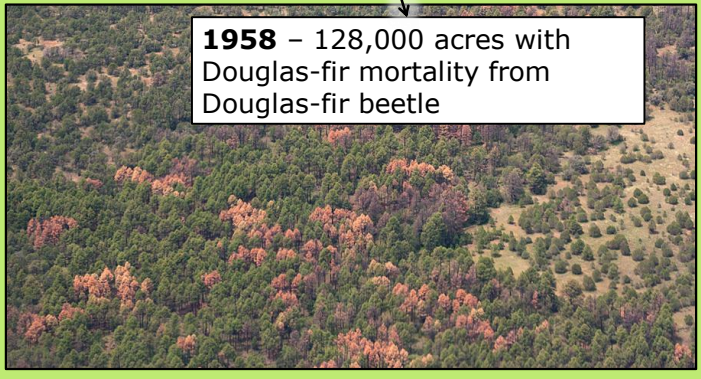
Bark Beetles

- Main Species
  - Western pine beetle *(Dendroctonus brevicomis)*
  - Roundheaded pine beetle *(Dendroctonus adjunctus)*
  - Ips beetles *(Ips* spp.*)*
  - Douglas-fir beetle *(Dendroctonus pseudotsugae)*
  - Fir engraver beetle *(Scolytus ventralis)*
  - Douglas-fir engraver *(Scolytus monticolae)*

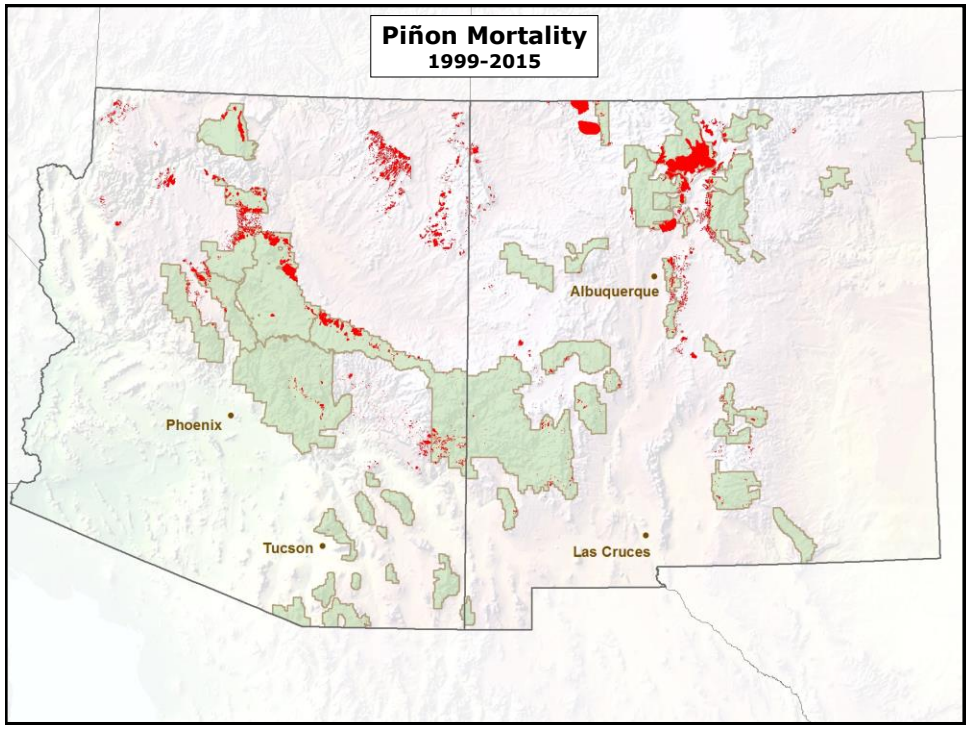
Bark Beetles

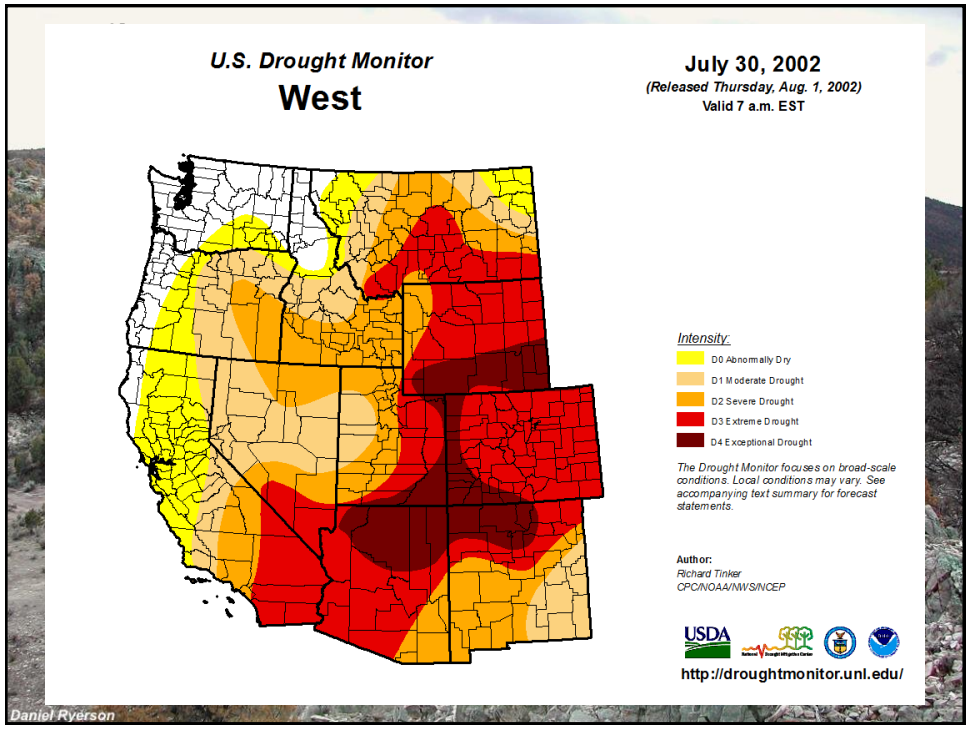
- Southwest
  - Primarily climate driven
    - Piñon – late 1500s, 1950s, early 2000s, 2011-2013
    - Ponderosa – 1923, 1950s, 2000s
    - Douglas-fir and white fir – 1950s, 2000s

1957 – 344,000 acres with ponderosa pine mortality reported from *Dendroctonus* and *Ips*

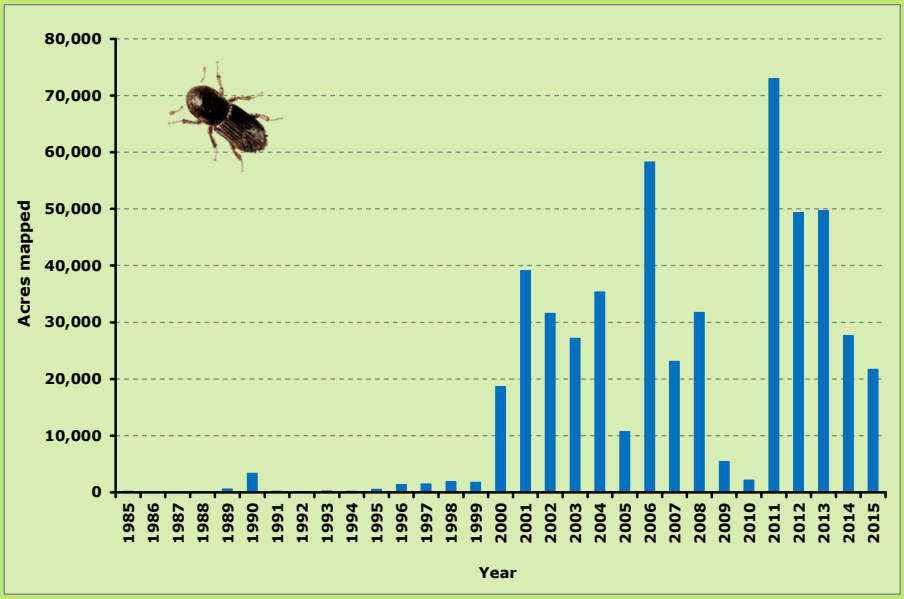


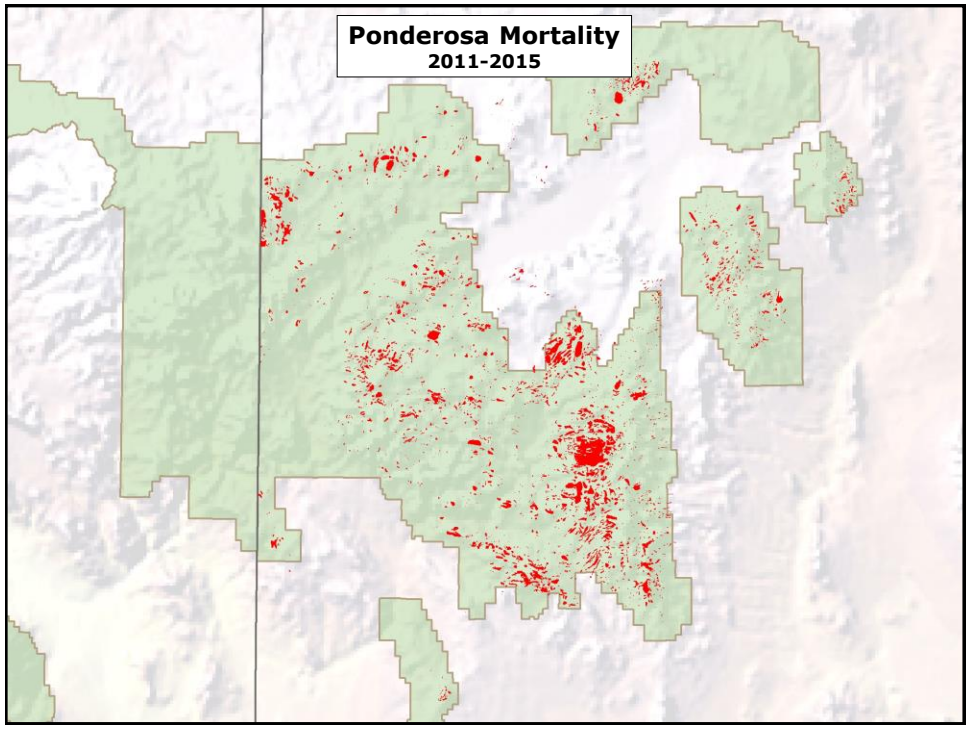
1958 – 128,000 acres with Douglas-fir mortality from Douglas-fir beetle


Piñon Mortality
1999-2015
Albuquerque
Phoenix
Tucson
Las Cruces

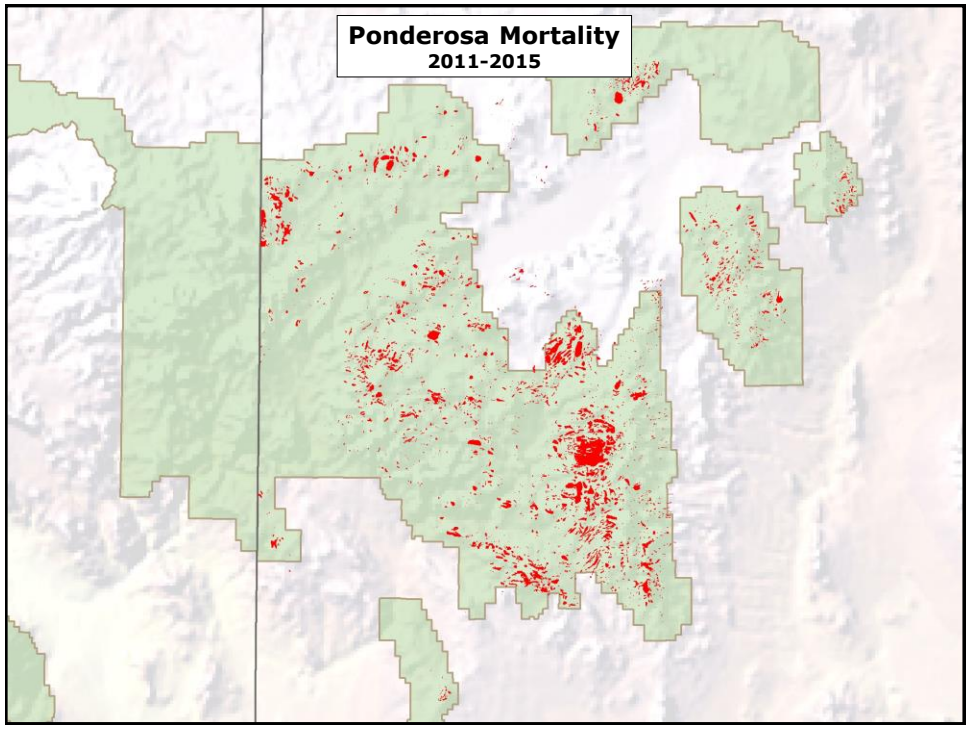

U.S. Drought Monitor
West
July 30, 2002
(Released Thursday, Aug. 1, 2002)
Valid 7 a.m. EST
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
Author:
Richard Tinker
CPC/NOAA/NWS/NCEP
http://droughtmonitor.unl.edu/
Daniel Ryerson

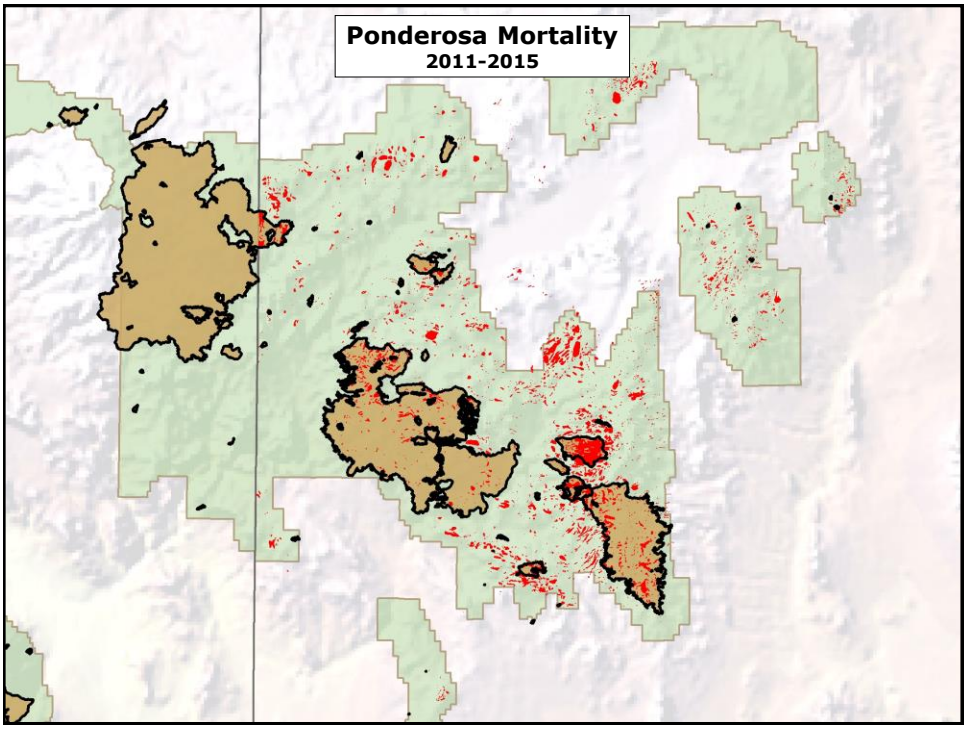
Ponderosa Pine Mortality on Gila NF

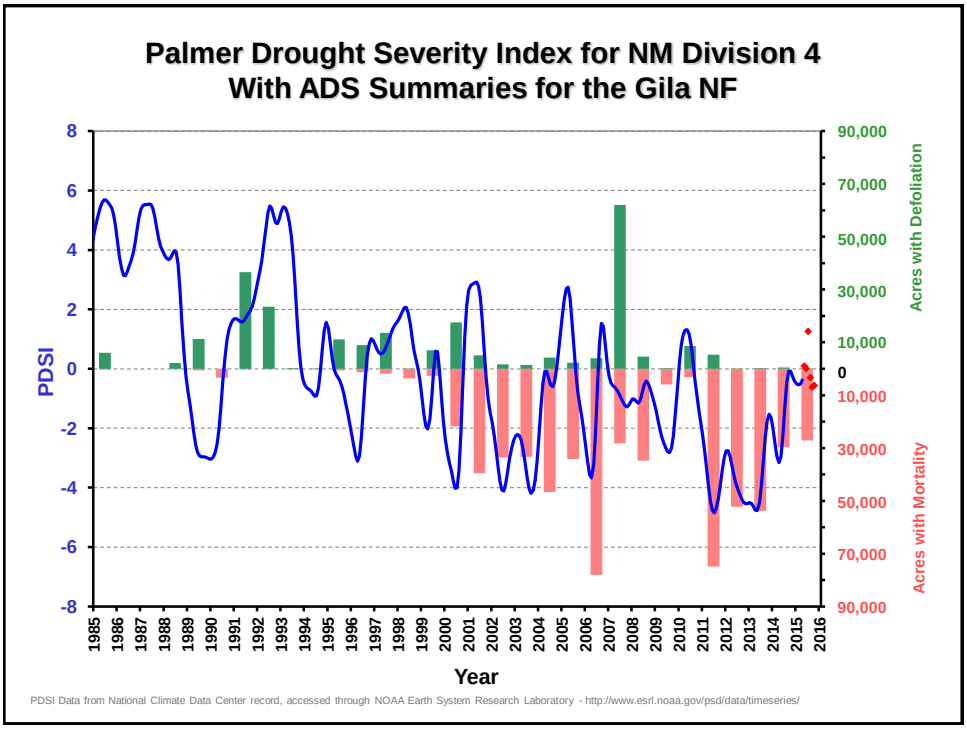




Bark Beetles in Ponderosa Pine

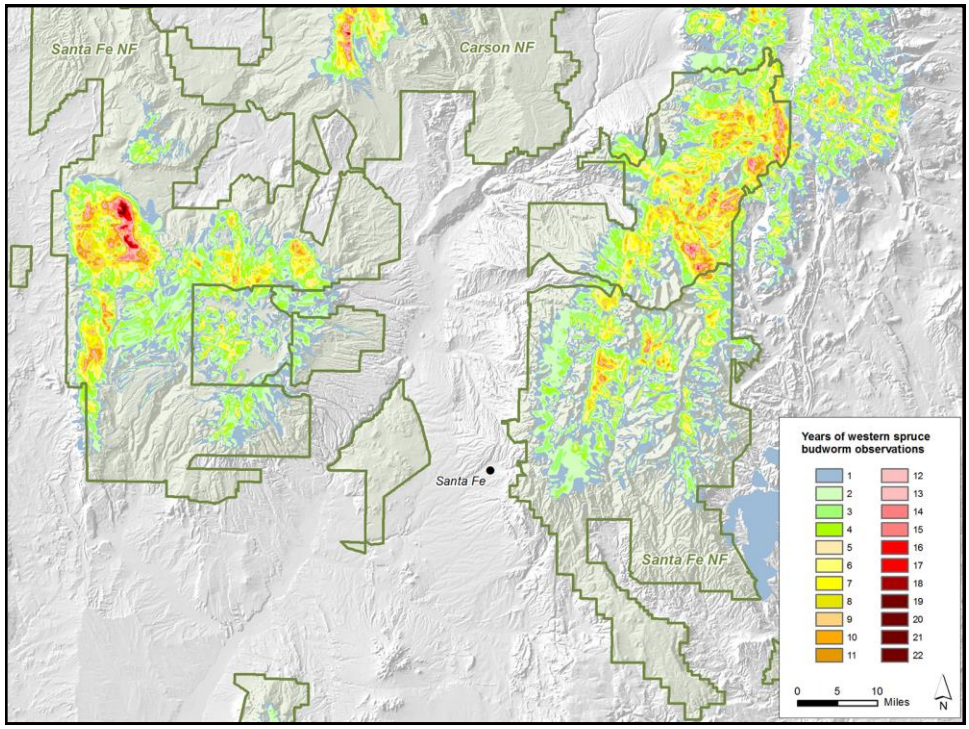


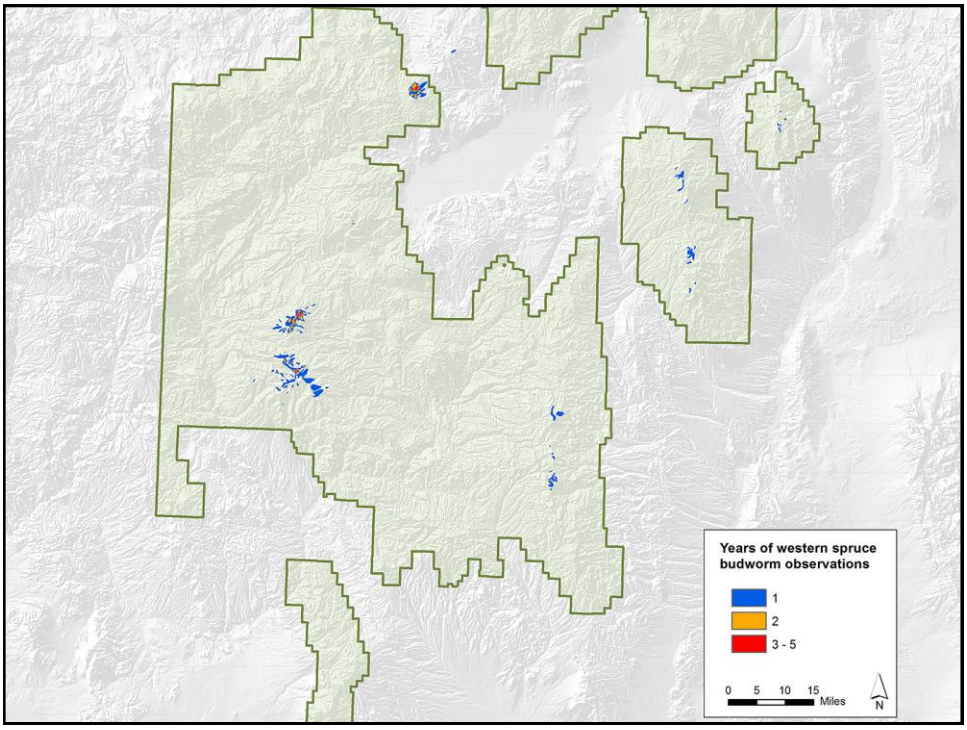

Ponderosa Mortality
2011-2015


Palmer Drought Severity Index for NM Division 4
With ADS Summaries for the Gila NF
PDSI
Acres with Defoliation
Acres with Mortality
Year
PDSI Data from National Climate Data Center record, accessed through NOAA Earth System Research Laboratory - http://www.esrl.noaa.gov/psd/data/timeseries/

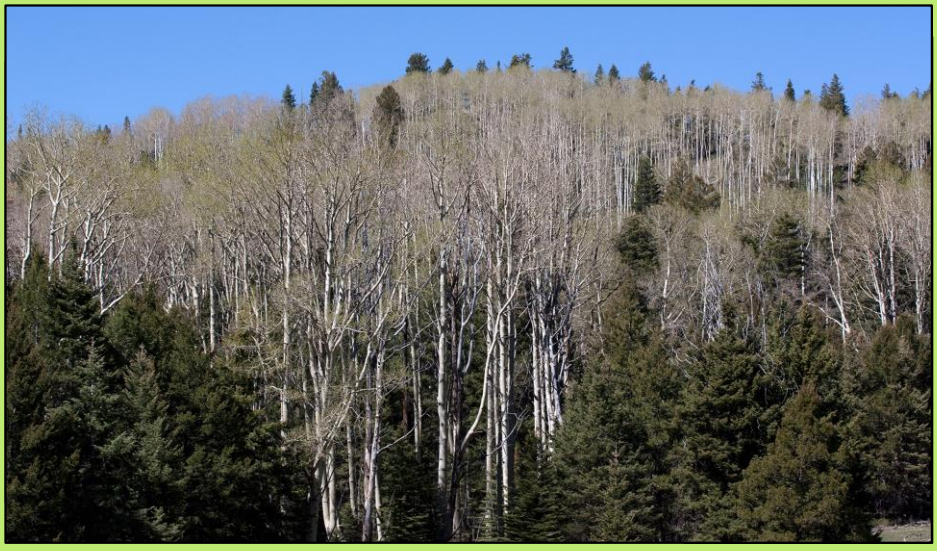
Defoliators

- Piñon needle scale (*Matsucoccus acalyptus*)
- Western spruce budworm (*Choristoneura freemani*)
- Douglas-fir tussock moth (*Orygia pseudotsugae*)
- Large aspen tortrix (*Choristoneura conflictana*)
- Western tent caterpillar (*Malacosoma californicum*)





Western Tent Caterpillar



Douglas-fir Tussock Moth

Orygia pseudotsugae

Douglas-fir Tussock Moth

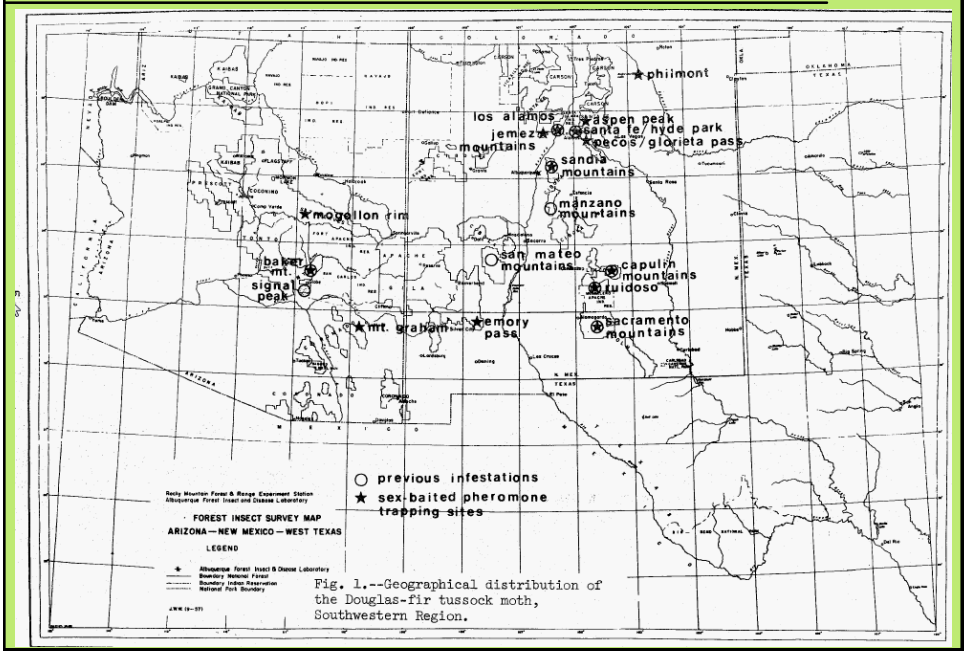


Fig. 1.--Geographical distribution of the Douglas-fir tussock moth, Southwestern Region.

Diseases

- Dwarf mistletoe
- Blister rust
- Root diseases

Dwarf Mistletoe

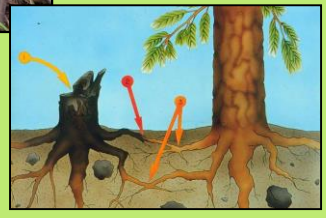
- Southwestern dwarf mistletoe
  - Gila NF - 40%
  - Regional average – 38%
- Douglas-fir dwarf mistletoe
  - Regional estimate ~ 50%

1987 Roadside Survey

Ranger District	%
Black Range	39
Glenwood	67
Luna	43
Mimbres	24
Quemado	36
Reserve	38
Silver City	58

Root Disease

- Common in mixed conifer and spruce-fir
- ~ 860,000 acres region-wide

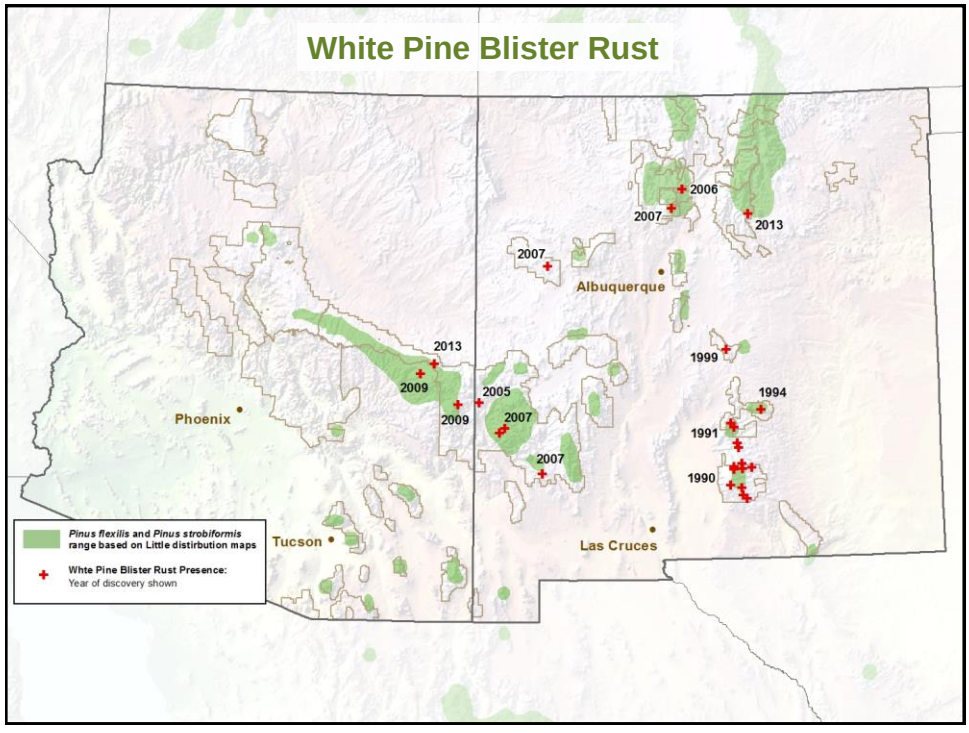


Others

Invasive

White Pine Blister Rust

- *Cronartium ribicola*
- Complex life cycle
- Asian species
- Presence in the SW

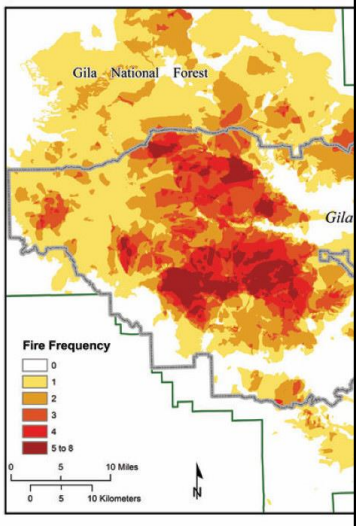


Invasive

July 1939 – Looking up Middle Fork of the Gila Wilderness Area. W.H. Shaffer

Moraga Fire, 2009

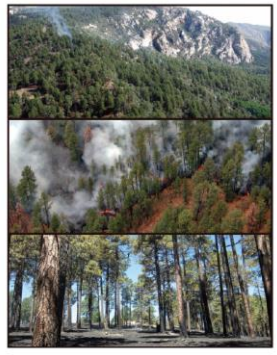
Fire History



USDA
United States Department of Agriculture

Historical and Current Fire Management Practices in Two Wilderness Areas in the Southwestern United States: The Saguaro Wilderness Area and the Gila-Aldo Leopold Wilderness Complex

Molly E. Hunter, Jose M. Iniguez, and Calvin A. Farris



Forest Service | Rocky Mountain Research Station | General Technical Report RMRS-GTR-325 | August 2014

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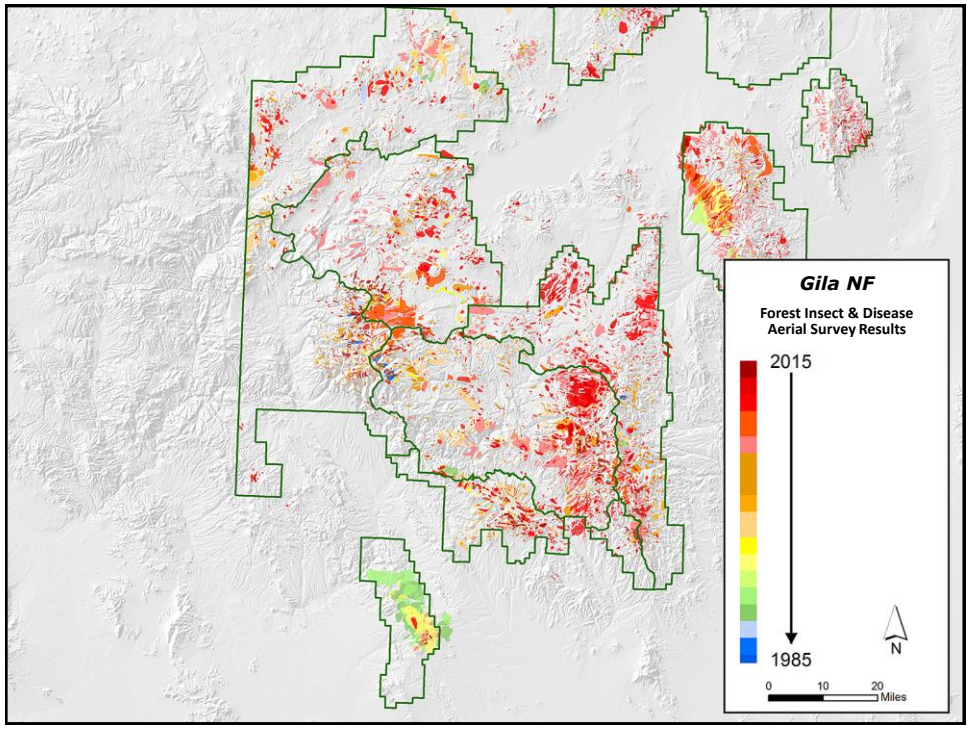
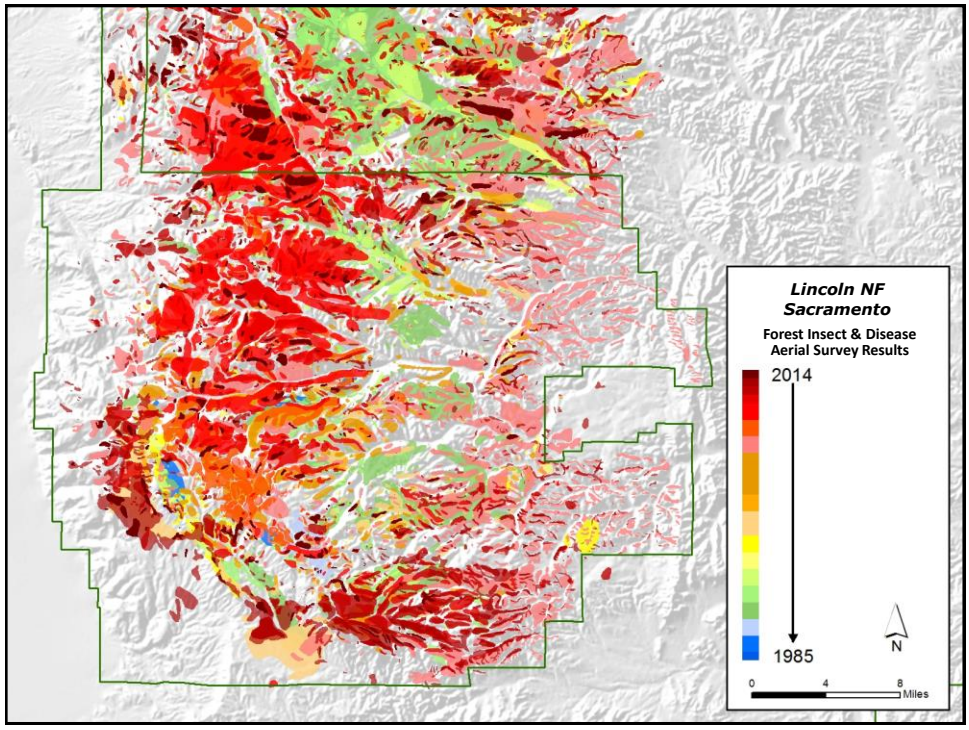
Post-Fire Insect Activity




Lincoln NF
Sacramento
Forest Insect & Disease
Aerial Survey Results
2014
1985
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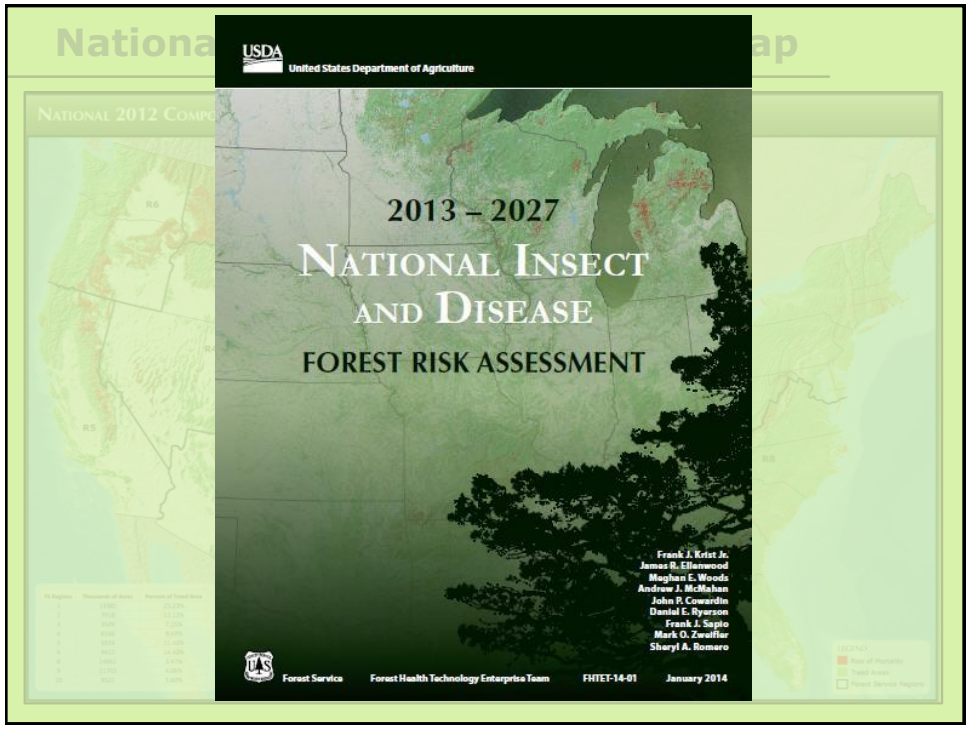
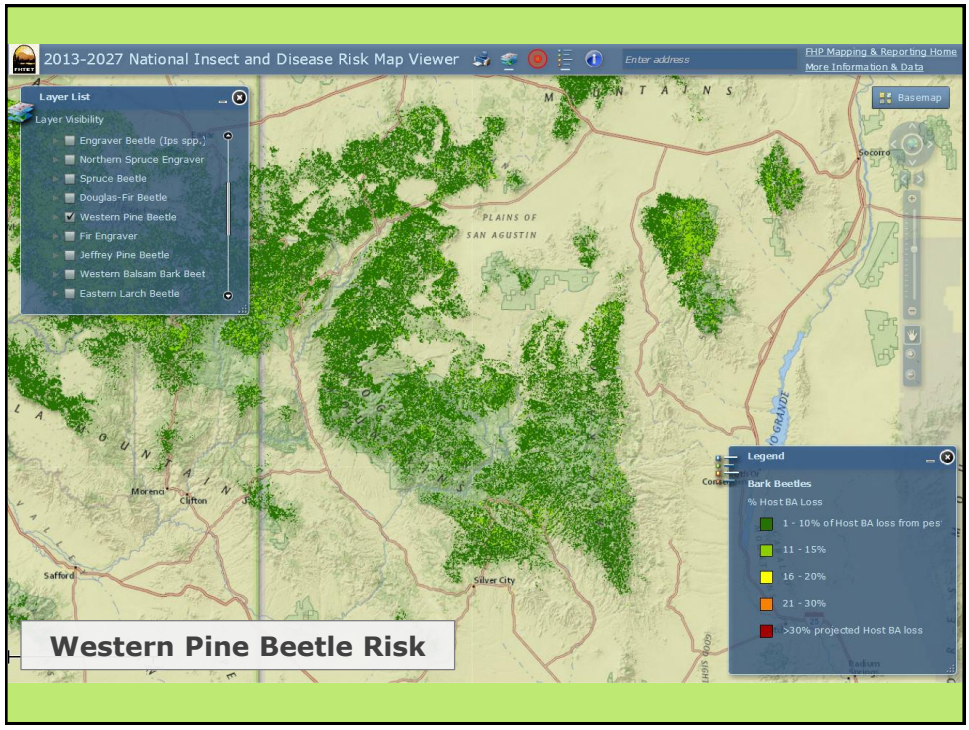
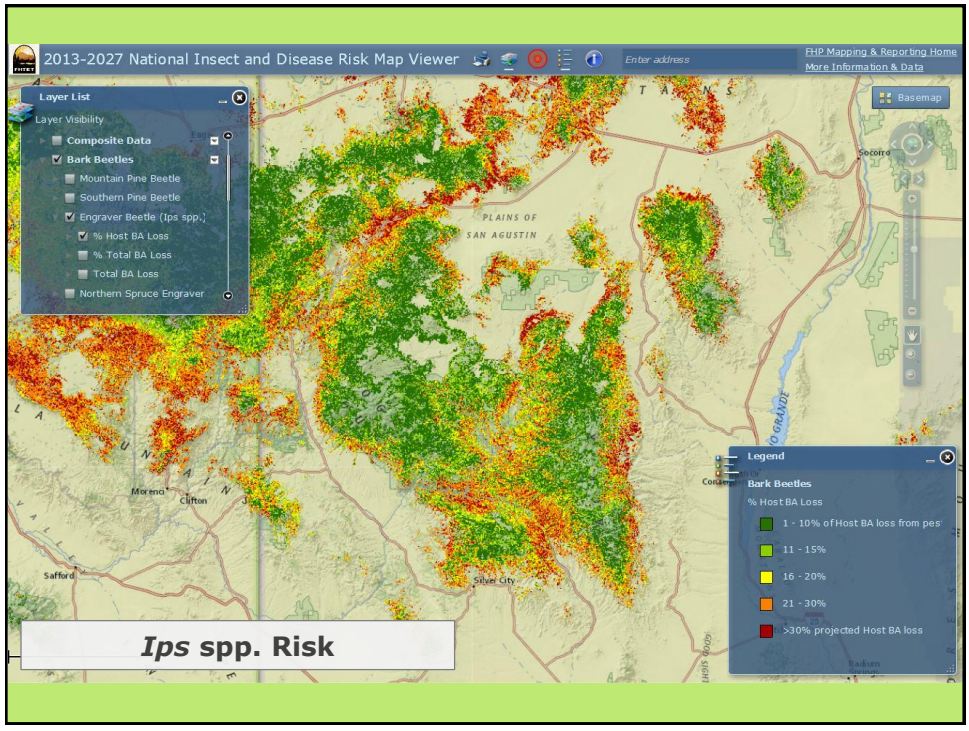
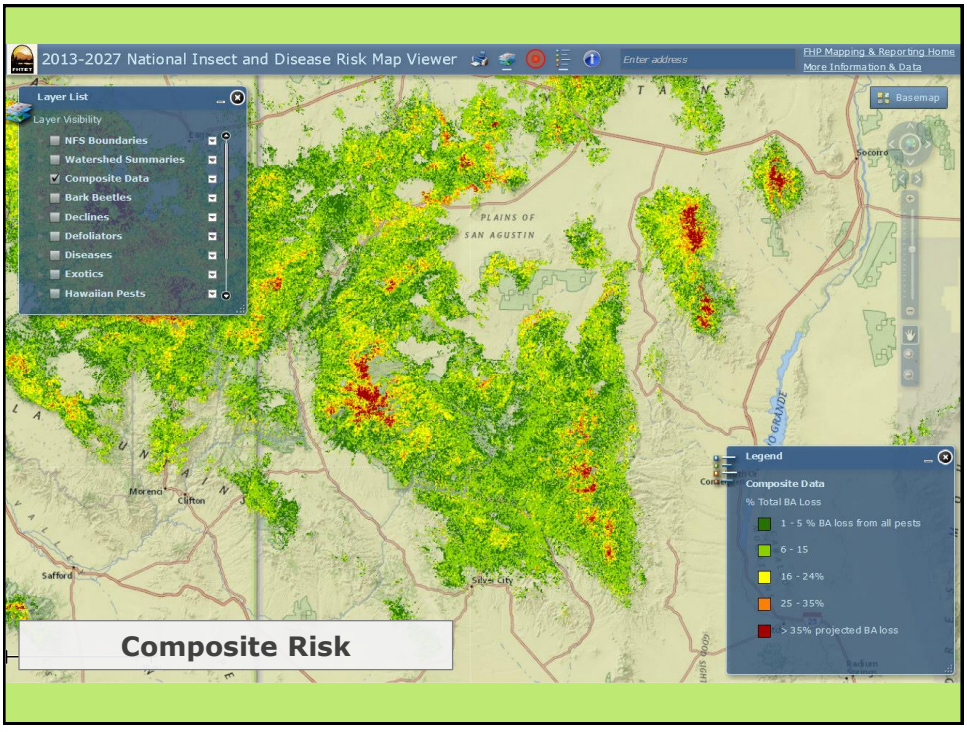
8
Miles


USDA
United States Department of Agriculture
2013 – 2027
NATIONAL INSECT
AND DISEASE
FOREST RISK ASSESSMENT
Frank J. Krist Jr.
James R. Ellenwood
Meghan E. Woods
Andrew J. McMahan
John P. Cowardin
Daniel E. Ryerson
Frank J. Sapio
Mark O. Zweifler
Sheryl A. Romero
Forest Service
Forest Health Technology Enterprise Team
FHTET-14-01
January 2014


2013-2027 National Insect and Disease Risk Map Viewer
Enter address
FHP Mapping & Reporting Home
More Information & Data
Layer List
Layer Visibility
Engraver Beetle (Ips spp.)
Northern Spruce Engraver
Spruce Beetle
Douglas-Fir Beetle
Western Pine Beetle
Fir Engraver
Jeffrey Pine Beetle
Western Balsam Bark Beet
Eastern Larch Beetle
Basemap
Legend
Bark Beetles
% Host BA Loss
1 - 10% of Host BA loss from pes
11 - 15%
16 - 20%
21 - 30%
>30% projected Host BA loss
Socorro
Moreno
Clifton
Safford
Silver City
Western Pine Beetle Risk


2013-2027 National Insect and Disease Risk Map Viewer
Enter address
FHP Mapping & Reporting Home
More Information & Data
Layer List
Layer Visibility
Composite Data
Bark Beetles
Mountain Pine Beetle
Southern Pine Beetle
Engraver Beetle (Ips spp.)
% Host BA Loss
% Total BA Loss
Total BA Loss
Northern Spruce Engraver
Basemap
Legend
Bark Beetles
% Host BA Loss
1 - 10% of Host BA loss from pes
11 - 15%
16 - 20%
21 - 30%
>30% projected Host BA loss
Socorro
Moreno
Clifton
Safford
Silver City
Ips spp. Risk


2013-2027 National Insect and Disease Risk Map Viewer
Enter address
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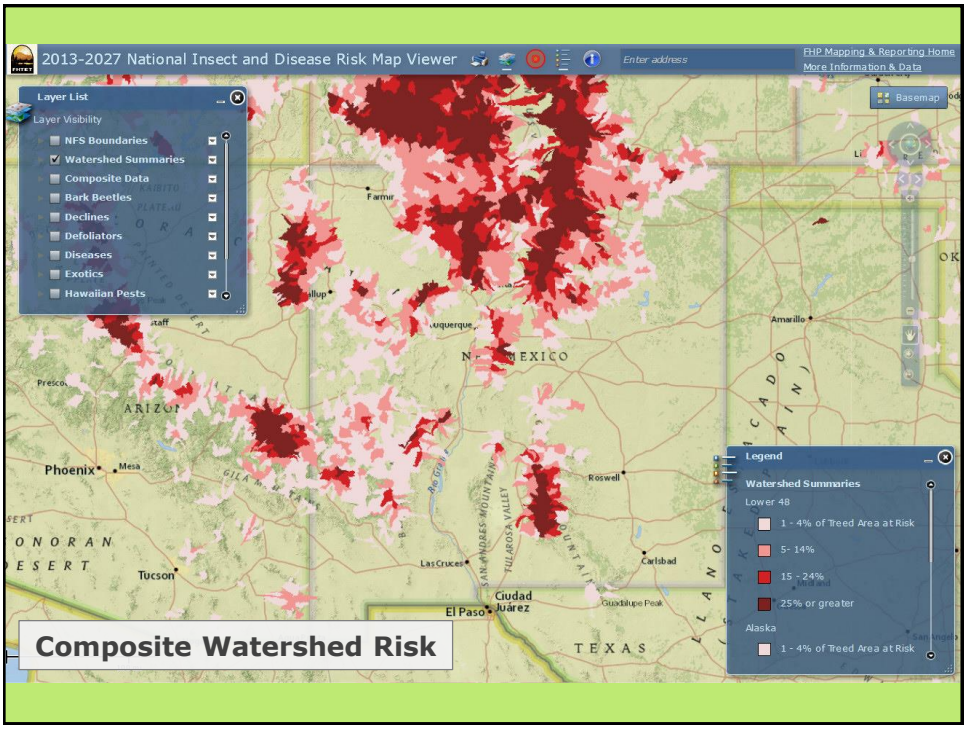
More Information & Data
Layer List
Layer Visibility
NFS Boundaries
Watershed Summaries
Composite Data
Bark Beetles
Declines
Defoliators
Diseases
Exotics
Hawaiian Pests
Basemap
Legend
Composite Data
% Total BA Loss
1 - 5 % BA loss from all pests
6 - 15
16 - 24%
25 - 35%
> 35% projected BA loss
Composite Risk


2013-2027 National Insect and Disease Risk Map Viewer
Enter address
FHP Mapping & Reporting Home
More Information & Data
Layer List
Layer Visibility
NFS Boundaries
Watershed Summaries
Composite Data
Bark Beetles
Declines
Defoliators
Diseases
Exotics
Hawaiian Pests
Basemap
Legend
Watershed Summaries
Lower 48
1 - 4% of Treed Area at Risk
5- 14%
15 - 24%
25% or greater
Alaska
1 - 4% of Treed Area at Risk
Composite Watershed Risk

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