Coastal Prairie

Climate Change Vulnerability and Adaptation Strategies for the Golden Gate Biosphere Region

Ecosystem Description

Coastal prairies are native grassland communities found in the central and northern regions of California, near shorelines and on hills, bluffs, terraces, and valleys. They are influenced by summer fog and generally dominated by perennial grasses and annual forbs. Coastal prairie vegetation associations are closely linked to Pacific coastal climates and topographic position and are sustained by disturbances such as fire and grazing. Common plants may include purple needlegrass (*Stipa pulchra*), Idaho and red fescue (*Festuca idahoensis, F. rubra*), California oatgrass (*Danthonia californica*), and California poppies (*Eschscholzia californica*). These grasslands support a wide variety of plants, mammals, birds, and invertebrates, including rare or endangered species such as Sonoma spineflower (*Chorizanthe valida*) and golden larkspur (*Delphinium luteum*).

Ecosystem Vulnerability - *Moderate*

Sensitivity & Exposure - *Moderate*

Projected Changes	Trend
Precipitation	▲▼ Varies
Drought	▲ Increase
Heat waves	▲ Increase
Sea level rise	▲ Increase
Pathogens	▲ Increase

Potential Impacts:

- Expansion of coyote brush, declining presence of grassland forbs, and increased competition for resources due to altered amount and timing of water availability
- Seedling mortality and disruption of flowering/fruiting cycles as temperatures increase
- Reduced ecosystem extent as a result of coastal erosion and inundation due to sea level rise and storm surge
- Spread of pathogens, affecting plant species abundance and composition following periods of increased precipitation

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

- *Invasive plants* alter habitat structure and function by out-competing native plants
- *Human development*, including *roads and highways*, fragments and reduces habitat extent and population connectivity, possibly reducing gene flow between populations
- *Agricultural development* introduces pollutants and alters native species composition
- *Fire exclusion/suppression* can result in soil nutrient depletion that limits germination and seed production of fire-dependent species and promotes the encroachment of woody plants
- *Livestock grazing* can negatively impact perennial grasses and has been associated with increased cover of non-native forbs and species richness in invasive grasses
- *Recreational activity* contributes to vegetation loss and destabilization

Coastal prairies are sensitive to factors that shift species distribution and composition and influence plant growth and nutrient availability. Changes in the amount and timing of water availability is likely to stress native vegetation, while also possibly accelerating coyote brush encroachment.

Ecosystem Vulnerability - *Moderate*

Adaptive Capacity - *Low*

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

Enhance:

- Diverse grasslands that support a variety of rare and endangered species
- Dynamic systems well-adapted to harsh conditions and natural disturbances (e.g., drought stress and wildfire)

Undermine:

- Significant loss, fragmentation, and degradation
- Rare throughout the region and often labeled as endangered plant communities
- Many species at risk of extirpation

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

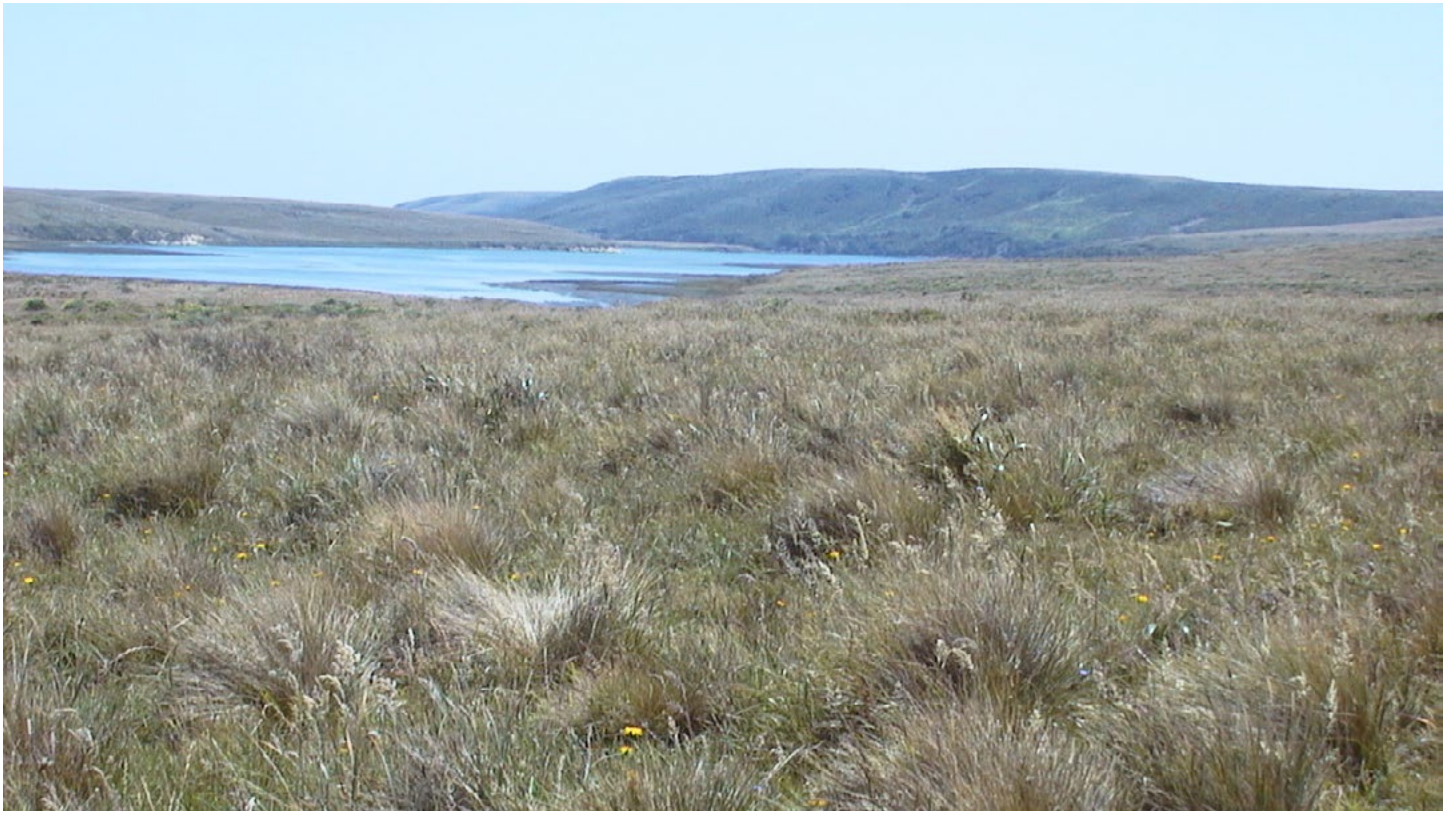
Enhance:

- Valued by the public for tourism and recreation
- Existing regulatory support and federal protection

Undermine:

- Constraints (e.g., staff capacity and resources) limit preservation and conservation efforts, such as invasive species eradication

Although prairie vegetation is well-adapted to natural disturbances, degradation due to human disturbance and invasion by non-native and woody species will likely reduce the resilience of these habitats to climate change.



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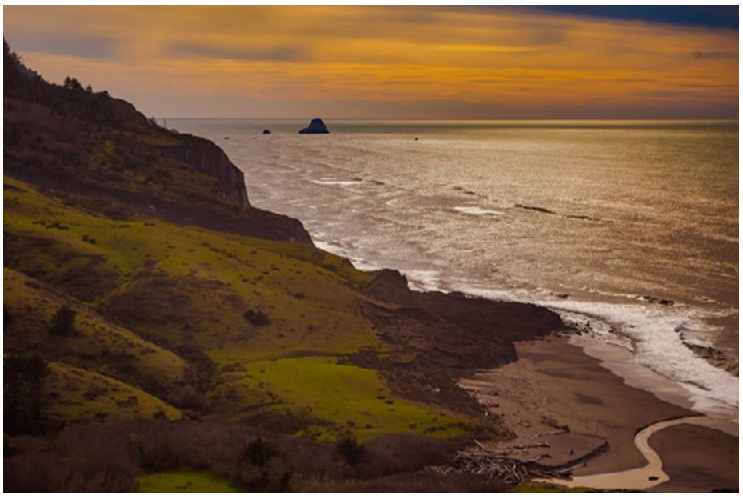
Adaptation Strategies & Actions

Adaptation strategies can reduce climate change vulnerability of a given ecosystem or species by addressing any or all of the three components of vulnerability (i.e., by reducing sensitivity, reducing exposure, and/or increasing adaptive capacity). The table below presents examples of adaptation strategies and actions, which fall within five categories, or approaches: Resistance/Resilience **(R)**, Acceptance **(A)**, Direct/Response **(D)**, Knowledge **(K)**, and Collaboration **(C)**. *Please note that the strategies and actions provided here should not be considered a checklist or plan, but rather as a set of examples for land managers to consider for further study when developing site- or species-specific actions.*

Adaptation Strategies	Adaptation Actions
Protect and restore coastal prairie habitats	• Remove non-native annual grasses and other invasive plant species using a variety of treatments (e.g., prescribed fire, mowing, hand pulling, herbicides) **(R)** • Use grazing at an appropriate timing, frequency, and intensity to promote vegetation recovery of perennial grasses and other desired vegetation **(R)** • Use prescribed burning to remove encroaching woody vegetation and increase vigor and recruitment in native grassland plants (ensure that burning is accompanied by invasive plant management) **(R)** • Work with local tribes and Traditional Ecological Knowledge (TEK) **(C)**
Promote awareness of and appreciation for grassland ecosystems and associated species	• Create outreach campaigns designed to increase recognition of coastal prairie as an important California ecosystem (e.g., "Love Your Grasslands"), and share the concept of old-growth grasslands with the public **(C)**
Increase understanding of current conditions and projected future changes in grasslands	• Expand fine-scale vegetation mapping to find high-quality patches that can be targeted for preservation **(K)** • Increase research on the historic composition and disturbance regime in coastal prairies **(K)**

Adaptation strategies and actions generated through breakout group exercises during the adaptation workshop in December 2023.



Lost Coast Headlands, Jesse Pluim/BLM (Public domain)