Project Summary – August 24, 2012

Maximizing evolutionary potential under climate change in southern California protected areas

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Efforts to prioritize conservation areas have typically relied on indices that include levels of endemism, species richness, and degree of threat. However, it has long been recognized that measures of species richness alone may fail to capture essential evolutionary processes that promote and sustain diversity. In particular, when mitigating the impacts of climate change it is important it identify regions where adaptive variation is maximized. We have used a multi-species approach that attempts to identify regions that harbor high levels of intraspecific morphological and genetic variation. When consistent across multiple species, such areas provide excellent conservation targets. We tested this new approach in the Santa Monica Mountains National Recreational Area (SMNRA), part of the southern subunit (2) of the California Landscape Conservation Cooperative. Using available data we are examining four species of vertebrate that differ in range size and habitat requirements to determine how well our method can prioritize conservation efforts. Species include: the side-blotched lizard (*Uta stansburiana*), the western fence lizard (*Sceloporus occidentalis*), the western skink (*Plestiodon skiltonianus),* and the wrentit (*Chamaea fasciata*).

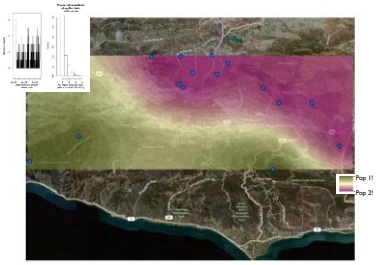

Figure. Example of identifying genetic structure across a landscape, here a side-blotched lizard (Uta stansburiana) in the Santa Monica Mountains National Recreation Area (SMNRA).

Results to date indicate that our method can identify both natural (see attached results report) and anthropogenic barriers (see Figure, right) to genetic flow, and can help aid conservation decisions under future climate change by identifying those environmental variables that are most important in shaping population structure. We are currently in the process of selecting the most appropriate climatic variables and layer resolution for each of the four species to complete final runs (see attached report), and to then project the maps of biodiversity in the SMNRA under future climate change.

Identifying areas of overlap in high biological diversity among all target taxa is another projected goal of this project. If areas important to biological diversity across taxonomic strata can be identified within the area, these biological "hotspots" can be the focus of conservation efforts. While our original dataset included three lizard and a single bird species, we have sought the inclusion of genetic data from as diverse a taxa set as possible. With the approval of NPS employee Seth Riley and graduate student Laurel Serieys, we have added a large mammal, the bobcat (*Lynx rufus*) to our target taxa. The inclusion of such data will likely reveal areas of high biodiversity under current climate conditions for a diverse suite of species utilizing the habitats of the SMNRA, as well how these hotspots might shift according to rapidly changing climate conditions in the Southern California region.