

Appendix 1. Method for calculating the regional species richness pool and map of regional species richness for California.

Background

Studies seeking to explore the relationships of community metrics such as richness or abundance to local environments risk overstating correlations if the role of the regional species pool is not additionally incorporated into analyses (White and Hurlbert 2010). The regional richness pool (an estimate of gamma diversity) represents that maximum alpha diversity attainable at a locality, and thus can strongly influence how many species are actually observed at sites. For this reason, we incorporated an index of the regional richness pool at each site as a sampling covariate in all our models of local richness and abundance. The calculation of the regional richness pool is not a simple process. A standard and recommended approach is to layer expert-derived range maps, resulting in a potential richness layer (Ricklefs 2000). There can be a large discrepancy between the pool of species available at a site and the actual number of species observed within a region (i.e., observed gamma diversity) due to habitat heterogeneity and localized holes in species' ranges (Hurlbert and White 2005). However, we follow White and Hurlbert (2010), in using range maps as the best available measure of the regional richness pool.

Methods

The regional species pool at each location was estimated by intersecting survey points with California Wildlife Habitat Relationship System (CWHR) range maps (California Department of Fish and Wildlife 2008) for all 155 bird species detected at least once in our surveys. CWHR range maps combine occurrence-data and expert opinion to derive vector-based, season-specific range maps for 864 bird species that are known to occur in California. CWHR range maps are the best available approximation of true ranges for birds within the state.

For each bird species, we used only the range identified as either “summer” (i.e., breeding-season) or “year-round.” Vector-based range maps were converted to a 1 km² raster grid and layered. Rasters share their resolution with the PRISM climate data used in this analysis. The number of species with ranges intersecting each grid cell was summed. The resultant surface (Fig. A1) was intersected with survey points to derive the regional species pool variable at each location.

Literature Cited

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White, E. P., and A. H. Hurlbert. 2010. The combined influence of the local environment and regional enrichment on bird species richness. *The American Naturalist* 175:E35–E43.

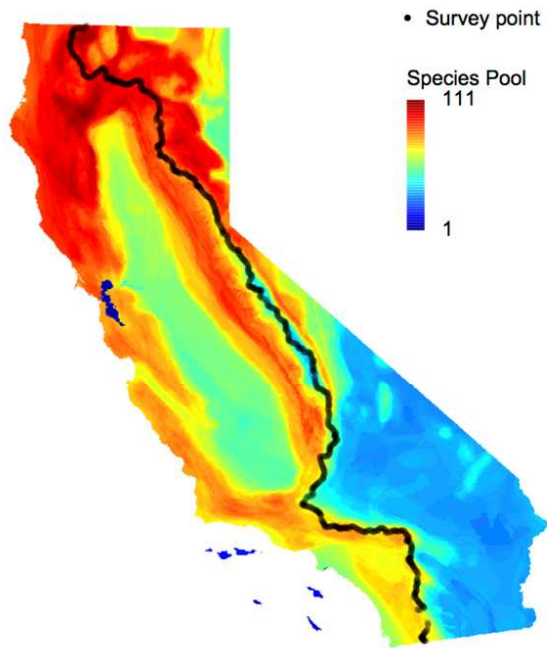


Figure A1. Available species richness pool for California as derived from expert-based range maps for 155 species detected at least once during surveys along PCT.