ESM 221
Applied Environmental Studies: Preparation for Problem Solving

Dr. John Rueter

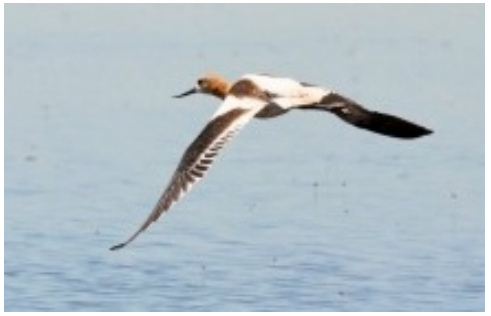
Outline

- Course organization & goals
- Biodiversity & ecosystem function
- Population growth introduction
  - factors affecting growth
  - exponential growth

Course Goals

- This course is focused on solving environmental management problems.
- We will explore concepts and tools that can be used to apply the principles of ecology for the protection of biodiversity and the restoration and maintenance of ecosystem functions.

Carp in Malheur WR, a crucial stopover for migratory birds



- Millions of non-native carp causing declines in plants & insects that birds need.
- Used to be >500,000 birds stopped each day; now 50,000
- Failed approaches: dynamite, poison, draining (for suffocation), screens… but carp always repopulated after 2-4 yrs
- Question: What should we do?

Photos: http://www.oregonlive.com/

Introductions

Prof. John Rueter

Course syllabus

Assignment 1 due date, in-class dropbox

Book

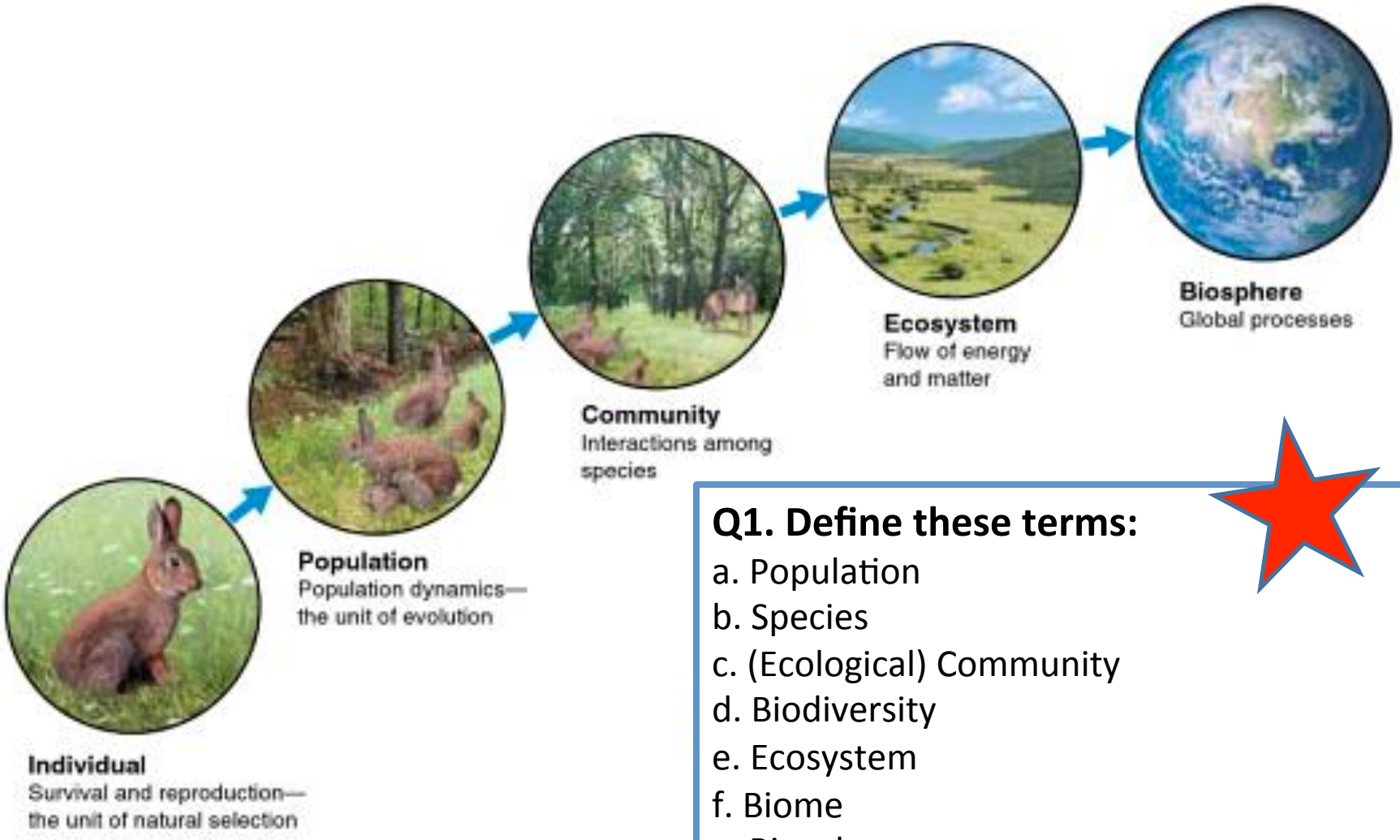
How to Succeed in this course:

- Attend class! Take notes!
- Always bring: Paper AND laptop
- In-class and weekly assignments are designed to help you ace the tests.
- Labs: Provide valuable hands-on experience. Embrace and enjoy.

Group work

- You will do a lot of individual and group work in this class from identifying simple definitions to figuring out solutions to problems.
- Each class day at the end of class, turn in your answers to the work.
- Keep your returned responses for reference and studying.

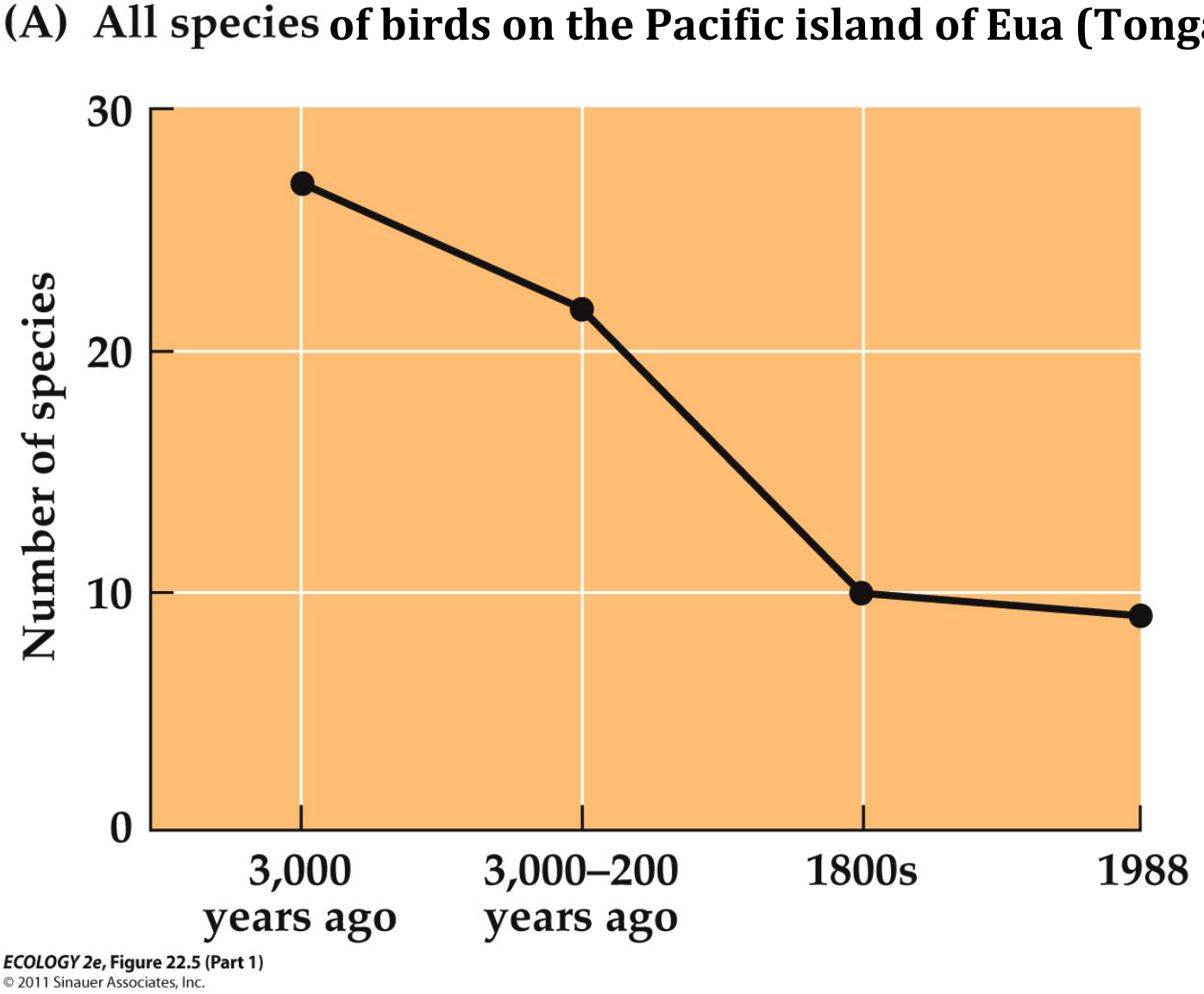
Biodiversity & Ecosystem Function



Q1. Define these terms:

a. Population
b. Species
c. (Ecological) Community
d. Biodiversity
e. Ecosystem
f. Biome
g. Biosphere

Biodiversity is declining globally.



ECOLOGY 2e, Figure 22.5 (Part 1)

Humans having been causing extinctions for centuries.

Extinction rates estimated from the fossil record are 2-3 **orders of magnitude** lower than now.

The extinction rate for mammals and birds:
background: **1** species **every 200 years**
current: **1 species per year**,

Average species life span:
background: 1-10 million years;
current: 10,000 years.

Declining Biodiversity

Declining global biodiversity can be explained by reference to the five *HIPCO* factors

H Habitat Loss & fragmentation

I Invasive Species

P Pollution

C Climate Change

O Overharvesting (direct killing)

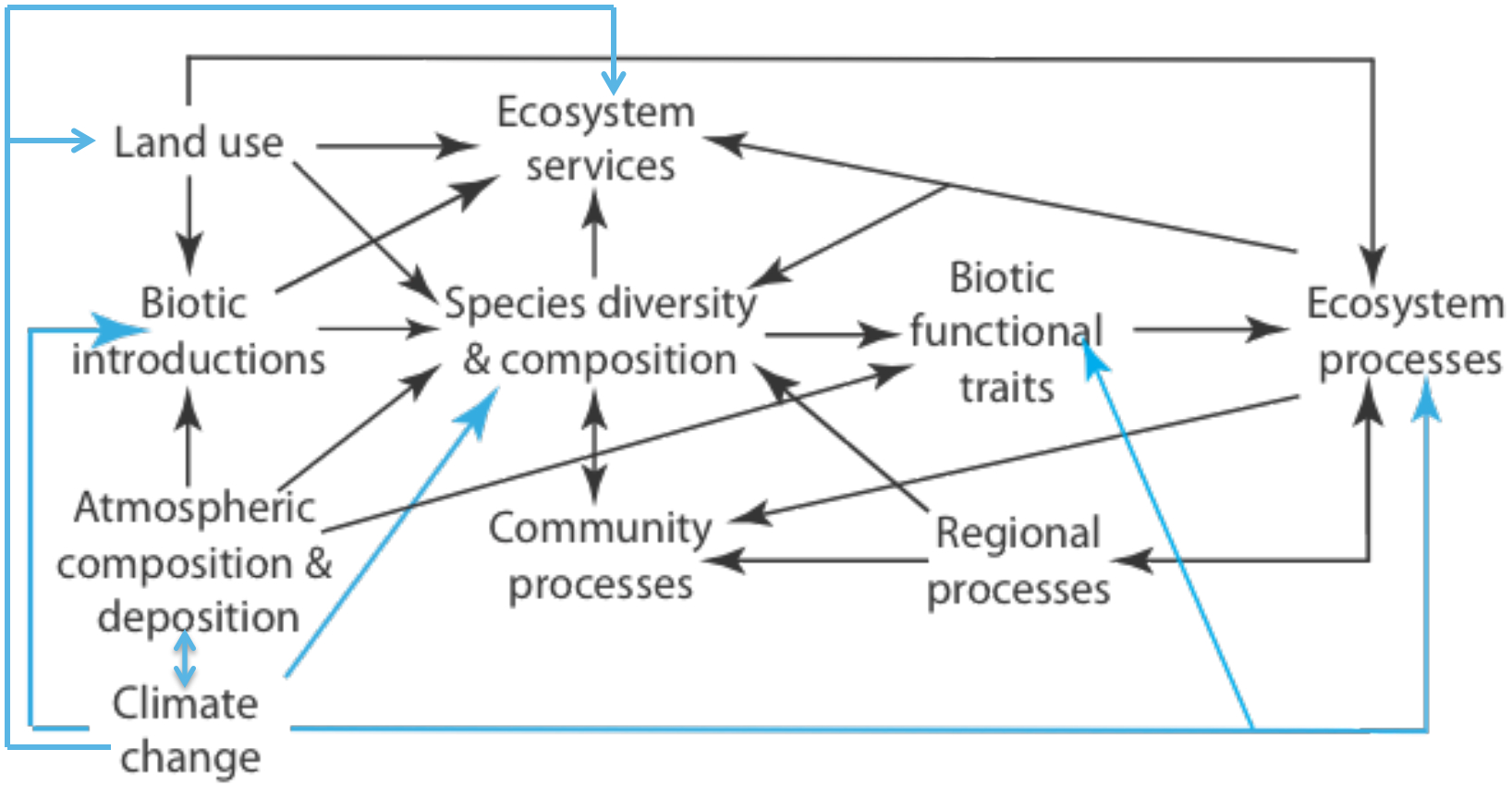
What do we need to know to manage populations and ecosystems and restore biodiversity and ecosystem function?

1. What do we know about populations?

2. How can we manage local biodiversity and ecosystem functions?

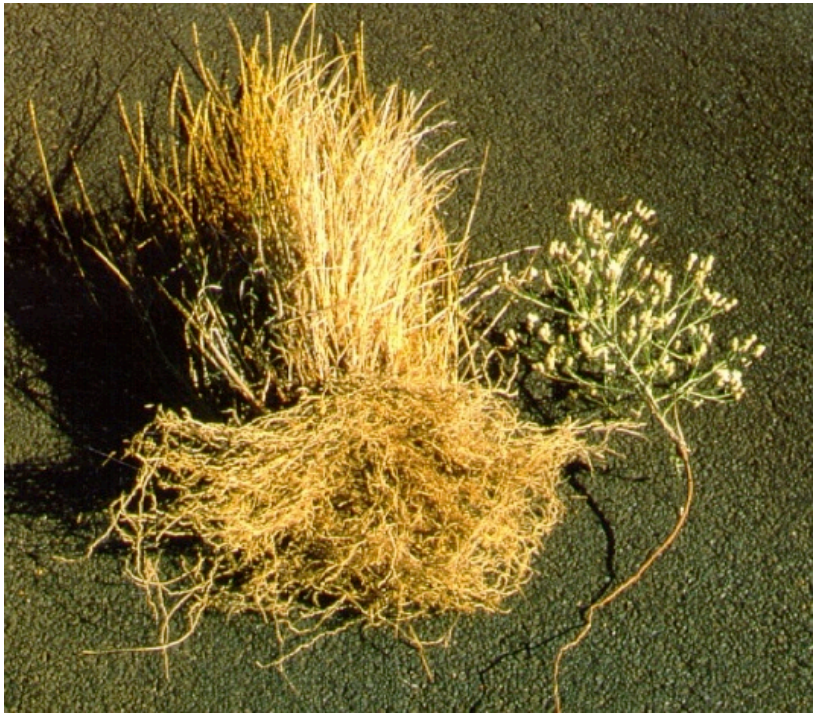
3. How can we manage global cycles?

Biodiversity and ecosystem function are related



Modified from Chapin et al. 1997

Species have unique roles. Their functional traits affect ecosystem process of erosion rate



Example: Fibrous root of native bunch grass vs. taproot of the non-native spotted knapweed