Nesting Preference and Productivity of Cavity Nesting Owls in Managed Boreal Landscapes

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Participants

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Background

Mature forest stands in the boreal are becoming increasingly rare due to periodic natural disturbances like fire or anthropogenic impacts such as timber extraction (Burton et al. 1999). Since forested lands are increasingly managed for multiple uses, in order to reduce negative impacts of intensive logging and maintain high levels of biodiversity (Mori and Kitagawa 2014) forest managers are trying to adopt timber harvesting methods that emulate natural disturbances, especially fire (Heikkala et al. 2014). Studies show that when directly compared, forest stands affected by fire retain more woody structure in form of old trees and snags than logged areas (Hobson and Schieck 1999, Schieck and Song 2006). Heikkala et al. (2014) pointed out that high tree retention levels are needed in order to ensure the long-term persistence of complex and abundant woody structures in stands affected by fire and partial logging. In a meta-analysis, Schieck and Song (2006) also found that bird species richness in old boreal forests was higher than young stands. Modern forestry practices (Straus et al. 2006, Mori and Kitagawa 2014), whether clearcuts with aggregated retention patches (Cooke and Hannon 2011), group selection harvesting (Tozer et al. 2010) or harvests emulating disturbance by fire (Schieck and Song 2006, Heikkala et al. 2014) create fragmentation that ultimately leads to habitat loss (Bunnel 1999, Fahrig 1999, Fahrig 2003). Some species dependant on large, old growth type forested areas are impacted more severely than species that are opportunistic and prefer mixed-aged stands or forest edges (Bunnel 1999, Hobson and Schieck 1999, Tozer et al. 2010, Cooke and Hannon 2011). Cavity nesting mammals and birds are some of the most affected because they

closely associate with large diameter live trees or snags (Cooke and Hannon 2011). Primary cavity excavators (Cooke and Hannon 2011) are mostly found in forests older that the average rotation age of harvested stands (Schieck and Song 2006) and considered keystone species because they provide nestsite for secondary cavity nesters that are limited by food abundance and availability of adequate nesting holes (Savignac and Machtans 2006, Korpimaki and Hakkarainen 2012, Brambilla et al. 2013). The Boreal Owl Aegolius funereus (BOOW) and Northern saw-Whet Owl Aegolius acadicus (NSWO) are two species of forest predators that throughout their North American range use mainly natural cavities excavated by Pileated Woodpeckers Dryocopus pileatus and Northern Flickers Colaptes auratus (Hayward et al. 1993). These owls seem to prefer old forests with many large diameter trees, sparse understory and multiple canopy layers, with many relatively low perches used during hunting (Hayward et al. 1993, Korpimaki and Hakkarainen 2012). While Hakkarainen et al. (1996) found that clearcuts can actually increase BOOW productivity others argue that large harvested blocks negatively influence owls by increased predation (Laaksonen et al. 2004, Korpimaki and Hakkarainen 2012). Hinam and St. Clair (2008) found that the presence of large open areas contributed to low breeding performance through reduced provisioning rates and induced poor physiological condition of male NSWO. However, in a nestbox experiment conducted in Norway most BOOW preferred artificial nests placed in open woodland or clearcuts and avoided nesting in old, closed spruce stands where predation risk by Pine martens Martes martes was very high (Sonerud 1985). Hayward (1997) concludes that forest patches affected by stand replacement disturbances like clearcuts will not be used by BOOW for at least 100 years, until the new forest develops large enough trees to be attractive to primary cavity excavators. Studies in Western North America revealed that BOOW prefer mature forests that are impacted by many natural, small scale or local disturbances that can be reproduced by management decisions that mimic these natural disturbances (Hayward 1997). The EMEND (Ecosystem Management Emulating Natural Disturbance) project located in the Clear Hills Upland, Lower Foothills Ecoregion of Alberta, Canada provides a unique opportunity to study the response of BOOW and NSWO to a forestry practice that emulates fire as a natural disturbance. This experiment is trying to measure the effect of variable retention harvesting and regeneration methods on a the integrity of the ecosystem and biotic communities at forest stand level. The research site is composed of a mosaic of 10 ha blocks (a total of 1,000 ha) harvested during 1998-1999 under variable retention treatments (clearcut - representing 0 %, 10%, 20%, 50%, 75% and 100% green tree retention (control), embedded in a larger landscape containing a mixture of recently impacted and protected areas. My study will explore habitat preference and productivity of these owls in three cover types: Deciduous dominated (DD), Conifer dominated (CD) and Mixedwood (MX) and in each cover type I will investigate and compare nest occupancy and productivity of owls in forest compartments with 20%, 50%, 75% green tree retention treatments, including control stands. My goal is to understand why owls prefer certain stands and what influences their distribution and productivity in variable retention forest compartments in the EMEND landscape 15 years post harvest.

Objectives

1. What is the nesting preference of cavity nesting owls at EMEND 15 years after harvest? A. Assess differences between nesting preference among the three cover types B. Determine nesting preference between treatments 2. What is the productivity of cavity nesting owls at EMEND 15 years post harvest? A. Compare owl productivity between different cover types B. Determine differences in productivity within treatments 3. Is the partial harvest method employed at EMEND in providing natural cavities suitable for owls 15 years post harvest? A. Determine differences of nesting opportunities (through the availability of natural cavities) for BOOW and NOSO in three cover types and four treatments on the EMEND landscape.

Key Results