

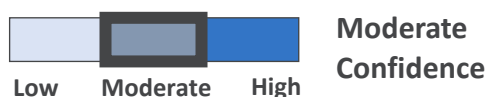
WIDE-RANGING MAMMALS

Climate Change Vulnerability and Adaptation Strategies for the Santa Cruz Mountain Region

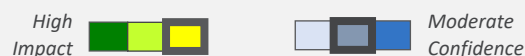
Species Group Description

Wide-ranging mammals within the Santa Cruz Mountains region that are covered in this assessment include mountain lion (*Puma concolor*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), and Columbian black-tailed deer (*Odocoileus hemionus columbianus*). These species are characterized by their large home ranges, and many exhibit seasonal shifts in distribution in response to breeding requirements and/or food availability.

Species Group Vulnerability



Sensitivity & Exposure



Projected Changes	Trend	Potential impacts:
Precipitation	▲ ▼	<ul style="list-style-type: none"> Changes in forage availability and quality for mule deer due to shifts in the amount and timing of seasonal precipitation
Streamflow	▲ ▼	<ul style="list-style-type: none"> Reduced availability of water sources, which impacts disease transmission and overall fitness/reproductive success
Drought	▲	<ul style="list-style-type: none"> Reduced habitat suitability following large, high-intensity fires
Wildfire	▲	<ul style="list-style-type: none"> Increased injury/mortality due to fires, especially if they occur during the breeding season when young are less able to escape
Disease	▲	<ul style="list-style-type: none"> Increases in disease-related mortality, especially in stressed individuals or where animals are crowded around fewer resources

Non-climate stressors may interact with climate stressors and disturbance regimes:

- *Residential/commercial development* results in habitat loss and fragmentation, and increased human presence can limit use of natural water sources and increase exposure to disease
- *Roads and highways* create barriers that restrict movement and gene flow
- *Anticoagulant rodenticides* cause both direct mortality as well as sub-lethal impacts, and have likely contributed to population declines
- *Invasive vegetation* likely reduces forage availability, quality, and diversity for mule deer
- *Livestock grazing* reduces forage availability and increases competition for available surface water
- *Fire exclusion/suppression* alters species composition and habitat structure, reducing forage and increasing likelihood of large, high-severity fires that cause mortality and habitat loss
- *Recreational activities* disturb wide-ranging mammals and cause avoidance of heavily-used areas
- *Timber harvest* and *fuelbreak construction* reduce habitat availability and impact movement
- *Deer hunting* affects local populations of native ungulates

Wide-ranging mammals are sensitive to climate stressors that alter forage/prey and water availability, which affects mammal survival and reproduction. Changes in disease and wildfire regimes can also increase mortality, and fire can impact habitat quality and resource availability.

Adaptive Capacity



Intrinsic factors (i.e., inherent characteristics) that enhance or undermine adaptive capacity:

- ▲ Highly mobile, enabling adaptation to changing environmental conditions
- ▲ Generalist habitat use, varied diets, and high behavioral flexibility
- ▼ Reduced population connectivity and gene flow due to habitat loss and fragmentation
- ▼ Low population density and slow recovery from disturbances in carnivores

Extrinsic factors (i.e., management potential) that enhance or undermine adaptive capacity:

- ▲ Charismatic megafauna valued by the public for photographic and wildlife-watching opportunities
- ▲ Revenue from deer hunting permits support habitat management activities

Wide-ranging mammals are highly mobile and generally flexible, enabling them to respond to variable conditions by moving to another location. However, they are heavily impacted by human development and other land uses that restrict movement and dispersal.

Adaptation Strategies for Wide-Ranging Mammals

Management strategies designed to reduce the vulnerability of wide-ranging mammals to climate change are likely to focus on reducing non-climate stressors associated with human land use.

ADAPTATION APPROACH	ADAPTATION STRATEGIES
Resistance strategies: Maintain current conditions by limiting change <i>Near-term approach</i>	<ul style="list-style-type: none"> • Limit introduction of new trails to important habitats (e.g., corridors, denning and rearing) • Prevent development (e.g., trails, parking lots) in vulnerable areas inside preserves that may cut off critical corridors
Resilience strategies: Accommodate some change while enabling a return to prior conditions <i>Near- to mid-term approach</i>	<ul style="list-style-type: none"> • Create large wildlife corridor(s) across Highway 17 for larger animals and supplement with micro-corridors • Create buffers/stepping stones (e.g., patches that provide multiple wildlife benefits) in corridors between sensitive habitats
Response strategies: Intentionally facilitate or direct adaptive change <i>Long-term approach</i>	<ul style="list-style-type: none"> • Implement assisted migration of species to create suitable habitat as the climate changes*
Knowledge strategies: Gather information about climate impacts, and/or management effectiveness <i>Near- to long-term approach</i>	<ul style="list-style-type: none"> • Improve knowledge about existing native and invasive species and their migration ability and patterns to facilitate native species connectivity* • Monitor connectivity through genetics, tracking, and remote sensing*
Collaboration strategies: Coordinate management efforts and/or capacity across boundaries <i>Near- to long-term approach</i>	<ul style="list-style-type: none"> • Improve education and communication on public trails (e.g., maintaining distance from habitat, importance for wildlife)

* Future management strategies (not currently occurring)



Further information and citations can be found in the source reports of the Santa Cruz Mountains Climate Adaptation Project, available online at <http://ecoadapt.org/programs/awareness-to-action/santa-cruz-mountains>.