

Territory sizes and patterns of habitat use by forest birds over five decades: Ideal free or ideal despotic?

Miranda Zammarelli¹, Matthew Ayres¹, Hannah ter Hofstede¹, David Lutz¹, and Richard Holmes¹

¹Dartmouth College

March 28, 2024

Abstract

Relations among territoriality, abundance, and habitat suitability are fundamental to the ecology of many animal populations. Theory suggests two classes of possible responses to increasing abundance in territorial species: 1) the ideal free distribution (IFD) predicts smaller territory sizes and decreased fitness as individuals adaptively pack into suitable habitats, and 2) the ideal despotic distribution (IDD) predicts stable territory sizes and fitness in preferred habitats for dominant individuals and increased use of marginal habitats and reduced fitness for subordinate individuals. We analyzed the territory sizes and locations of seven migratory songbird species occupying a 10-hectare plot in the Hubbard Brook Experimental Forest, New Hampshire, USA over a 52-year period. All species varied in abundance during the study, some dramatically, and all species displayed clear patterns of habitat preferences within the study plot. Consistent with IFD, and contrary to IDD, territory sizes decreased with local abundance for all species, irrespective of spatial patterns. There was surprisingly high variation in territory size within years. Conformity of territory size to predictions of the ideal free distribution has general consequences for population dynamics and argues for the efficacy of territorial signaling in songbirds.

Hosted file

Zammarelli et al. Manuscript.docx available at <https://authorea.com/users/760688/articles/736429-territory-sizes-and-patterns-of-habitat-use-by-forest-birds-over-five-decades-ideal-free-or-ideal-despotic>

Hosted file

Zammarelli et al. Tables.docx available at <https://authorea.com/users/760688/articles/736429-territory-sizes-and-patterns-of-habitat-use-by-forest-birds-over-five-decades-ideal-free-or-ideal-despotic>





