Endemic Habitats

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


Photo by California Dept. of Fish and Wildlife (CC-BY-2.0)

Habitat Description

Endemic habitats feature specialized vegetative communities that are adapted to harsh and unique conditions derived, in part, from parent soil material. Endemic habitats are typically limited in distribution, occupying distinct areas in southern California defined by soil-related properties. Endemic habitats considered in this assessment include: serpentine, carbonate, gabbro, pebble plains, and clay lens.

Habitat Vulnerability

Moderate Vulnerability

Sensitivity & Exposure

Shifts in precipitation, moisture availability, and temperature may affect endemic habitat composition, survival, and vulnerability to non-climate stressors. Increasing fire frequencies are unlikely to benefit even the most fire-adapted endemic communities due to slow recovery from disturbance. Non-climate stressors can reduce endemic habitat resilience by increasing fragmentation and/or by exacerbating climate-driven changes. Human population growth may increase the severity/extent of these stressors in the future. Soil properties moderate endemic habitat distribution, composition, and vulnerability to other drivers.

Drivers of Endemic Ecosystems

- Climate sensitivities: Precipitation, soil moisture, drought, extreme high temperature events
- Disturbance regimes: Wildfire
- Non-climate sensitivities: Energy production & mining, fire suppression practices, recreation, land use conversion, invasive & problematic species, livestock grazing, transportation corridors
- Other sensitivities: Soil properties, population growth

Projected Climate and Climate-Driven Changes	Potential Impacts on Endemic Habitats
Precipitation changes *Variable annual precipitation volume and timing; increased climatic water deficit; longer and more frequent droughts*	• Altered species composition, cover, richness, fitness, germination, recruitment, and survival • Altered vulnerability to non-climatic stressors (e.g., soil disturbance from OHV use) • Altered invasive species pressure and conifer and shrub encroachment
Increasing temperatures & extreme heat events *+2.5 to +9°C by 2100; more frequent and longer heat waves*	• Direct vulnerability to high temperatures unknown; potential mortality increases • Altered community composition or encroachment of other vegetative communities if temperature changes cause snowpack shifts
Reduced snowpack *Los Angeles-region mountains may see -42% decline by 2040, particularly at lower elevations*	• Increased erosion and soil disturbance • Reduced winter insulation for higher elevation endemics, potentially reducing survival and/or enhancing desiccation • Pebble plains: reduced frost heave may facilitate tree/shrub invasion
Altered wildfire regimes *Increased fire size, frequency, and severity*	• All endemic habitats: delayed habitat recovery • Reduced regeneration (serpentine), recruitment and habitat extent (gabbro) • Altered species composition and potential type conversion (serpentine)

Adaptive Capacity

Factors that enhance adaptive capacity:

+ May be fairly resistant to change due to highly specialized communities and unique soil conditions
+ High diversity amongst all endemic habitats
+ Provide a variety of ecosystem services: biodiversity and recreation

Factors that undermine adaptive capacity:

- Migration in response to climate stressors may be limited by small, isolated populations, specific soil requirements, small dispersal distances, and several landscape barriers
- Typically slow to recover following disturbance
- Lower diversity within a given endemic grouping

Adaptation Strategies for Endemic Habitats


Photo by Bill Bouton (CC-BY-SA 2.0)

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	Promote the recovery of threatened/ endangered plant and animal species	• Increase habitat suitability through habitat enhancement • Restore habitats • Minimize non-climate stressors (e.g., recreation impacts)
	Limit and change urban development patterns to reduce habitat fragmentation	• Create a moratorium on developing in undisturbed areas; focus development in previously developed/ abandoned areas
Promote Resilience	Maintain and/or increase habitat resilience	• Restore habitats • Manage tree and shrub encroachment
	Mitigate consequences of large disturbances by planning ahead	• Develop a gene conservation plan for *ex situ* collections for long-term storage
Facilitate Transition	Identify and protect refugia	• Designate conservation easements • Identify areas where relict plants could be established
Increase Knowledge	Improve understanding of the effects of climatic variability on various endemic vegetation communities	• Install plots to measure species distribution, abundance, and physiological response • Identify species and genotypes most resilient to change
	Increase knowledge of management impacts on endemic, threatened or endangered species persistence	• Design and implement a monitoring system to evaluate management effectiveness and impacts • Use monitoring information in implementation of adaptive management
Engage Collaboration	Limit and change urban development patterns to reduce habitat fragmentation	• Conduct education and outreach with public, city managers, and land managers to protect endemic refugia

*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

EcoAdapt™
Meeting the challenges of climate change

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.