

**Land Use and Conservation Values of Farmland Forests:
Outcomes of Livestock Grazing on the Aspen Forest Understorey
in the Greater Riding Mountain Region, Manitoba**

By
Karin E. Newman

A thesis
Submitted to the Faculty of Graduate Studies of the
University of Manitoba
in partial fulfillment of the requirements for the degree of
Master of Science

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Abstract

The past 125 years of agricultural settlement in North America has resulted in extremely fragmented habitats. In farming landscapes, small patches of remaining native vegetation on private land are generally intermixed with agriculture or are actively grazed by livestock. This study takes place in the primarily agricultural rural municipalities surrounding Riding Mountain National Park (RMNP), Manitoba, Canada. Even as the critical necessity to engage in conservation beyond borders is recognized, the importance of native vegetation habitats on private land, including forest, is too often overlooked. Although livestock are widely perceived as adversely affecting natural habitat, relatively little is known about the impacts of livestock grazing on these remnant forest habitats.

To examine the effects of cattle grazing on forests, the understory diversity was compared across sites with different livestock grazing histories and intensities. Patch- and landscape-level environmental factors were measured at sites both in and around RMNP. The diversity of the matrix (non-forest) habitat of privately owned sites was invariably adversely affected by the intensity of agricultural land use, while forests showed more resilience. In forests, grazing intensity played a strong role in determining understory composition. While livestock grazing tended to be associated with exotic species, only heavy grazing was significantly associated with increased cover of certain grazing-tolerant exotic species. Other native perennials were associated with non-grazed or moderately grazed sites. Furthermore, moderate grazing had no effect on the native understory diversity, as compared to non-grazed and past grazed landscapes. These results suggest that both protected forests and moderately grazed forests act as important

refuges for native species in agricultural landscapes. A diversity of land uses, including moderate forest grazing, can be compatible with the protection of regional forests.

Although National Parks are increasingly surrounded by intense human land uses, often very little is known about the conservation goals of neighbouring local communities. Management ideals, attitudes and values that local landowners held about privately owned forests were collected through a series of structured interviews and a mail-out questionnaire in communities within the Riding Mountain Biosphere Reserve, surrounding RMNP. Because knowledge in the farming culture is often passed down from previous generations, each individual farmer holds decades of personal observations about this environment. Thus, survey participants were an important source of local knowledge and observations on the conservation and use of native vegetation in their environment. Landowners in the study area are managers of a substantial amount of native vegetation, much of which was used for cattle production. Conservation motivations for maintaining relatively undisturbed land were often associated with function and environmental services, including erosion, water retention and habitat protection. Forest cover also represented a significant proportion of native vegetation on private land. Participating landowners voiced the importance of maintaining non-production land on their farms. Despite financial reliance on the land base, stewardship and conservation reasons were the main motivations cited by participants for maintaining forested land. Current and future conservation plans to revitalise and preserve forested fragments in the greater Riding Mountain region will necessarily rely heavily on the knowledge experience and resources of local landowners.

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1. Introduction and Literature review

1.1. General Introduction

Almost two centuries of farming settlement in North America has resulted in the conversion of extensive tracts of original grassland and forest to agricultural and livestock grazing lands (Boutin and Jobin 1998). The clearing and fragmentation of forests for cultivation has accompanied economic development through much of the world (Tyrczniewicz et al. 1999), effects of which include overall reduction of forest habitat and increased isolation of remaining forests (Kruess and Tscharntke 1994). Fragmentation has been linked to the loss of species and habitats (Boutin and Jobin 1998; Hobbs 1993), as well as changes to ecological processes (Hobbs 1993). Decades of fire suppression that have accompanied settlement (Hobson et al. 2002), along with the potential firebreak effect of widespread agricultural lands (Weir and Johnson 1998) have lengthened the fire cycle, changing patterns of forest renewal and succession, e.g. in the boreal forest (Weir and Johnson 1998; Bergeron and Dubuc 1989), and elsewhere in the world (Jantzi et al. 1999).

In western Canada, the aspen parkland/ boreal transition region settlement occurred in the late 1800s (Hobson et al. 2002; Bird 1961), and continued through to 1930. Prior to agricultural settlement, surveys undertaken were generally designed and carried out to qualify the timber and agricultural resource potential of the lands (Tyrell 1888). However, it is difficult to estimate the precise amount of loss for any habitat type prior to agricultural settlement, as there are few, if any, quantitative environmental surveys dating back to that time. Recently, there has been increasing interest in assessing what remains of the original vegetation cover in agricultural landscapes (Hobson et al.

2002) in order to monitor, to manage and to better preserve remnants of native vegetation (Fitzsimmons 2003; Keddy and Drummond 1996). Land cover in the rural municipality of Clanwilliam in the 1870s, before intense agricultural expansion took place, has been recently estimated by Sobkowich (2000), using qualitative surveyor notes and maps from this period, (Figure 1.1). On a larger scale, oblique aerial photography from 1948, which is available for the entire Biosphere Reserve region, has been used to create maps depicting land cover after the most intense agricultural expansion, (Figure 1.2.A). When compared to recent remotely sensed data, (PFRA 1994), it is apparent that forest clearing has continued steadily to the present (Figure 1.2.B). Much of the remaining forests in agricultural landscapes are privately owned as small farm woodlands (Jacobson 2002; Ranney et al. 1981). There is slow but increasing recognition that these small forests are an integral part of the landscape and contribute to the health of the greater ecosystem (Freemark et al. 2002; Erickson et al. 2001; Bayne and Hobson 1998; Boutin and Jobin 1998; Middleton and Merriam 1983).

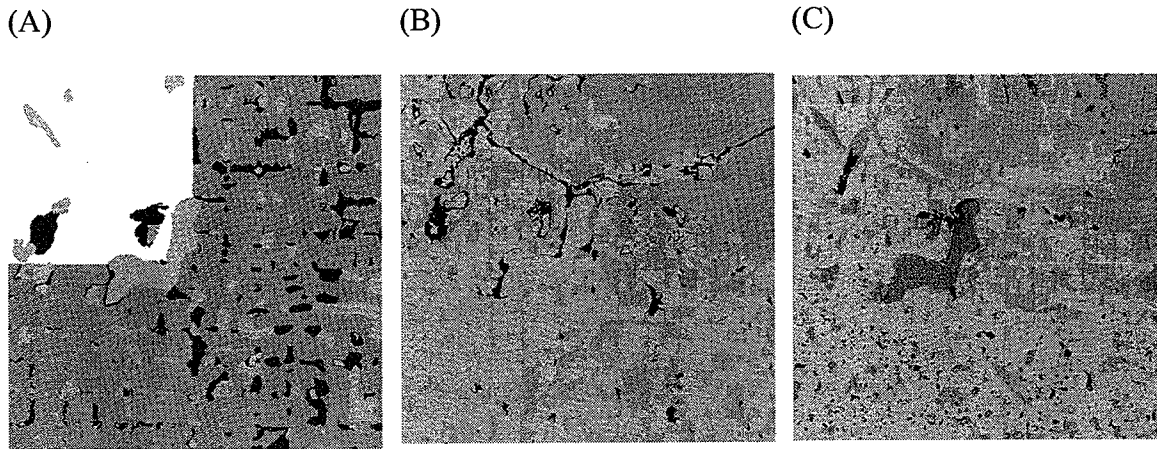


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