

## **Beyond species richness: an empirical test of top predators as surrogates for functional diversity and endemism**

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### **Abstract:**

Using surrogate species to monitor the status of target biodiversity in areas undergoing exceptional habitat loss requires extending the traditional assessment of surrogates for taxonomic diversity to validating surrogates for functional diversity. This validation will be critical to inform about broader ecosystem processes and stability. We compared the surrogacy reliability of the habitat-specialist Rufous-legged Owl (*Strix rufipes*) and the habitat-generalist Austral Pygmy-Owl (*Glaucidium nana*), and we examined potential underlying mechanisms for surrogacy relationships in Andean temperate forests, a global biodiversity hotspot in southern Chile. During 2011–2013, we conducted 1,145 owl surveys, 505 vegetation surveys, and 505 avian point-transect surveys across 101 sites comprising a range of conditions from degraded forest habitat to structurally complex old-growth forest stands. The habitat-specialist *S. rufipes* was a reliable surrogate for all avian biodiversity measures, including avian endemism and functional diversity measures (degree of community specialization and density of large-tree users, understory users, and cavity-nesters). On the contrary, the habitat-generalist *G. nana* did not function as a surrogate. With increasing occurrence of *S. rufipes*, the density of target specialized biodiversity (species, guilds, and communities) increased nonlinearly and peaked at the least degraded sites. This specialist aggregation might be driven by stand structural complexity available in older, more stable, forests. These results suggest that management actions tailored to promote occurrence of habitat-specialist owls, such as the *S. rufipes*, may result in enhanced density of endemic species, specialized communities, and likely ecosystem stability.