A primary reason for this project!

Keeping Common Species Common

Introduction

Landscape Pattern and Fragmentation

Within the current context of rapid landscape change, there are few studies of the specific effects of urban and exurban expansion on biodiversity (Hansen et al. 2005). Miller and Hobbs (2002) reviewed 217 landscape studies in recent volumes of Conservation Biology and only 6% are related to exurban and urban land use. There is an urgent landscape management need to understand and predict the impact of exurban development and increased road density on the rate of habitat loss and the effects on biodiversity (Hawbaker et al. 2006, Schrott et al. 2005a). In response to this need, there is a growing demand by public and private conservation and land management organizations for quantitative data of landscape pattern change and habitat fragmentation for effective conservation policy guidelines (Gustafson 1998, Turner et al. 2001, Vos and Chardon 1998).

Rates of Habitat Loss

Landscape ecological theory suggests the rate of habitat change is more critical to wildlife population viability than the pattern of change (Forman et al. 2003). The rate of habitat loss is unique to each landscape and cannot be extrapolated from landscapes that have similar amounts of habitat and fragmentation but dissimilar disturbance histories (Schrott et al. 2005b). When the rate of landscape change exceeds the re-generation time of the species, populations may exhibit a lagged response to habitat loss (Schrott et al. 2005a**).** The rate of change is a spatio-temporal gradient which varies across a landscape and is site specific (Schrott et al. 2005a). An important research priority is the rate of disturbance patterns in the landscape such as an increase in road density (Forman et al. 2003).

Roads Density and Small Vertebrates

Exurban development increases road density which bisects otherwise continuous habitat. Animal populations are fragmented by roads which can act as barriers to animal movement either through avoidance or mortality (Forman et al. 2003, Shepard et al. 2008a). Road kill of small vertebrates is not well documented when compared to large mammals (Trombulak and Frissell 2000). However, Allard (1935, 338) reported from the Washington DC area that "the great scourge in the box turtle's life" is getting crushed by passing cars on the highways; and Klemens (2000, 22) defines roads as a box turtle "kill zone". Reptiles and amphibians that have seasonal migrations as part of their natural history are particularly vulnerable to roads (Aresco 2003, Dodd 2001, Fahrig et al. 1995, Gibbons et al. 2000, Shepard et al. 2008b, Steen and Gibbs 2003, 2004, Steen et al. 2006, Trombulak and Frissell 2000). Mortality of female fresh water turtles when crossing roads on nesting migrations can be the cause of populations in the US to be increasingly male biased which will make turtle populations decline (Steen and Gibbs 2004, Steen et al. 2006). For example, the mortality rate of turtle populations in the southeastern US is partly due to road fatalities that are greater than 5% annually, and exceeds sustainable levels (Steen and Gibbs 2004). Road density in the US is ~ 6.5 million km, and exerts a significant ecological footprint on the landscape (Forman et al. 2003). Negative effects of roads are often

underestimated but are recognized as drivers of land use change and habitat fragmentation (Hawbaker et al. 2006, Turner et al. 1996, Vos and Chardon 1998).

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