

# Climate Change Vulnerability Information

## Upland Group

### **Sub-habitats:**

- Chaparral and serpentine shrublands
- Oak foothill pine woodland
- Oak woodland

### **Species Groups and Species:**

- Yellow-billed magpie
- Valley oak
- Mast-associated species
- Cavity nesters and roosters
- Red-legged frog
- Yellow-legged frog
- Western bumblebee and pollinators
- Swainson's hawk

### **Exposure**

#### **Oak woodlands/Oak foothill pine woodlands**

- Significant increase in climatic water deficit (up to 44% in northern Sierra foothills) due to increases in potential evapotranspiration ([Hauptfeld et al. 2014b](#))
- Increased wildfire risk both in terms of fire frequency and total area burnt ([Hauptfeld et al. 2014b](#), [Fried et al. 2004](#))
- Changes in precipitation regime unknown both in direction and magnitude ([Hauptfeld et al. 2014b](#))

#### **Chaparral and serpentine shrublands**

- Some increase in climatic water deficit due to increases in potential evapotranspiration (e.g. up to 18% in Panoche Basin ([California Climate and Hydrology Change Graph tool, 2015](#)))
- Increased wildfire risk both in terms of fire frequency and return interval ([Fried et al. 2004](#))
- Changes in precipitation regime unknown both in direction and magnitude ([Cayan et al. 2008](#))

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### Sensitivity

#### Oak woodlands/Oak foothill pine woodlands

- Low to moderate sensitivity to changes in temperature and precipitation ([Hauptfeld et al. 2014b](#))
- RCM-based modeling of two endemic oak species suggest substantial range contraction under climate change ([Kueppers et al. 2005](#))
- High sensitivity to changes in disturbance regimes such as wildfire and pests ([Hauptfeld et al. 2014b](#)).
- High sensitivity to changes in biological resource use such as human development ([Hauptfeld et al. 2014b](#)).

#### Chaparral and serpentine shrublands

- Chaparral species show low sensitivity to temperature change and moderate sensitivity to precipitation change ([Hauptfeld et al. 2014a](#))
- Chaparral species show high sensitivity to altered fire regimes ([Hauptfeld et al. 2014a](#))
- Serpentine communities show low to moderate sensitivity to climate change ([Damschen et al. 2012](#))

### Adaptive Capacity

#### Oak woodlands/Oak foothill pine woodlands

- Tree species show only moderate capacity to adapt to changes because of long recruitment time ([Hauptfeld et al. 2014b](#))
- High biodiversity provides high potential for ecological adaptation due to multiple species fulfilling functional roles ([Hauptfeld et al. 2014b](#))

#### Chaparral and serpentine shrublands

- Chaparral species show high capacity to resist stressors because of temperature tolerance, drought tolerance, and extensive seed dormancy ([Hauptfeld et al. 2014a](#))
- Serpentine communities may act as refugia because unfavorable soils limit competitive effects from other plant species ([Hauptfeld et al. 2014a](#))
- Serpentine species often have limited dispersal abilities ([Damschen et al. 2012](#))