Brett Kelly – Thesis Outline

## Project Goals

* Determine status, distribution, and important environmental factors for Brook Trout in the Iowan Driftless Area
* Investigate interactions of Brown Trout and native SGCN
* Assess cool-coldwater stream fish communities in the Iowan Driftless

# Chapters

1. **Stream-segment scale occupancy analysis of Brook Trout using physical habitat covariates at three levels (instream, riparian, and catchment)** 
   * **Then use model results to predict remaining Iowa distribution and/or suitable sites (how to proceed depends on if instream factors are most important covariates – constrains inference to sites where we have data OR we could see if any landscape variables are correlated with those particular covariates and predict based on that)**
   * **Or: do a finer scale analysis to identify potential restoration sites, and a coarser grained one to predict distribution in unsampled areas of the Iowa Driftless (i.e. instream variables to identify restoration sites among sampled streams; landscape variables to predict in unsampled catchments)**

**2. Investigate interactions of Brown Trout and native SGCN using two-species occupancy models, relative abundances, average body length, and condition**

* **Conditional Occupancy Probability**
* **Relative Abundance (fish per 100m)**
* **Average TL (mm)**
* **Body Condition (relative weight)**

3. MAXENT modeling to predict Brook Trout distribution and/or potential restoration sites across unsampled portions of Iowa Driftless Area (can we incorporate multiple data streams? i.e. Bionet and my data?) -- \*Feasibility contingent upon results from chapter 1 analysis (i.e. if we DO NOT end up predicting distribution and restoration sites there, this would be an applicable place) and time constraints with undergrad research involvement\*

# Back-up ideas or “down-the-road” analyses

1. Brown Trout body condition and relative abundance; influenced by habitat limitations, interspecific competition, or density dependence? Context dependent?

# Undergraduate Research

1. Undergraduate Research: Influence of land-use land-cover on a coldwater fish IBI in the Iowa Driftless Area (Sam Grinstead)

# Notes, Ideas, and References

Chapter 1

Journal articles, etc

Chapter 2

Journal articles, etc

Chapter 3

Mixed Distribution Models – (Every paper by Macdonald et al. referenced in the above report ^)

Chapter 4

Chapter 5

Hoxmeier and Dieterman (NO DATE) – “Application of Mixture Models for Estimating Age and Growth of Stream Dwelling Brook Trout”

Mixed Distribution Models – (Every paper by Macdonald et al. referenced in the above report ^)

Ideas:

Journal articles, etc