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# Proposed Energy Project Footprints May Overlap with Evolutionary Hotspots in Mojave Desert

Genetic diversity within animal species provides the raw material for adaptation and evolution. Geographic regions containing high genetic diversity and divergence — within and among animal populations — are critical to the evolutionary potential of that landscape.

When a geographic region shows spatial overlap in high genetic diversity and divergence for many species, it can be considered an “evolutionary hotspot”. In a study published in the journal *Diversity*, researchers from USGS, Florida Museum of Natural History, Utah Valley University and Humboldt State University identify 10 such hotspots in the Mojave Desert, and assessed whether they overlapped with proposed renewable energy developments.

Researchers mapped the population genetic structure for 17 animal species across a spatial map of the Mojave Desert. The analysis included four species that are listed or of special concern: Agassiz’s desert tortoise (*Gopherus agassizii*), bighorn sheep (*Ovis canadensis*), fringe-toed lizard (*Uma scoparia*) and Mohave ground squirrel (*Xerospermophilus mohavensis*).

The 10 evolutionary hotspots were mainly concentrated along the western and southern edge of the Mojave Desert. While 30% to 40% of the total hotspot area overlapped with protected areas, another 3% to 7% overlapped with footprints of proposed utility-scale renewable energy development projects. This increased to a 17% overlap when transmission corridors are included within project footprints.

GIS-based maps resulting from this study can be incorporated into ongoing land-use planning efforts, and can identify specific regions where further studies may be needed to discern and rank the potential impacts to animal populations and connectivity.

## Management Implications

- Landscape genetics analysis and hotspot mapping can help identify geographic regions of high conservation priority.
- Researchers have identified 10 hotspot regions in the Mojave Desert, 30-40% of which already overlap with protected areas, but up to 17% overlap with footprints of proposed utility-scale energy projects and transmission corridors.
- A growing set of genetic landscapes data and GIS maps from USGS collaborators now offers increasingly detailed, science-based tools for landscape managers to overlay and assess conservation and land-use scenarios.

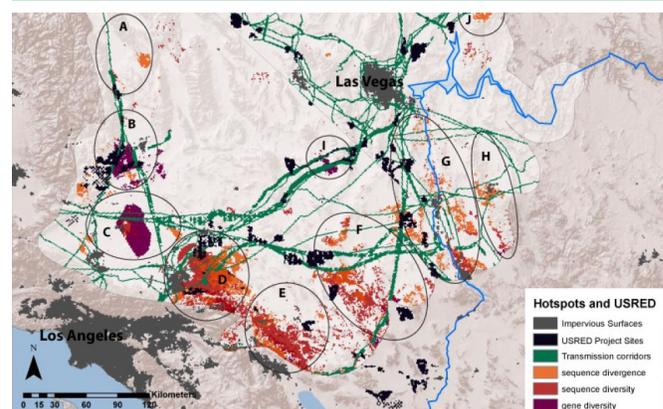
### THIS BRIEF REFERS TO:

Vandergast, AG, RD Inman, KR Barr, KE Nussear, TC Esque, SA Hathaway, DA Wood, PA Medica, JW Breinholt, CL Stephen, AD Gottscho, SB Marks, WB Jennings, RN Fisher. 2013. Evolutionary hotspots in the Mojave Desert. *Diversity* 5(2): 293-319. doi: 10.3390/d5020293

<http://www.werc.usgs.gov/ProductDetails.aspx?ID=4892>  
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Hotspot analysis results were overlaid against footprints of proposed energy projects and transmission corridors. See full-sized image in Figure 4 of the study.