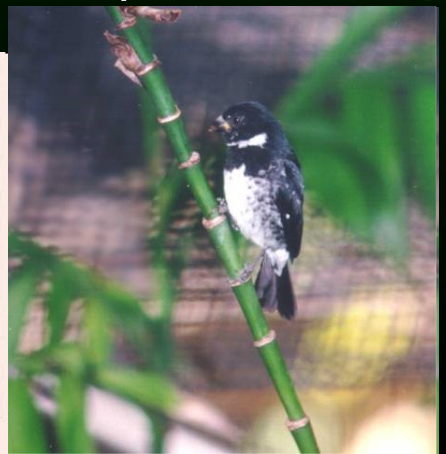
Species Abundance and Diversity
Chapter 16

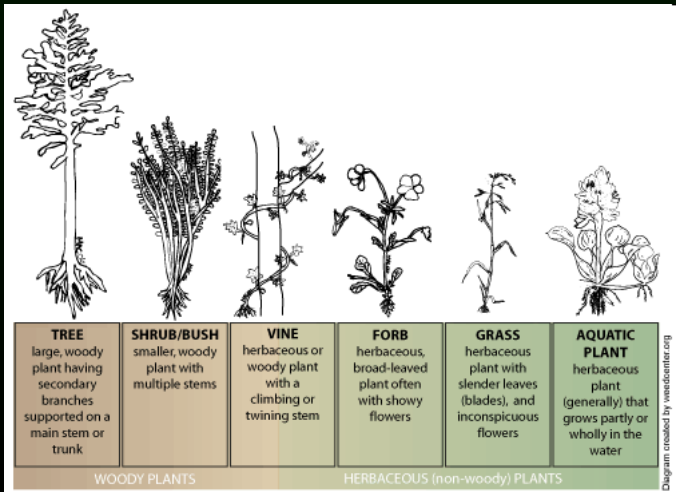
Moving from interactions between 2 organisms to many!!!

Some community-related terms!

- Community: Association of interacting species inhabiting some defined area.
  - Community Structure includes # of species, relative species abundance, and species diversity.
- Guild: Group of organisms that all make their living in the same fashion (can be closely related or not!).
  - Seed eating animals in the desert.
- Life Form (growth form): Combination of structure and growth dynamics (used for plants).

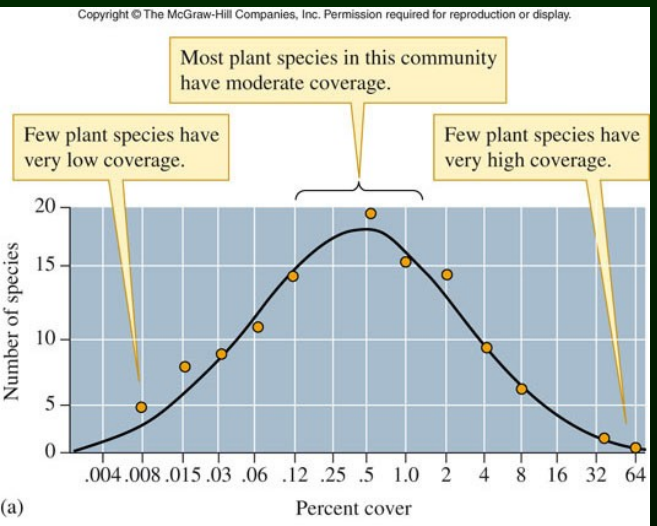
Rodents in the study area are caught, tagged and released.





Species Abundance

- Most species are moderately abundant – few are extremely abundant or rare!



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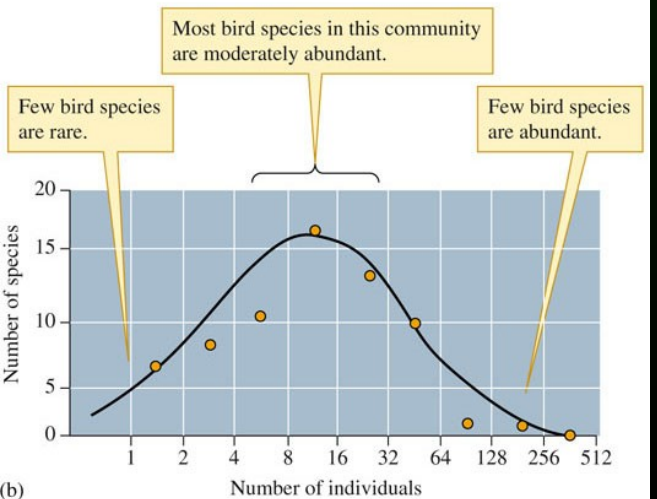


(b)

% cover for plants! Why???

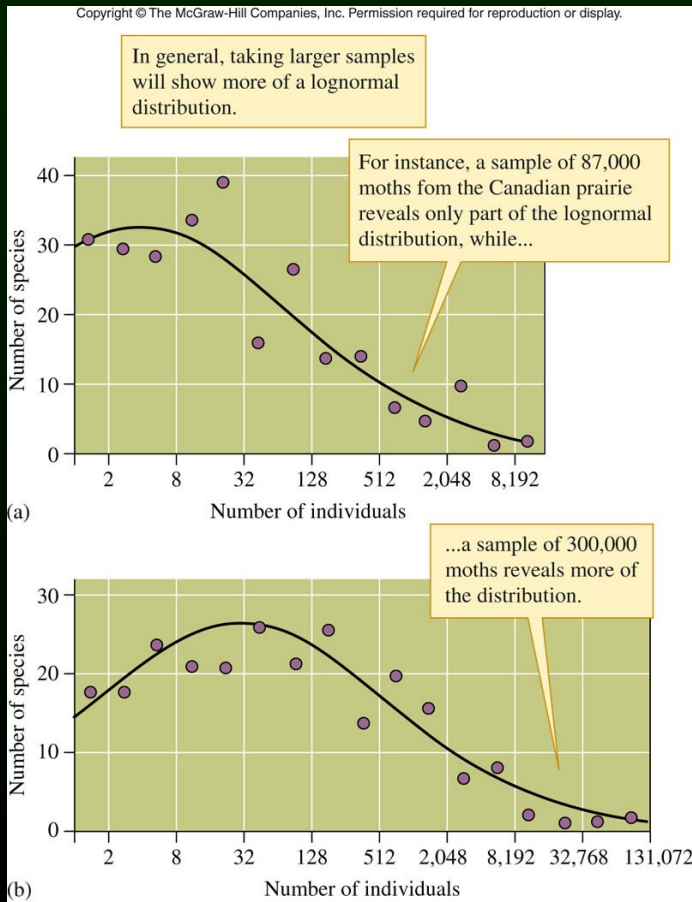
Called lognormal distribution (bell curve)

Lognormal Distribution

- *May* proposed lognormal distribution is a statistical expectation.
- It's the product of many environmental variables
- Sample size is very important.

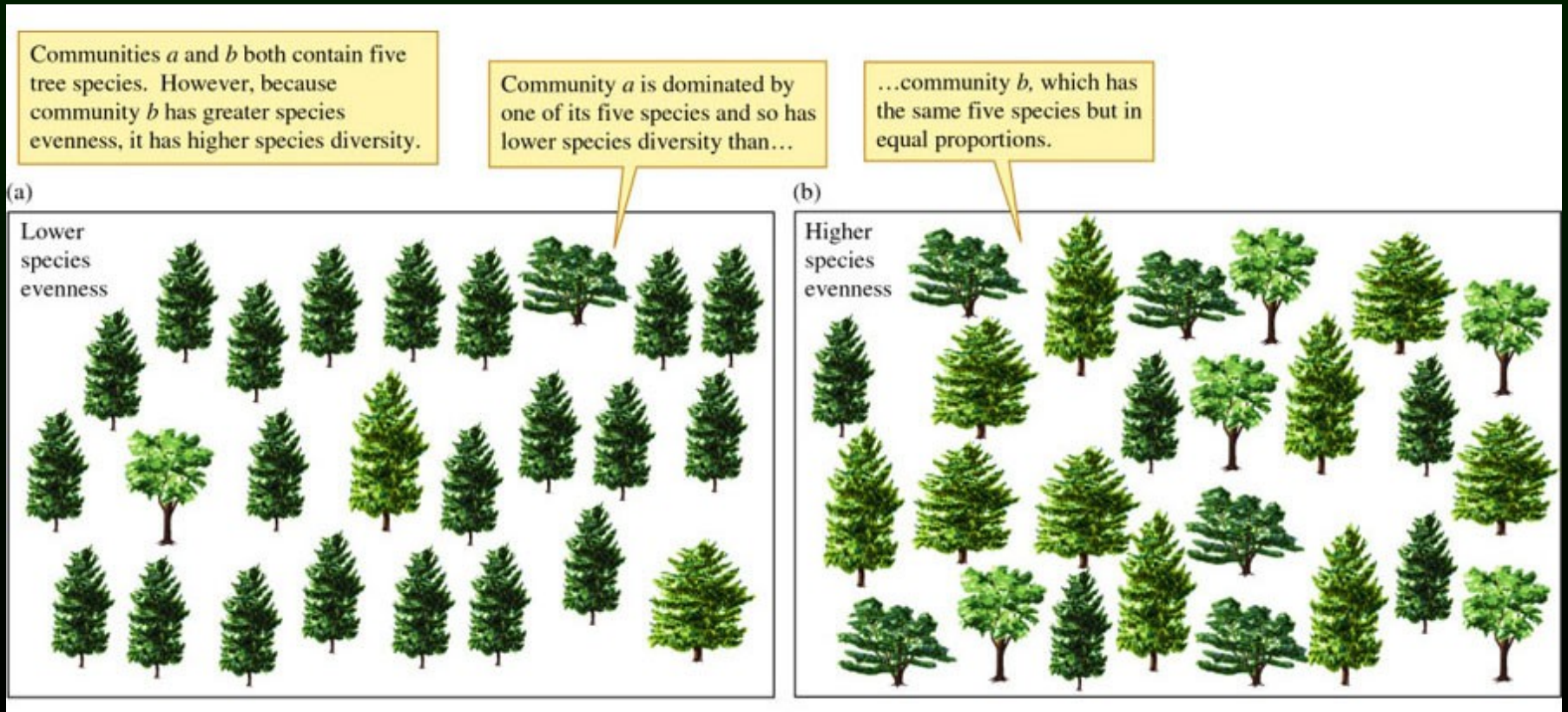
The more you sample, the more you find, the more "lognormal" the distribution will be!

How does this relate to your test grades???



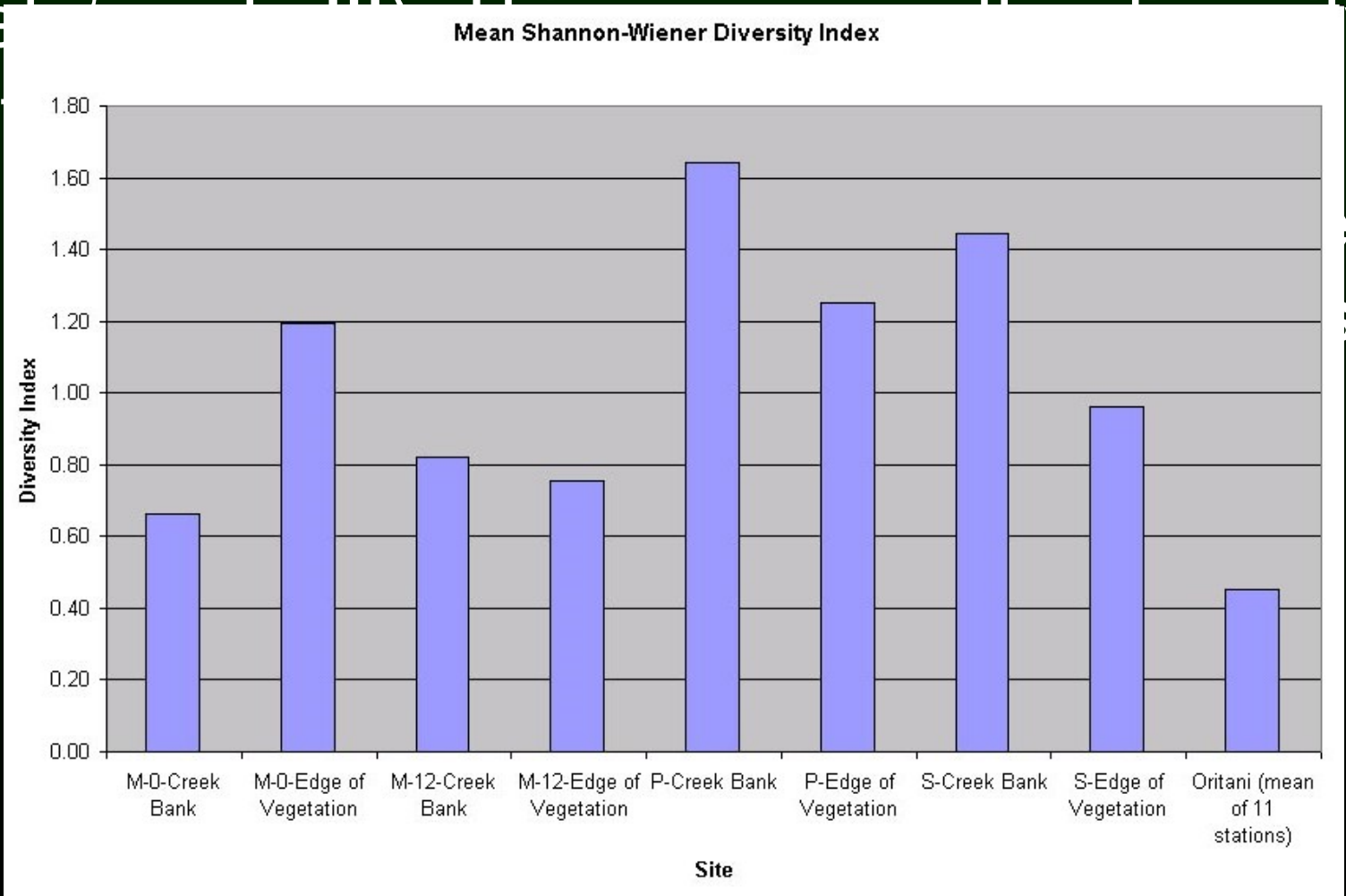
Species Diversity

- Two factors define species diversity:
  - Species Richness
    - Number of species in the community.
  - Species Evenness
    - Relative abundance of species.



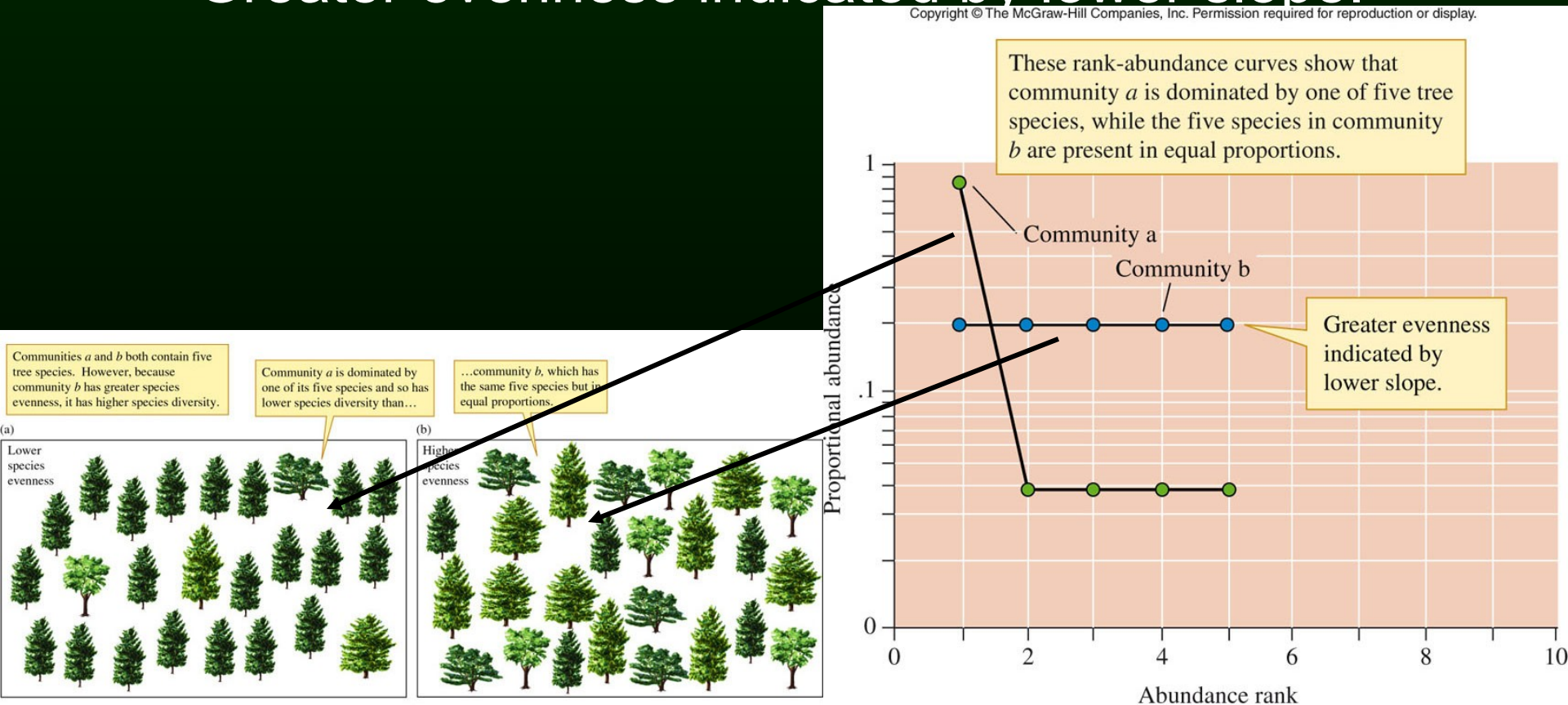
Ways to Measure Species Diversity

- Shannon Wiener Index: (don't worry about the formula!!! This is a non-majors class for Pe
wi
for

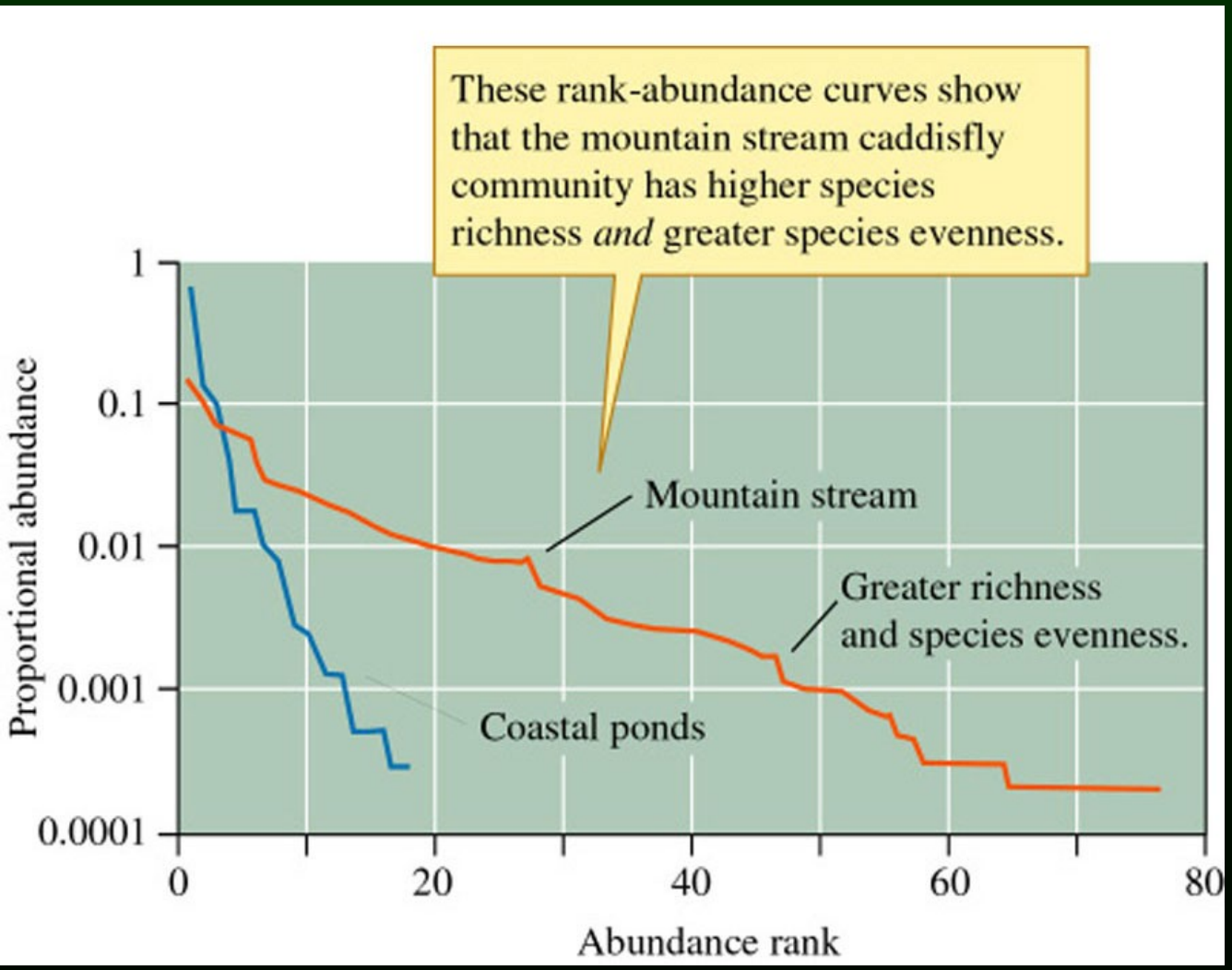


Ways to Measure Species Diversity - Rank Abundance Curves

- Portray relative abundance and species diversity within a community by plotting relative abundance of species against their rank in abundance.
  - Greater evenness indicated by lower slope.



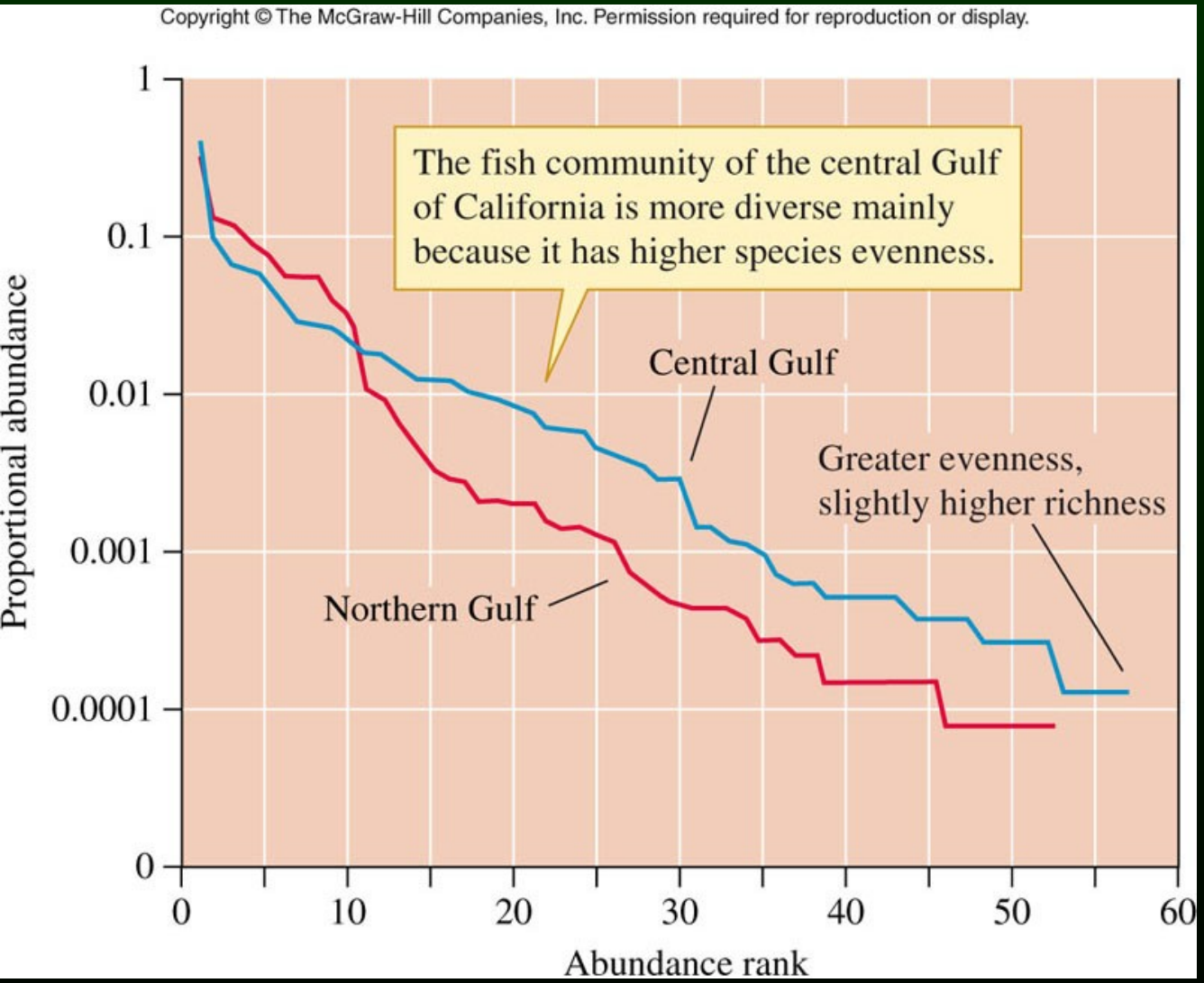
Rank Abundance Curves



Slope lower = more evenness

Longer curve = more richness

Rank Abundance Curves – could/will be on a test!!!



Slope lower = more evenness

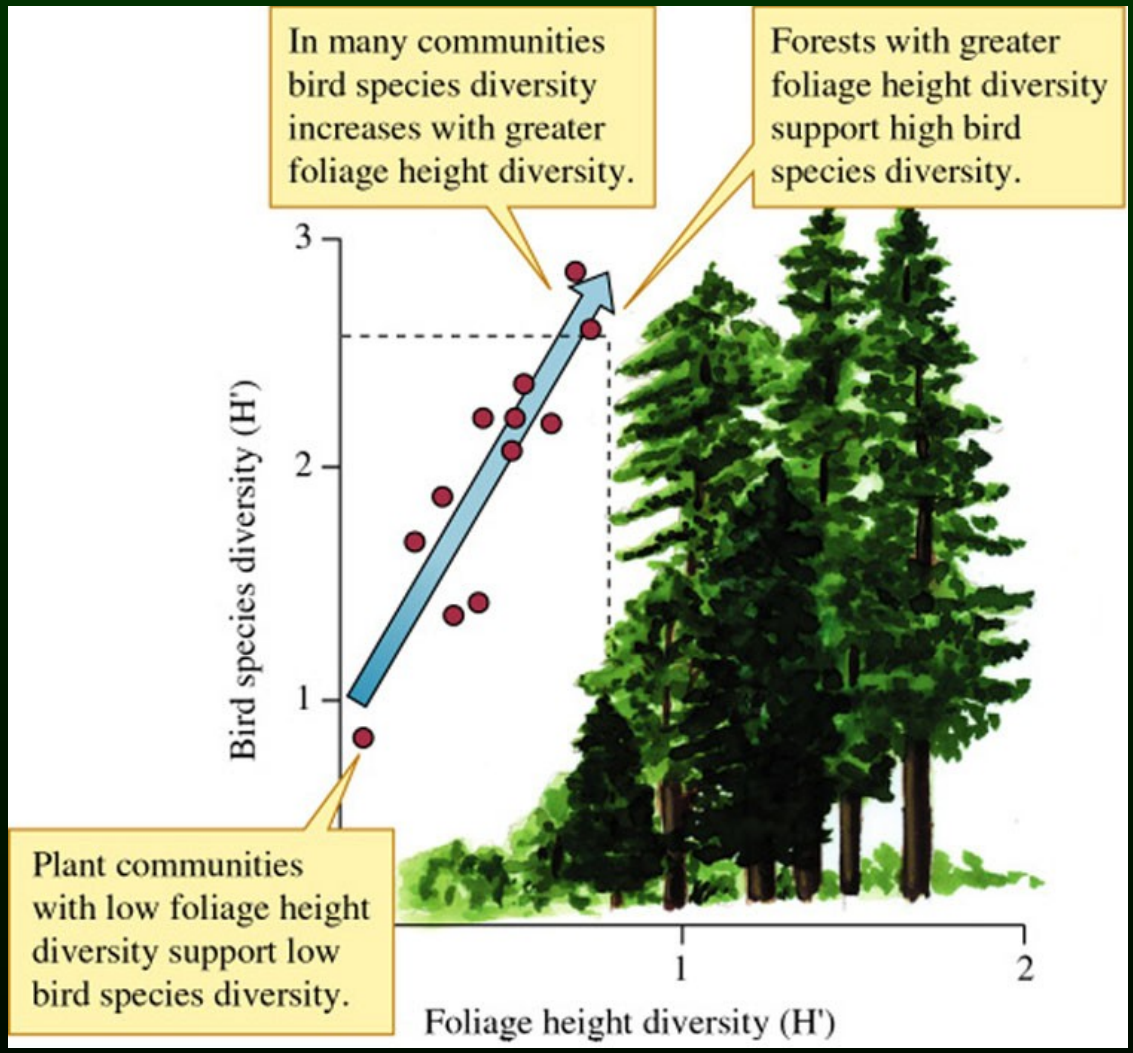
Longer curve = more richness

Environmental Complexity

- In general, species diversity increases with environmental complexity or heterogeneity.

Where would you find more species???

Environmental Complexity



Similar results found: mammals, lizards, plankton, marine gastropods, reef fish

Disturbance and Diversity

- Disturbance: Discrete, punctuated, killing, displacement, or damaging of one or more individuals that directly or indirectly creates an opportunity for new individuals to be established.

What are some other examples of disturbances???

Disturbance and Diversity

- Disturbances have two major characteristics:
  - Frequency
  - Intensity

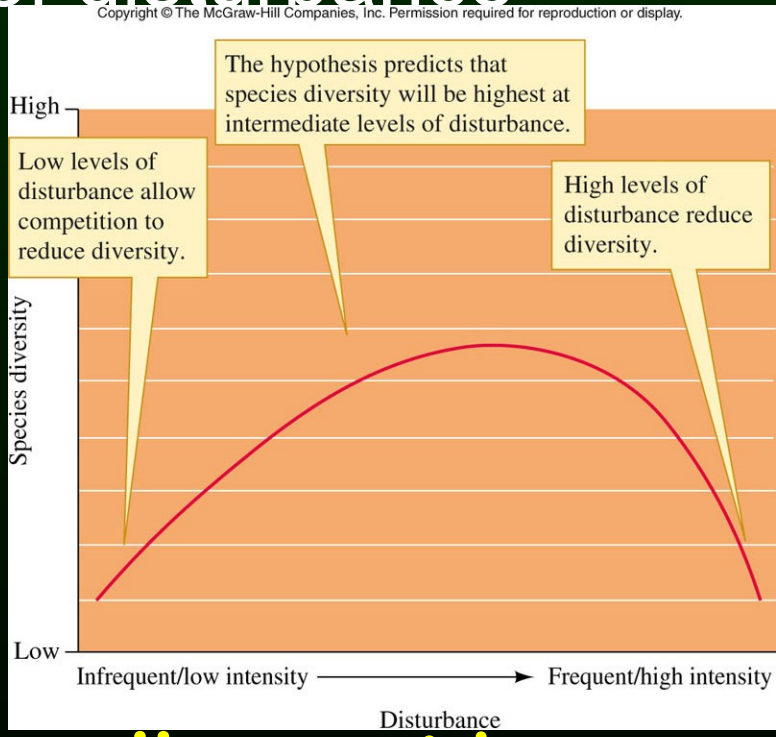
White and Pickett listed 26 major sources of disturbance: (abiotic) fire, hurricanes, ice storms, flash floods; (biotic) disease, predation, human-caused

http://www.youtube.com/watch?v=G_OfxHsNNIM

Intermediate Disturbance Hypothesis

- *Connell* proposed that intermediate levels of disturbance promote higher diversity
  - both high and low levels of disturbance would reduce diversity.

Why???



Time between disturbances allows wide variety of species to colonize, but not long enough to allow competitive exclusion!

Disturbance and Diversity in the Intertidal Zone

- *Sousa* predicted level of disturbance depends on boulder size.
  - Large boulders require more force to move.

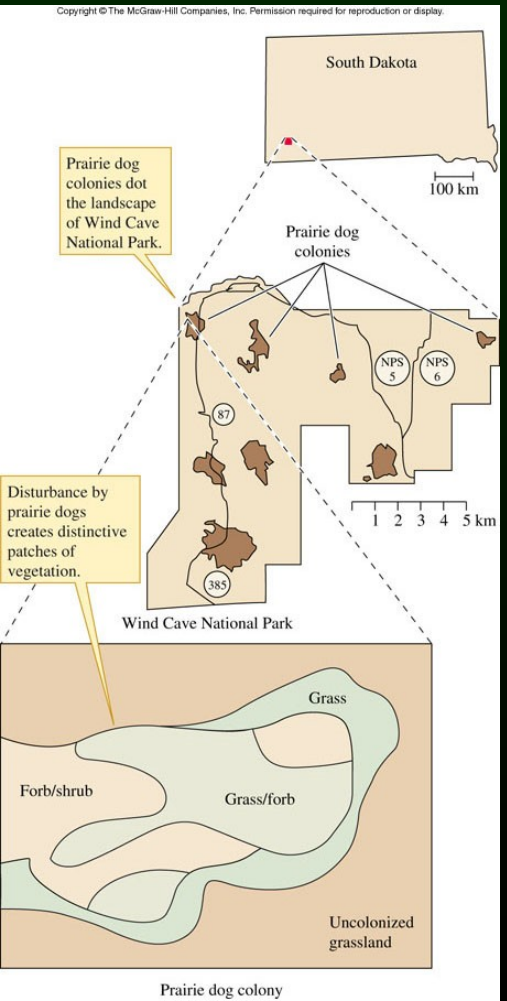
What is the main source of disturbance here???

Boulders with greatest diver had intermed levels of disturbance.

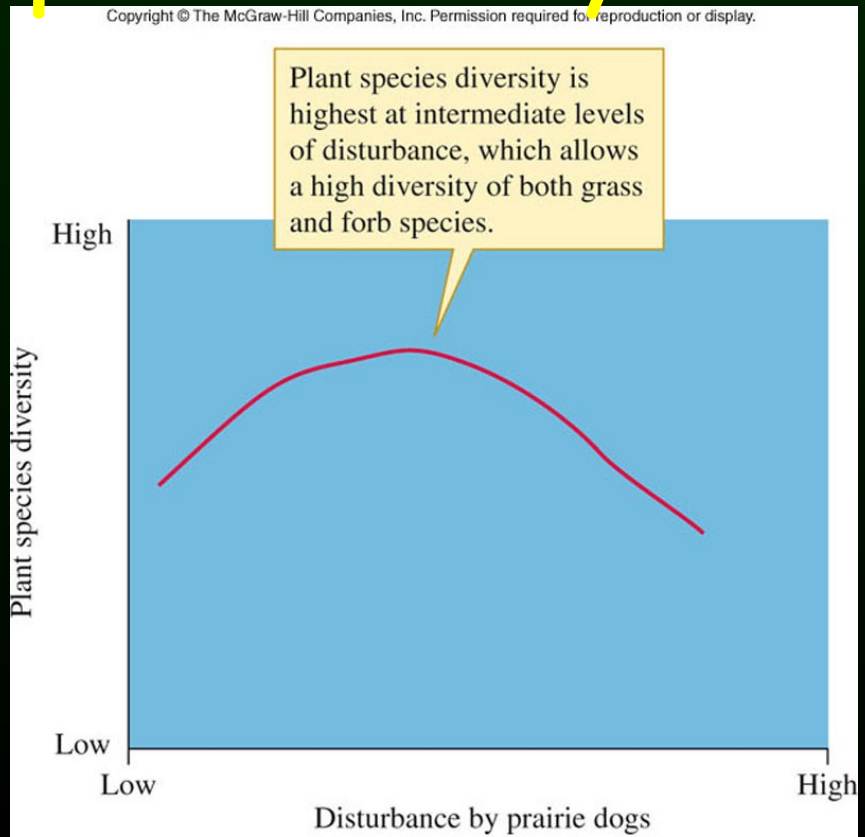
How does this relate to the intermediate disturbance hypothesis?

Disturbance and Diversity in Temperate Grasslands

- *Whicker* and *Detling*: Prairie dogs (*Cynomys* spp.) source of disturbance on N. A. prairies.



Probably less plant diversity!



What do you think would happen if prarie dogs were removed???

Human disturbances – always bad???

- When, according to Connell, would it be "good" (leading to more diversity)?

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