Climate Change Vulnerability Information
Desert/Grassland Group

Sub-habitats:
Dunes/washes
Grasslands
Vernal pools and swales
San Joaquin Desert

Species Groups and Species:
Burrowing mammals
"Grassland" shorebirds
Western burrowing owl
Native perennial bunch grasses
Orcuttia grasses
Vernal pool crustaceans
Atriplex polycarpa
Ephedra californica
Kangaroo rats
Blunt-nosed leopard lizard

Dunes: characterized as a residual sand ecosystem dominated by plant species that occur in sandy areas in the Mojave desert.The Monvero Residual Dunes distribution is narrowly restricted to hilltops and ridgelines along the Monocline Ridge in the Ciervo Hills that occur in the lower Inner South Coast Range in western Fresno County, generally between 1,500 and 3,000 feet elevation.

Exposure – Measure of how much of a change in climate or other environmental factor a species or habitat is likely to experience.

Grassland
- The amount of area covered by grasslands is projected to decrease by up to 20% by 2070 driven by changes in precipitation patterns in the San Joaquin Valley and changes in land use in the Sacramento Valley (PRBO 2011).

San Joaquin Desert
- The predominant effects of climate change on wildlife populations will likely result from changes in water availability (PRBO 2011)

Sensitivity – measure of whether and how a species or habitat is likely to be affected by a given change in climate

Grasslands
- California native perennial and annual grass diversity was relatively unresponsive to all individual global change treatments (Zavaleta et al. 2003).
- With a slight drying, the wild oat grasslands would be expected to shift to brome-dominated grasslands. The conversion of grasslands to desert may be accelerated if winds erode unprotected soils exposed during droughts (BLM 2010).

- California grassland, species interactions strongly influence responses to changing precipitation patterns, overturning direct climatic effects within 5 years (Suttle et al. 2007).

San Joaquin Desert

- Unclear how changes in precipitation will alter thatch generated and therefore kangaroo rats and other herbivores (BLM 2010).

Vernal pools

- Pyke (2005) explored scenarios of precipitation, temperature, and land-use change on vernal pool hydrology. Precipitation changes have an over-riding effect on hydro-period compared to temperature and land-use.
- Kneitel (2013) found that species richness and total density significantly increased in late inundation timing treatments.
- *Orcuttia viscida* found to be sensitive to changes in hydrologic regime changes (CDFW 2011). Species within this genus specialize across gradient of vernal pool inundation times (Griggs & Jain 1983).

Adaptive Capacity – Ability to accommodate or cope with climate change impacts with minimal disruption.

Grassland

- **If dry years increase, could see introduced annual grasses do poorly, and more years where the grassland vegetation is dominated by native drought-adapted species. Other possibility is invasion of desert exotic grasses (i.e. *Brassica tournefortii*) (BLM 2010).**
- Grassland expanded, largely at the expense of Woodland and Shrubland, even under the cooler and less dry climate scenario where increased woody plant production was offset by increased wildfire (Lenihan et al. 2007).

Vernal pools

- Existing biological reserves for many vernal pools are biased toward drier areas (Pyke 2005).
- Grazing exclosure study indicated that 3 years after the removal of grazing, ungrazed vernal pools dried an average of 50 days per year earlier than grazed control pools (Pyke & Marty 2005).
- Large year-to-year variation in rainfall patterns, which somewhat mimics the increased climatic variability expected to occur with global change, may have provided the selective pressure for plant seed banks and invertebrate egg banks as demographic buffers against the unpredictable environment (Rice & Emery 2003).
- Not at all clear how the human-imposed fragmentation of pool complexes has affected natural gene flow patterns and thus the capacity for pools to "share" genetic variation important for adaptive shifts (Rice & Emery 2003).
- The current distribution of biological reserves suggests that many of the most sensitive pools could be lost to urban and suburban growth long before the full extent of climate change is realized (Pyke 2004).