A CLIMATE-ADAPTED REGIONAL CONSERVATION DESIGN FOR THE SOUTHERN SIERRA (4B)

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To assess conservation opportunities across the 4.4 million acres of the Tehachapi Mountains and Southern Sierra Nevada, The Nature Conservancy and the Southern Sierra Partnership developed a regional conservation design which takes into account the current distribution of ecosystems and threats, as well as, the projected effects of climate change. The overall objective was to identify areas for the focal targets, such as oak woodland, semi-arid montane, conifer forest, and desert scrub, with the highest resilience that would also enable adaptation to a changing climate; therefore, we explicitly factored in climate change impacts and adaptation into the selection of areas for the regional design. We implemented this objective by using a multi-scale approach. We overlaid the current mapped distributions of the vegetation targets with species' distribution climate model results to assess what parts of the targets' current distributions are projected to be stressed versus stable. We set higher representation goals for the stable areas and lower goals for the stressed areas in the assumption that stressed areas will continue to play an important role in the ecosystem and will be important to connect with potential refugia. Using Marxan to run site-selection scenarios at each of the two goal levels, with both current and climate-adapted inputs, we generated four regional designs that were synthesized into one set of priorities. Marxan also incorporated current conservation lands and a habitat suitability model comprised of road density, intensive agriculture, and housing density. Landscape features assumed to foster climate adaptation, such as steep temperature gradients, topographic moisture potential, and distance for perennial water, were used to discount the suitability layer for the adaptation scenarios. The resulting regional conservation design prioritizes the landscape into core areas (33% of study area) primary and secondary buffer and connectors (14% and 13% respectfully).   The regional conservation design is not meant to be a definitive recipe for success or a plan for public or private land acquisition or new regulations. It serves as an initial hypothesis of what it will take to conserve the natural systems of the region in the face of climate change.

Key words: regional conservation design, Marxan, climate change, climate adaptation, Sierra Nevada