



Chaparral Habitats

Climate Change Vulnerability, Adaptation Strategies, and Management Implications in Southern California National Forests



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Habitat Description

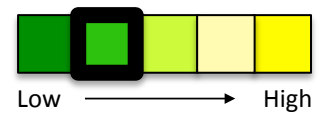
Chaparral habitats in southern California harbor high floristic diversity and provide critical habitat for a variety of wildlife species. Chaparral is characterized by semi-arid shrub-dominated assemblages of sclerophyllous (hard-leaved) plants with adaptations to counter seasonal drought. Dominant chaparral species can be categorized by mode of regeneration following fire: seedling recruitment, resprouting, or a combination of both strategies, termed facultative-seeding. Obligate-seeders accumulate seed stores that germinate following fire, whereas obligate-resprouters utilize underground structures to resprout following fire. Facultative-seeders use a combination of both methods.

Habitat Vulnerability

Sensitivity & Exposure

Chaparral habitats are resilient to seasonal drought but shifts in drought severity, frequency, or timing may contribute to plant dieback/mortality or altered community composition. Mature obligate-seeders and shallow-rooted species may be most vulnerable to drought mortality, but obligate-seeder seedlings may fare better than obligate-resprouters in burned areas experiencing drought. Many chaparral species are fire-adapted, but more frequent fires linked with increased human ignitions and drought can inhibit chaparral regeneration and facilitate conversion to exotic grassland or degraded shrubland. Invasive species perpetuate shifting fire regimes, and land use conversion destroys/fragments habitat and alters invasive plant establishment and ignition rates. Shrub habitats are projected to decline regionally by late century; chamise may experience significant habitat reductions, losing up to 82% of current distribution by mid-century.

Low-Moderate Vulnerability



Drivers of Chaparral Habitats

- Climate sensitivities: Drought
- Disturbance regimes: Wildfire
- Non-climate sensitivities: Invasive & problematic species, land use conversion

Projected Climate and Climate-Driven Changes	Potential Impacts on Chaparral Habitats
<p>Increasing drought & precipitation changes <i>Longer, more severe droughts with drought years twice as likely; variable annual precipitation volume and timing, with wetter winters and drier summers; increased climatic water deficit</i></p>	<ul style="list-style-type: none"> • Increased dieback and mortality, particularly for obligate-seeders and shallow rooting species • Altered community composition and potential novel germination patterns via canopy dieback • Potential habitat distribution shifts • Elevated fire risk by expanding length of peak ignition season • Impaired post-fire recovery, particularly for obligate-resprouters
<p>Altered wildfire regimes <i>Increased fire size, frequency, and severity</i></p>	<ul style="list-style-type: none"> • Impaired regeneration leading to shifts in composition and structure; dominant species (e.g., <i>Ceanothus</i> spp., <i>Arctostaphylos</i> spp.) at risk of local extirpation due to shortened fire intervals (<10 and <20 years) • Potential conversion to exotic grassland or degraded shrubland

Adaptive Capacity

Factors that enhance adaptive capacity:

- + Fairly resilient to most climate stressors and can recover from disturbance with sufficient time
- + Occurs in many areas (inland, coast, mountains)
- + High species diversity, including many endemic plants and animals
- + Provides variety of ecosystem services: biodiversity, recreation, carbon sequestration

Factors that undermine adaptive capacity:

- Habitat extent, continuity, and structural/functional integrity degraded by human land use
- Migration in response to climate change undermined by limited dispersal capacity, slow growth, and exposure to multiple stressors
- Landscape barriers (land use, agriculture, grazing) are increasingly common near human areas

Adaptation Strategies for Chaparral Habitats



What kinds of adaptation options are there?

- Enhance Resistance* → Prevent climate change from affecting a resource
- Promote Resilience* → Help resources weather climate change impacts by avoiding the effects of or recovering from changes
- Facilitate Transition* → Accommodate change and/or enable resources to adaptively respond to variable conditions
- Increase Knowledge* → Gather information about climate impacts and/or management effectiveness in addressing climate change challenges
- Engage Collaboration* → Coordinate efforts and capacity across landscapes and agencies

Adaptation Category	Adaptation Strategy	Specific Management Actions
Enhance Resistance	Restore disturbed areas with native species to limit erosion and prevent establishment of non-native species	<ul style="list-style-type: none"> • Remove non-native species as soon as they are detected • Immediately plant/seed with native species after disturbance • Water plants to ensure establishment • Exclude off-highway vehicles (OHVs) from restored sites
	Practice rapid, effective fire suppression to minimize fire frequency and restore appropriate fire return intervals	<ul style="list-style-type: none"> • Conduct patrols during high wind events for early detection of fire • Practice effective types of fuels management in strategic locations (around at-risk human communities or key resources)
Promote Resilience	Restore/manage habitat to reflect future climate conditions while still benefitting native species and mirroring current ecological function	<ul style="list-style-type: none"> • During restoration, prioritize resilient species or species expected to do well under future climate conditions; possibly incorporate species not currently on site (assisted migration) • Focus habitat restoration activities on sites that are less likely to experience very warm or dry conditions
	Limit recreational use to decrease disturbance and risk of wildfire	<ul style="list-style-type: none"> • Centralize recreation impacts to easy-access areas • Improve public education and interpretive signage to increase awareness of impacts, and increase regulation/enforcement
Facilitate Transition	Identify vulnerable species and natural resources to inform protection efforts	<ul style="list-style-type: none"> • Conduct spatial analysis to identify vulnerable species, incorporating levels of biodiversity, climate and non-climate threats, and functional diversity
Increase Knowledge	Determine risk of type-conversion to exotic annual grassland	<ul style="list-style-type: none"> • Model historical and future climate change, including fire risk and impact on likelihood and rate of type-conversion and invasive species establishment
Engage Collaboration	Coordinate with other groups to reduce wildfire risk	<ul style="list-style-type: none"> • Engage land use planners to reduce leapfrog development

*Actions presented are those evaluated as having higher effectiveness and/or feasibility.

Management Implications

This information can be used in a variety of ways:

- ✓ Forest Plan Revisions
- ✓ U.S. Forest Service Climate Change Performance Scorecard: Element 6 - "Assessing Vulnerability" and Element 7 - "Adaptation Actions"
- ✓ Bureau of Land Management Resource Management Plan Revisions

Resilient management requires implementing a variety of adaptation options



Further information and citations can be found in source reports, *Climate Change Vulnerability Assessment for Focal Habitats of Southern California* and *Climate Change Adaptation Strategies for Focal Habitats of Southern California*, available online at the EcoAdapt Library: <http://ecoadapt.org/library>.