

Estimating inbreeding rates in Northern Spotted Owls: insights from pedigrees and spatio-demographic models.

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The federally-threatened Northern Spotted Owl (*Strix occidentalis caurina*) has a substantial influence on management of federal lands. Despite decades of investigation, important details about its status and habits remain unknown. In particular, determining the frequency of inbreeding may help explain spatial variation in demographic trends. Inbreeding is best estimated using pedigrees, however, multigenerational pedigrees are difficult to establish in long-lived, highly mobile species, as parental and grandparental identities are not always known. We used > 9,500 Northern Spotted Owl hatch records from a ~30 year period to assemble the most comprehensive pedigree available. Despite the volume of data, most individual pedigrees were incomplete. Preliminary estimates of inbreeding derived from pedigrees suggest that 3.14% and 2.9% of the population is highly inbred with inbreeding coefficients of $F = 0.25$ and $F = 0.125$, respectively. However, additional analyses of idealized pedigrees revealed that inbreeding rates from incomplete pedigrees overestimate inbreeding as the amount of missing data increases, therefore indicating that they must be considered high upper-bounds estimates. In the absence of unbiased estimates, we turned to a spatio-demographic Northern Spotted Owl simulation implemented in HexSim. Based on simulations, 2.16% ($F = 0.25$) and 2.01% ($F = 0.125$) of Northern Spotted Owls are highly inbred. Implications of inbreeding have not been incorporated into demographic models for Northern Spotted Owls. Thus, we discuss remaining challenges that need to be overcome to refine our understanding of demographic trends within the subspecies.