Community Ecology

Today's agenda:
Quiz,
Introductions,
Syllabus,
Paper Presentation assignment,
Project 1: Diversity Patterns,
Intro to Community Ecology,
Diversity Patterns

Introductions

Tell us:

- Your name
- Your research interests
- Something interesting about yourself

Syllabus: basic stuff

Class Meeting Days: M, W
Class Meeting Time: 3:30 – 4:45 pm
Class Meeting Location: DAV 260
Instructor: Dr. Brian Maitner
Office Location: DAV 226 (but I’m usually in URL 106, because it’s warmer)
Office Hours: TBA - ?
Email: bmaitner@usf.edu

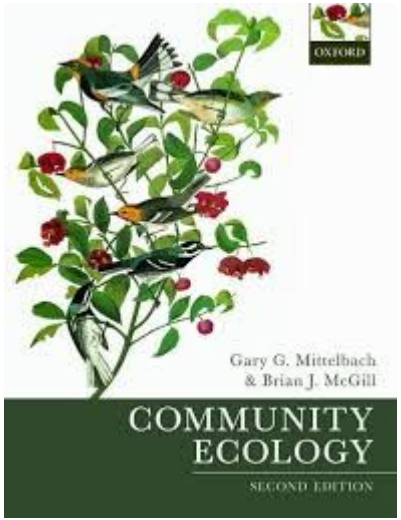
Syllabus: Course structure

Lectures and book - provide overview

Assignments - deeper dive into your own interests

Many small assignments = less stress

Graded Items	Percent of Final Grade
Projects (4x)	40%
In-class quizzes	10%
Midterm	10%
Final	10%
Paper presentation assignments (2x)	10%
Conceptual Figure Assignment	5%
Network Assignment	5%
Group Presentation Assignment	5%
TBD Assignment	5%



Course Expectations

- Participate! Ask questions. Share ideas, experiences, and knowledge!
- Be respectful.

Recommendations

- Read the syllabus
- Read the book
- Take notes on paper
- Plan ahead

Questions so far?

Paper presentation assignment 1: Due Jan 29

Step 1: Find a paper on diversity patterns in your study system (or one you pick)

Step 2: Make 2 slides explaining the paper

Slide 1) graphics made by you that explain what was done in the study

Slide 2) what they found (should include results figure(s) from paper)

Step 3: Present the paper using those two slides (5 minute max)

Project 1: Diversity Patterns: Due Feb 7

Step 1: Pick a diversity pattern(s) relevant for your study system

Step 2: Find and read 10-20 relevant papers

Step 3: Write 2 pages about it (double spaced)

Introduction format, references don’t count against page limit

Potential things to include:

- Description of patterns
- Hypothesized mechanisms
- Tests of mechanisms
- Gaps in our knowledge

Questions so far?

What is Community Ecology?

“Community ecology is that branch of science focused squarely on understanding Earth’s biodiversity, including the generation, maintenance, and distribution of the diversity of life in space and time.” - Mittelbach and McGill

What is Community Ecology?

Molecule < Organelle < Cell < Tissue < Organ < Organism < Population < **Community** < Ecosystem < Biosphere

What is Community Ecology?

Science focused on multiple, co-occurring species.

- Overlaps with other branches of ecology
- Best not to stress over an exact definition

Why Community Ecology?

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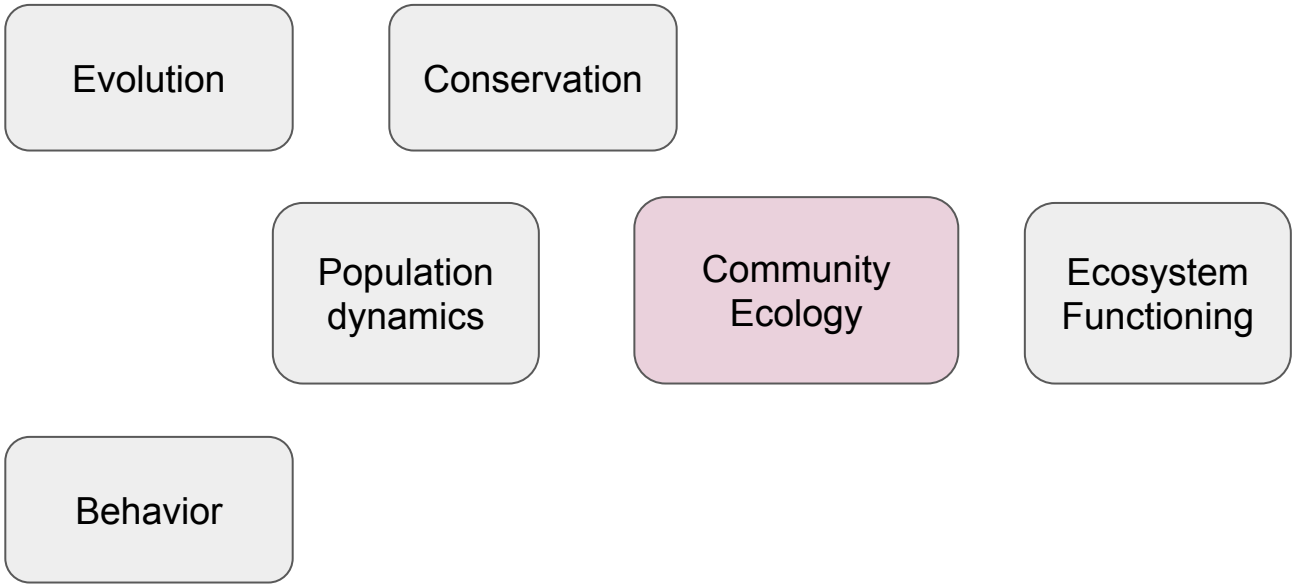
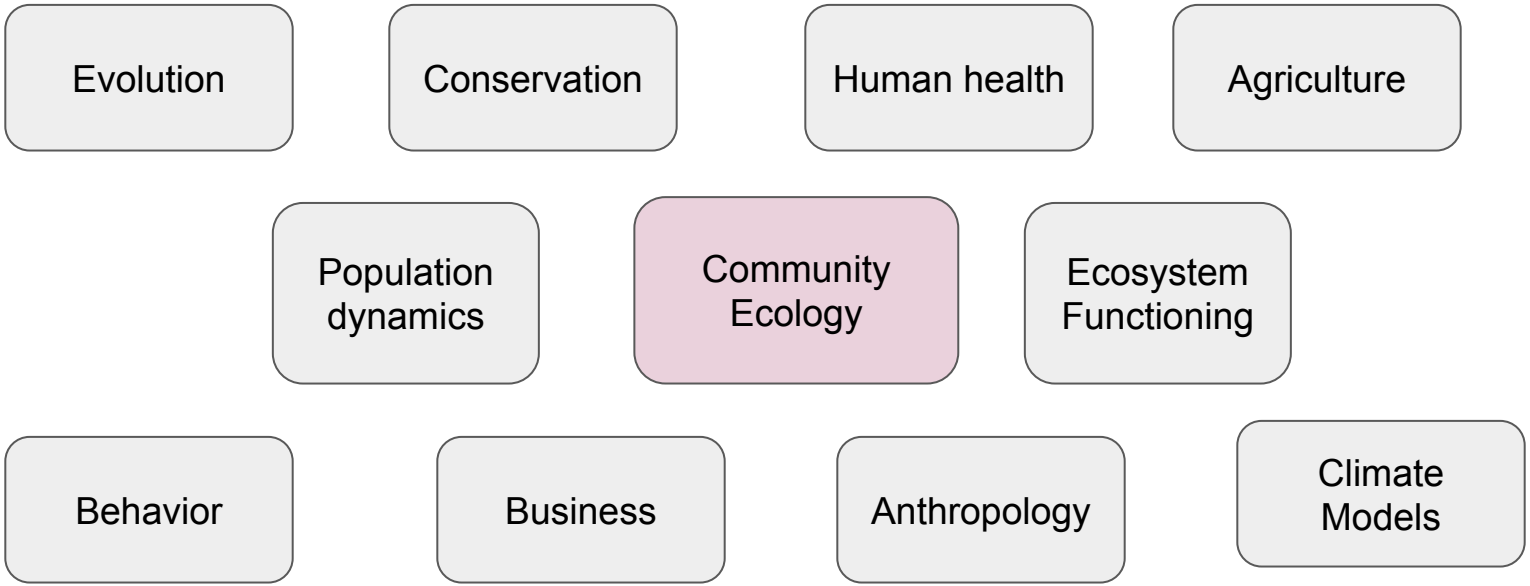


Why Community Ecology?



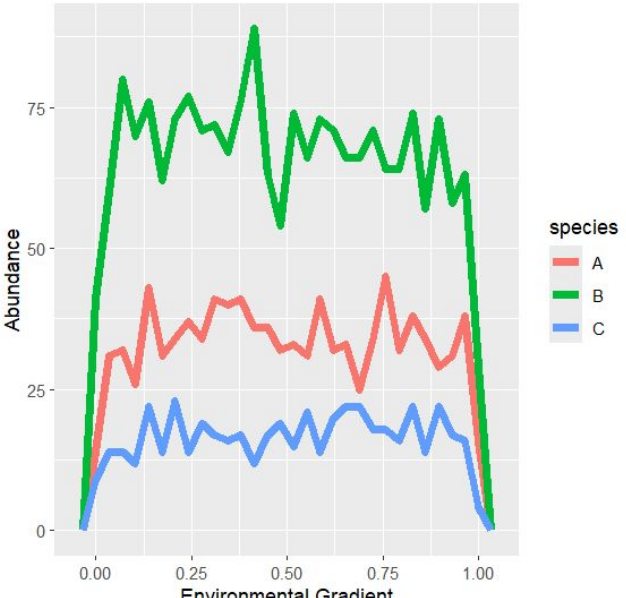
Questions?

The history of community ecology

The history of community ecology

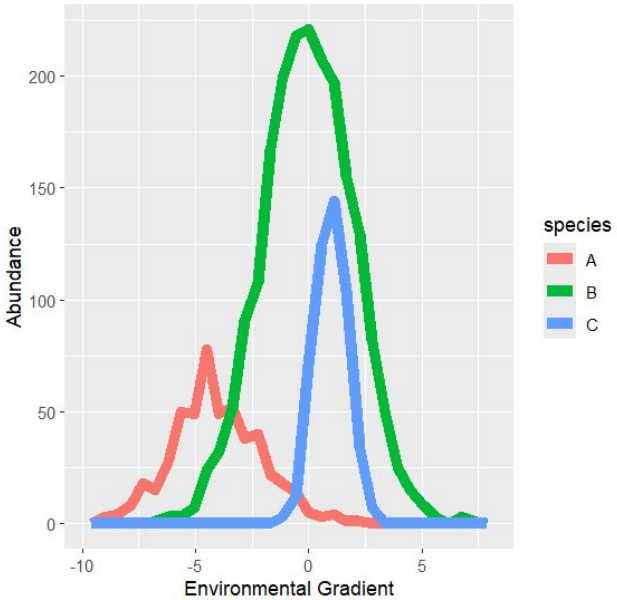
- Started with plant ecologists in the early 1900's
- Thought there were fixed types of communities
- Communities progressed towards a stable "climax community"

Image: Florida Department of Environmental Protection



The history of community ecology

- The idea of fixed types of communities has been abandoned
- Communities as aggregations of individual species



Meanwhile, in the animal world…

- Focus on demographic processes
- Focus on interspecific interaction (competition, predation)

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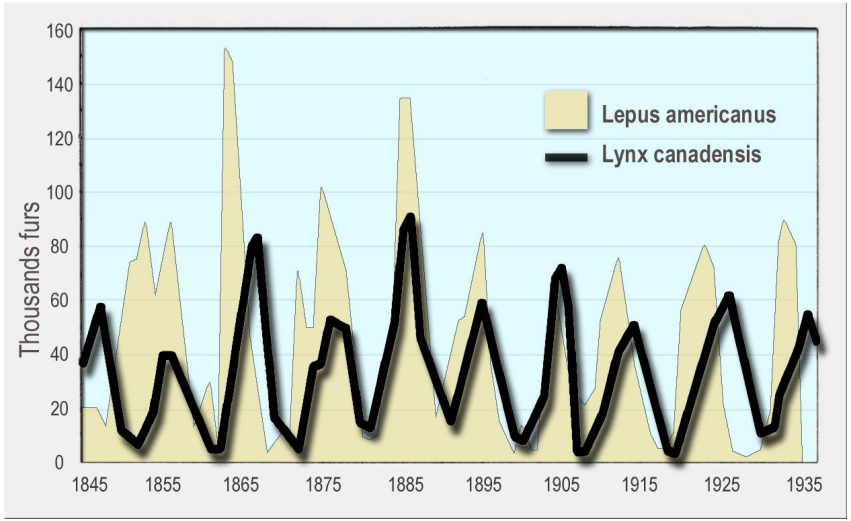
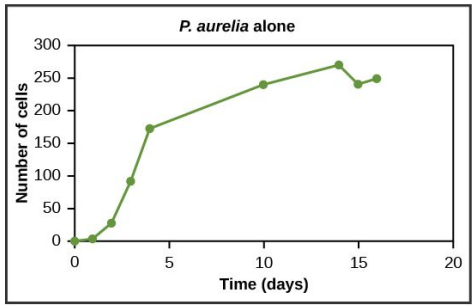
$$\frac{dx}{dt} = \alpha x - \beta xy,$$
$$\frac{dy}{dt} = -\gamma y + \delta xy,$$

Lotka-Volterra Model



Meanwhile, in the animal world…

- Mathematical equations let to predictions about coexistence
- Tested in experimental systems
- Competitive Exclusion Principle



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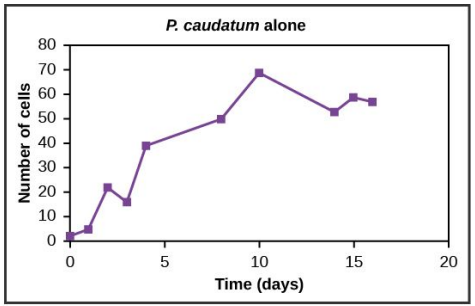

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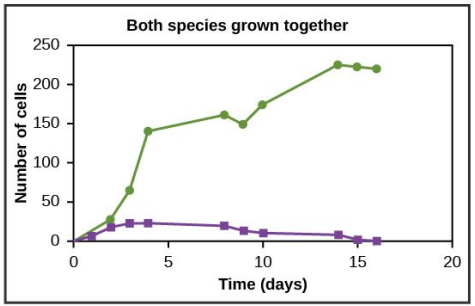


(c)

CNX OpenStax - http://cnx.org/contents/GFy_h8cu@10.53:rZudN6XP@2/Introduction

Plants vs Animals

Plants - Focus on what lives where

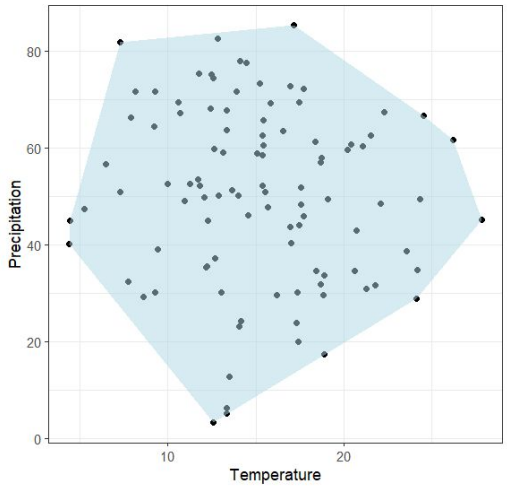
Animals - Focus on interactions

These different focuses make sense!

- Differences in generation times, predation vs herbivory

Niche Concept

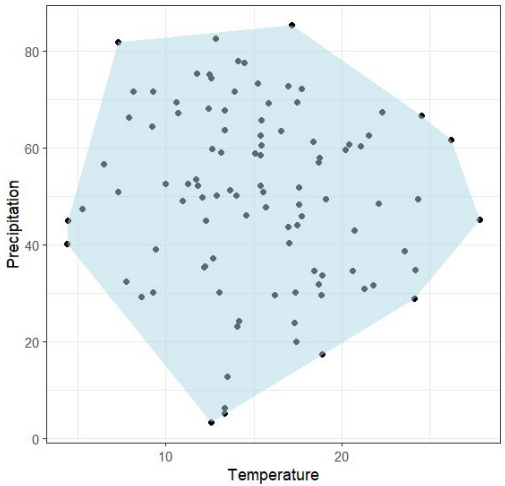
Grinnellian (Abiotic) Niche: Environmental requirements

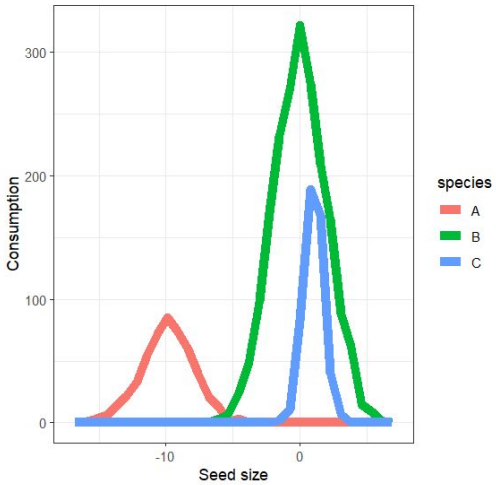


Niche Concept

Grinnellian (Abiotic) Niche: Environmental requirements

Eltonian (Biotic) Niche: Species' interactions in a community



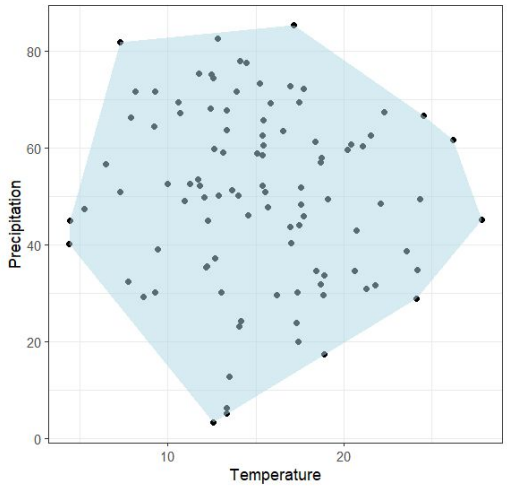


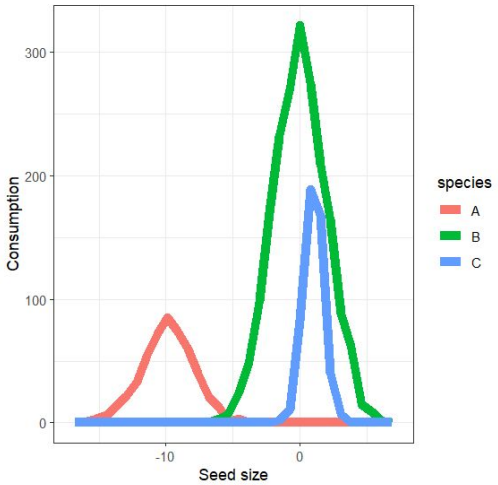
Niche Concept

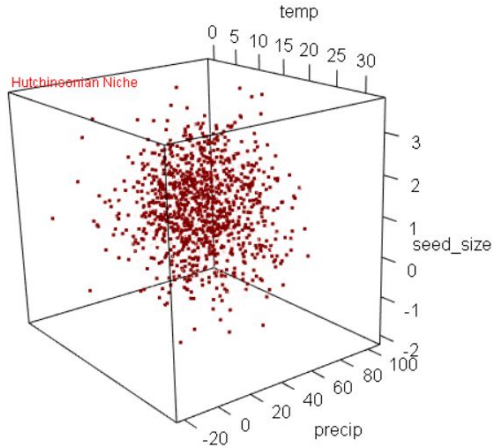
Grinnellian (Abiotic) Niche: Environmental requirements

Eltonian (Biotic) Niche: Species' interactions in a community

Hutchinsonian (n-dimensional) Niche: Environment + Interactions

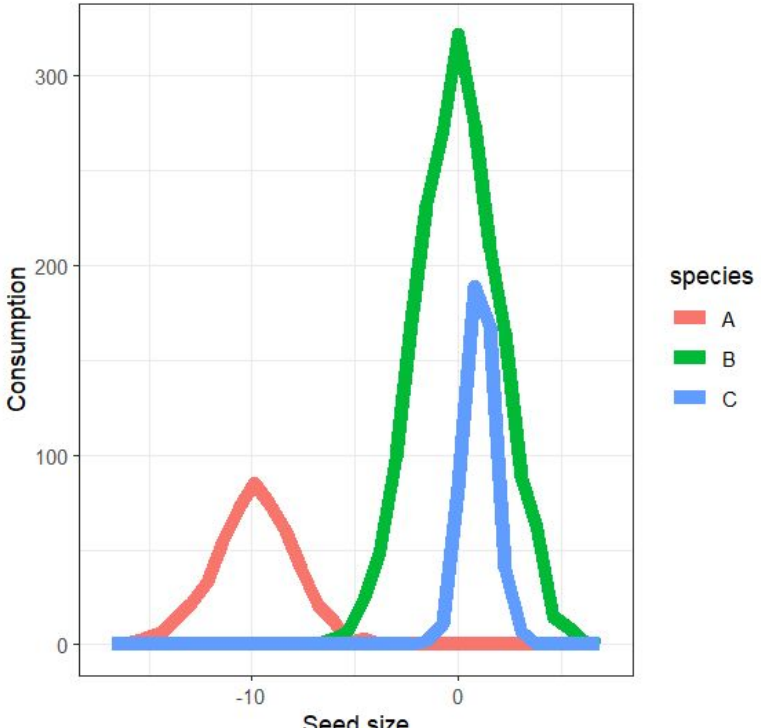






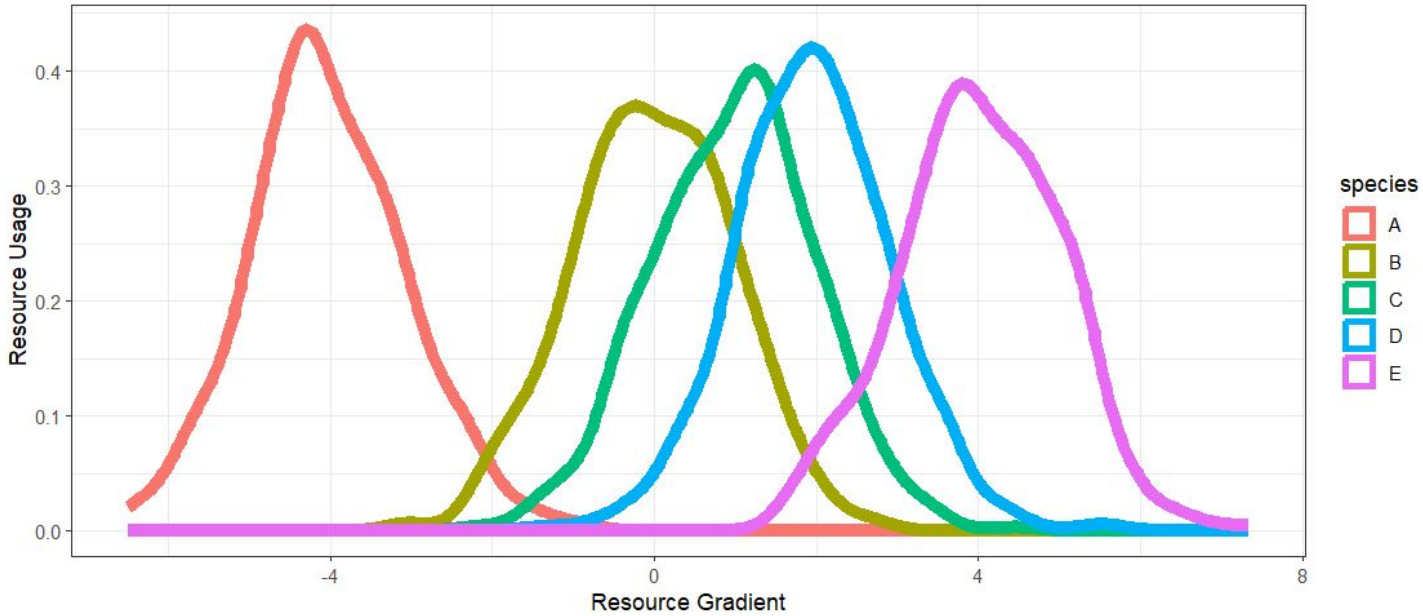
Linking Niches to Competition

- Competitive exclusion rule tied to niche overlap
- Do niches have to be identical?



Limiting similarity

- Improvement on the competitive exclusion principle



Reality Set In

- Nature is complicated
- Competition isn’t the only thing to consider
- Importance of null models
- Different, interacting processes operate at different scales

Community Ecology Today

- Most of that “historical” stuff is still relevant
- Embracing diversity of questions, mechanisms, approaches
- Fancy stats and computational methods
- New tools
- Open Science / Open Data
- Still lots of basic research and data to do

Next Class: Diversity Patterns