

# Douglas-fir Mortality and Flatheaded fir borer in Northern California

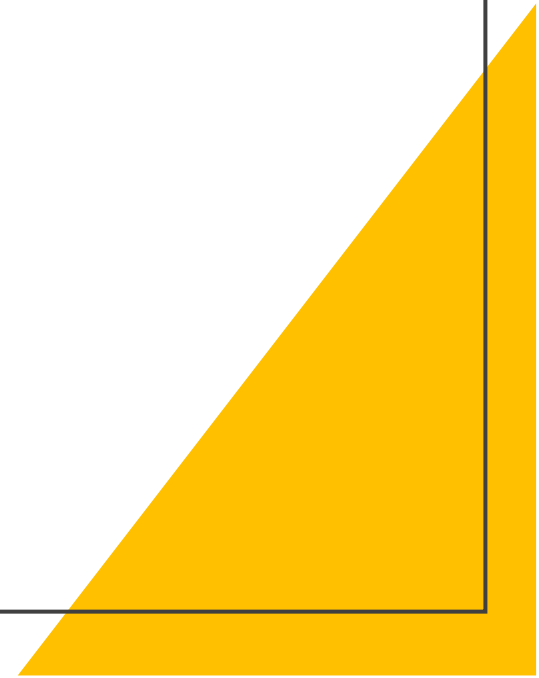
Danny Cluck

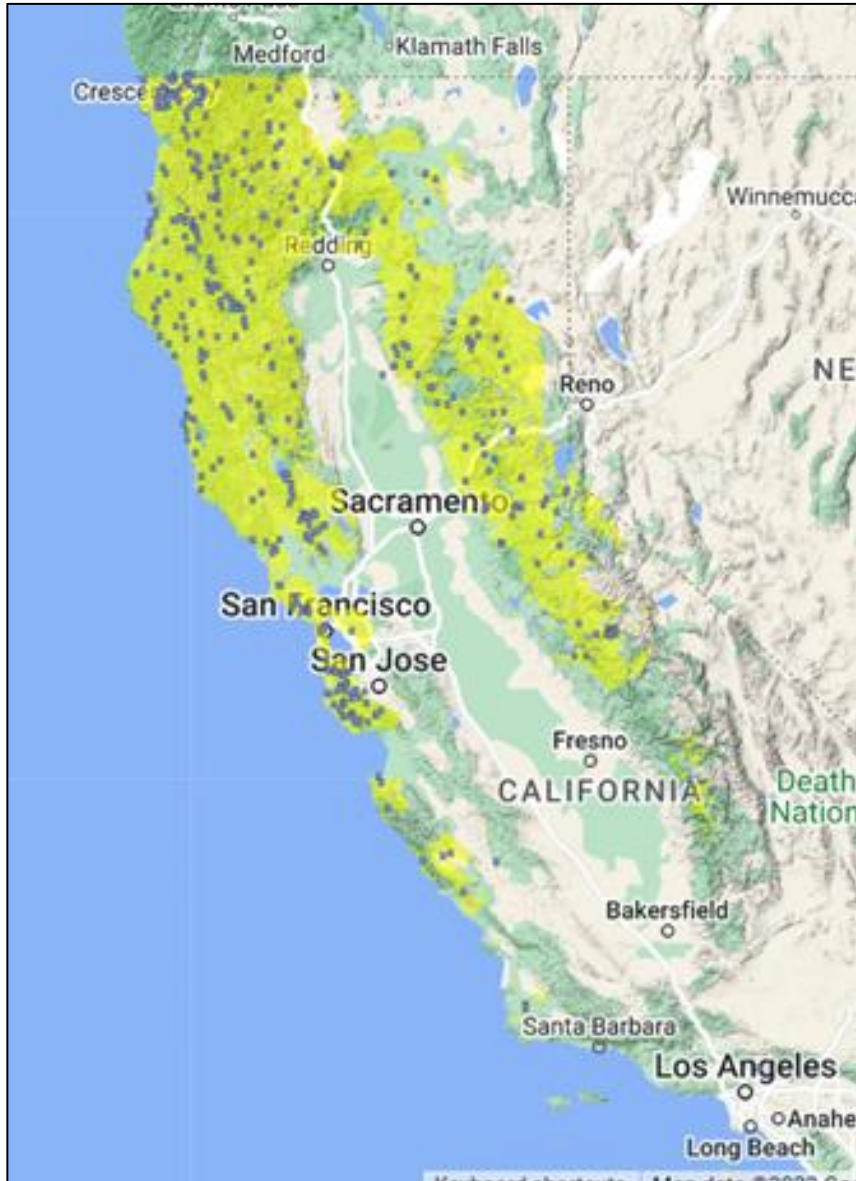
Entomologist

US Forest Service

Forest Health Protection

Susanville, CA



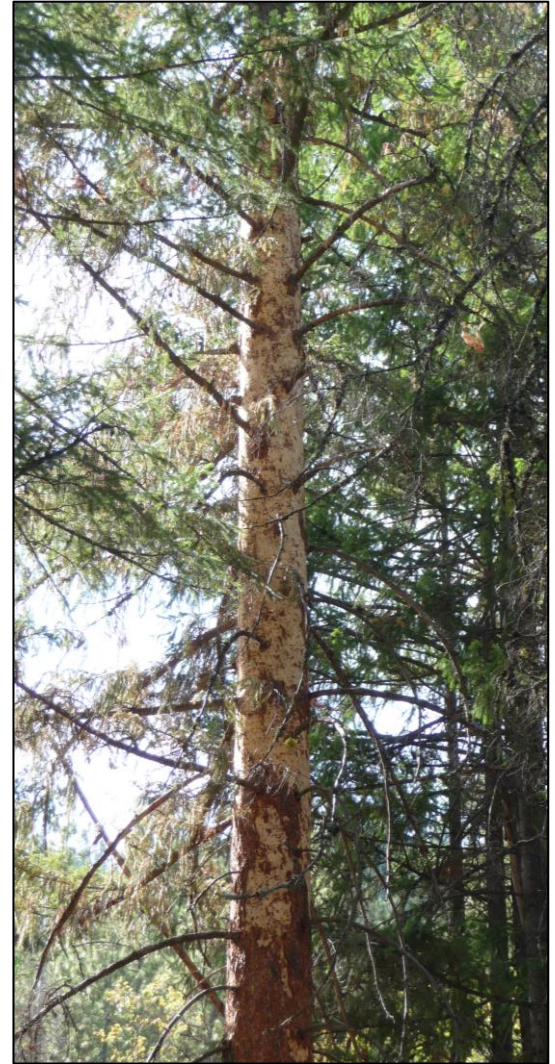


# Range of Douglas-fir in California

2008: A  
dying  
Doug Fir?

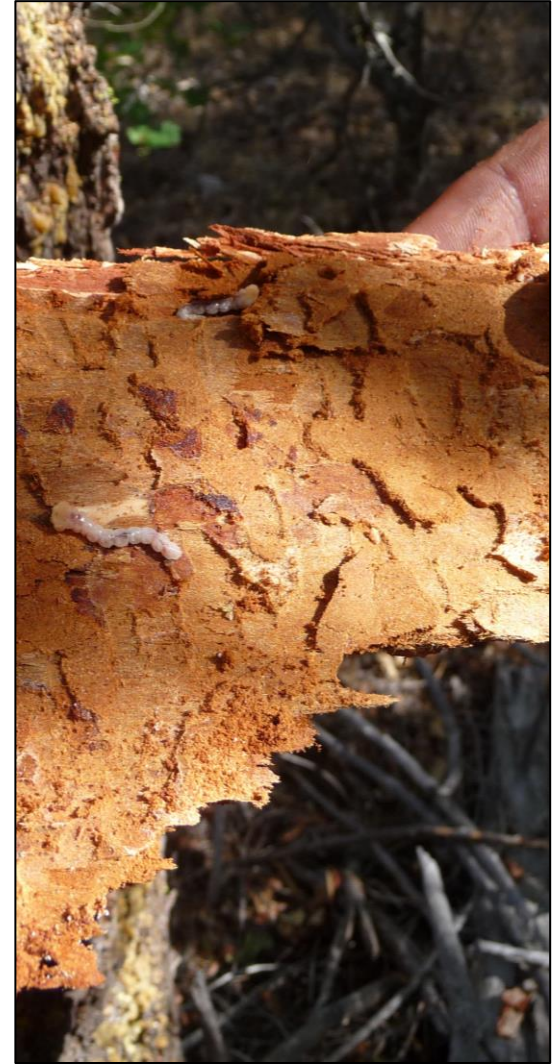
No way!!!

This sure doesn't look like  
Douglas-fir beetle



# The culprit: Flatheaded Fir Borer

*Phaenops drummondi*



Plumas National Forest

Elevation: 4,400 ft

Dry eastside mixed conifer

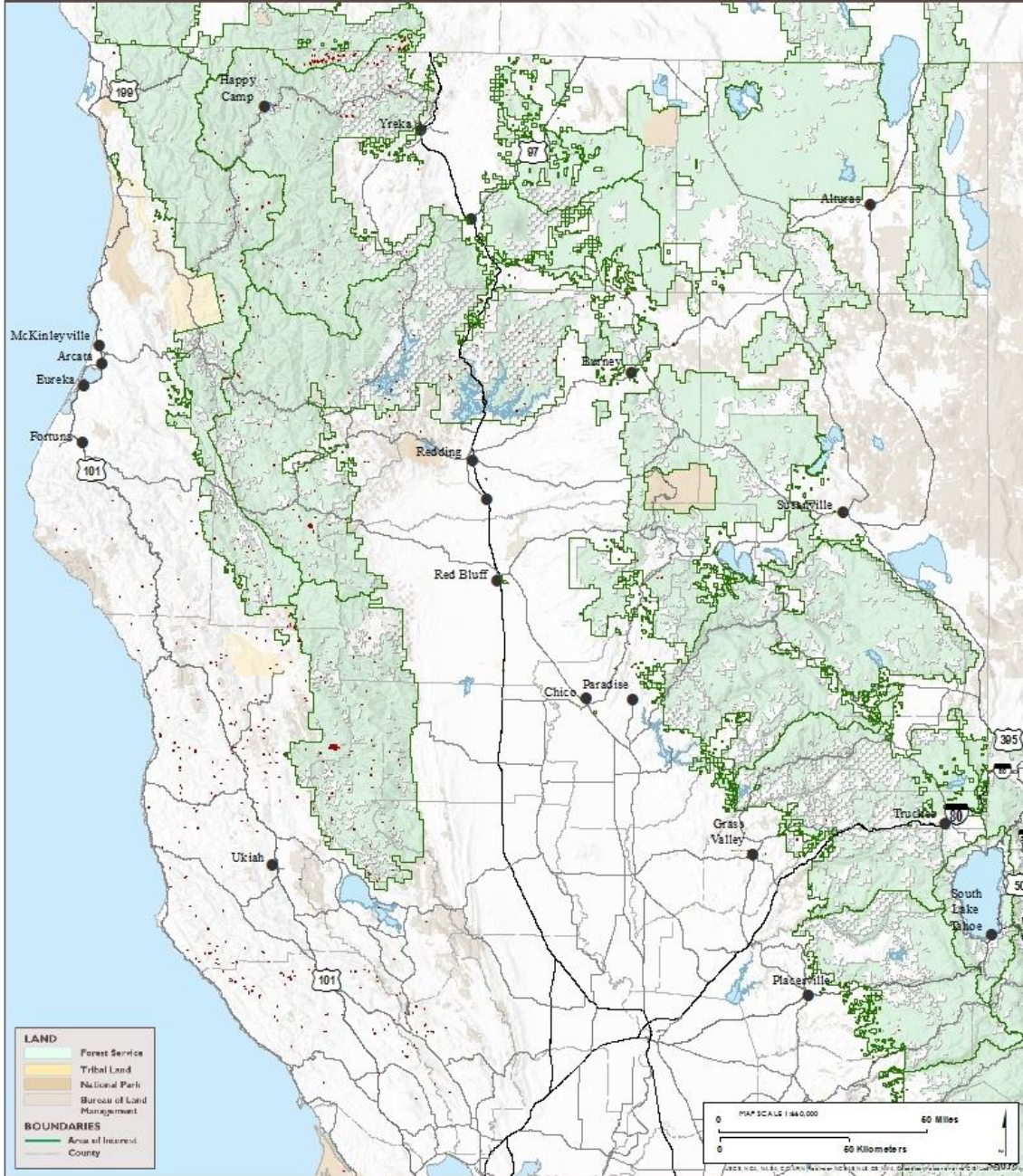
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2009-2010:  
Scattered dead and  
dying Douglas-fir  
observed across  
northern California





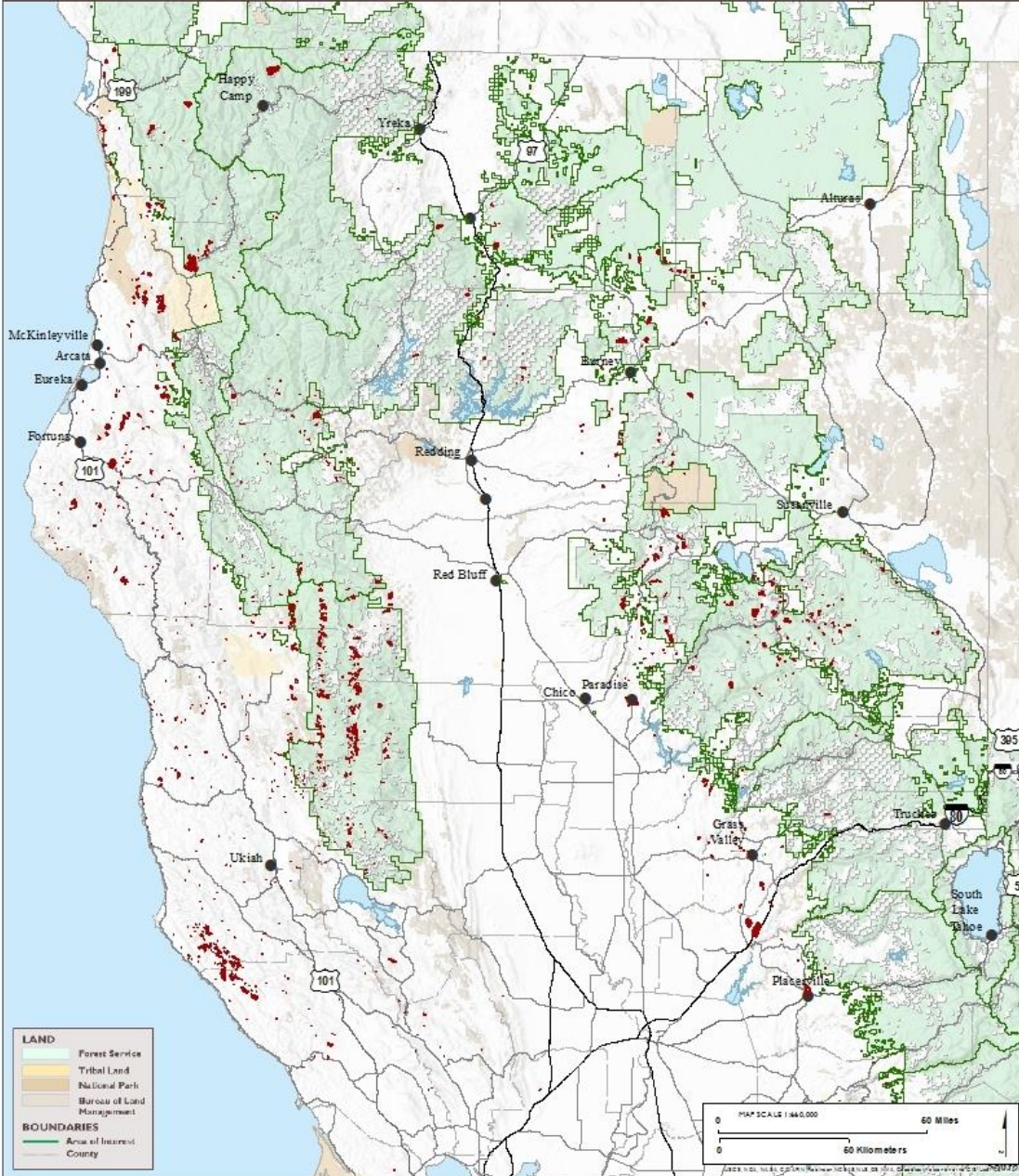
# AERIAL DETECTION SURVEY, 2008-2010 FLATHEADED FIR BORER-CAUSED DOUGLAS-FIR MORTALITY



Douglas-fir  
Mortality in  
California with  
Flatheaded fir  
borer (2008-  
2010)

2015:  
Here we  
go again





Douglas-fir  
Mortality in  
California:  
Flatheaded  
fir borer  
(2015-2016)



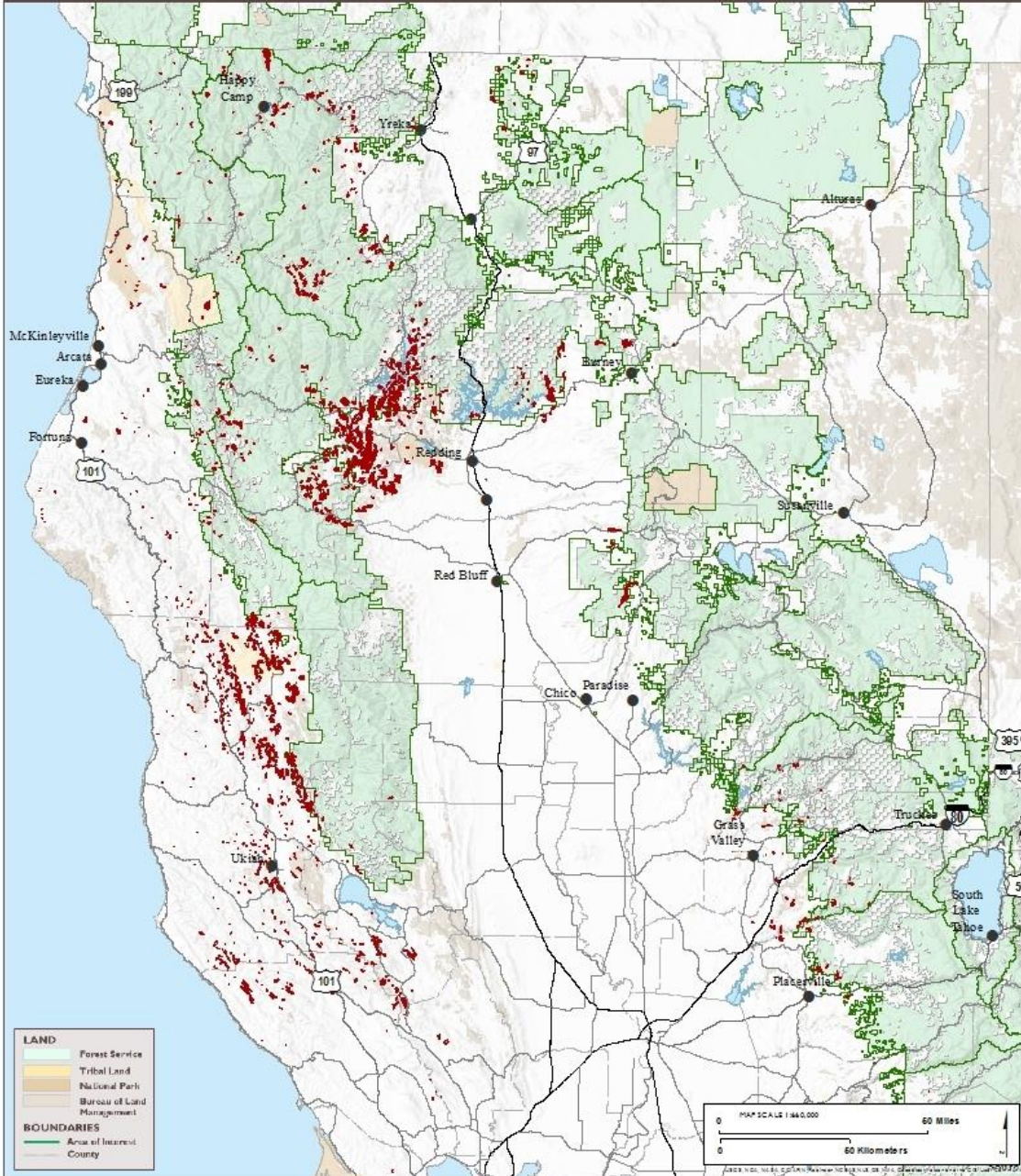
Douglas-fir beetle

Plumas National  
Forest (2012-2015)





# AERIAL DETECTION SURVEY, 2021-2022 FLATHEADED FIR BORER-CAUSED DOUGLAS-FIR MORTALITY



## Douglas-fir Mortality in California: Flatheaded fir borer (2021-2022)

~3 million  
dead DF  
recorded in  
2022!!



Battle Creek – Tehama County

Elevation: ~3500 ft

South facing slope with canyon live oak



Deer Creek – Butte County

Elevation = ~3200ft

South facing slope with canyon live oak



Stanislaus River – Tuolumne County

Elevation ~3600ft

Northwest aspect with oak species

# Lake and Napa Counties, December 2021

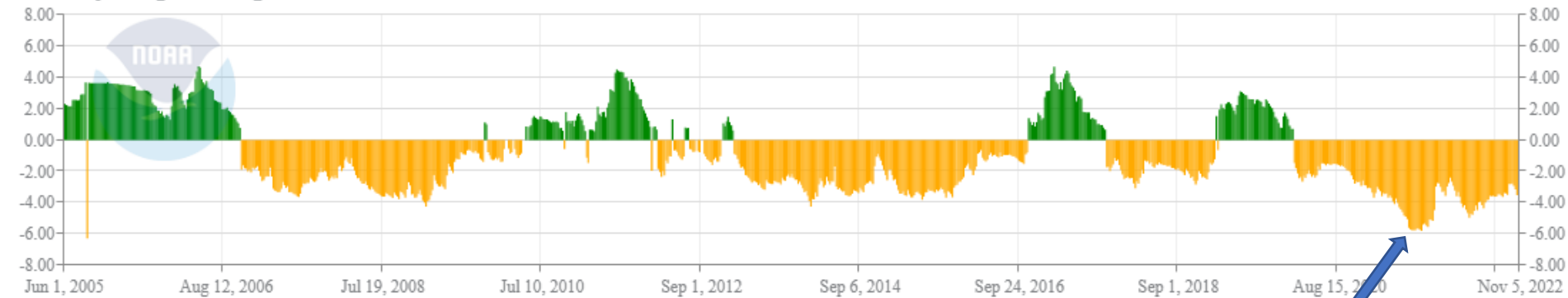
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# What do these mortality events have in common? Extreme Drought!

## California Climate Division 2

### Palmer Hydrological Drought Index



Lowest PHDI values ever calculated  
for NE California: June – September  
2021  
(records go back to 1895)



## Common themes of mortality locations and trees

- Mostly south to west aspects and lower elevations
- Encroachment of Douglas-fir into oak woodlands
- Chronic infestation over several years?
- Slow and declining growth
- Generally larger trees; few saplings or pole size trees killed by flatheaded fir borer





# Other observations associated with Douglas-fir mortality in California

- Attacks by *Scolytus unispinosus* (tops, branches and small trees) and in NW California, *Psuedohylesinus* spp.
  - Some mortality associated with blackstain root disease, velvet-top fungus, or Armillaria root disease (NW California)
  - Accumulation of dead trees on the same poor sites over several years in coastal CA
  - More episodic type events on poor sites for inland Coast Range and Cascade/Sierra with greatest mortality observed in 2022
  - Stand density doesn't appear to be a factor in some locations
-



# Impacts of Douglas-fir mortality

- Impacts mostly related to hazard tree issues along roads, powerlines and recreation areas.
  - Post-marking and post-harvest mortality in thinning projects
  - Loss of canopy cover preferred by some wildlife species
  - Changes in fuels: Short term (red phase to gray phase for canopy), Long-term snag fall/course woody debris
  - Benefit to shade suppressed oak species and understory vegetation
-



April 7, 2022



March 17, 2023

Is this wave  
over?  
Not yet!

- 45% of normal for water year 2020/2021
- 81% of normal precipitation in 2021/2022
- 115% of normal so far in 2022/2023



# Thank you and acknowledgements

- Chris Lee, CAL FIRE Forest Pathologist
  - Beverly Bulaon, US Forest Service Entomologist
  - Cynthia Snyder, US Forest Service Entomologist
  - Curtis Ewing, CAL FIRE Entomologist
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