BACKGROUND

Occupying 50,000 sq. miles of the driest, hottest land in the United States, the Mojave Desert is one of the most suitable areas for utility-scale solar farm development. However, the Mojave is also home to distinct endemic flora and fauna, one of the most unique being the Mojave desert tortoise (Gopherus agassizii). Because land development and the increasing use of off-road vehicles, it is estimated that the Mojave desert tortoise population has decreased by a devastating 90%, and is listed as threatened by the IUCN. It’s undeniable that renewable energy is a solution to our growing climate change issues; however, solar energy developers must take into account the toll they have on the environment before proceeding with more solar farm construction. The goal of this analysis is to look at the amount of habitat destruction already caused by utility-scale solar farm development and to offer mitigation strategies that could be employed by future solar farm developers.

RESULTS

Analysis of the desert tortoise range showed that a considerable amount of suitable tortoise habitat is used by solar farms. The following areas of land were calculated to determine the percentage of tortoise habitat being used by solar farm activity. 676 square miles of hydric soil (out of the total 2601 square miles) were found within 15 miles of solar farms, posing a great risk for tortoises that may be looking for suitable burrowing spots. 4900 square miles of shrub and cacti (out of 26,896 square miles) were occupied by solar farms. The commonality of shrub and cacti mean the tortoises aren’t running out of food just yet; the risk comes from when vegetation is cleared away from solar farms for fencing. Oftentimes the tortoises get disoriented when faced with a fence, and they will continuously pace in search of a cleared path. If there are no burrows or vegetation nearby to provide shade, the tortoise could die from the intense heat. Solar farms take up a large percentage of human-developed land use in the Mojave (625 square miles out of 1024 square miles currently developed). Increased human-tortoise interactions can be lethal; desert tortoise death by humans are often caused by being ran over by vehicles and being handled by humans—when stressed, desert tortoises will sometimes empty their bladders; the loss of fluids can prove to be fatal in an area where every drop of water counts.

METHODOLOGY

In order to assess the amount of desert tortoise habitat being encroached upon by utility-scale solar farms, three major factors were examined and compared to both the desert tortoise range and current solar farms in the area: Hydric Soil (soil formed under conditions of saturation, flooding, or ponding); Optimal for tortoise burrows due to softness of the soil and the cool temperatures within it; Vegetation: Used for tortoise diet and shade from the desert sun (shrubs and cacti). Developed Land Use: Land developed for human use, ranging from residential areas to major roads; developed land within 15 miles of solar farms was examined specifically. Each factor was converted into rasters and extracted to the extent of the tortoise range. Next the area of the factor within 15 miles of solar farms was extracted to determine the percentage of area being used by solar farms. The solar farm extent was determined using the largest solar farm (5 sq. miles) plus an extra 10 miles to create a suitable buffer between tortoises and the solar farm area.

Vegetation

Hydric soils

Developed Land use

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