Hierarchical Abundance Modeling to Inform oak savanna Habitat Restoration within the Anoka Sand Plain of Minnesota

A Thesis

SUBMITTED TO THE FACULTY OF

UNIVERSITY OF MINNESOTA

BY

MARGARET EDWARDS

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF SCIENCE

ADVISER: TODD W. ARNOLD

FEBRUARY 2019

© Margaret Edwards 2019

**Acknowledgements**

First and most importantly, I would like to thank my committee for their guidance during this process. I was fortunate to benefit from such an amazing combination of individuals, whose contributions elevated this experience far beyond what I could have achieved on my own. Todd, thank you for all of your endless support and guidance, especially when I was mired in various struggles. Thanks to Brian for encouraging me to tell this story as it was meant to be told, and to Hannah for providing expert insight about the natural history behind my study. I would also like to thank de facto committee member Althea ArchMiller, whose perspective and input were completely invaluable.

There are countless others who contributed to my success. I would like to thank the Minnesota Department of Natural Resources, the XX grant program, the MN Herpetological Society, and the University of Minnesota for funding and support. Thanks to all of the members of the Arnold lab and other occupants of B52 for your collaboration and support. Thanks to Bob, Jenn, and Christi for helping me in the field, Gerda for allowing me the flexibility to continue working while I was in school. Thanks also to my coworkers in the Data Den for putting up with me during this **Dedication**

This thesis is dedicated to my Nana, Dolores Hughesdon. An incomparable woman who always saw the good in the world, she valued her own education and taught me to value mine. I know that she would be proud of me now.

**Abstract**

{Replace with your List of Tables *(optional page)*. If you delete this optional page, work in Normal view or Page Layout view so that you do not accidentally delete the Section Break that separates this section from the body of your thesis. Also if you delete this page, you will need to delete the Page Break that separates it from the Table of Contents. }

**Table of Contents**

{Replace with your Table of Contents.}

**List of Tables**

{Replace with your List of Tables *(optional page)*. If you delete this optional page, work in Normal view or Page Layout view so that you do not accidentally delete the Section Break that separates this section from the body of your thesis. Also if you delete this page, you will need to delete the Page Break that separates it from the List of Figures page. }

**List of Figures**

{Replace with your List of Figures (*optional page*). If you delete this optional page, work in Normal view or Page Layout view so that you do not accidentally delete the Section Break that separates this section from the body of your thesis.

{Replace with the body of your thesis. Do not delete the final two paragraph returns at the end of the document in the process of pasting in the body of your thesis, as this will change the page numbering. If you do paste in the body of your thesis, you may take a second, separate step to delete the extra paragraph returns if necessary, but, if you do so, be sure to double-check the page numbering afterwards to be sure it is still correct.}