A dissertation

A Thesis
Presented to
The Division of
University of Nebraska-Lincoln

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

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Approved for the Division
(School of Natural Resources)

Craig R. Allen	Dirac Twidwell

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HEB, TD, CPR, DF, CRA, BF, ER, CAL, MPM, KES, FL, MBB,

1. **Professional development**. AJT, KP, CRA, DT, MBB, JC,

To my partner of eight years–Schultzie–thank you for everything. Just kidding, thank you, Nat Price.

Preface

This is an example of a thesis setup to use the reed thesis document class (for LaTeX) and the R bookdown package, in general.

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List of Tables

List of Figures

Abstract

THis is my amazing abstract.

Dedication

Something snarky to mike moulton – maybe a limerick

Chapter 1

thesisdown::thesis_word: default

Placeholder

Preliminary Content

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Acknowledgements

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Preface

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Dedication

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    THis is my amazing abstract.

Chapter 2

Introduction

2.1 Background

- On abrupt changes in the environment

1. A few examples of abrupt changes that are highly referenced.

2. Whydoes it matter that we can detect??
3. A few examples of the methds that have been used ot identifythese shifts

- histortically
- real-time
- predictive

3. PRoblems with the methods in

- aplpication
  - difficult to apply
  - to interpret
- theory - lackthereof

4. Descrive the attempts to identify regime shifts

2.2 My thesis

My thesis is that regime detection metrics are not useful and are difficult to interpret and apply to multispecies systems. 1. Brandolini's principle

TWo major sources of problems? 1. Defining a regime shift
2. Methods have not proven useful for application beyond single-species systems and systems about which causal drivers can just be monitored.

- Current state of regime shift theory
- Why it is important to diagnose/detect abrupt changes at the system level

- Current methods are not being employed by ecological management.
  - Why are applications largely restricted to theoretical research?
  - Why are the applications to empirical data largely restricted to the research community?
  - Is this an artefact of how long it takes for applied ecologists and ecological management to adopt new data anlysis techniques?

2.3 Dissertation abstract (content summary)

This dissertation comprises **X** sections:
1. Review of the current methods used to identify abrupt changes in ecological systems - Types of analyses - Univariable vs. multivariable - Picked up vs. not picked up (look at # papers using method in WOS, maybe. . .)
1. A beginner's guide to Fisher Information (derivatives metric) {#distance}
1. Distance method
1. Fisher Information binning method and an application of it to spatiotemporal data
1. Conclusions

Chapter 3

Quantitative indicators of abrupt ecological change

Placeholder

3.1 Abstract

3.2 Introduction

3.3 Methods

3.3.1 Identifying papers/RSDMs in the literature

3.4 Results

3.4.1 Potential figures

3.4.2 Potential tables

3.5 Discussion

Chapter 4

A guide to Fisher Information for Ecologists

Placeholder

4.1 Abstract

4.2 Introduction

Step 3. $p(s)$ as a function of the rate of change of s

Step 4. Calculate the derivatives-based Fisher Information

4.3 Acknowledgements

Chapter 5

An application of the Fisher Information binning method to spatiotemporal avian community data

Placeholder

5.1 Abstract

5.2 Introduction

5.3 Methods

5.3.1 Data collection

5.3.2 Study areas

Military bases as study sites

Focal military bases

Delineating spatial transects for spatial analysis

Delineating transects for spatial analysis

Selecting routes for temporal analysis

5.3.3 Calculating the Fisher Information binning measure

5.4 Results

5.4.1 Temporal data

5.4.2 Spatial data

5.4.3 Interpreting the Fisher Information binning measure

5.5 Discussion

Appendix A

The First Appendix

This first appendix includes all of the R chunks of code that were hidden throughout the document (using the `include = FALSE` chunk tag) to help with readibility and/or setup.

In the main Rmd file

In Chapter ??:

Appendix B

The Second Appendix, for Fun

References

Placeholder