

# 2023 CA Forest Health Aerial Detection Survey Results & Trends



J E F F R E Y M O O R E  
U S F S R 5 A E R I A L  
S U R V E Y P R O G R A M  
M A N A G E R



# Background

Aerial Detection Survey is a systematic overview utilizing direct ocular discernment of the relative health of most of our forests regardless of ownership

Areas with recent mortality and/or current damage are recorded on touch-tablets by program specialists

Sample photos are also taken

Primary data is hand drawn digital polygons of areas with damage

Light fixed wing aircraft is used typically on a four-mile grid flying pattern



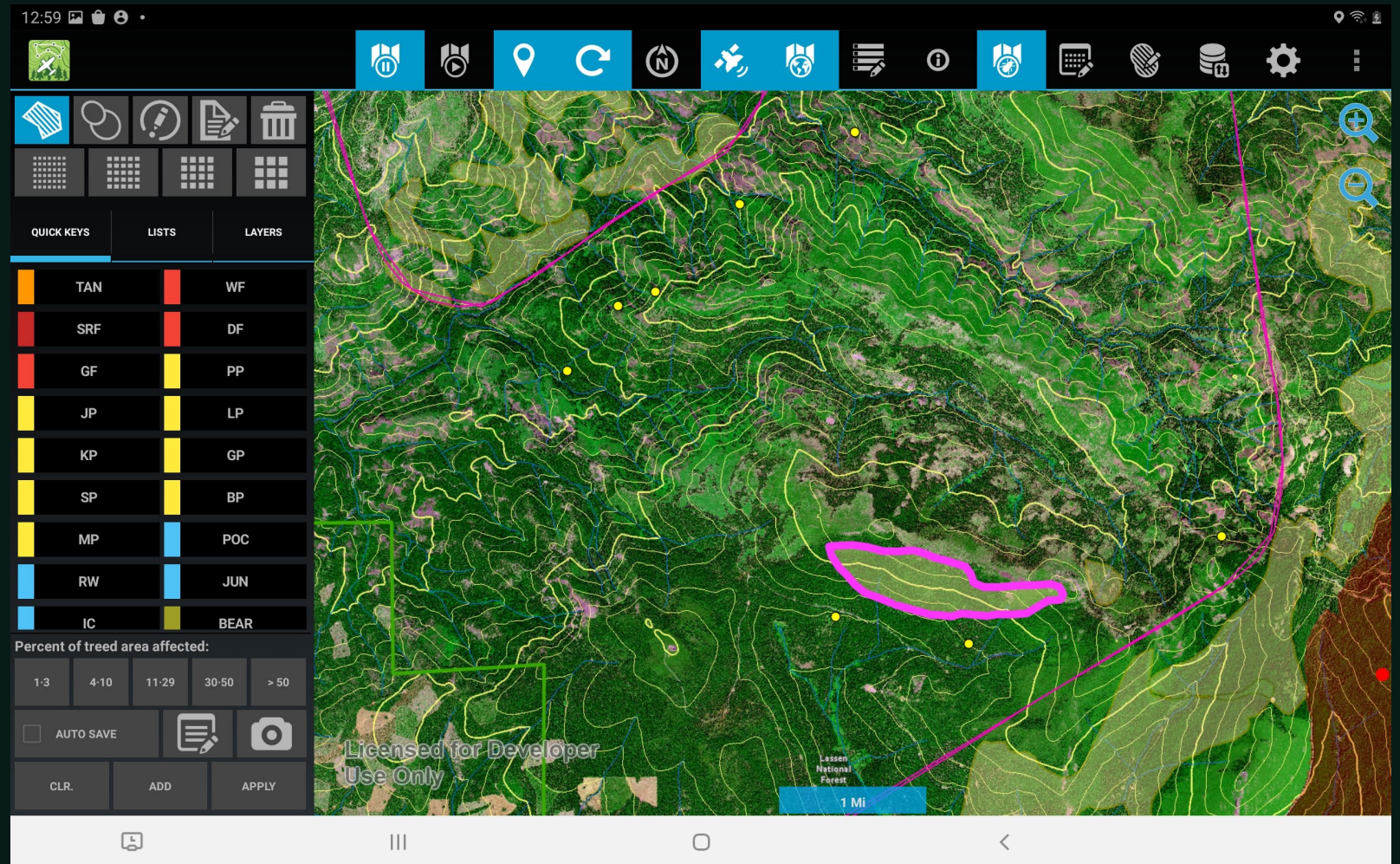
# Program

---

- Small Team
- Small Budget
- Modest Platform
- Massive Data
- Timely Annual Results
- Trend Analysis
- Historical Continuity

# Digital Mobile Sketch Mapping Unit DMSM

- Smart Android touch tablet app
- False color NAIP imagery
  - Contours
  - Streams
- Flight lines
- Recent burn areas
- Contours
- National lands boundaries



# What is meant by Red Dead?

- When a tree is killed by bark beetles it still looks healthy from a distance
- After some months when the foliage dries out it changes to a red, yellow or some other color making it visible from the air and accurate species identification becomes possible
- We call this a lag effect
- Trees mapped were likely killed the prior year<sup>★</sup>



# Background

---

2020-2022 were the hottest and driest three-year period on record especially in central/northern portions of the state.

The winter of 2022-2023 saw record precipitation in many areas however trees were/are greatly weakened, and bark beetle populations are at epidemic levels





# Bark Beetles

Persistently high  
populations exacerbated by  
drought and overcrowding



# Diseases

Difficult to quantify and likely mixed conditions due to drought



# 2023 ADS Results

## FOREST HEALTH PROTECTION AERIAL DETECTION MONITORING

### 2023 SURVEY

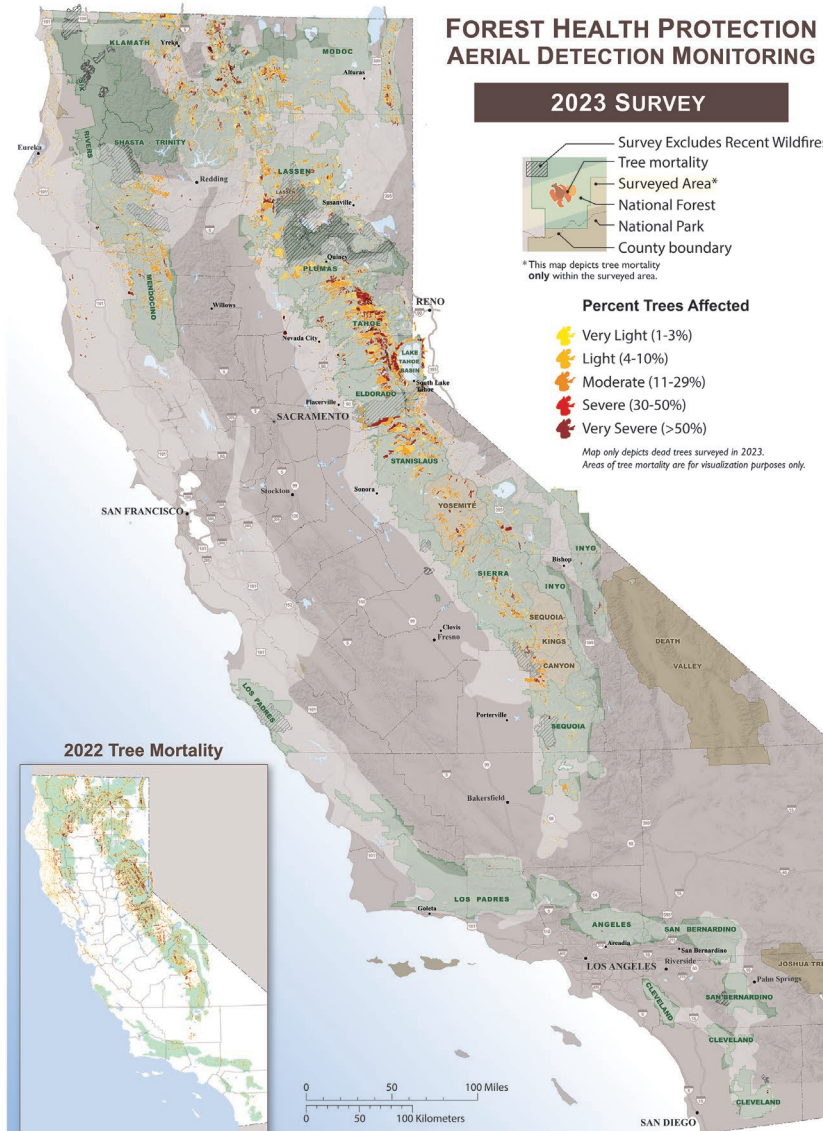


\*This map depicts tree mortality only within the surveyed area.

### Percent Trees Affected

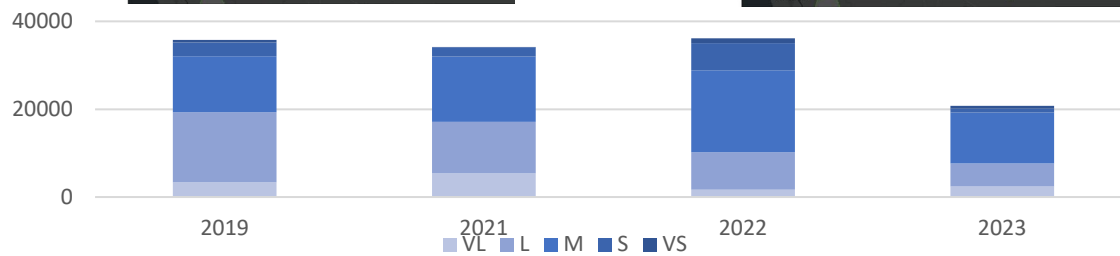
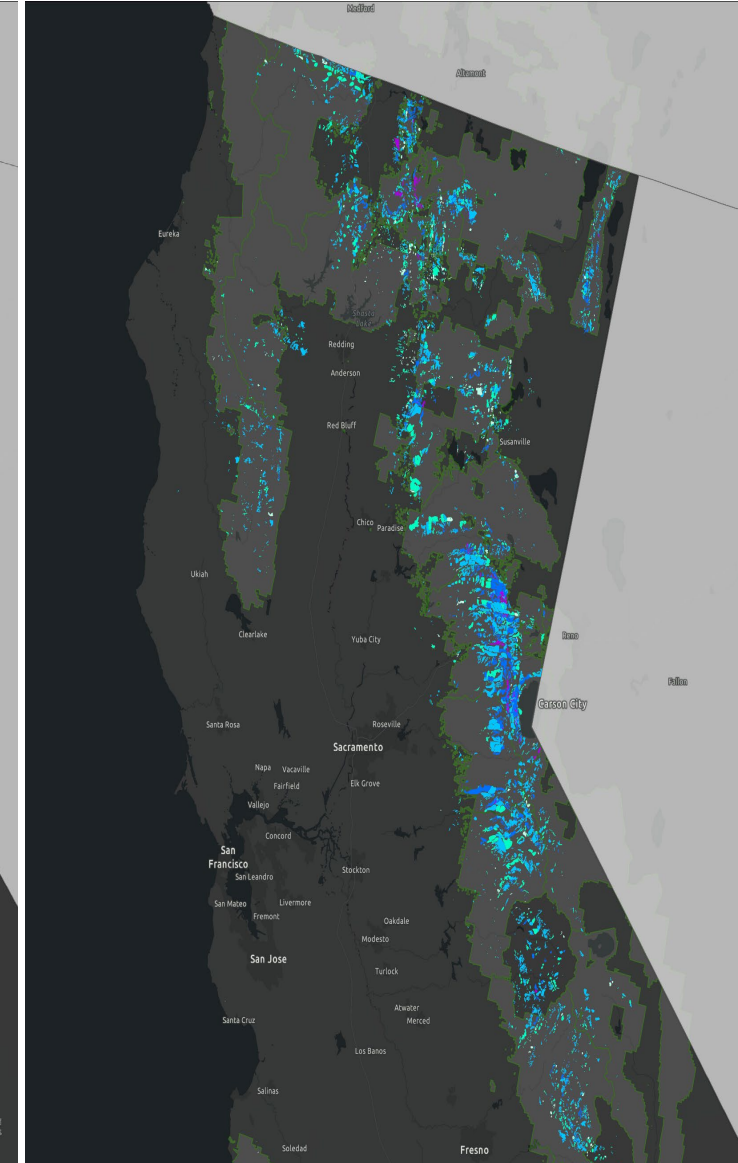
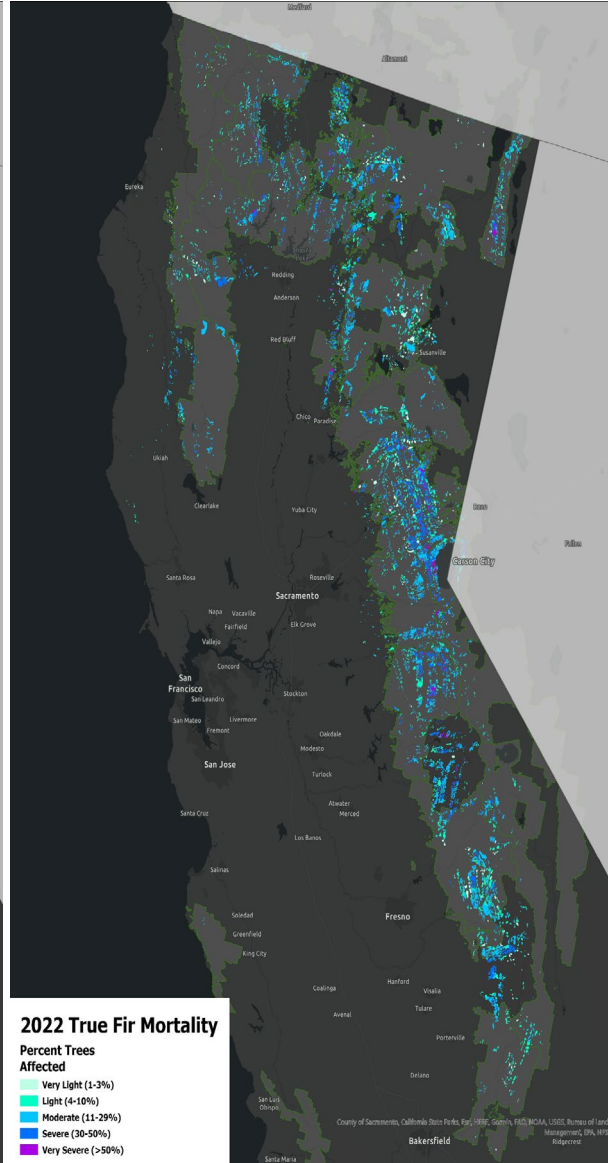
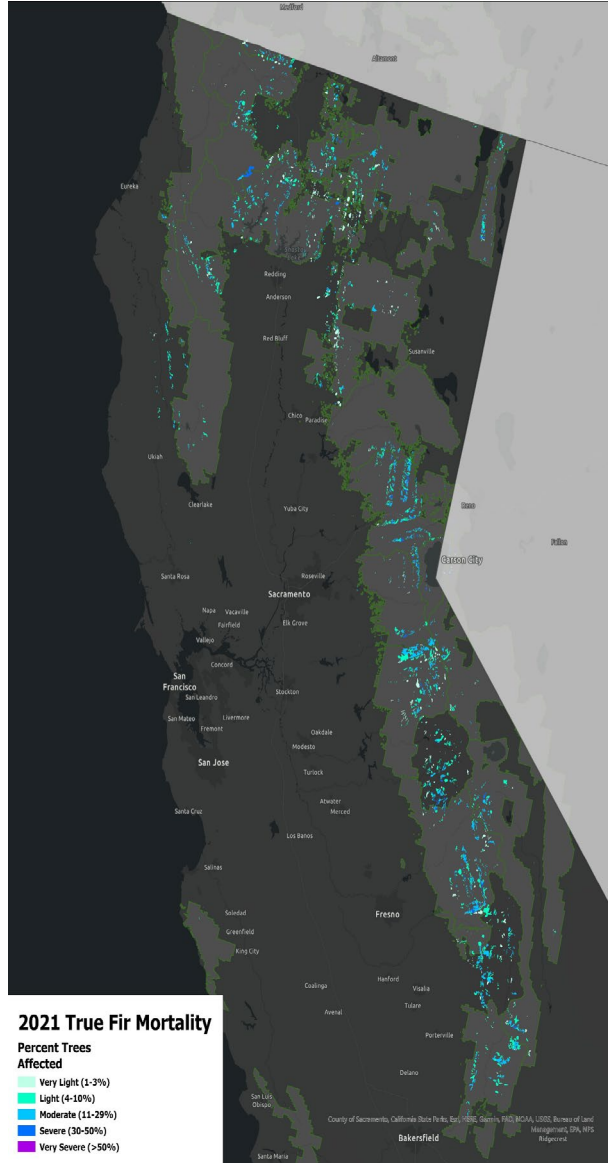
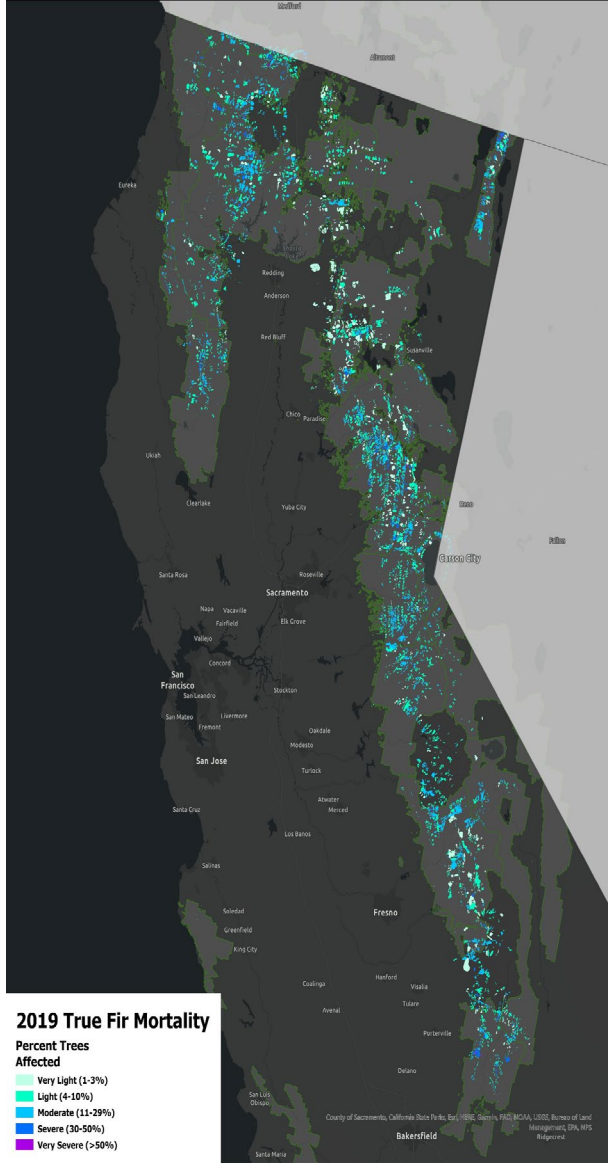


Map only depicts dead trees surveyed in 2023. Areas of tree mortality are for visualization purposes only.



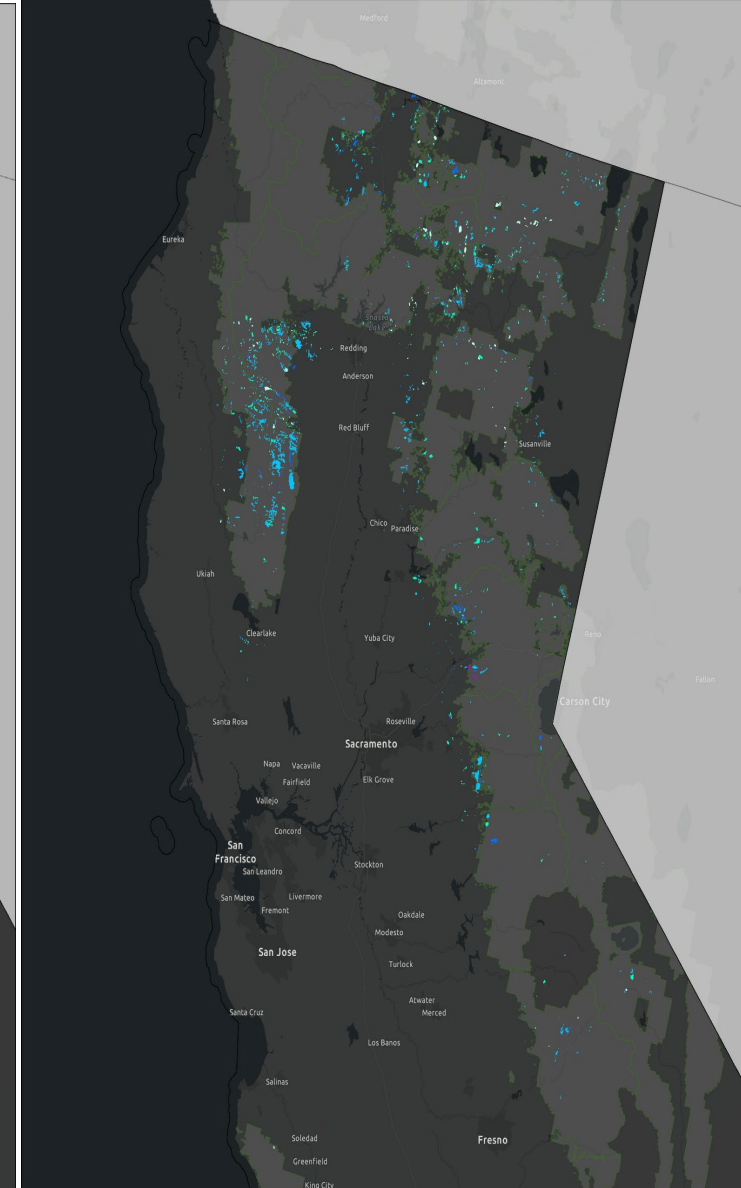
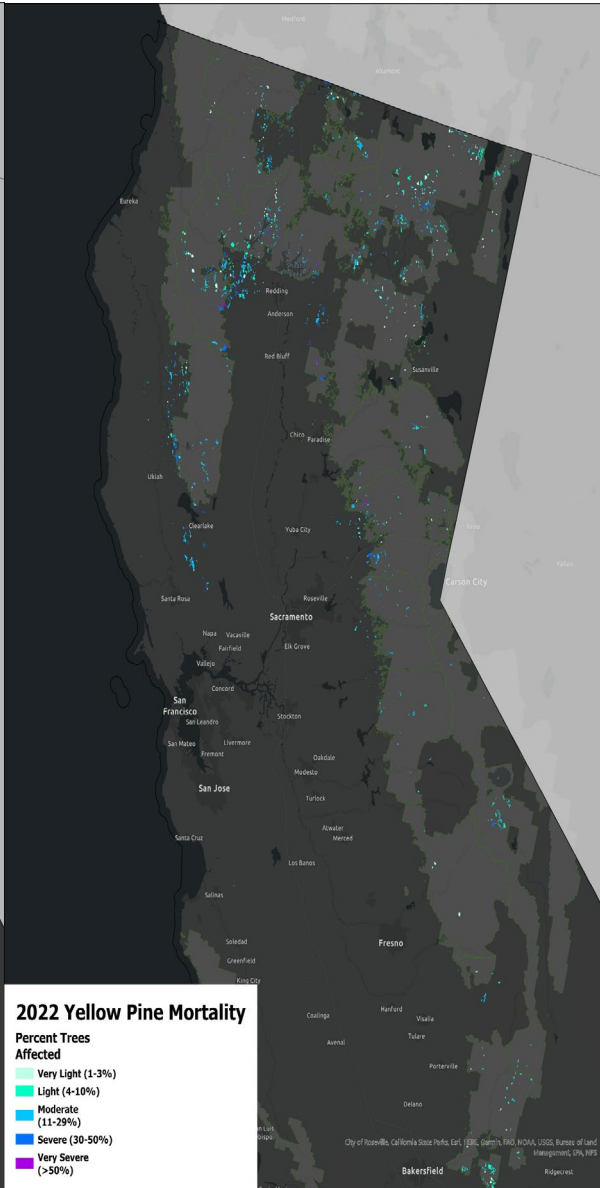
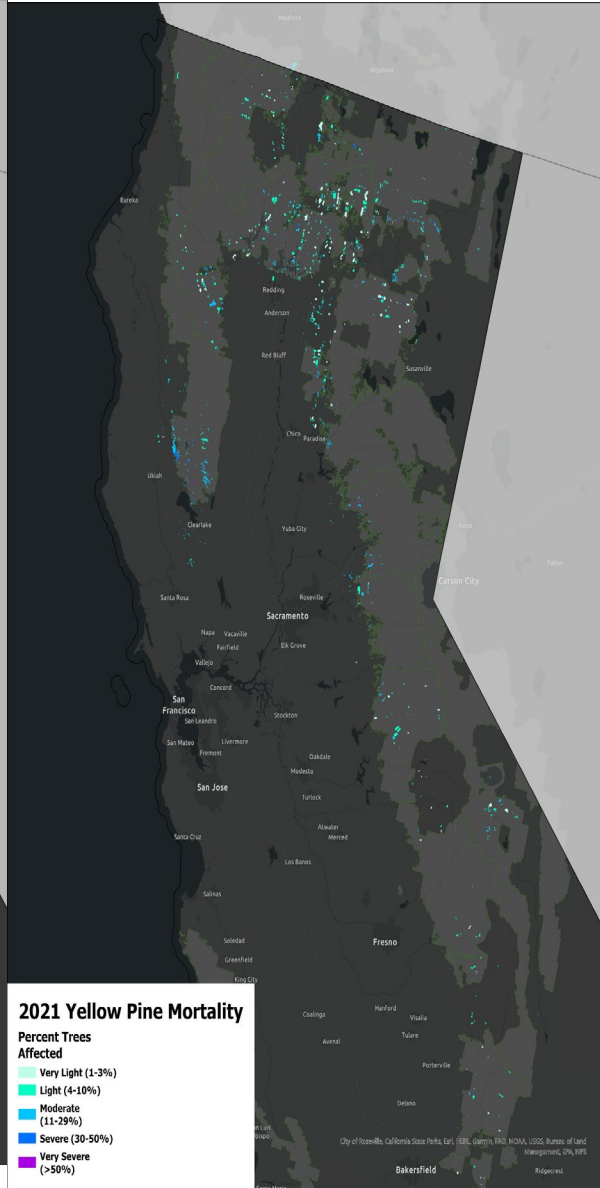
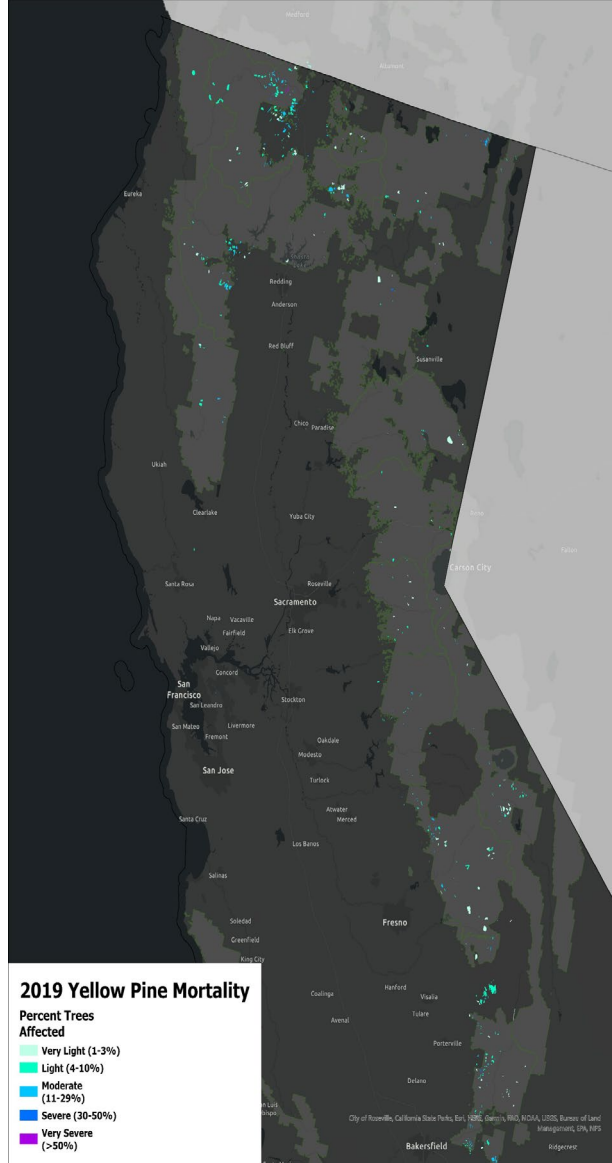
### 2022 Tree Mortality



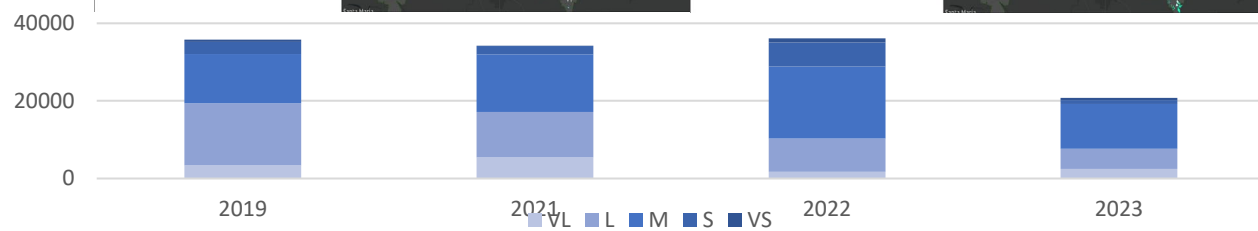


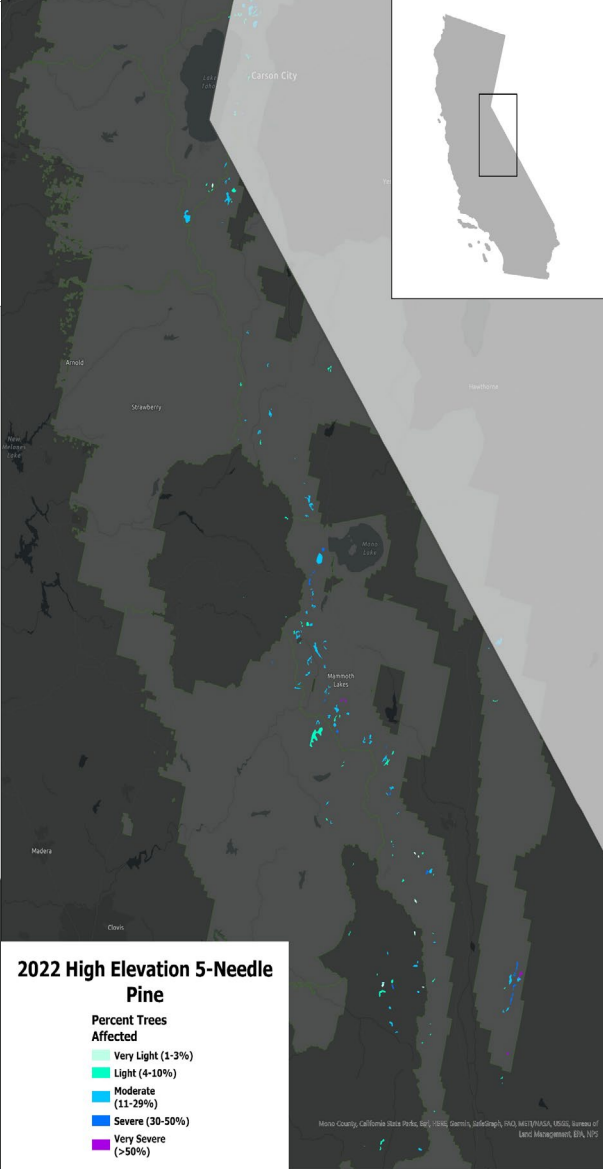
# True Fir ADS Damage 2019-2023

County of Sacramento, California State Parks, Esri, HERE, Garmin, IGN, INRIA, USGS, Bureau of Land Management, EPA, NPS, Ridgecrest

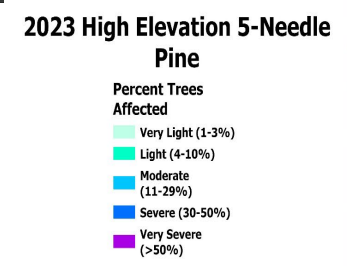
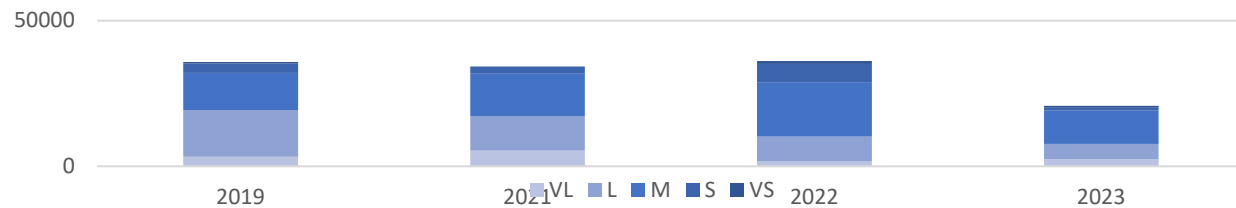


# Yellow Pine ADS Areas 2019-2023

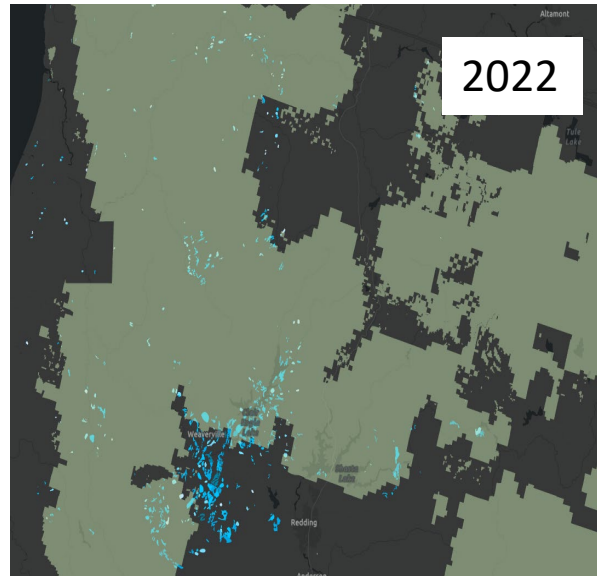
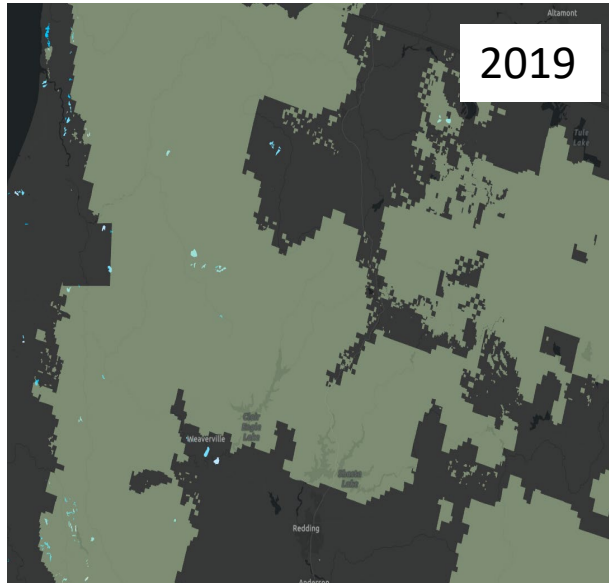
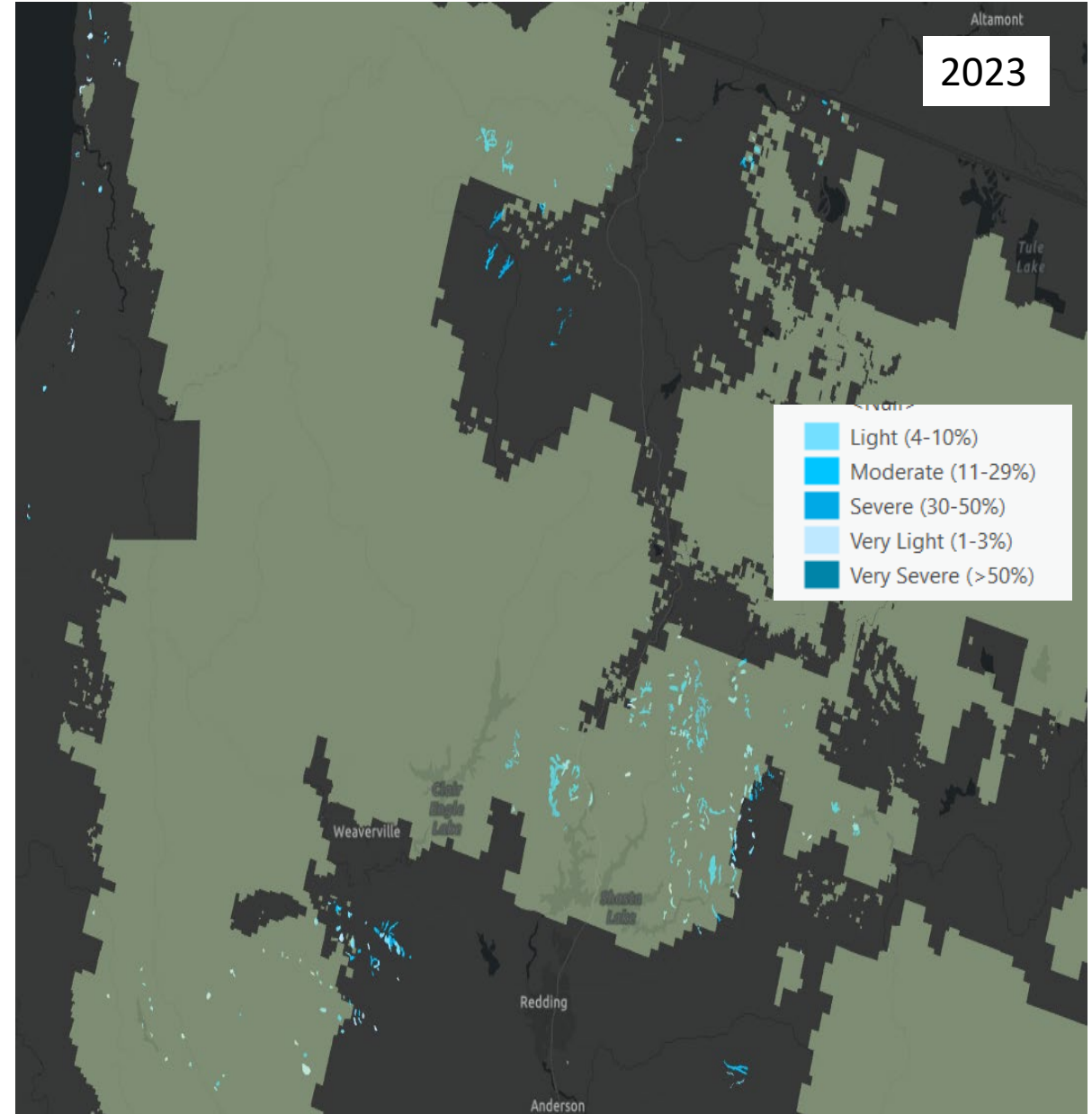
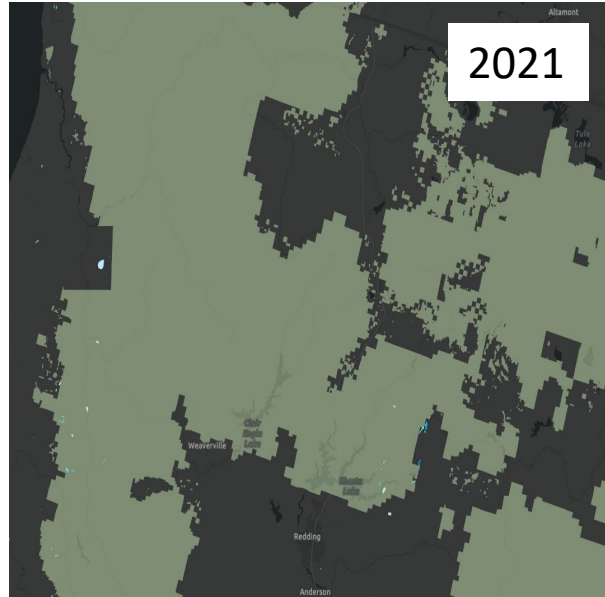
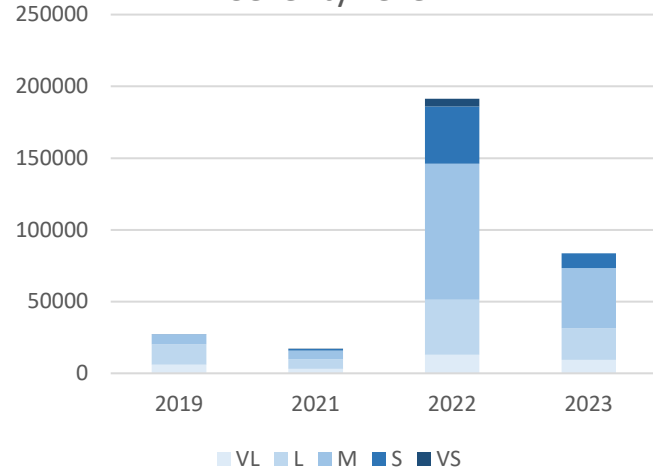




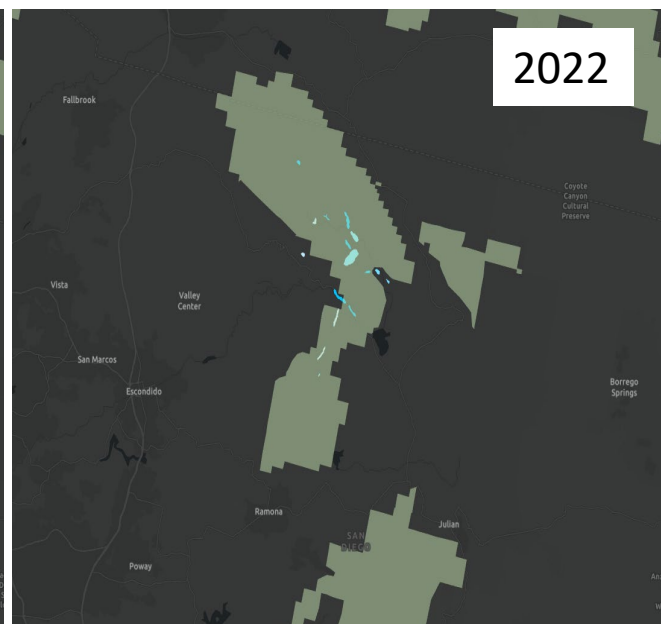
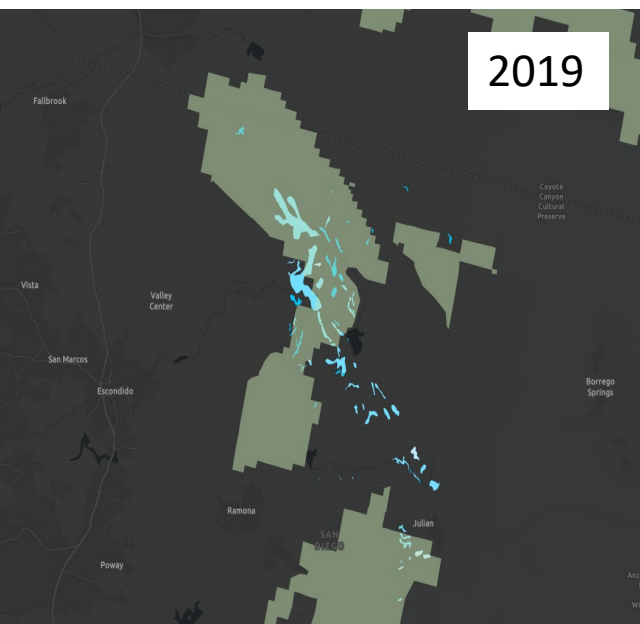
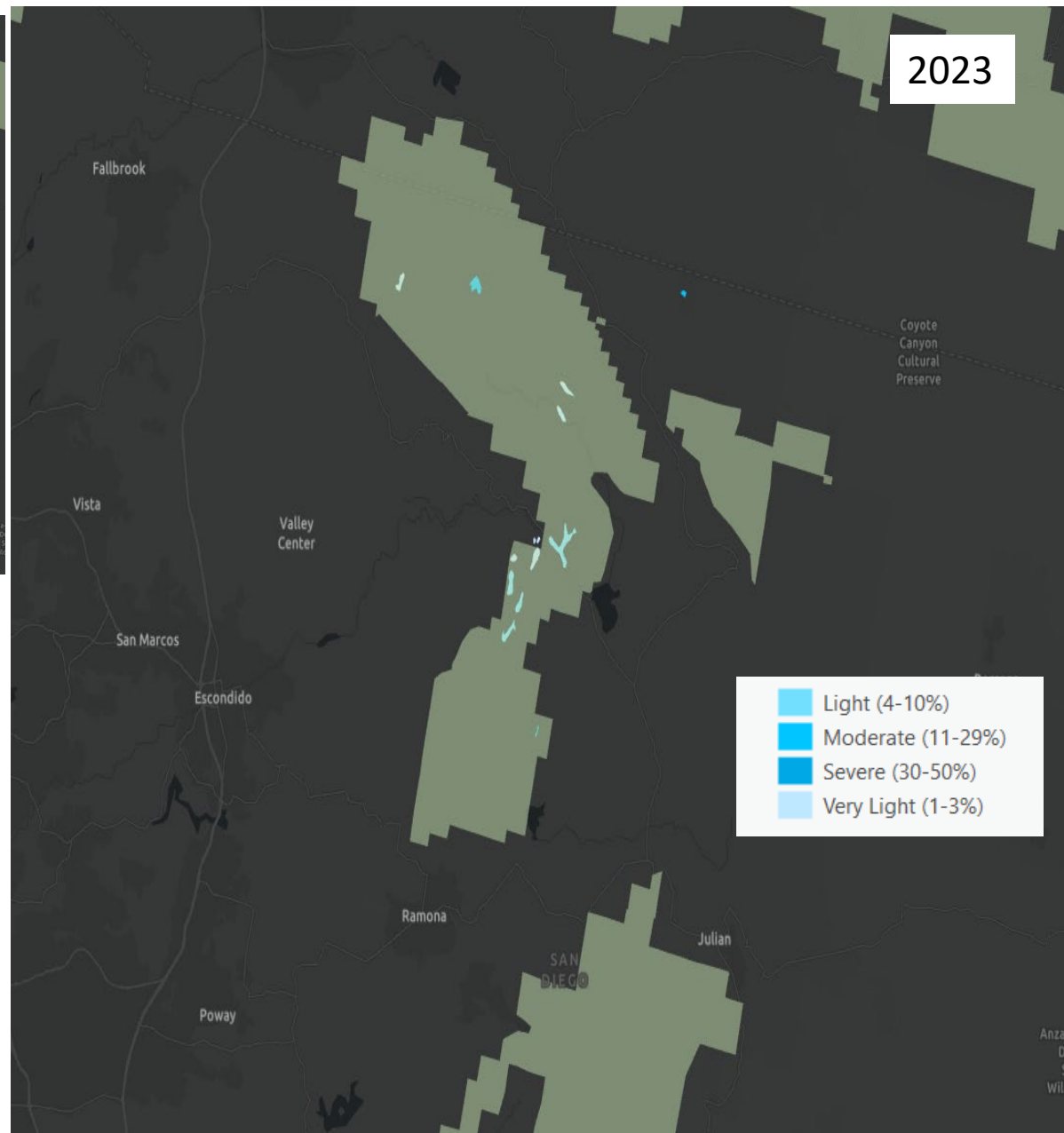
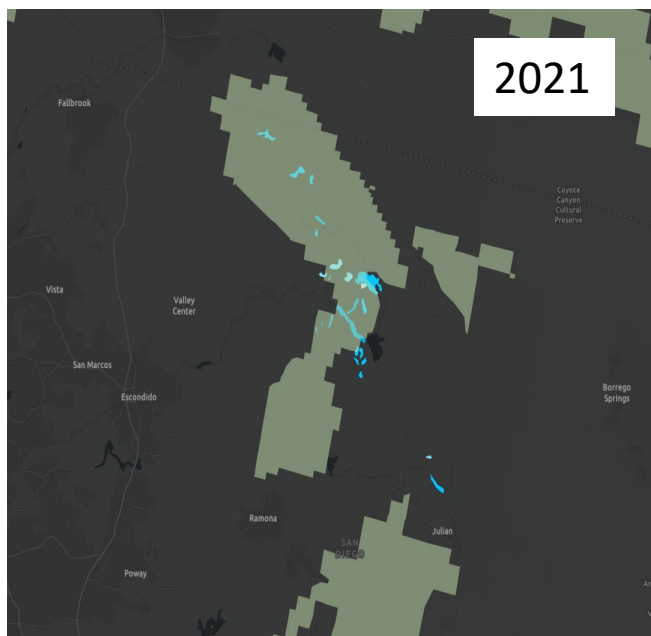
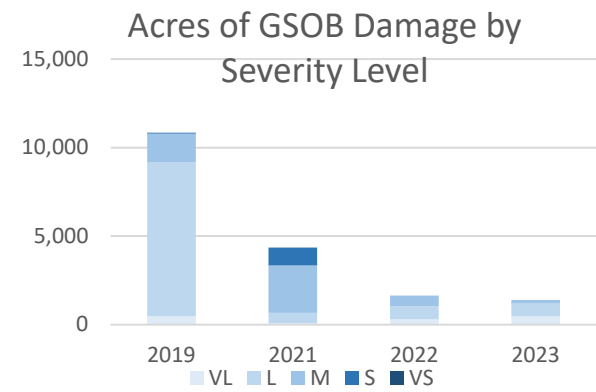
# High Elevation ADS Damage 2019-2023



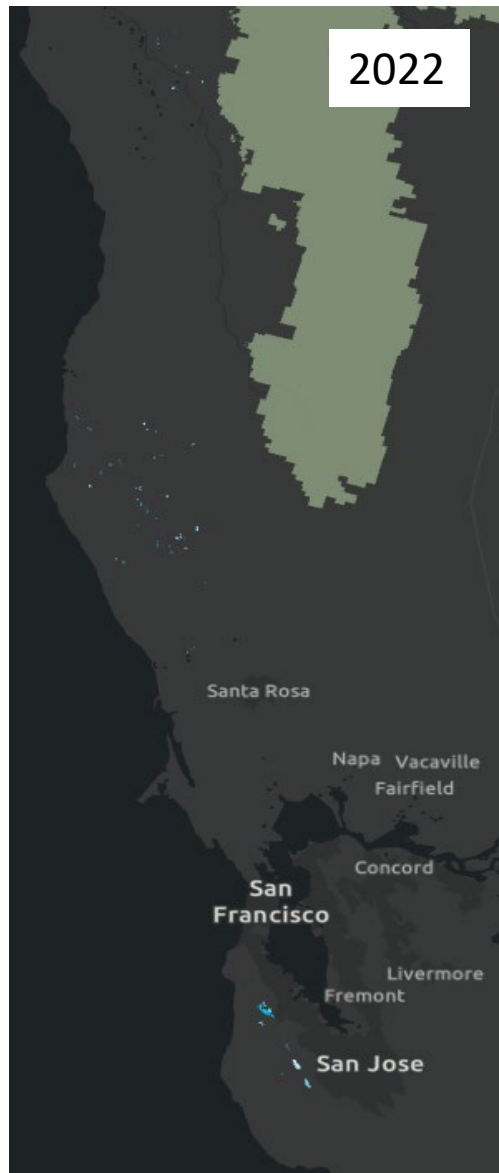
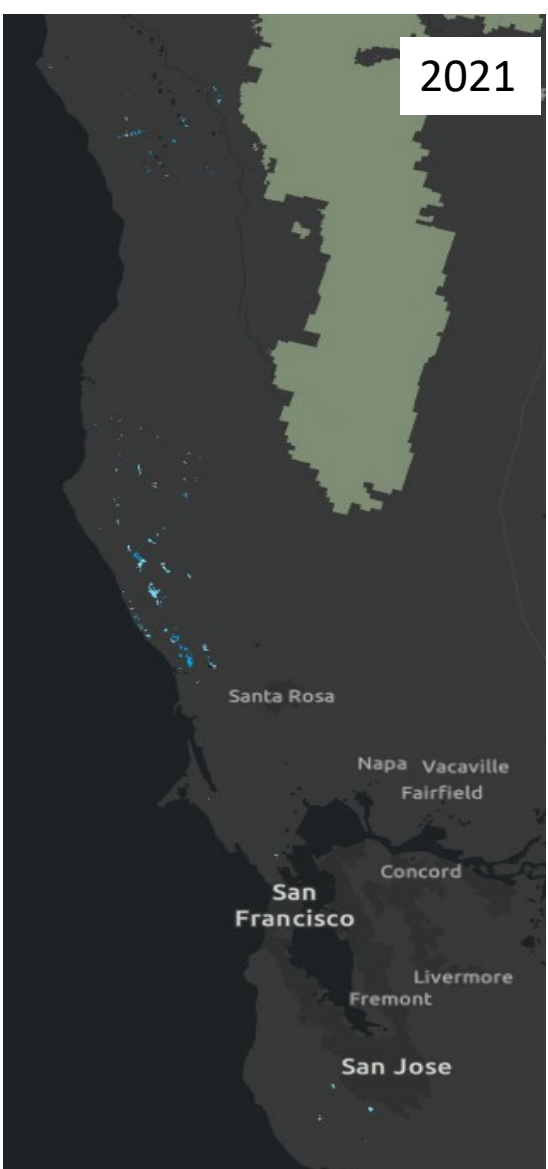
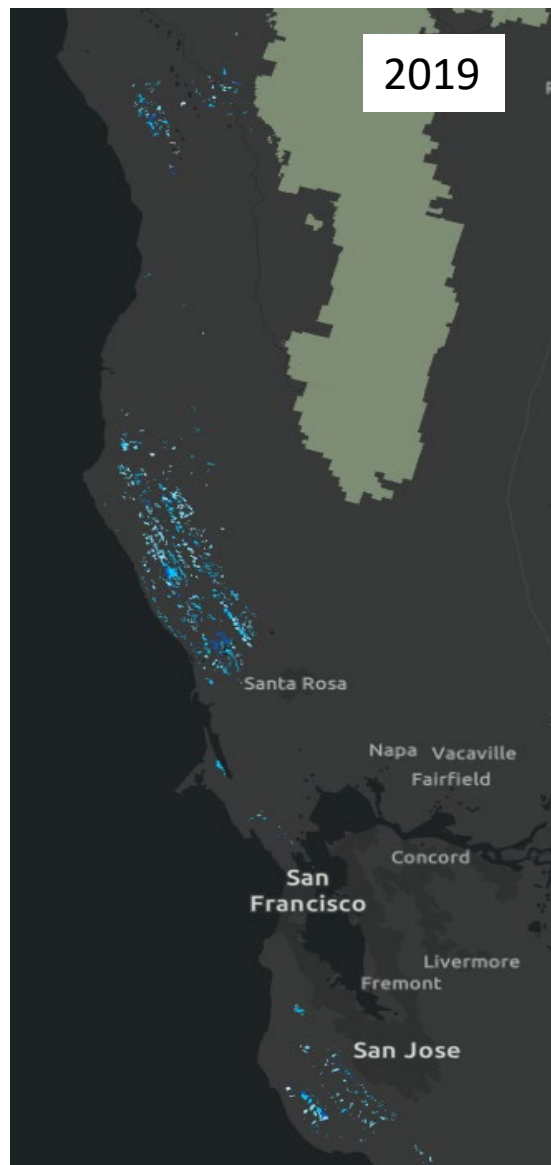
Acres of Douglas Fir Damage by Severity Level



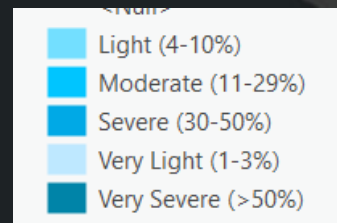
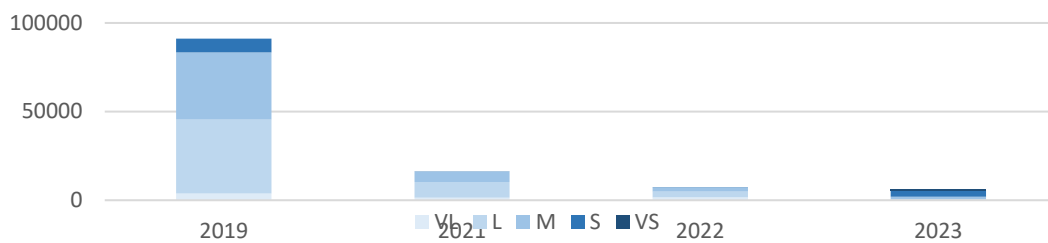
# ADS Damage Areas for Douglas-Fir



# ADS Damage Areas for GSOB



# SOD Damage 2019-2023



# Additional 2023 ADS Findings

---

## PINE MORTALITY

- Substantial decrease since the height of the last major drought in 2016-2017
- Pine mortality is still elevated and most active in areas of the northern interior especially in and around the Mendocino NF

## SUDDEN OAK DEATH

- Mortality is again greatly decreased in all areas
- Likely due to lack of new infections since 2018 our last wet spring
- Spread into new areas is also minimal in these conditions

## GOLDEN SPOTTED OAK BORER

- Mortality remained decreased from the last several years
- Likely due to a dearth of preferred host in interior areas
- Probable spread near Escondido but was collected as point data and not yet integrated into the dataset





# Summary

Many trees in many areas likely never recovered from the last major drought of 2015-2018 even with one year of abundant precipitation

New mortality is heaviest in the central Sierra Nevada Range and areas further north

true fir are currently the most heavily affected species

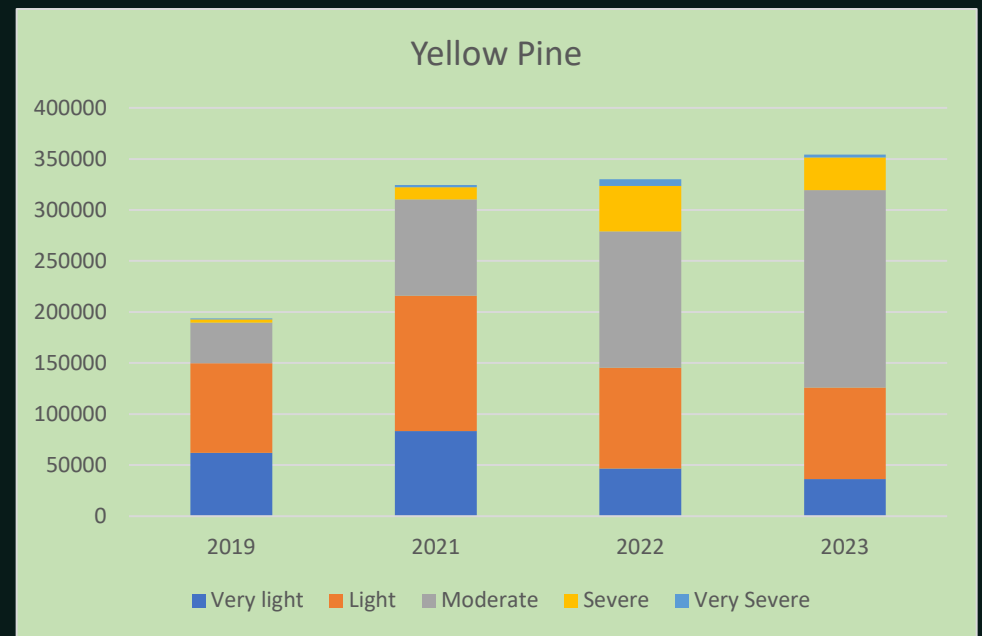
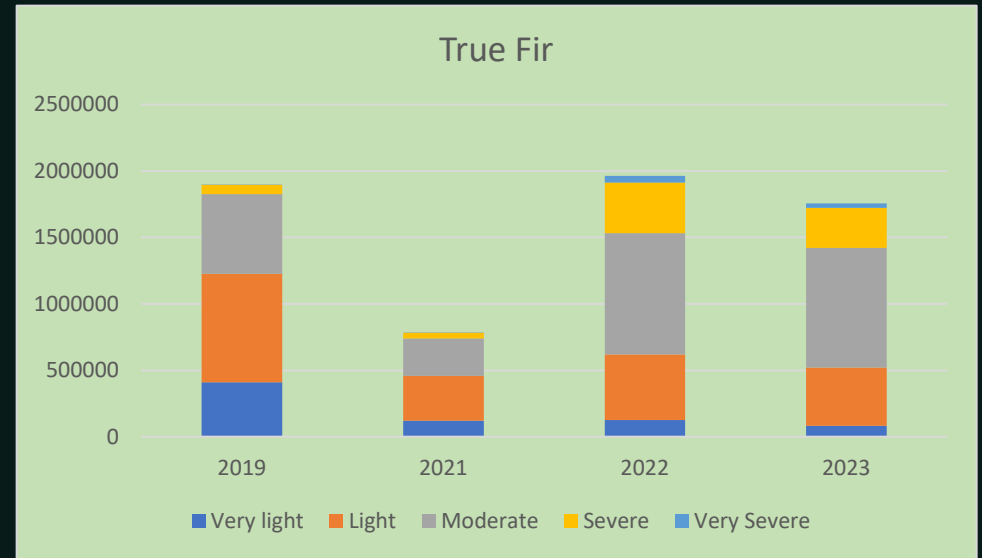
Douglas-fir mortality is still elevated around the greater Redding area, but much decreased along the coast from 2022





# What To Expect in 2024

- Since the aerial survey has a lag, trees killed in 2023 will likely be mapped in 2024
- Beetle populations are still massive on the landscape especially fir engraver
- One wet year will not stop this ongoing mortality event; however, another wet year is expected in winter of 2023-2024
- Spring rains in 2023 likely spread SOD infections and will start a new wave of infections



# Thank you

---

Jeffrey Moore

[jeffrey.moore@usda.gov](mailto:jeffrey.moore@usda.gov)

[https://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3\\_046696](https://www.fs.usda.gov/detail/r5/forest-grasslandhealth/?cid=fsbdev3_046696)

