THE APPLICATION OF SUCCESSIONAL THEORY-BASED MANAGEMENT TO MINNESOTA PRAIRIE SITES DEGRADED BY INVASIVE PLANT SPECIES

by

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This thesis submitted by Jamie R. Hanson in partial fulfillment of the requirements for the Degree of Master of Science at St. Cloud State University is hereby approved by the final evaluation committee.

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THE APPLICATION OF SUCCESSIONAL THEORY-BASED MANAGEMENT TO MINNESOTA PRAIRIE SITES DEGRADED BY INVASIVE PLANT SPECIES

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A thesis project at Camp Ripley Army National Guard Training Site will address the effectiveness of directing succession as a means of restoring areas dominated by perennial terrestrial invasive species: Common Tansy (*Tanacetum vulgare*) and Spotted Knapweed, (*Centaurea stoebe ssp. micranthos*). The purpose of this project is to design and implement an experiment that will test different combinations of treatments that alter the three factors of site availability, species availability, and species performance, as defined by Pickett et al. (1987) and Sheley et al. (2003). Altering these three factors is done with the goal of restoring perennial invasive-species-dominated areas into a native plant community. My experimental objective is to determine if succession-based management strategies are an appropriate methodology for the restoration of Minnesota prairie ecosystems that are impacted by invasive species, as it has been shown that invasive species can severely degrade ecosystems. The research question further involves determining which practices within this framework of succession are most effective in restoring Minnesota prairie ecosystems that are degraded by the presence of these invasive plant species. This experiment took place in spring 2010 through fall 2011 and incorporated site manipulation of four seedbed preparations, two cover crop types, and two seed dispersal methods. The addition of a fourth factor involved the application of a selective herbicide, Milestone, to half of each plot. Statistical analysis determined that by the end of data collection in August 2011, all levels from the first three factors in the experimental design did not significantly reduce either invasive species. The application of the fourth factor did significantly reduce both invasive species' mean percent cover. However, a negative consequence of this selective herbicide is reduction in species richness in plots and increase in non-native grass cover. It is

recommended, due to the nature of succession, continued monitoring, data collection, and analysis occur on experimental sites.

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TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES