

# Influence of variable retention timber harvesting on upland habitat suitability and population dynamics of Wood Frogs (*Lithobates sylvaticus*)

Lead by: [Matt Robinson](#)

Theme: [Biodiversity](#)

Status: Continuing

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## Participants

- [Matt Robinson](#)

## Background

Amphibian population declines have been documented worldwide, with habitat loss and alteration considered the primary cause (Houlahan 2004; Stuart 2004). Amphibians are important to forest ecosystems and disturbances resulting from timber harvesting may negatively affect their habitats and populations (Demaynadier 1995). Most amphibians have complex life histories, requiring both aquatic and terrestrial habitats to complete their life cycles (Semlitsch 2000). Loss, alteration, or isolation of either habitat type may be detrimental to population persistence (Gibbs 1998), and as such, it is imperative to consider both habitats when assessing suitability under different land-use regimes (Baldwin 2006b). Wood frogs (*Lithobates sylvaticus*) are a forest-associated species (Demaynadier 1998) common in the boreal mixedwood forest of Alberta (Russell and Bauer 2000). In upland environments, wood frogs prefer closed-canopy forest (Demaynadier 1998, 1999) and are associated with deciduous leaf litter, coarse woody debris, understory plant cover, and moist soil conditions (Demaynadier 1998; Rittenhouse et al. 2007, Constible 2001, Semlitsch 2009). Intensive timber harvest practices, such as clearcutting, can alter microhabitat features (Demaynadier 1995) resulting in local declines in wood frog survival and abundance (Rittenhouse et al. 2008; Semlitsch 2009). Pond-breeding amphibians also require suitable aquatic habitat for breeding and

larval development (Blomquist and Hunter 2010). Ephemeral wetlands - pools that dry annually (Colburn 2004) - are a common feature in the boreal mixedwood (Okonkwo 2011) and are known breeding habitat for wood frogs and other amphibians (Baldwin 2006a; Berven 1990; DiMauro and Hunter 2002; Okonkwo 2011). The amount of forest canopy surrounding ephemeral pools can alter biotic and abiotic conditions that influence the performance and success of amphibian larvae (Halverson 2003; Skelly 2002, 2005). Removal of trees adjacent to breeding pools during timber harvesting may therefore affect reproductive success of amphibian breeding populations. Variable retention is a forest management technique where live trees and other forest features are retained during harvesting using patterns meant to emulate those found following natural disturbance (Gradowski 2010, Lindenmeyer 2012). This strategy aims to maintain forest stand structure, species diversity, and ecosystem function within managed forests, while still allowing for sustainable timber removal (Gradowski 2010, Lindenmeyer 2012). The influence of variable retention harvesting on amphibian habitat and populations remains largely unstudied. I propose to evaluate the influence of different levels of retention harvesting on the upland and breeding habitat suitability of wood frogs in the boreal mixedwood forest of Northwest Alberta.

## **Objectives**

The purpose of this study is to assess the effectiveness of variable retention timber harvesting in maintaining suitable upland and breeding habitat for wood frogs in post-harvest stands. My main thesis objectives are to: (1) examine the relationship between upland habitat use of wood frogs and forest habitat features in post-harvest stands in order to determine which local habitat and landscape features limit wood frog upland distributions and (2) assess the suitability of ephemeral pools as breeding habitat for wood frogs under different levels of canopy cover (forest retention levels) in order to determine breeding pool conditions limiting to larval growth, development, and reproductive success (completion of metamorphosis).

## **Key Results**

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