Disturbance Mapping for Evaluating Conservation Corridors

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Background of the Desert Tortoise

- Listed as Federally threatened in 1990
- Critical habitat created in 1994
- Home range consists of the Mojave Desert
Threats to the Desert Tortoise

• Competing land use: Urbanization, Off-highway vehicle use, large-scale solar and wind energy, and military use.

• Raven predation, drought, invasive plants, nutritional compromise, fire, etc
1994 Recovery Plan recommendations for design of Mojave desert tortoise conservation areas to preserve viable populations

• Areas should be >= 1,000 square miles and contain populations ranging from 10,000 to 20,000 adult tortoises

• Only 4 critical habitat units and some NPS lands meet the minimum size; many are compromised by complex perimeters

• In the past 2 years, only 3 critical habitat units have met the target for minimum viable population size in a conservation area
Protect Existing Populations and Habitat

- TCAs are not population islands and cannot recover the species alone; especially given that they are smaller with fewer numbers than recommended for viability.

- Need to maintain habitat linkages between existing tortoise conservation areas for population connectivity and long-term viability.
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Upon detailed review of corridors, it has been determined that NLCD impervious does not fully account for disturbances.
Objectives

1. Identify disturbances in linkages through manual aerial photo interpretation
2. Prioritize linkages based on disturbance
3. Consider where concentration of efforts would have the biggest impact
Disturbance Mapping

- All corridors were manually reviewed and all disturbances not represented by NLCD Impervious data were manually mapped by heads-up digitizing based on Esri’s Imagery map services.
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A survey grid of ~10,500 4 km² cells was used to track status and control the scale of the survey (roughly 1:10,000).
Methods

• A geoprocessing model was developed to combine digitized features and NLCD data produce summary statistics and layers
  • Point and line features were buffered based on type to create areas
  • Overlaps were handled using a “trumping” order.
  • Attributes of both digitized disturbances and NLCD data were carefully maintained for further review and analysis
The three most disturbed linkages are:
- Ord Rodman to Joshua Tree National Park (21.99%)
- Ivanpah to Desert Tortoise Conservation Center (12.11%)
- Ivanpah to Piute – El Dorado (11.38%)
Results
Breakdown of percent of each disturbance type by corridor.
On average, we digitized an additional 300% of disturbed land per linkage and a total of 380% across all linkages.

Difference can be attributed to:

- Missing impervious surfaces
- Newer disturbances (although most imagery used in digitizing was 2010)
- Disturbances are not always “impervious” (OHV, illegal dumping sites, mines, etc)
- Overestimating total area of digitized disturbance due to buffering operations
Future Current Usage

• Extending survey area beyond linkages to critical habitat units.

Data being used for:
• Fragmentation analyses
• Conservation area and linkage prioritizations
• BLM’s Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development
• Spatial data uncertainty analysis for the Desert Tortoise Spatial Decision Support System
Thank You

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