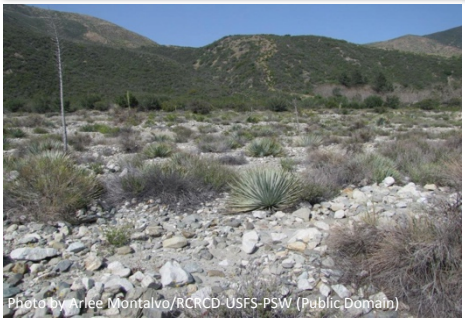
Alluvial Scrub Habitats

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

Alluvial scrub habitats commonly inhabit outwash fans, river wash deposits, and riverine deposits at canyon mouths toward the base of mountain ranges, including the San Gabriel, San Bernardino, San Jacinto, and Santa Ana ranges. Alluvial scrub habitats can also be found on wash deposits of regional rivers, including the Santa Ana River and its tributaries. Alluvial scrub consists mainly of flood-adapted drought-deciduous subshrubs and evergreen woody shrubs.

Habitat Vulnerability

Sensitivity & Exposure

Alluvial scrub habitats are critically sensitive to climate drivers that alter hydrologic, flooding, and scouring regimes and/or that alter moisture availability, as these factors affect habitat distribution, composition, and survival. Other climate drivers (temperature, wildfire) affect habitat composition. Alluvial scrub habitats are also very sensitive to non-climatic drivers that exacerbate climate-driven changes. Dams, water diversions, and flood control structures compound hydrological alterations and habitat connectivity, while invasive species can directly compete with alluvial scrub vegetation for increasingly limited resources.

Moderate-High Vulnerability

Drivers of Alluvial Scrub Habitats

- Climate sensitivities: Precipitation, soil moisture, drought, flow regimes (high/low flows), air temperature, snowpack depth, snowmelt timing
- Disturbance regimes: Flooding & erosion, wildfire
- Non-climate sensitivities: Dams, water diversions & flood control structures, invasive & problematic species

Projected Climate and Climate-Driven Changes	Potential Impacts on Alluvial Scrub Habitats
Altered precipitation & soil moisture *Variable annual precipitation volume and timing; increased climatic water deficit; longer, more severe droughts*	• Altered distribution, species composition, productivity, and succession patterns; drier conditions may inhibit succession, limit annual species' establishment, and/or cause conversion to more xeric communities • Altered invasive species pressure
Increasing temperatures *+2.5 to +9°C by 2100*	• Altered distribution • Altered species composition; freeze-sensitive species may have more growth opportunities, but hot conditions may impair success of annuals
Altered stream flow & flooding regimes *Increased winter flow/flood volume; earlier, shorter, lower volume spring runoff; decreased summer flow*	• Altered distribution • Altered succession patterns and species composition; more frequent flooding may increase habitat heterogeneity • Altered pollination/dispersal via impacts on ground-dwelling insects
Altered fire regimes *Increased fire size, frequency, and severity*	• Altered species composition and population structure • Impeded vegetation recovery with shorter fire return intervals • Altered pollination/dispersal via impacts on ground-dwelling insects

Adaptive Capacity

Factors that enhance adaptive capacity:

+ Disturbance-adapted community with diverse reproductive capabilities
+ Moderate spatial/successional and floristic diversity; provides habitat for many rare animals
+ Provides variety of ecosystem services: biodiversity, flood and erosion protection, and water supply/ quality/sediment transport

Factors that undermine adaptive capacity:

- Eliminated from 90-95% of historical habitat area; currently fragmented and generally isolated along unaltered streams and alluvial outwashes
- Landscape barriers, specific soil requirements, and limited dispersal capacity may limit migration opportunities in response to climatic stressors
- Low-moderate functional group diversity

Adaptation Strategies for Alluvial Scrub Habitats


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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 native species to disturbed areas	• Restore habitat with native species that are disturbance-tolerant • Build a reserve of seeds/plants that are disturbance-tolerant
	Restore fluvial processes to low-gradient streams that support alluvial scrub vegetation	• Raise roads out of washes • Remove dikes, mining operations, and recharge basins that obstruct migration of streams and sediment deposition areas • Require undeveloped buffers along streams
Promote Resilience	Improve ability to confidently source plants for alluvial scrub restoration	• Conduct a common garden experiment which includes plants from across the species' range in order to understand the level of adaptive variation within the population
	Maintain and/or restore natural and historical watershed characteristics	• Designate critical habitat where the most sensitive species are found, and in areas where the home ranges of several species overlap
Facilitate Transition	Identify and protect refugia	• Protect areas that may be buffered from climate change effects
	Improve habitat restoration tools to support plant and animal response to changing climate conditions	• Develop habitat restoration techniques that will be successful under future climate conditions
Increase Knowledge	Map species distributions to understand potential habitat loss/gain and improve restoration	• Survey the vegetation and design plant palette with suitable species for current and future conditions • Use joint species distribution modeling to look at multiple species within a habitat simultaneously, incorporating multiple threats
Engage Collaboration	Work across jurisdictions	• Communicate about projects and coordinate on-the-ground activities (e.g., invasive species management)

*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

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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.