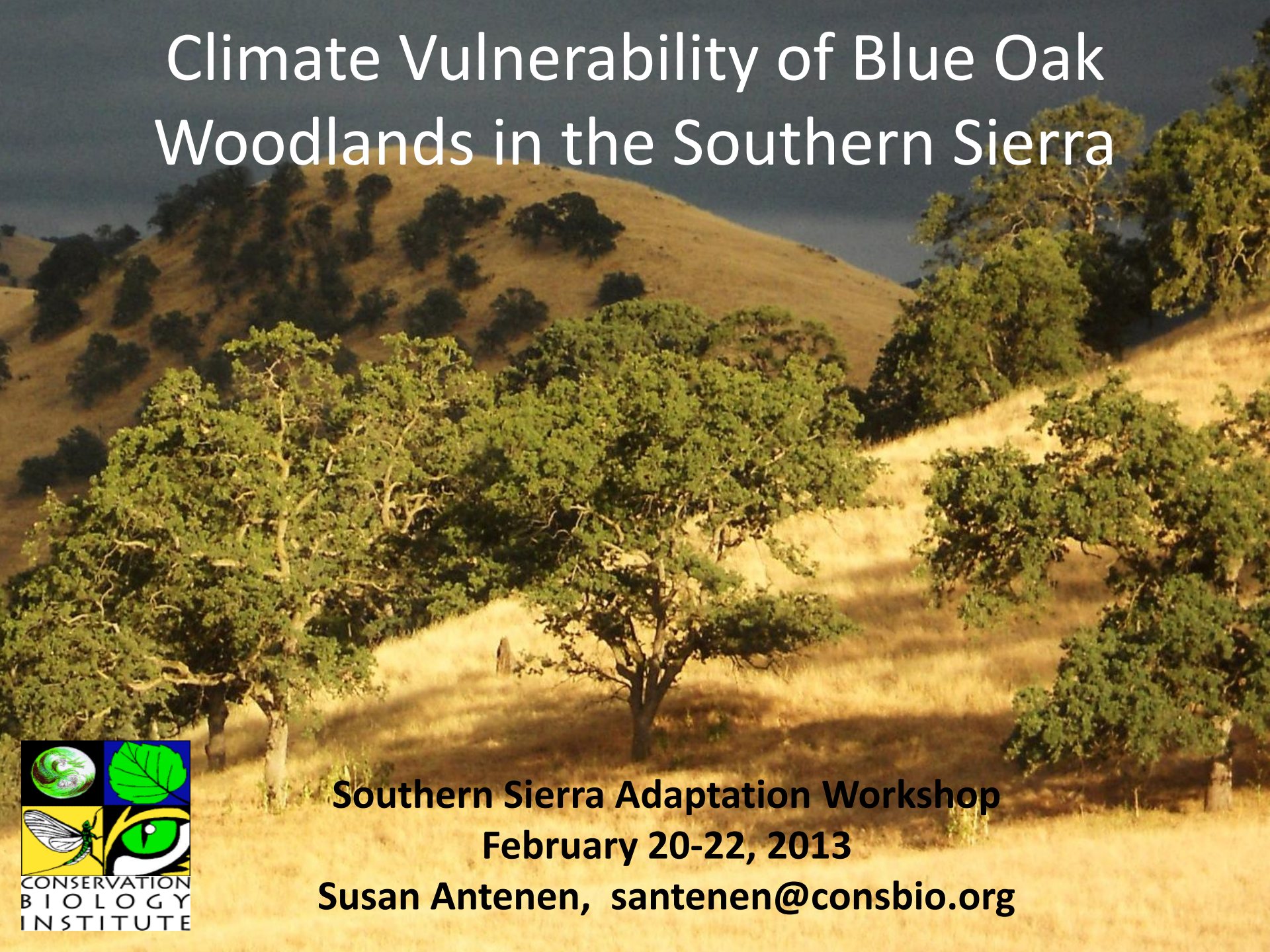
# Climate Vulnerability of Blue Oak Woodlands in the Southern Sierra



**Southern Sierra Adaptation Workshop**
**February 20-22, 2013**

**Susan Antenen, santenen@consbio.org**

CONSERVATION BIOLOGY INSTITUTE

# Southern Sierra Partnership

Audubon CALIFORNIA

The Nature Conservancy
Protecting nature. Preserving life.™

Sequoia Riverlands Trust
Conserving California's Heartland

SIERRA BUSINESS COUNCIL

Tejon Ranch CONSERVANCY

CONSERVATION BIOLOGY INSTITUTE

**Species and Habitat Models:**
**Jason MacKenzie, The Nature Conservancy**

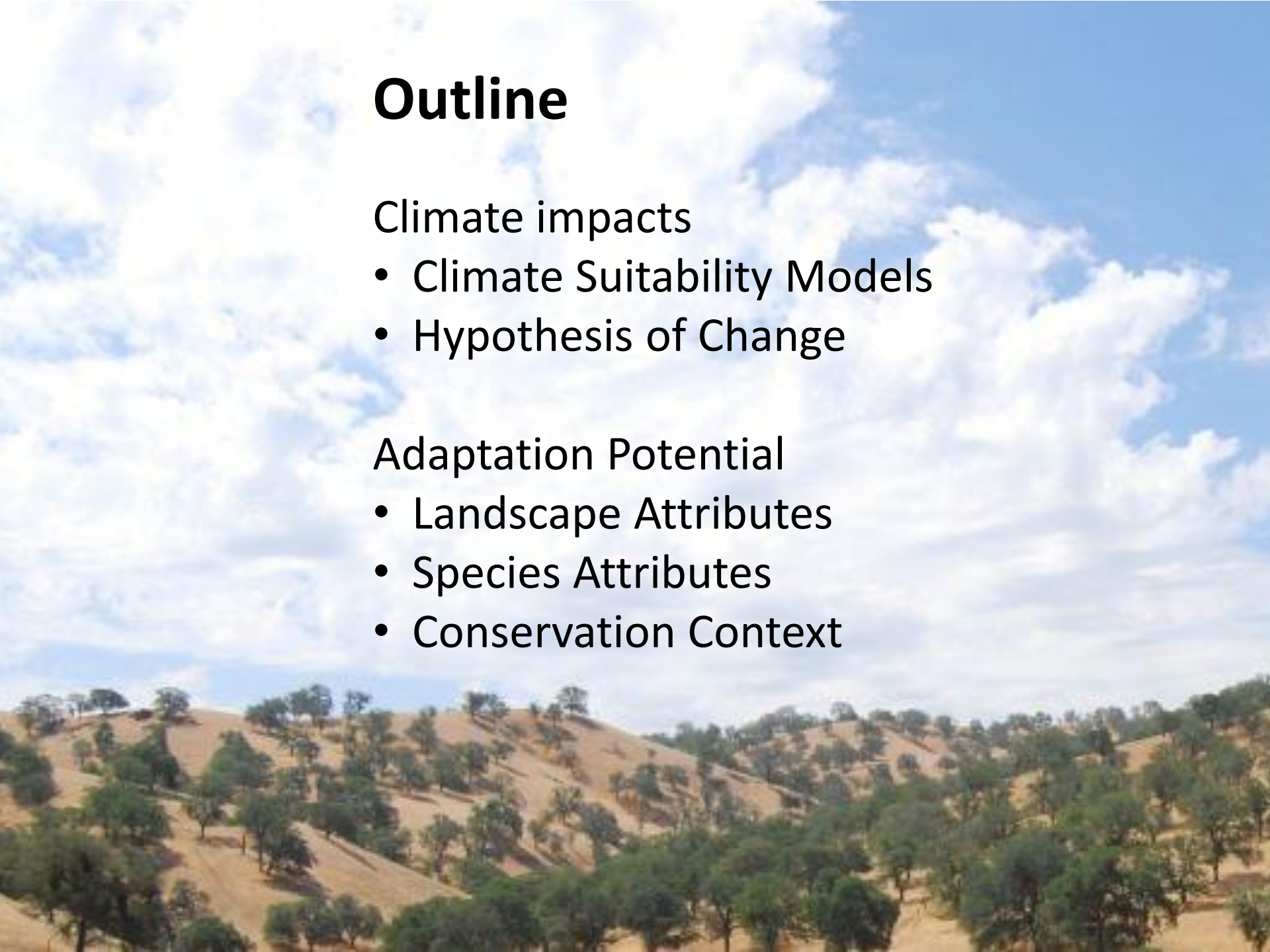
# Outline

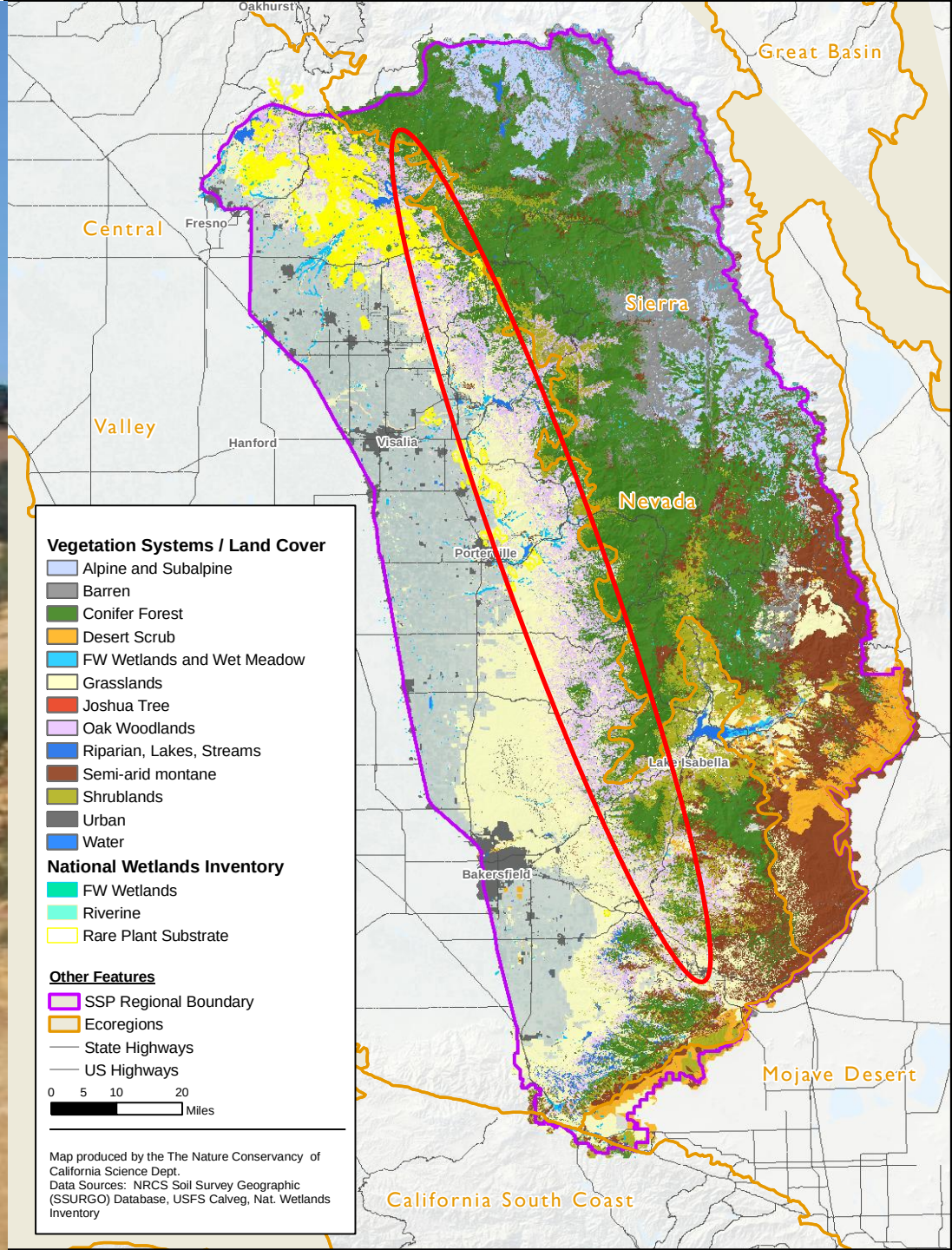
Climate impacts

- Climate Suitability Models
- Hypothesis of Change

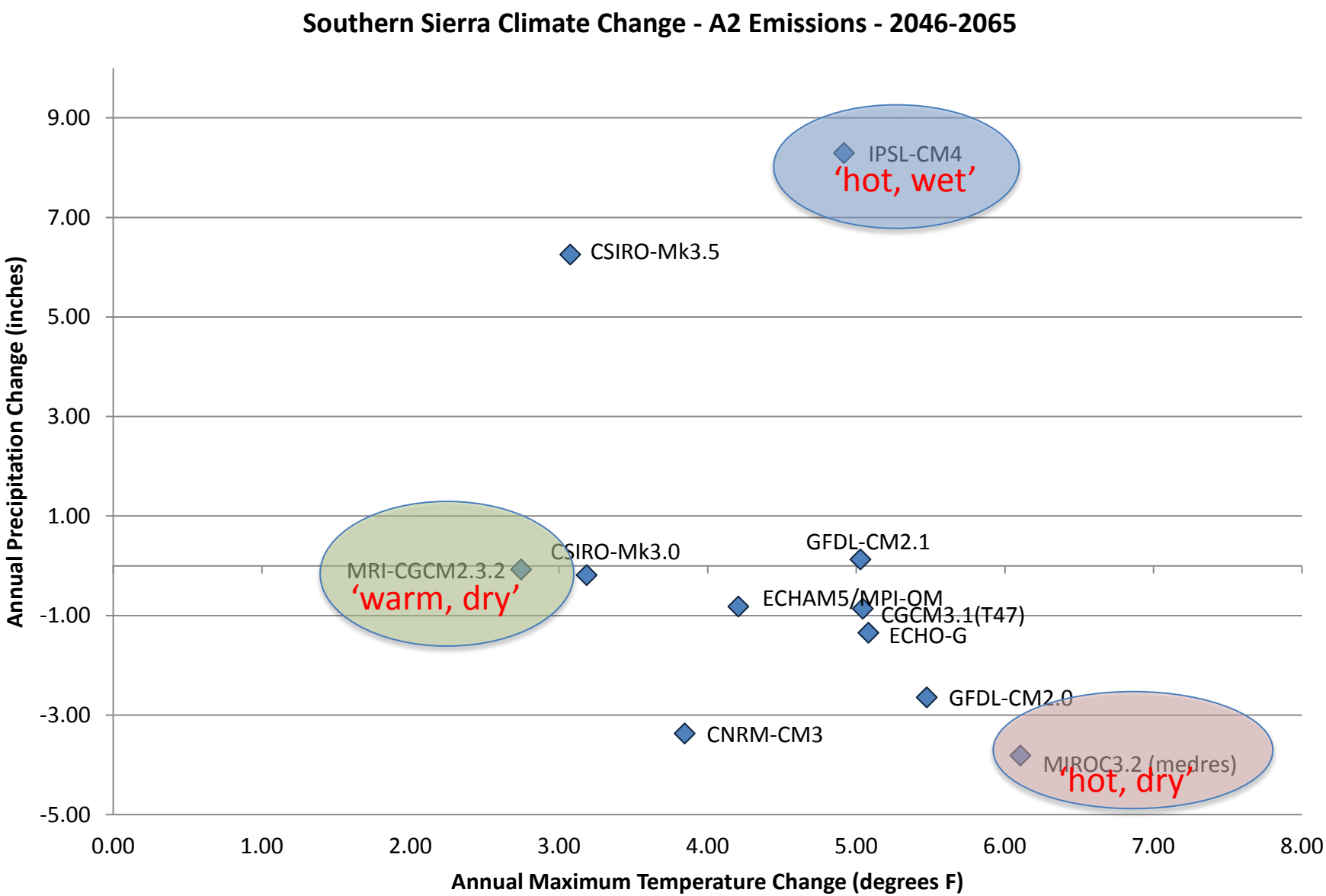
Adaptation Potential

- Landscape Attributes
- Species Attributes
- Conservation Context

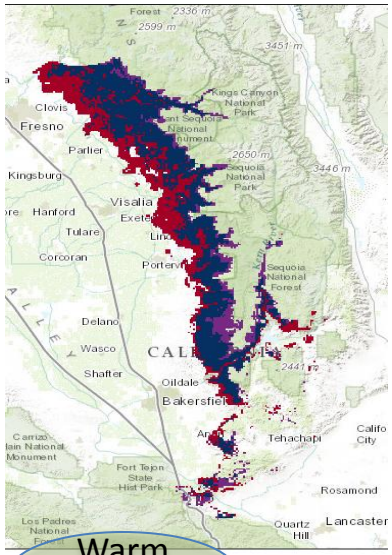



Oakhurst
Great Basin
Central
Fresno
Sierra
Valley
Hanford
Visalia
Nevada
Porterville
Lake Isabella
Bakersfield
Mojave Desert
California South Coast
Vegetation Systems / Land Cover
Alpine and Subalpine
Barren
Conifer Forest
Desert Scrub
FW Wetlands and Wet Meadow
Grasslands
Joshua Tree
Oak Woodlands
Riparian, Lakes, Streams
Semi-arid montane
Shrublands
Urban
Water
National Wetlands Inventory
FW Wetlands
Riverine
Rare Plant Substrate
Other Features
SSP Regional Boundary
Ecoregions
State Highways
US Highways
0 5 10 20
Miles
Map produced by the The Nature Conservancy of California Science Dept.
Data Sources: NRCS Soil Survey Geographic (SSURGO) Database, USFS Calveg, Nat. Wetlands Inventory

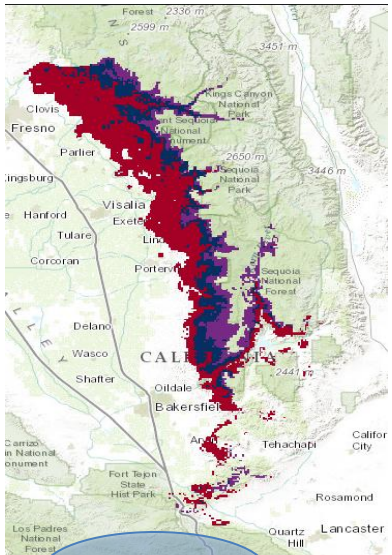
# Selecting Outlier Climate Projections to Bookend Scenario Planning



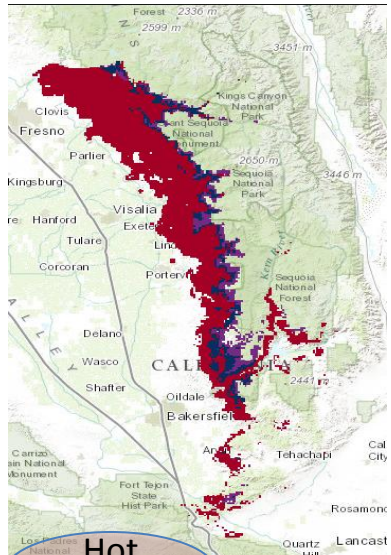
# Blue Oak




Warm Dry



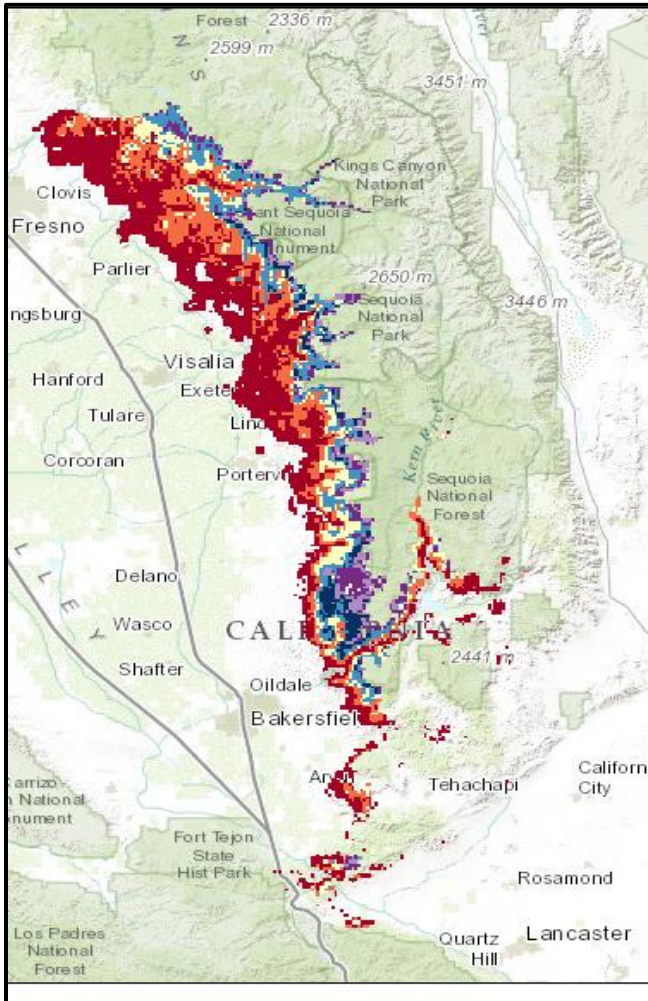

Hot Dry



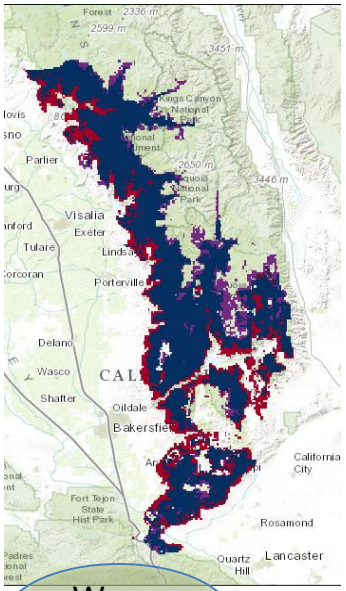

Hot Wet

| | |
|---|---|
| contraction | (support >80%) |
| contraction | (support >60%) |
| uncertain | |
| stable | (support >60%) |
| stable | (support >80%) |
| expansion | (support >60%) |
| expansion | (support >80%) |

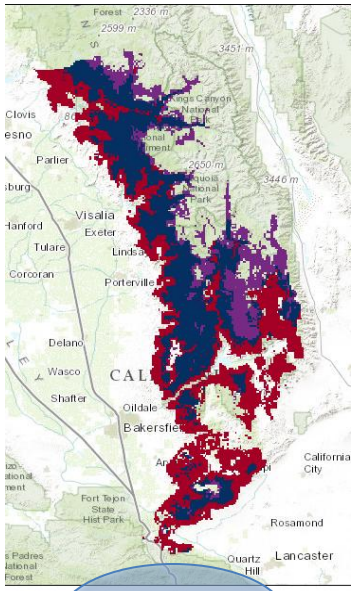
Ensemble



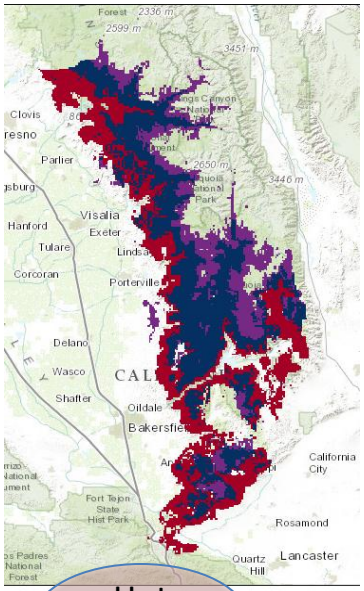
# Interior Live Oak




Warm Dry

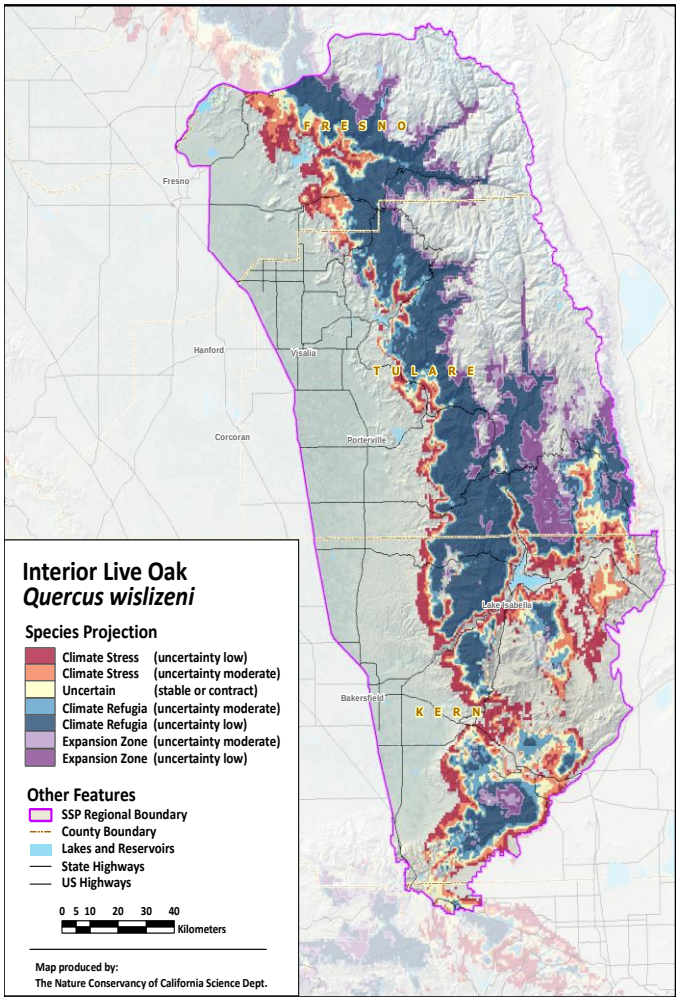



Hot Dry




Hot Wet

Ensemble




| | |
|---|---|
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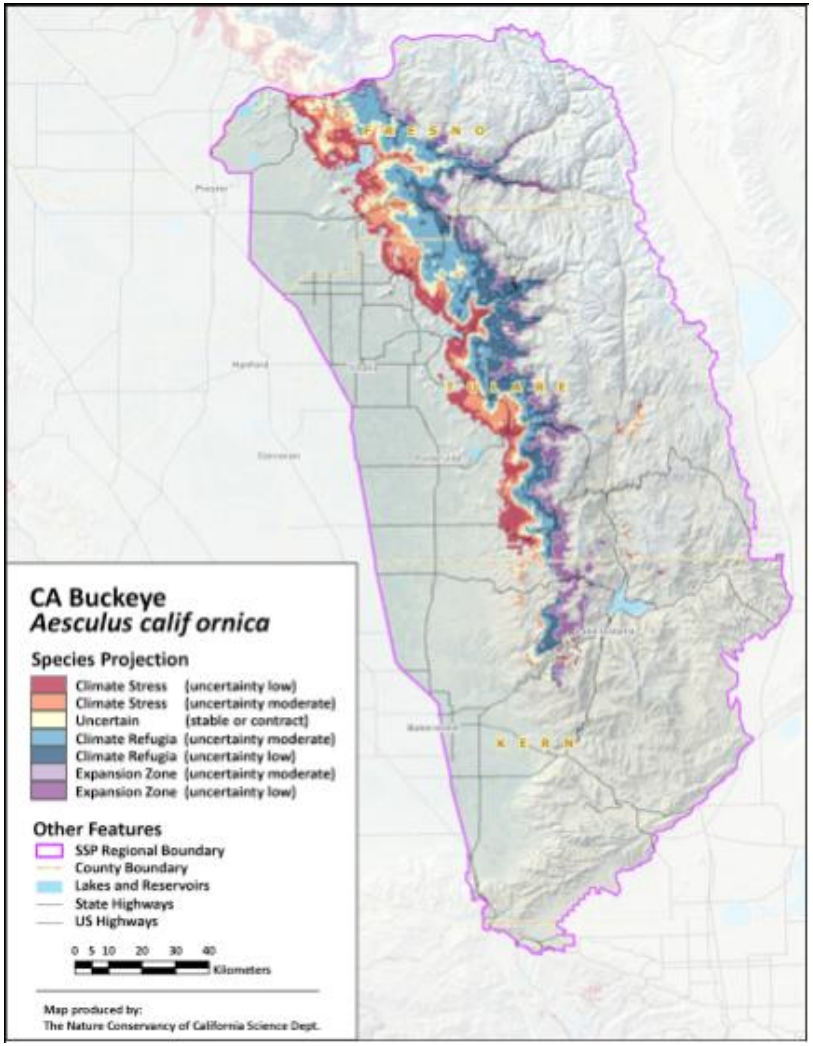
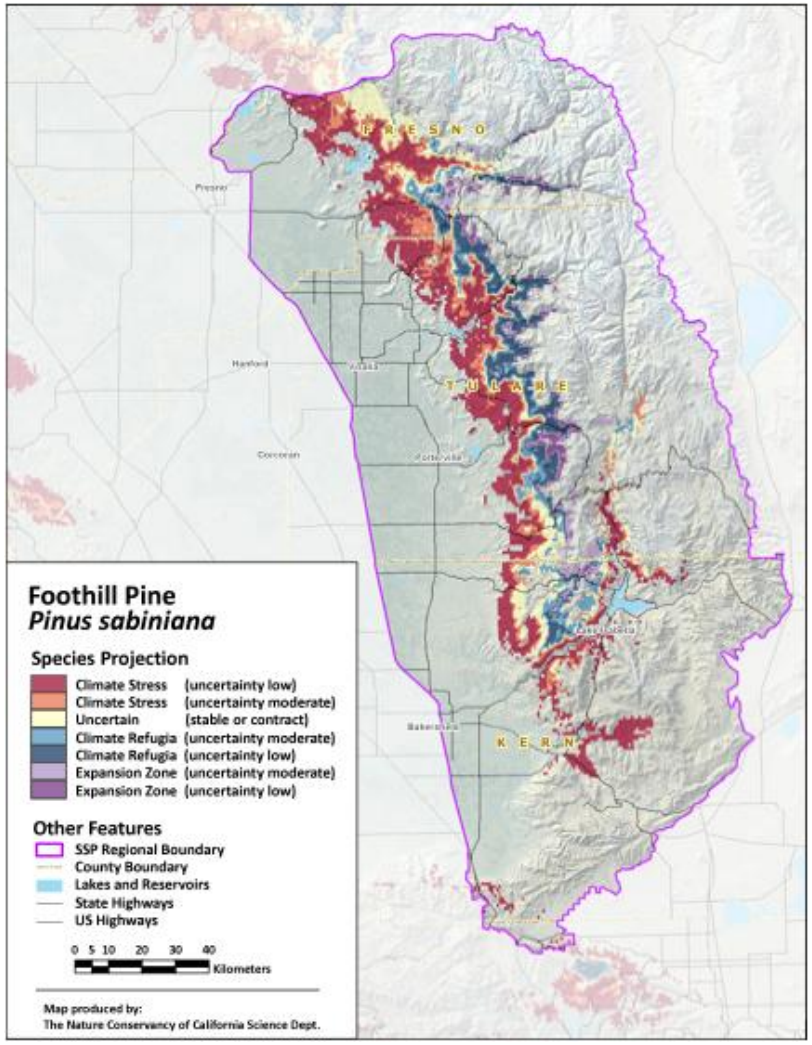
| contraction | (support >60%) |
| uncertain | |
| stable | (support >60%) |
| stable | (support >80%) |
| expansion | (support >60%) |
| expansion | (support >80%) |

# Ensemble Models

## California Buckeye



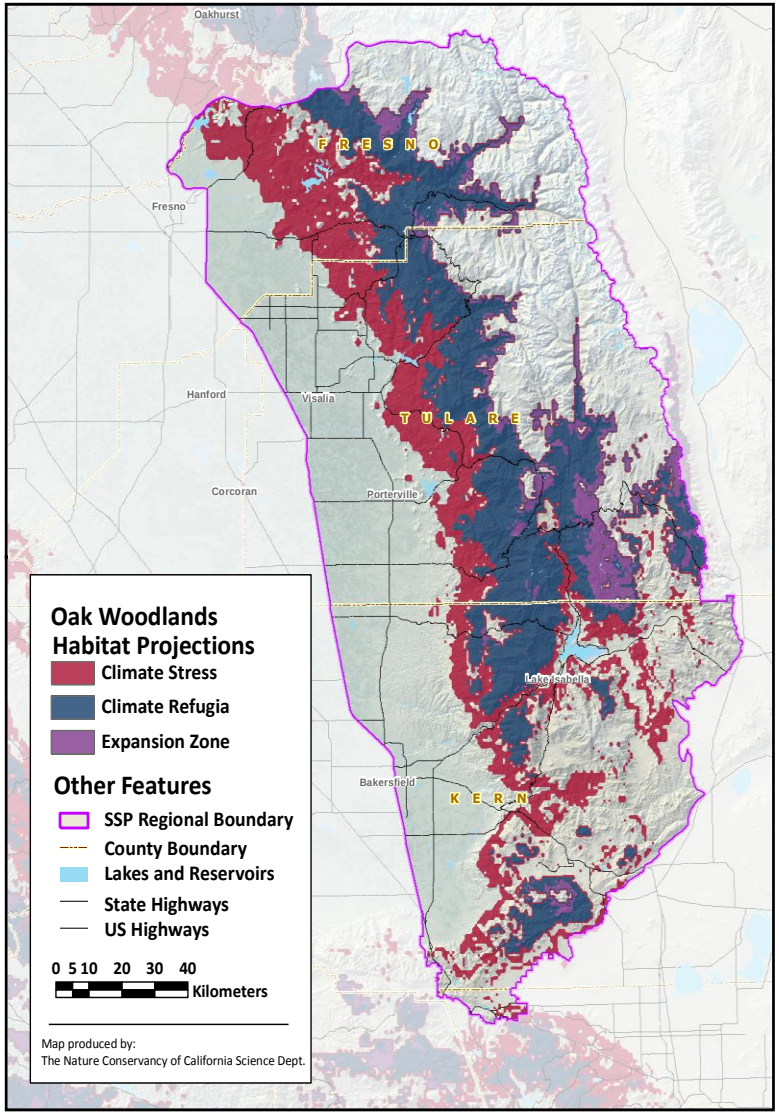

## Foothill Pine



# **Results** -- Percentage of Current and Potential Expansion Range

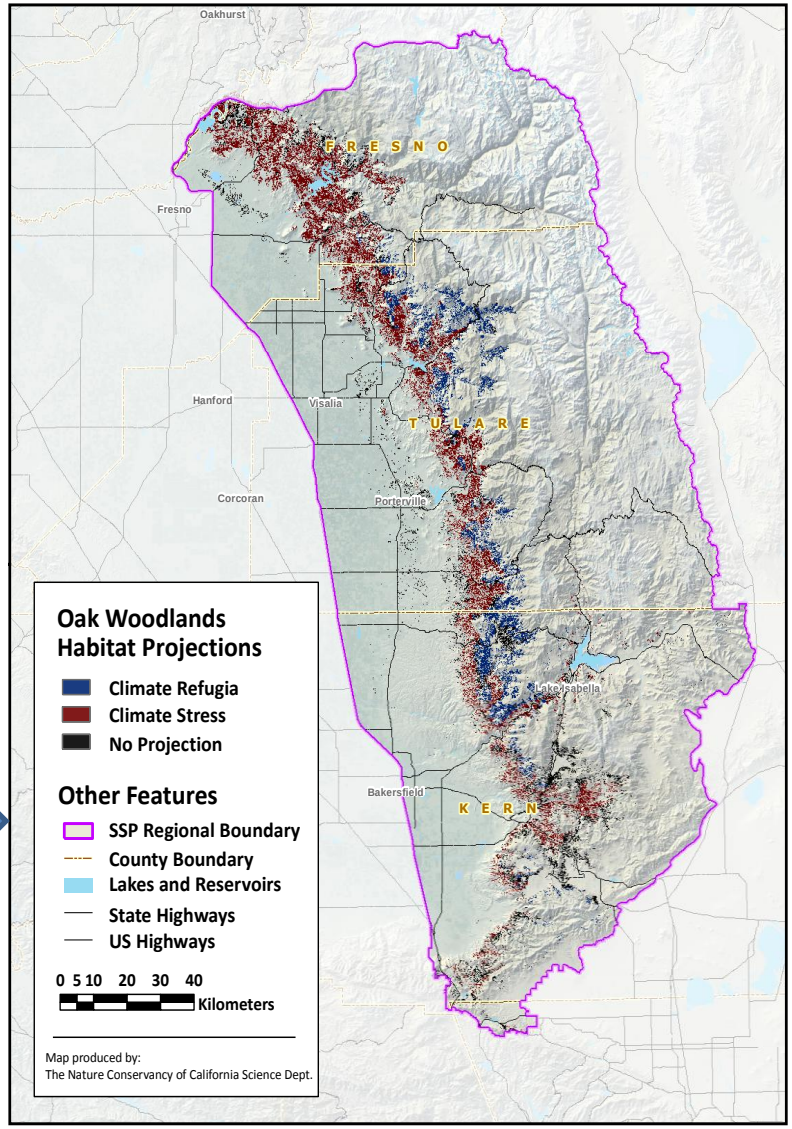
| Species | Stressed | Uncertain | Stable | Expansion |
|---|---|---|---|---|
| Blue Oak | 63 | 11 | 16 | 11 |
| Foothill Pine | 55 | 15 | 21 | 10 |
| CA Buckeye | 30 | 12 | 40 | 18 |
| Interior Live Oak | 24 | 10 | 50 | 16 |

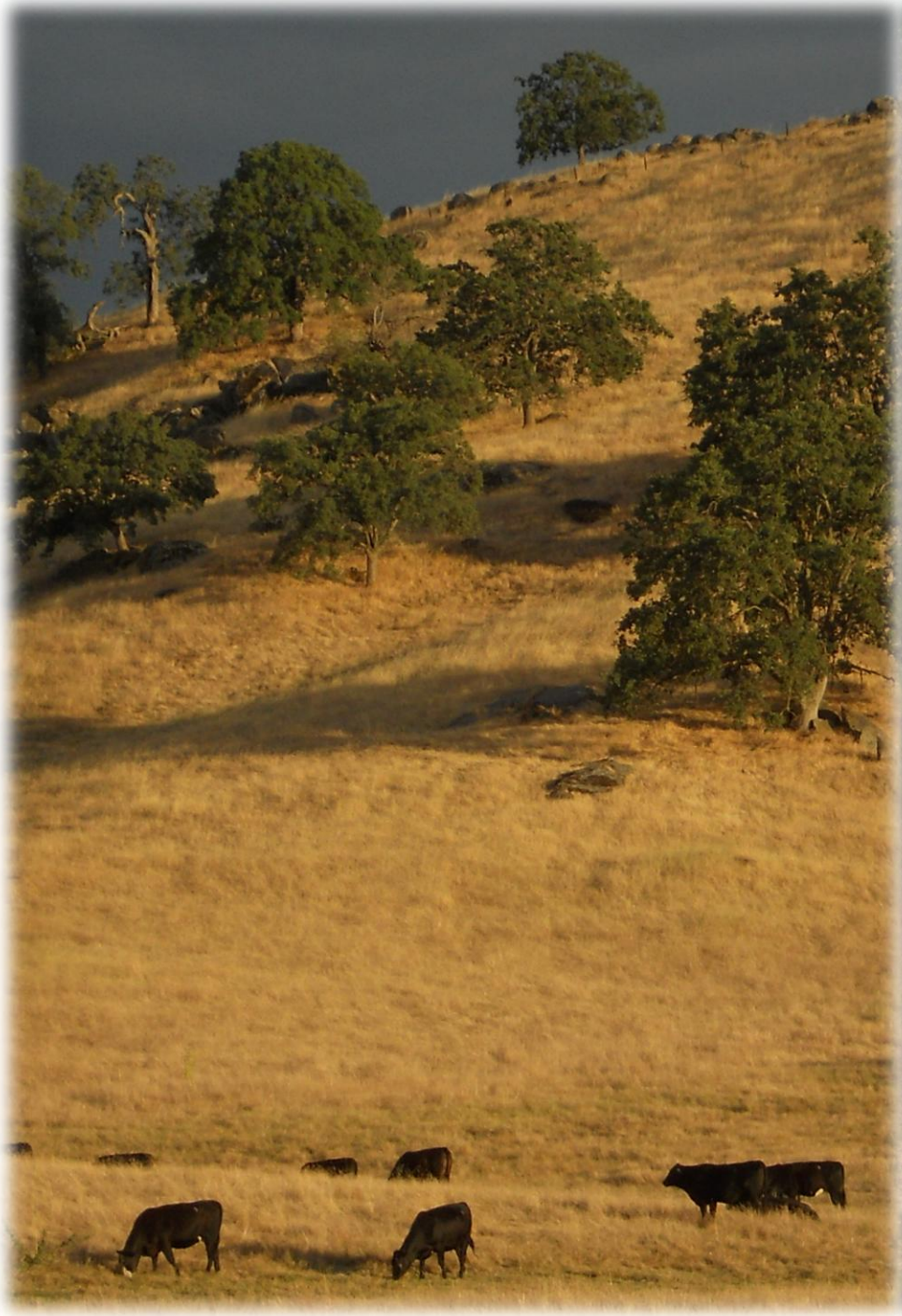
# Habitat Rollup for Oak Woodlands



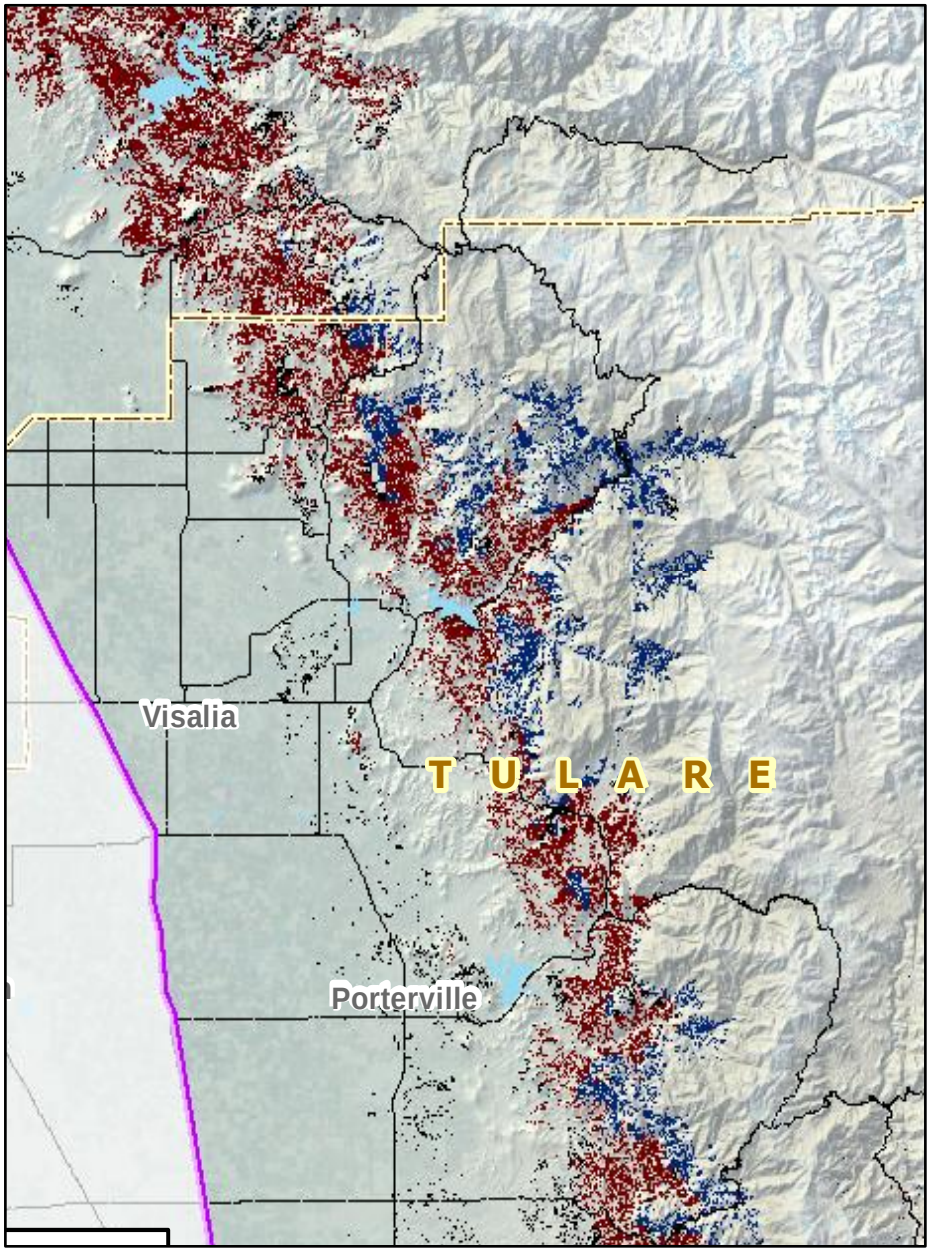

stack high consensus species projections

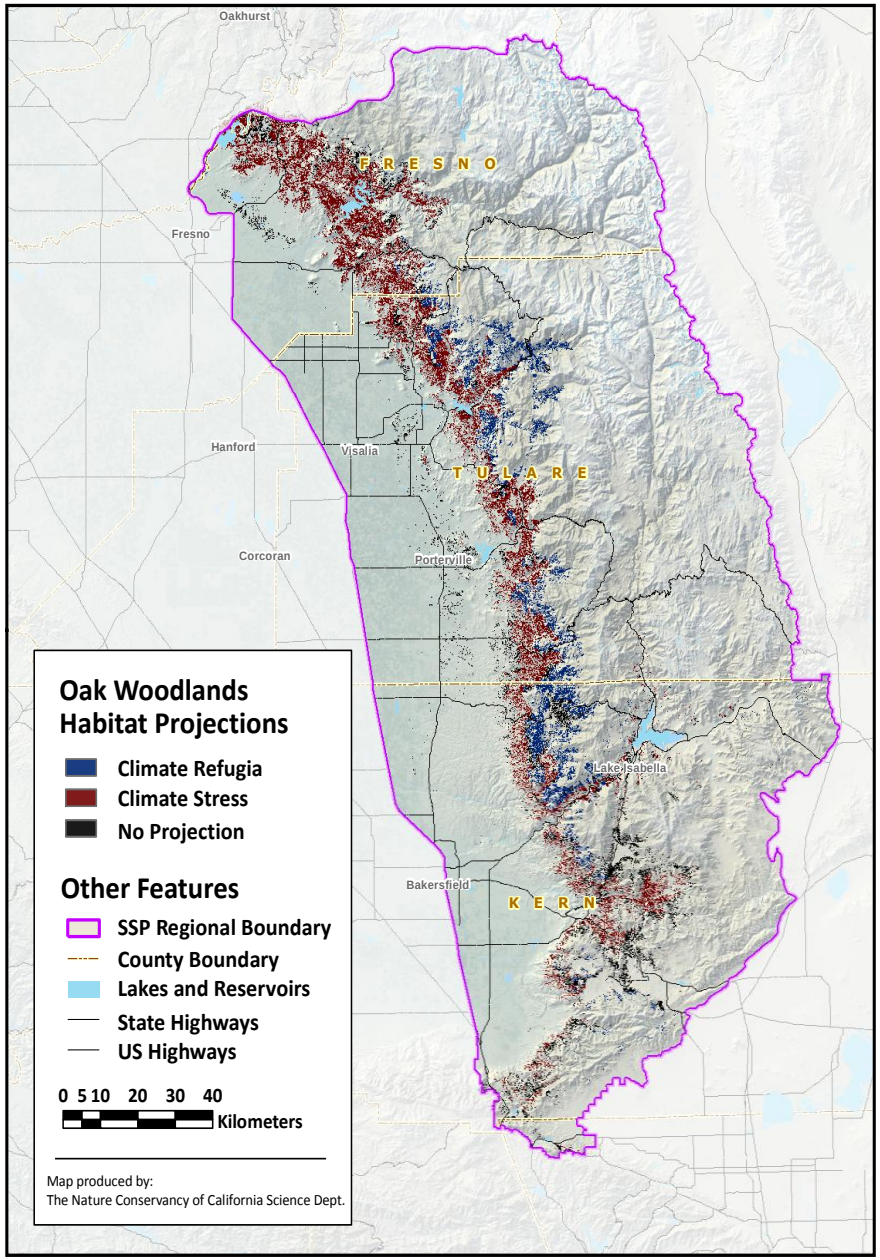
mask projections by current distribution

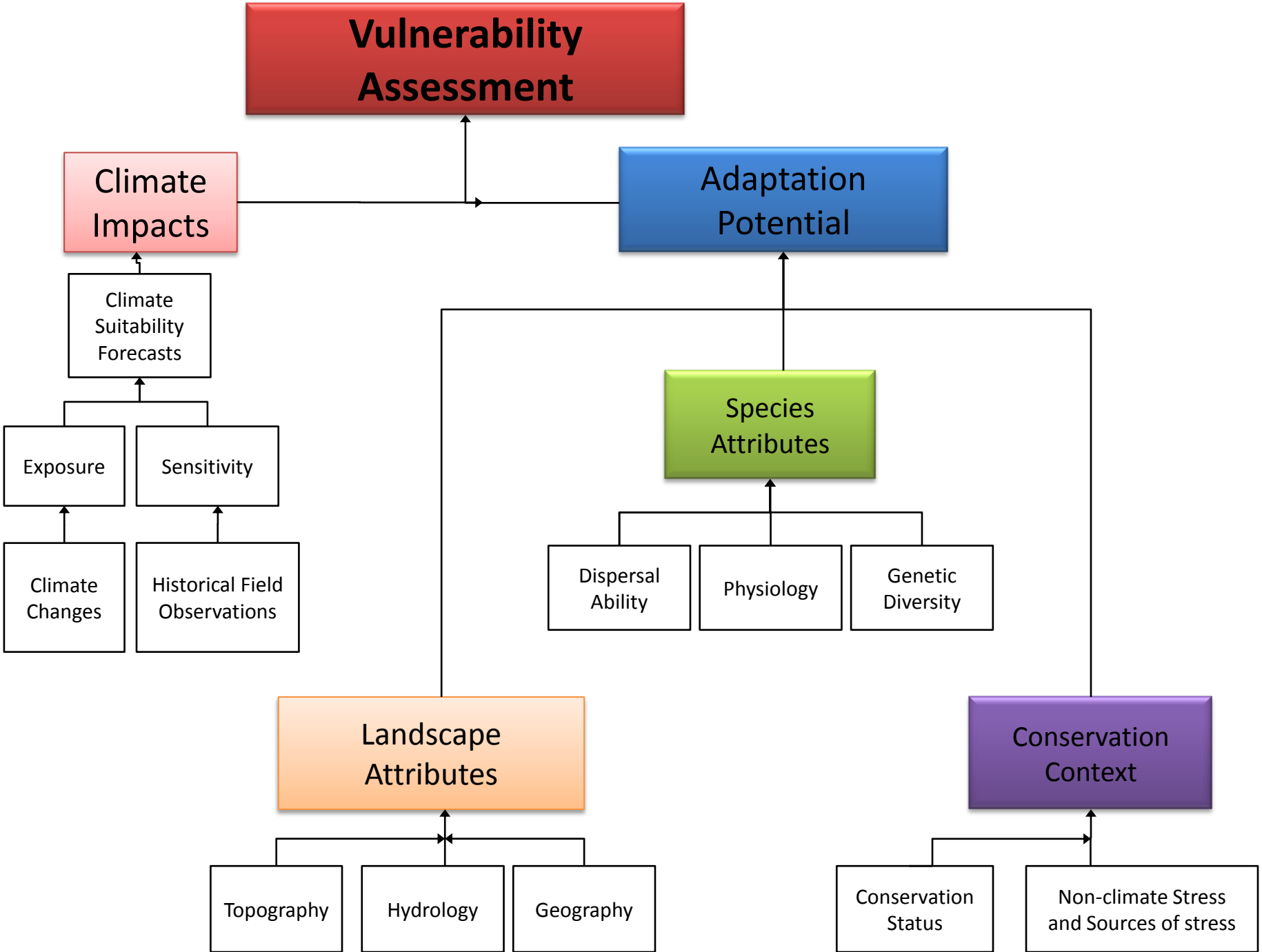





Created by: Susan Antenen, 2013


Visalia
T U L A R E
Porterville


Oakhurst
F R E S N O
Fresno
Hanford
Visalia
T U L A R E
Corcoran
Porterville
Lake Isabella
Bakersfield
K E R N
Oak Woodlands Habitat Projections
Climate Refugia
Climate Stress
No Projection
Other Features
SSP Regional Boundary
County Boundary
Lakes and Reservoirs
State Highways
US Highways
0 5 10 20 30 40
Kilometers
Map produced by:
The Nature Conservancy of California Science Dept.


Vulnerability Assessment
Climate Impacts
Adaptation Potential
Climate Suitability Forecasts
Exposure
Sensitivity
Climate Changes
Historical Field Observations
Species Attributes
Dispersal Ability
Physiology
Genetic Diversity
Landscape Attributes
Conservation Context
Topography
Hydrology
Geography
Conservation Status
Non-climate Stress and Sources of stress