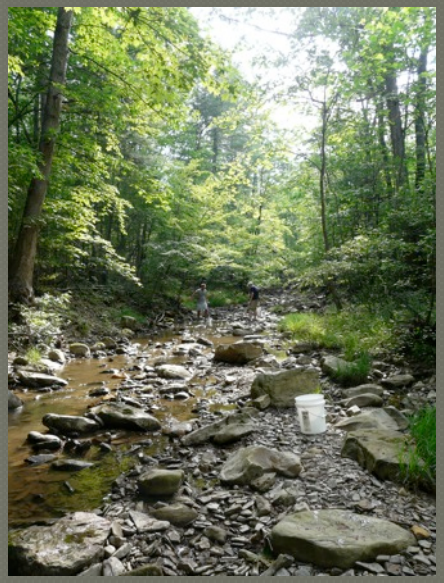
Introduction to Ecology

BISC 204



Dr. Wendy Palen
(wpalen@sfu.ca)

TA's:

Nico Muñoz *Thurs tutorials

(nicom@sfu.ca)

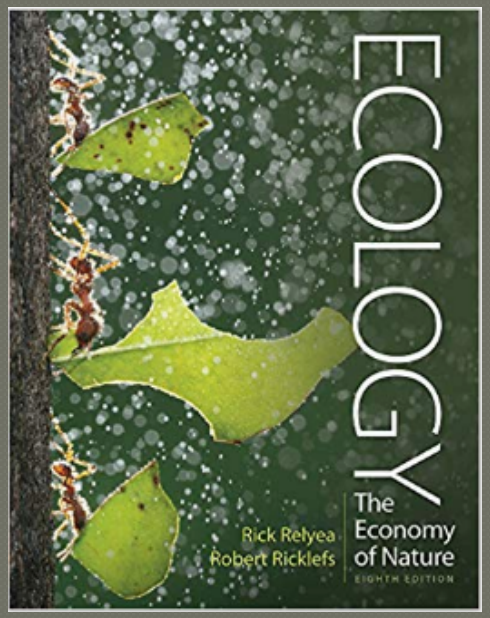
Rylee Murray *Tues tutorials
(ryleem@sfu.ca)

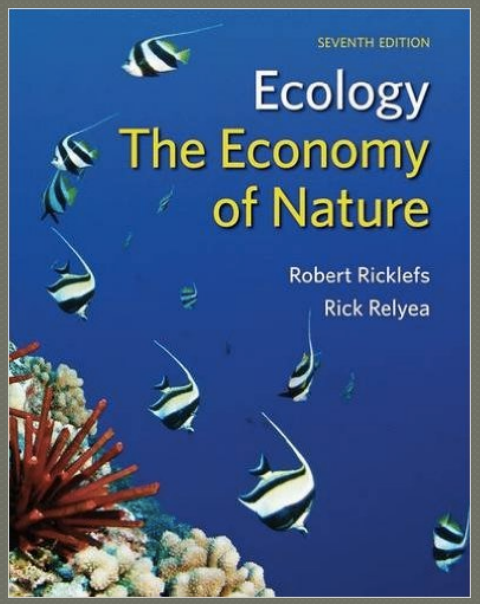
Course Website

www.sfu.ca/biology/courses/bisc204

- All important course information will be posted to the above website
- Lecture notes (available prior to lecture), lecture slides (after), syllabus
- **This class DOES NOT use Canvas for class announcements**

Textbook





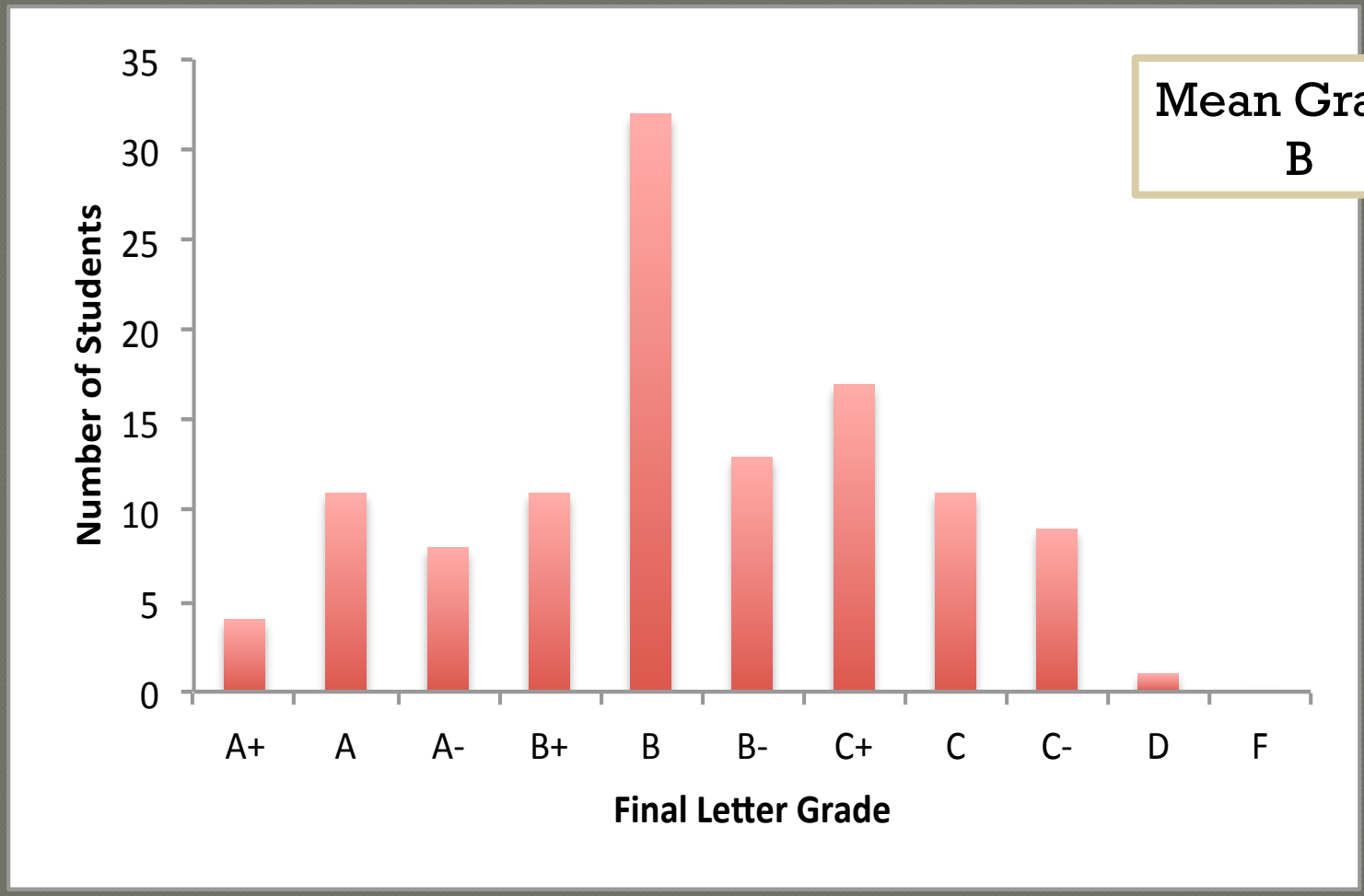
- RECOMMENDED but not required
- Helps clarify concepts for many students, but lectures will not follow the text closely
- 8th Edition available at SFU Bookstore
  - Cheaper used on Amazon

Grade distribution & deadlines

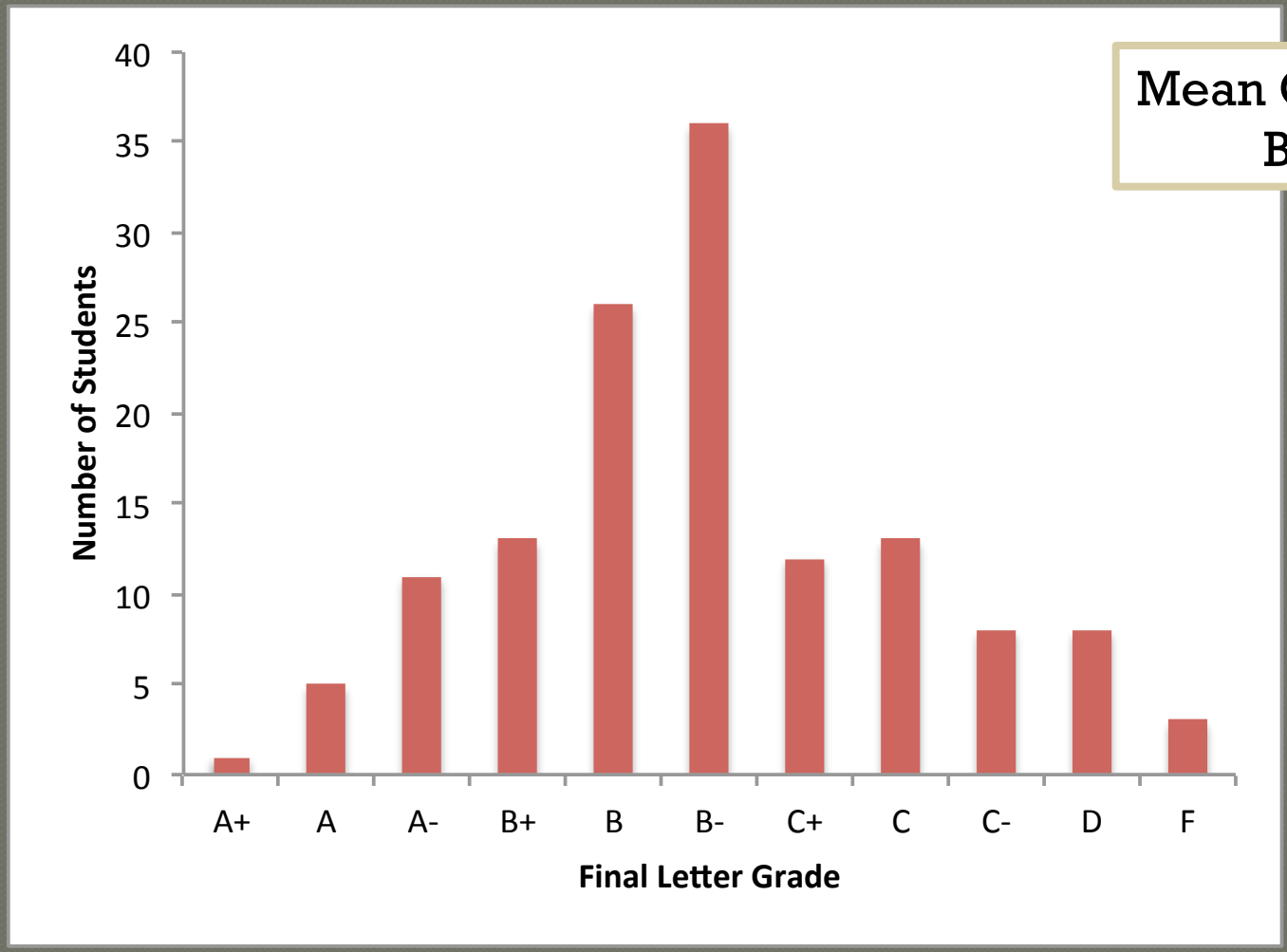
Activity	Date	Percent of final grade
Exams		
1	Thursday – Sept. 26	15
2	Thursday – Oct. 24	15
3	Friday – Dec. 5	25
Paper review		
Rough draft & peer review	Week of Oct. 1 (tutorial)	*
Final draft	Week of Oct. 7 (tutorial)	5
Presentation	Weeks of Oct. 28th/Nov. 4th (tutorial)	5
In-class exercises (4)		
Estimating population size	Thursday – Sept. 12	5
Population dynamics	Thursday – Sept. 19	5
Community ecology experiments	Thursday – Oct. 17	5
Nutrient budgets	Thursday – Nov. 21	5
Graphical Analysis	Thursday – Nov. 28	5
Tutorial attendance & participation	Ongoing	10
TOTAL		**100**

- If you think you'll miss an exam or assignment, you MUST contact me as soon as possible & provide supporting documentation
- Students with disabilities who require accommodation (csd_office@sfu.ca)
- Tutorial Attendance is **MANDATORY (starts next week)**

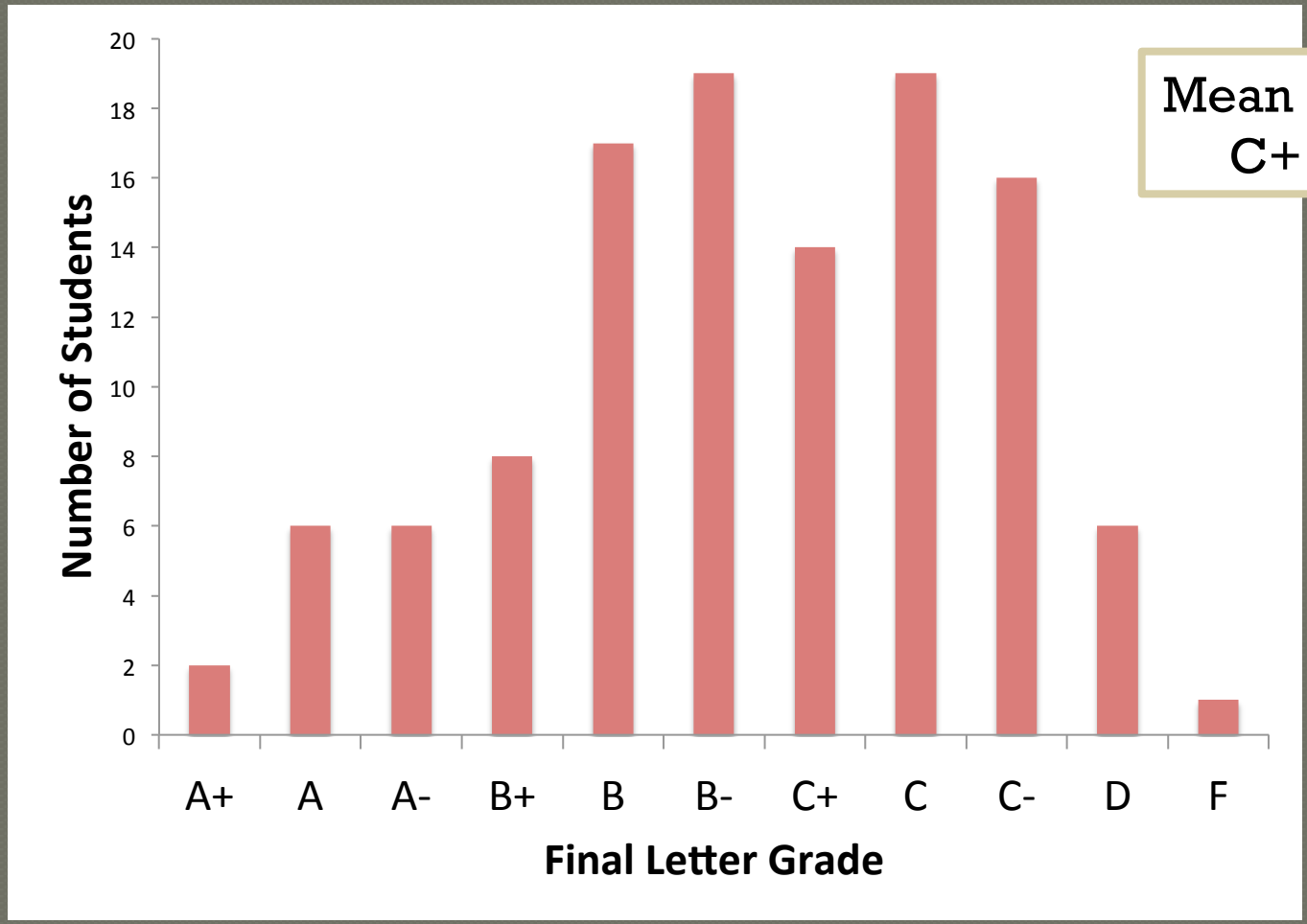
Final Grades: Fall 2018



Final Grades: Fall 2017



Final Grades: Fall 2016



STUDENT LEARNING COMMONS

Learn. Collaborate. Grow.

learningcommons.sfu.ca

YOUR ACADEMIC SUCCESS CENTRE

☑ **Learning Strategies**
- Manage your time
- Improve your study skills
- Read texts more effectively
- Get more from lectures

☑ **Writing Strategies**
- Plan your paper
- Develop effective arguments
- Improve coherence and flow
- Learn self-editing skills

☑ **Services are FREE** for all SFU undergraduate and graduate students!

☑ **Plus...**
- EAL/ESL (English Conversation Groups)
- MS Office workshops

SFU

BURNABY
Bennett Library
Room 3020

SURREY
Room 3695
Podium Level 3

VANCOUVER
Belzberg Library
Harbour Centre

Visit in person or online at
www.learningcommons.sfu.ca

A little about me…

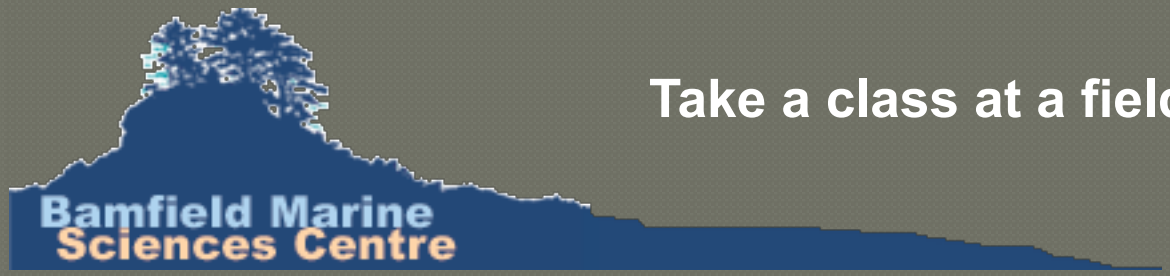
- Univ. of Virginia
- PhD: Univ. of Washington
- Postdoc: UC-Berkeley

- At SFU since 2007

- Freshwater Ecology, Conservation Biology

- Amphibians, Fishes, Population dynamics of species at risk of extinction, Energy Development, impacts of climate change

Learning ecology in the classroom is not ideal….



Take a class at a field station

SFU

NSERC CRSNG

Get involved in research to learn more

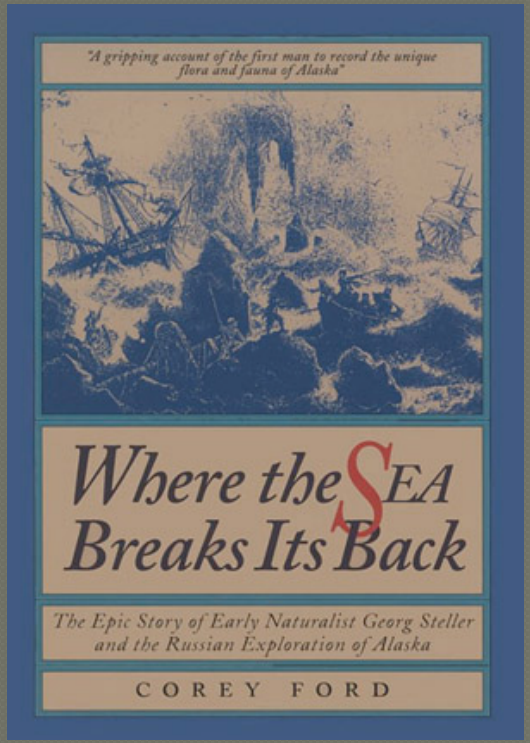
Volunteer!

Take BISC 298/497/498 –Research for credit courses

Apply for a summer undergraduate research award (USRA)

Do a research honors thesis (BISC 490/491/492)

Brief history of *Ecology* (read about it: Ricklefs Ch.1)



- 18th C natural history as an occupation
- Initial interest in what regulated populations
  'demography' - human, fisheries, etc.
- 'Harmony' in nature - systems stable and in equilibrium
  pervasive concept…
- Ecology of disease (epidemiology)
- mid-1800's (19th C) saw increasingly complex ideas & understanding
- modern ecology came into public view in 1960's

WHY?

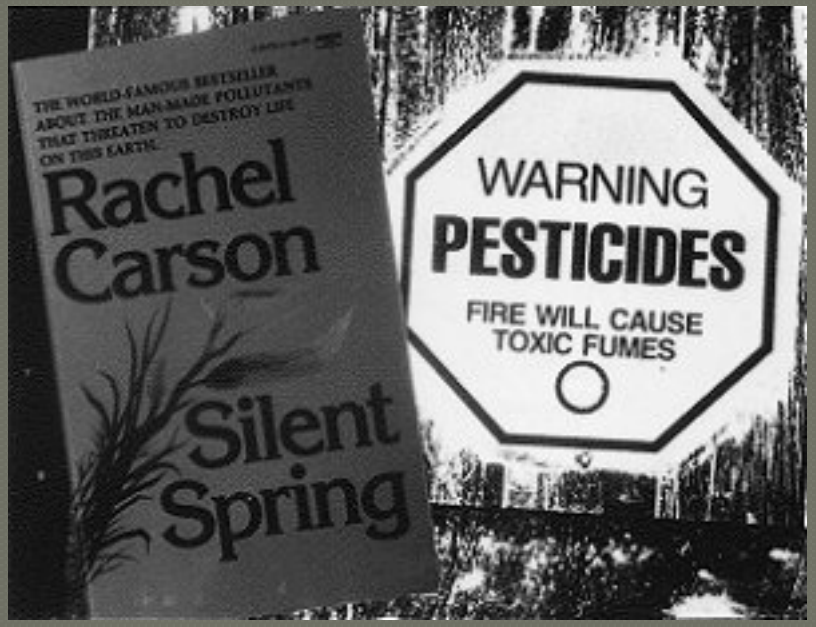
Rapid industrialization --> environmental degradation

Nuclear technology (Trinity test 1945)

Space travel

Silent Spring by Rachel Carson

Population Bomb by Paul Ehrlich



And why is it relevant today?

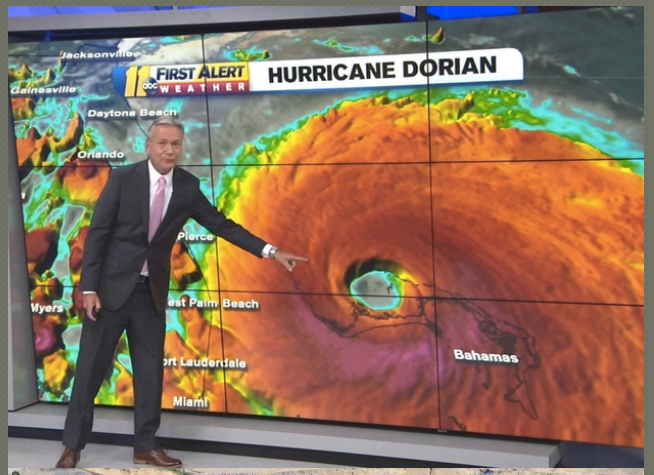
Wealth disparity → Environmental degradation

Human Population Growth

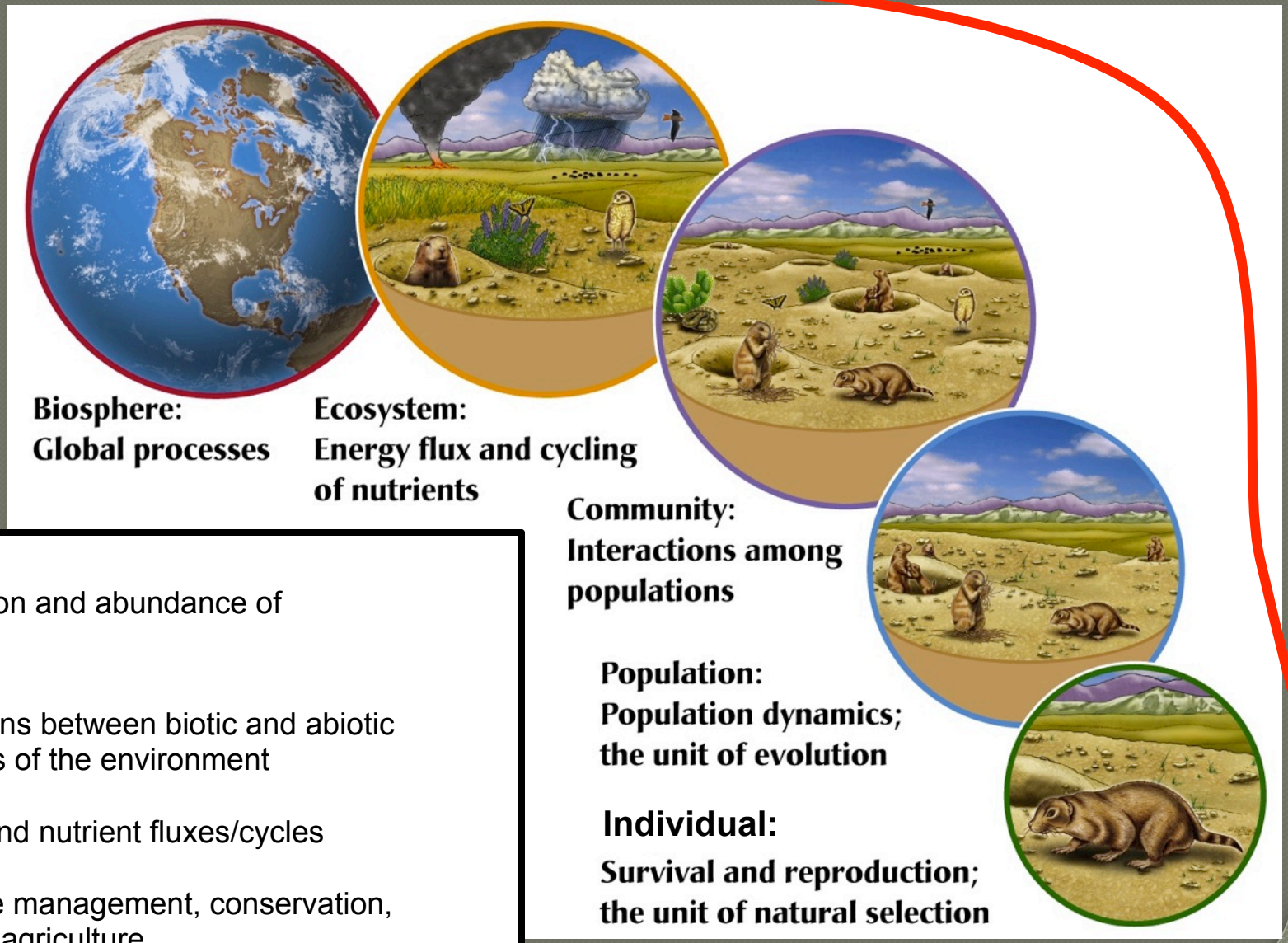
Climate change → Refugees

Natural hazards → Social & Env $$

And on, and on...



What is *Ecology* ?



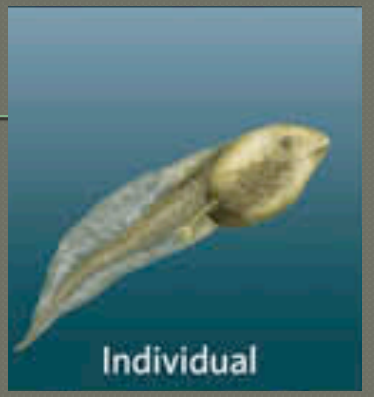
1. Distribution and abundance of organisms

2. Interactions between biotic and abiotic components of the environment

3. Energy and nutrient fluxes/cycles

4. Resource management, conservation, restoration, agriculture

Individuals



Individual:

- acquire nutrients and energy, and produce wastes
- have a membrane boundary that separates internal processes from the external environment.

Species: individuals that are capable of interbreeding or share genetic similarity.

- This definition is not universal...

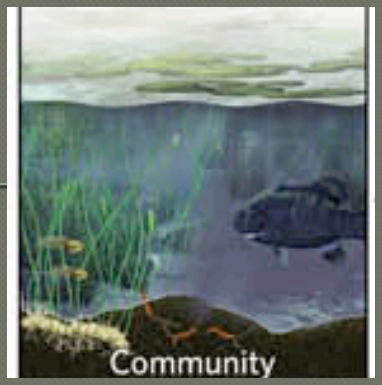
Populations

Population: individuals of the same species living in a particular area.

- Boundaries can be natural (e.g., forest edges) or political (e.g., state lines).

Geographic range (distribution) is the extent of land or water within which a population lives.

Communities



Community: Populations of species living together in a particular area.

- Boundaries are not always rigid, and may cover small or large areas.

Includes many types of interactions, such as predation and competition.

Example: Cheetahs and gazelles on the African plains.

Chapter 1 Figure 01-03
Ecology: The Economy of Nature, Seventh Edition
Photo by Michel & Christine Denis-Huot/Photo Researchers, Inc.

Ecosystems

Ecosystem: one or more communities of living organisms interacting with their nonliving physical and chemical environments.

→ movement of energy and matter between physical and biological components.

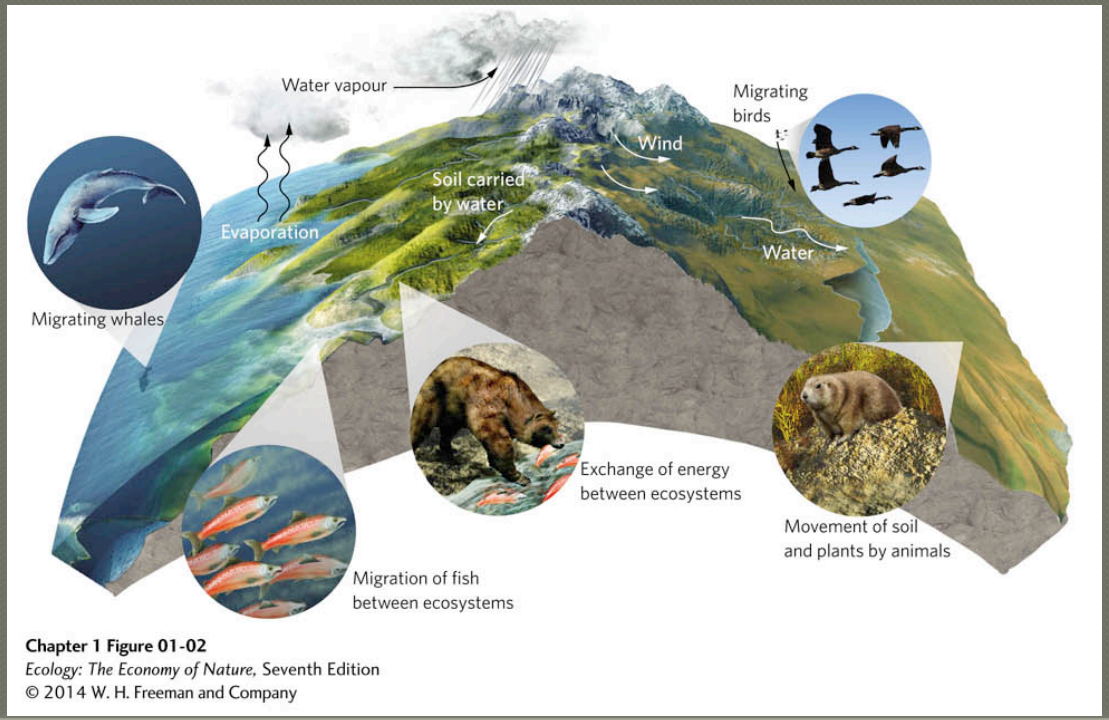
→ "flow" of material from "pools" of elements, such as carbon, oxygen, hydrogen, nitrogen, and phosphorus.

Boundaries are often not distinct

The Biosphere

Biosphere: all ecosystems on Earth.

Distant ecosystems are linked together by exchanges of wind and water and by the movement of organisms.



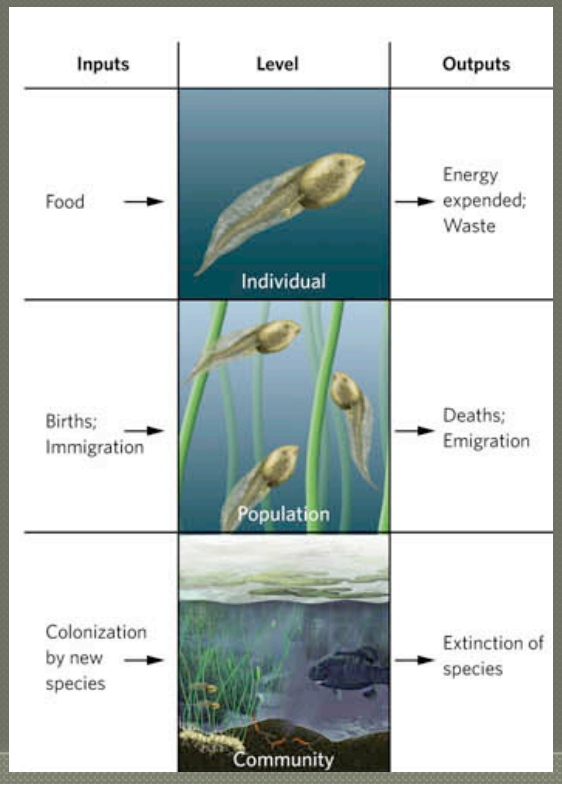
Chapter 1 Figure 01-02
Ecology: The Economy of Nature, Seventh Edition

Governing principles of ecology

Matter and energy cannot be created or destroyed, but can change form (i.e. first law of thermodynamics).

Ecological systems gain and lose matter and energy.
A dynamic steady state occurs when gains and losses are in balance.

Gains →



→ Losses

Approaches to *Ecology* (read about it: Ch. 1)

Descriptive - observe/describe patterns

Functional - understand dynamic relationships, mechanisms

proximate causes for patterns

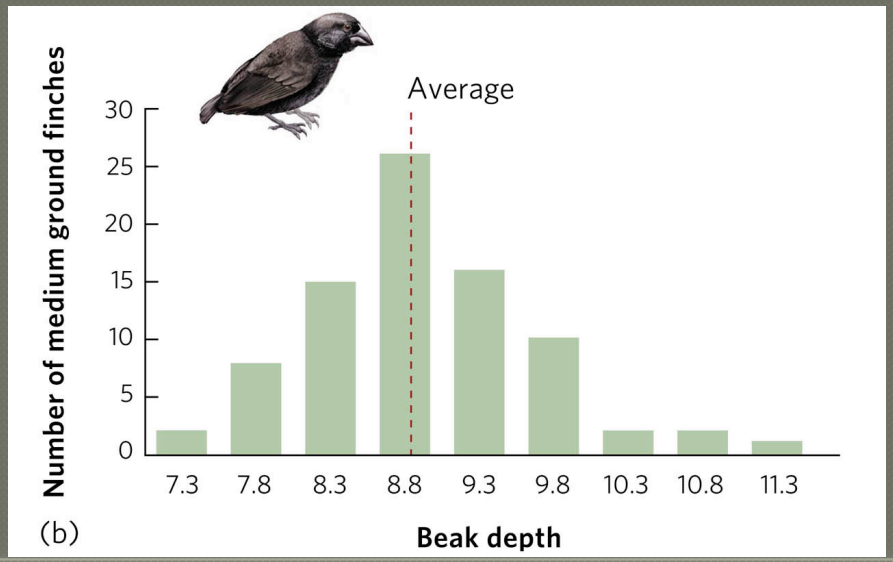
Evolutionary - understand historic reasons for adaptations

ultimate causes for patterns

**All three are necessary for 'good' ecological understanding

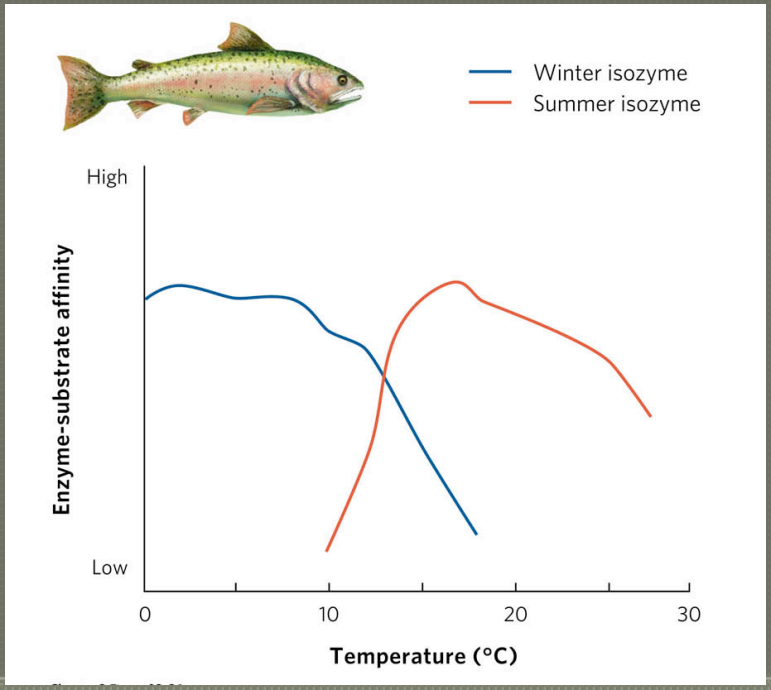
Review Concepts (Ch. 7):

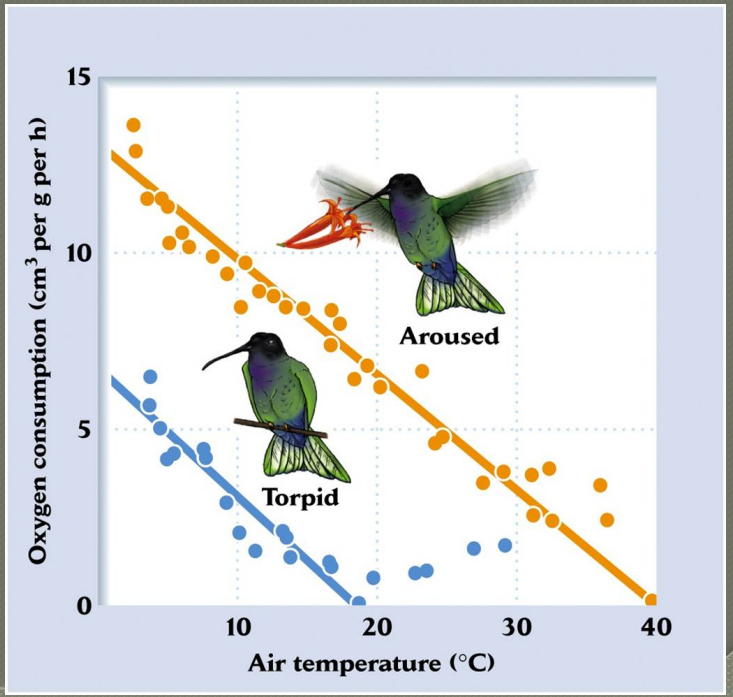
- Evolution by natural selection
- Adaptation
- Fitness



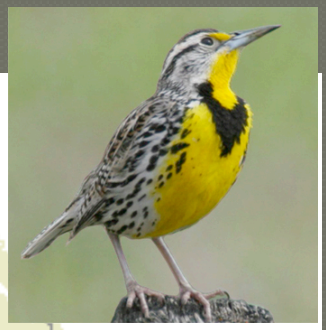
Ecological Adaptations (Ch. 2 & 3):

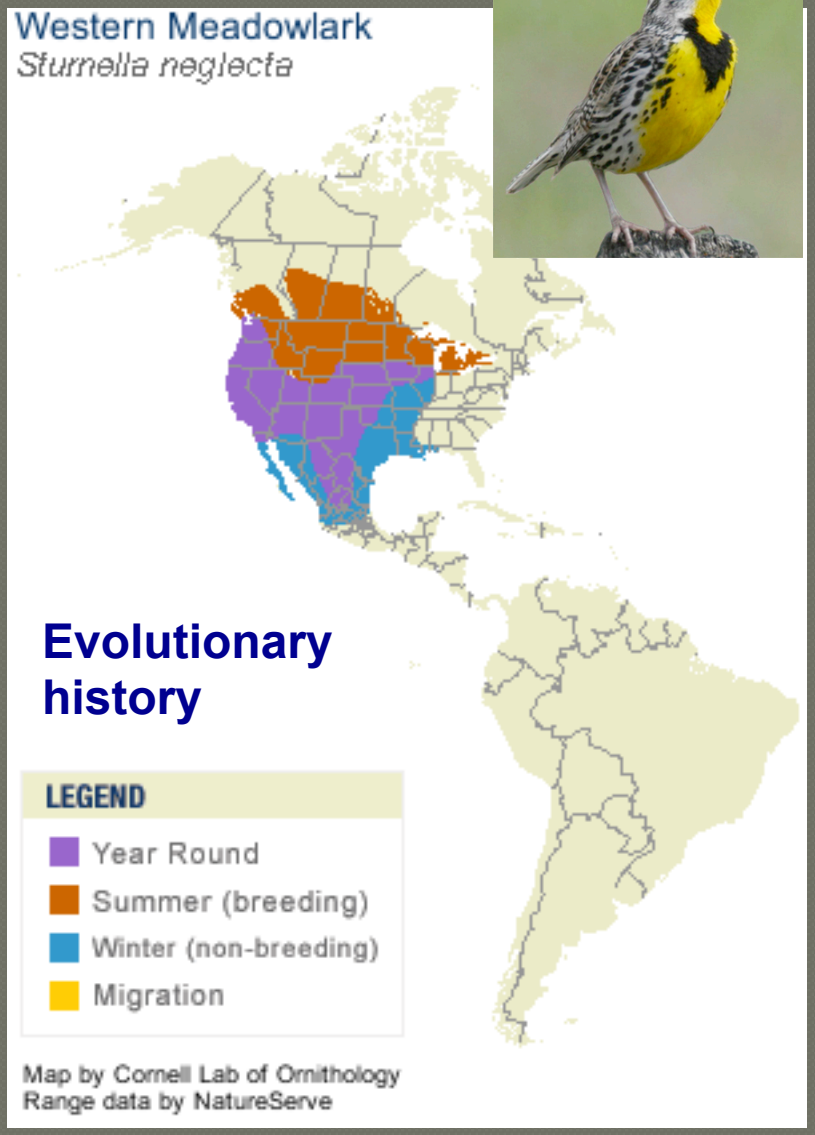
- Aquatic Environments (Ch. 2)
- Terrestrial Environments (Ch. 3)



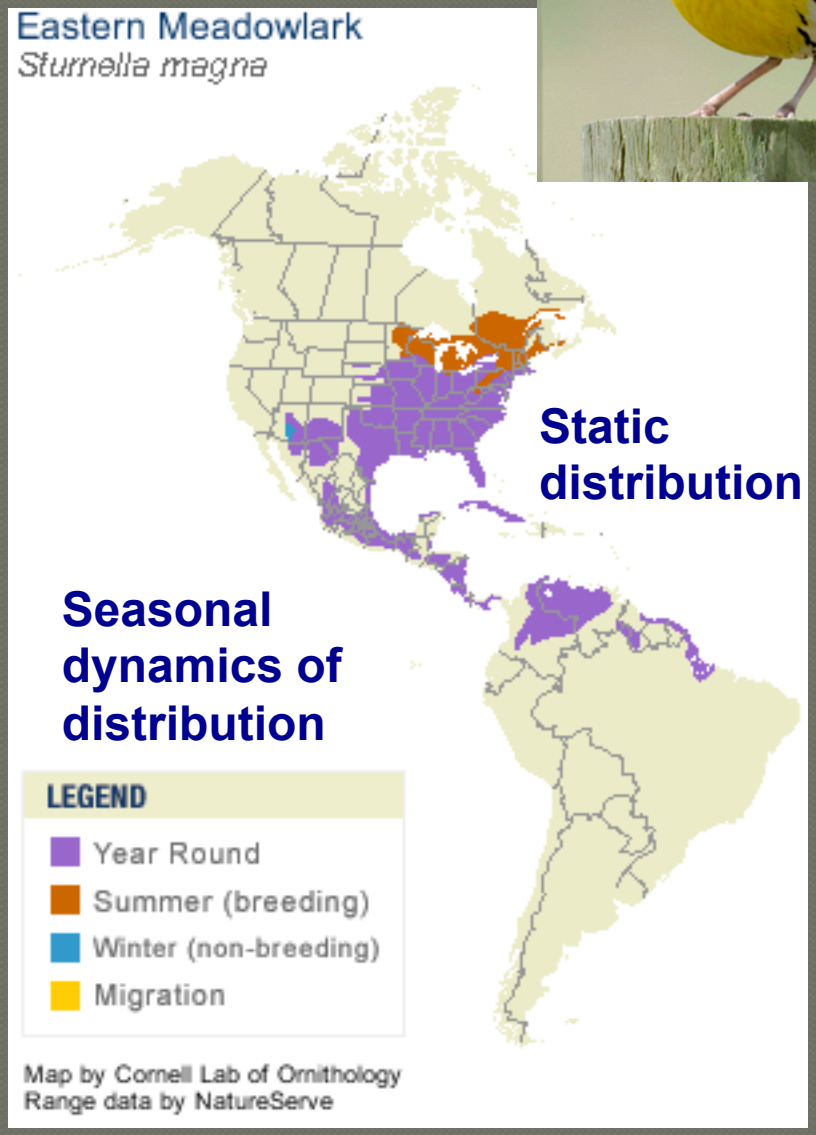


Examples of Ecological Questions:





Evolutionary history



Static distribution

Seasonal dynamics of distribution

Things to remember:

1) Download lecture notes before class

2) Bring calculator for all in-class exercises (check the syllabus for dates)

3) Check the website for updates to the syllabus, readings, assignments. These things are *not* fixed…

4) Come for help, early and often! We're here to help, but please respect your TA's (and my) time. Use office hours and tutorials.