

TERRESTRIAL GASTROPOD BIOGEOGRAPHY IN THE GRAND CANYON ECOREGION, SOUTHWESTERN USA

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ABSTRACT

We studied the biogeography of land Gastropoda in the Grand Canyon ecoregion (GCE) on the southern Colorado Plateau. Literature, museum data-mining, and replicated, randomly stratified sampling at springs and in adjacent upland habitats were used to test whether contemporary range predicted elevation range and mediated local ecological gradient influences on assemblage composition and structure in this 35,000 km², topographically diverse landscape. Previous researchers reported approximately 287 terrestrial gastropod taxa in the southwestern molluscan assemblage, including 234 native species among 38 genera in 18 families, a fauna dominated by Helminthoglyptidae and other large-bodied families and with many locally endemic species. We documented 74 native and non-native land Gastropoda species in 32 genera among 17 families in the GCE (25.8% of the provincial fauna). Stratified random quantitative field sampling at 18 paired springs and non-springs upland habitats across elevation revealed 30 land snail species in 21 genera among 12 families. Land snail densities at desert springs reached 16,679 snails/m². Like the GCE assemblage, but in contrast to the provincial assemblage, the field assemblage was strongly dominated (53.3 percent) by widely distributed, small boreal (Rocky Mountain, nearctic, or circumpolar) taxa. We demonstrate a strong overprint of contemporary biogeographic range across elevation, from desert springs into montane forests. The GCE assemblage is a fauna distributed in an inverse latitudinal diversity gradient (iLDG). Although boreal taxon richness, H' diversity, and assemblage differences between springs and adjacent uplands all decreased with elevation (a pattern expected among LDG assemblages), small-bodied boreal taxa dominated the assemblage across elevation. Land snail biogeography is a dominant factor in assemblage composition across elevation and microhabitat gradients. Conservation of desert springs will disproportionately protect boreal land gastropod biodiversity in the Southwest, but protection of individual springs, microhabitat types, and species are needed to sustainably conserve the southwestern fauna.