HABITAT AND NICHE

Environmental Science: Concepts

BEGIN BY READING PAGE 1 OF NOTES

Quotes and Introduction

What is a Habitat?

- Where a species lives
- Consists of all the physical and biological resources available to a species
- Different than ecosystem →

Habitats

Physical Factors

- Elevation
  - Air temperature
  - Rainfall
- Steepness
  - Soil type
  - Amount of water
- Slope aspect
- In water: pH levels, salinity, DO level, temperature

Biological Factors

- Other organisms
- Food
- Water
- Shelter

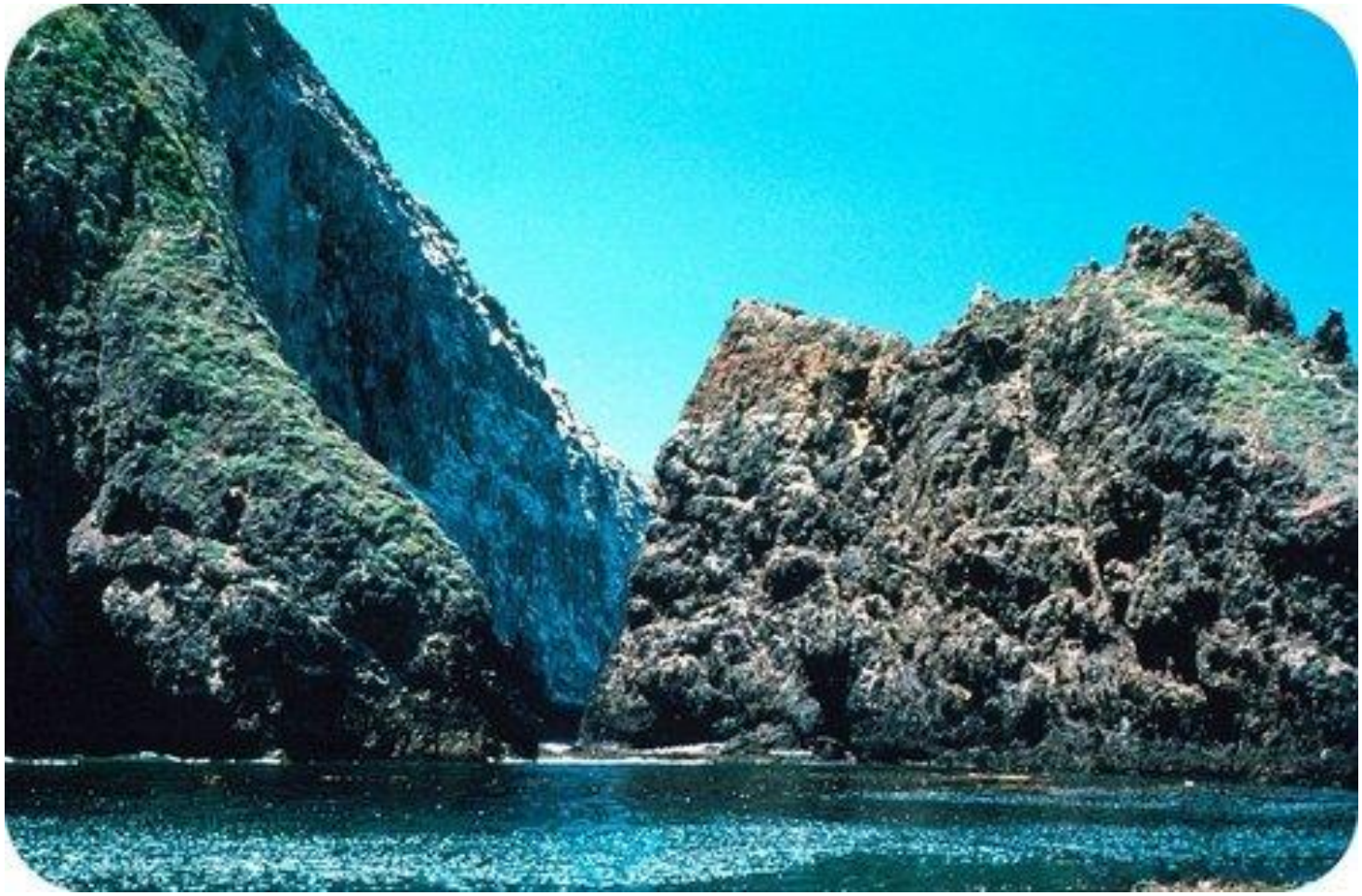
*refers to the necessities needed to live, grow, and reproduce

Physical and Biological Factors

- Interact to determine the quality of the habitat for a given organism

What habitats do you see?

Santa Cruz Island, off of California coast



Characteristics of…

An ANIMAL habitat

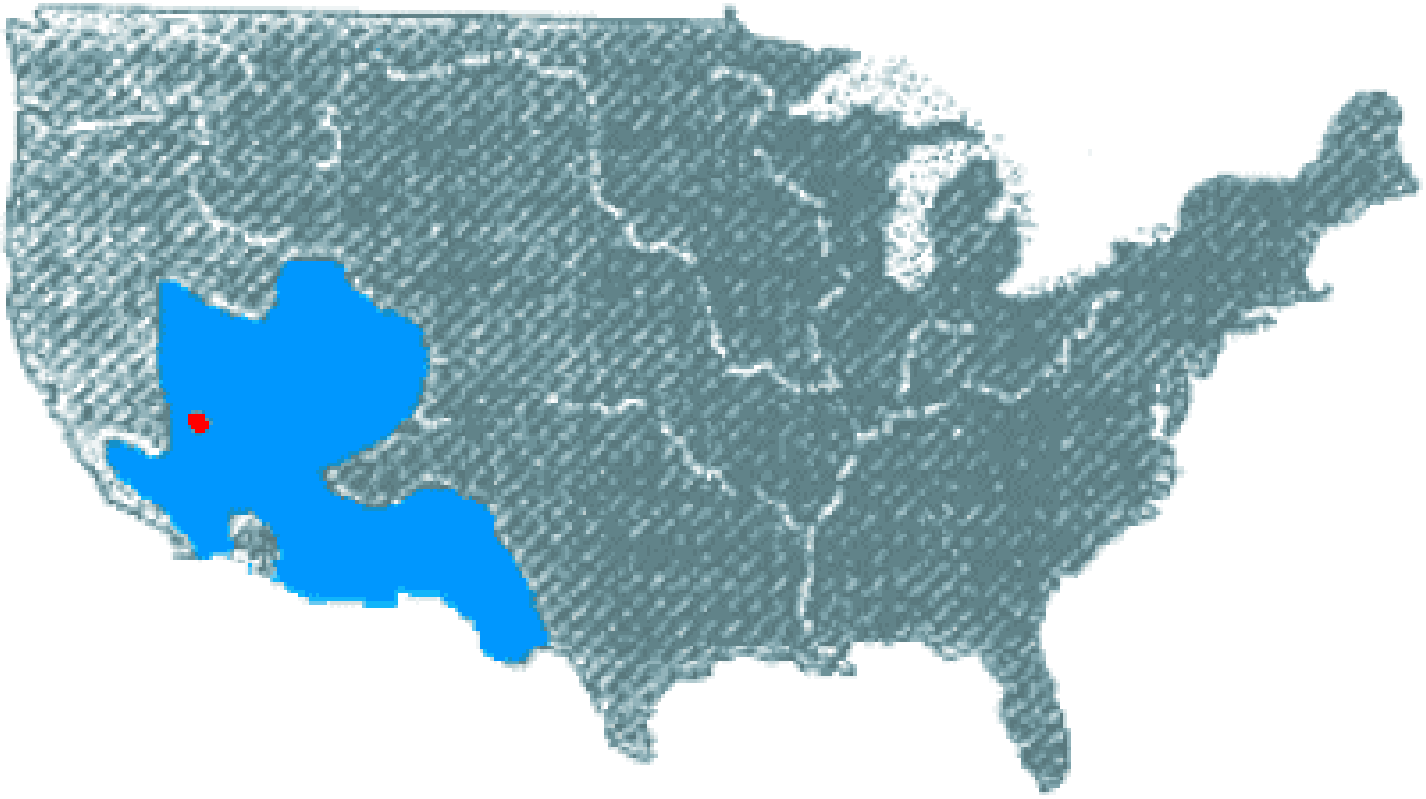
A PLANT habitat

Geographic Range

- Collection of all habitat areas of a species
- In different parts of the world, different species can be found
- Factors limit the distribution of organisms
  - Dispersal ability
  - Tolerance to different environmental conditions
  - Interactions with other species

Range Map

- Gray = humans
- Blue = Desert Bighorn
- Red = pupfish



What is a Niche?

- The role a species plays in the ecosystem
- How an organism "makes a living" → occupation
- An organism's "ecological position in the world"

- What impacts/relates to organism? How does it impact/relate to other organisms?
  - Sum of all its interactions

Niches include…

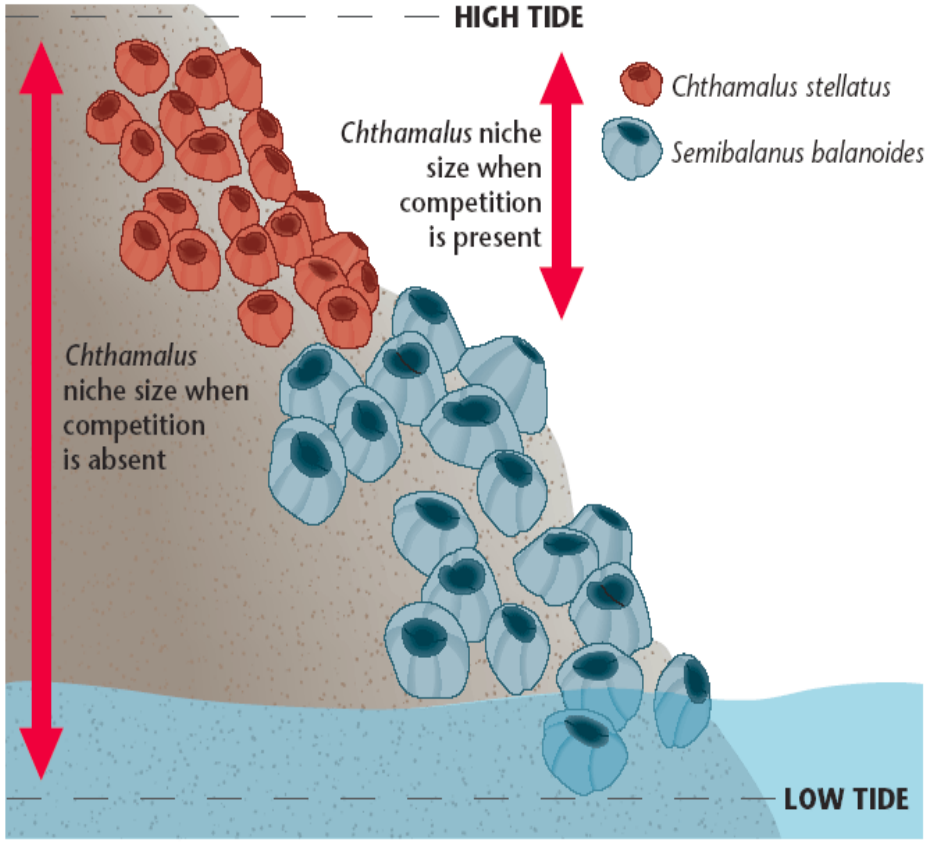
- Ranges of conditions it can tolerate
- Resources it uses
- Food it eats
- Methods by which it obtains resources
- When, how it reproduces
- Time of reproduction
- Time of activity (nocturnal or diurnal)
- Types of organisms it interacts with

weekend window to katmai national park video clip

- http://www.youtube.com/watch?v=5_kD7XtqXII

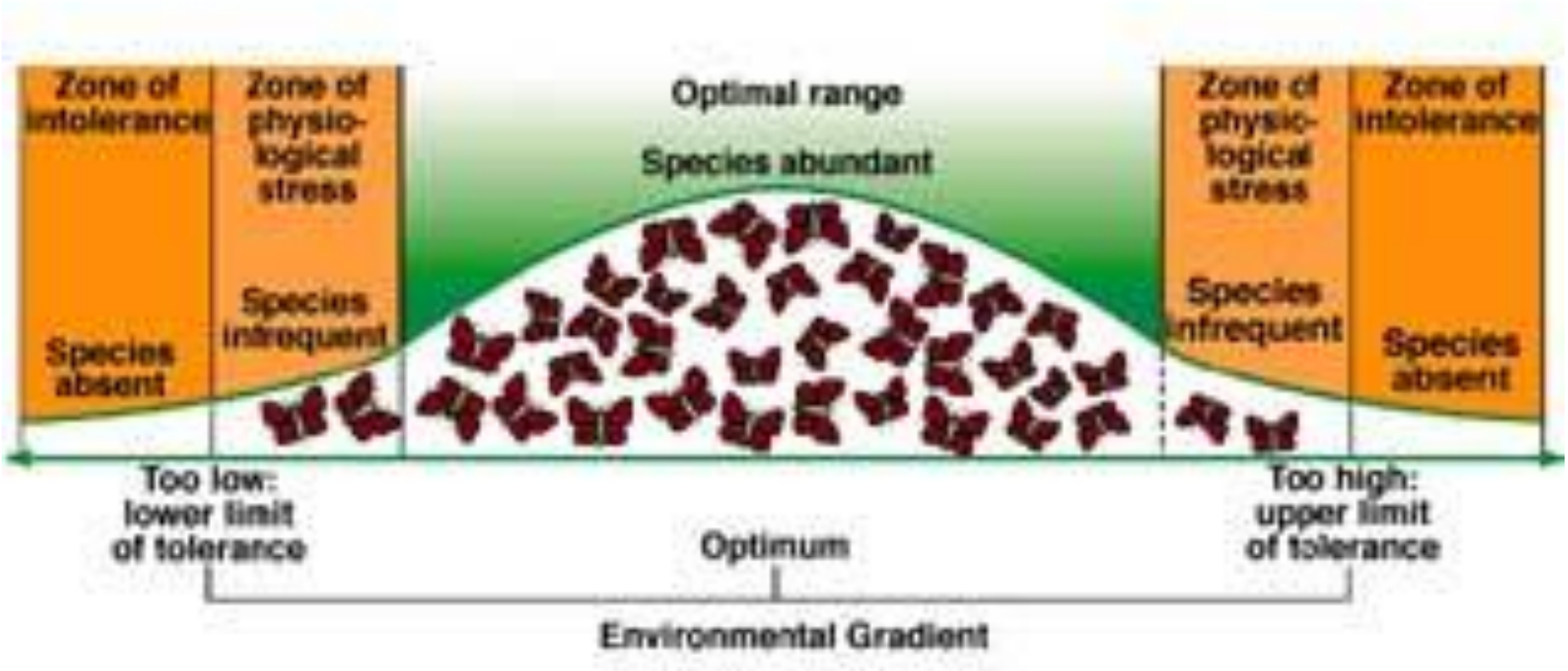
Niche impacted by **TOLERANCE** & **COMPETITION**

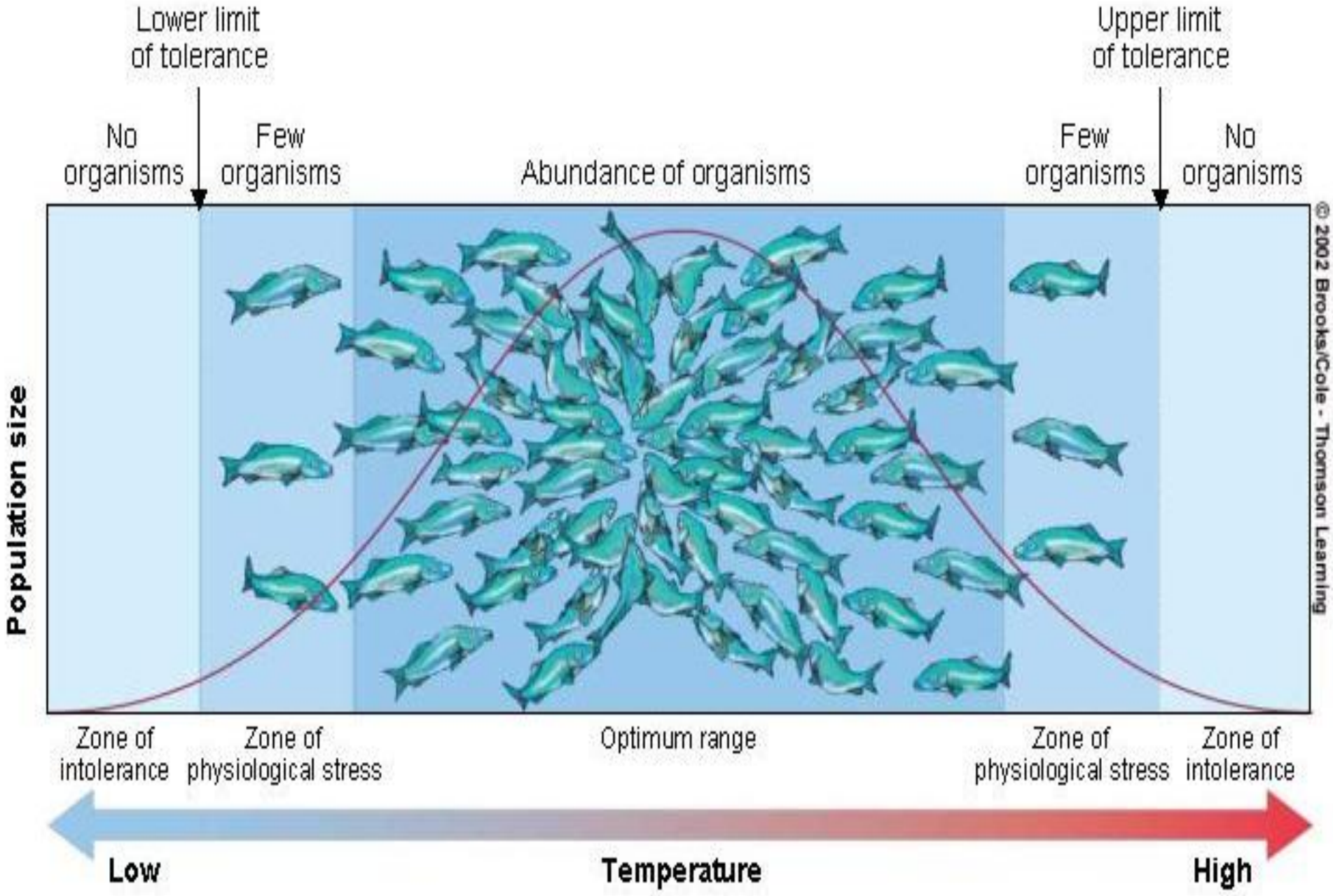
- Affected by an organism's tolerance → its ability to survive and reproduce under changing environmental conditions
- Often restricted by competition



Tolerance Limits

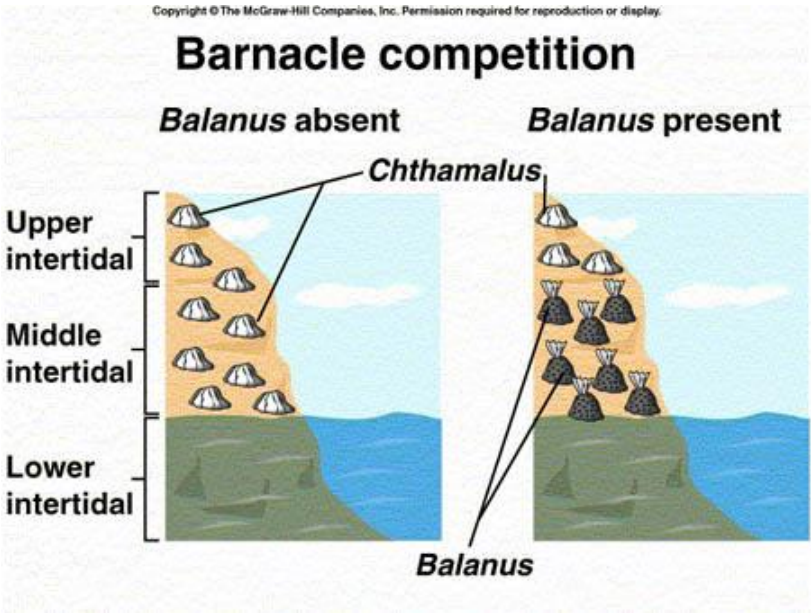
The principle of tolerance limits.



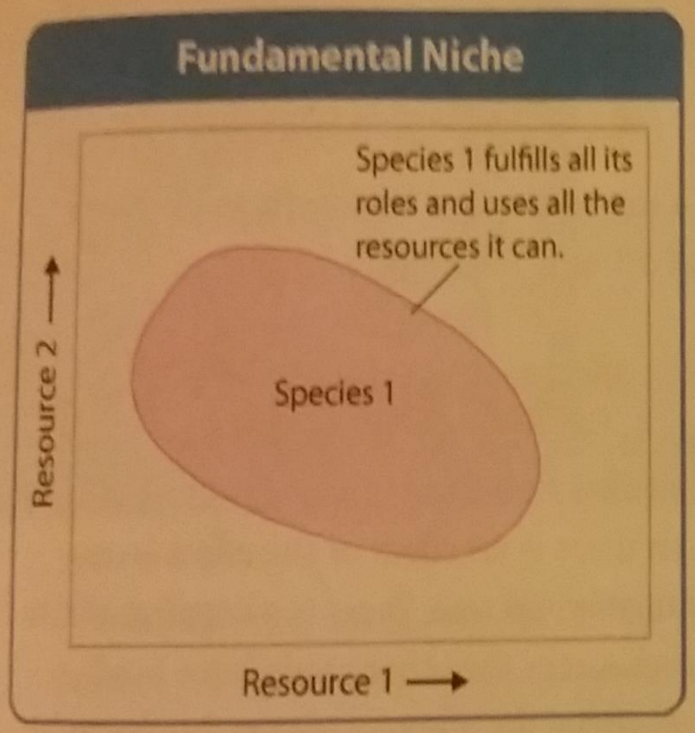

Lower limit of tolerance
Upper limit of tolerance
No organisms
Few organisms
Abundance of organisms
Few organisms
No organisms
Population size
© 2002 Brooks/Cole - Thomson Learning
Zone of intolerance
Zone of physiological stress
Optimum range
Zone of physiological stress
Zone of intolerance
Low
Temperature
High

2 types of Niches

- Fundamental → all the resources that a species could use in the environment
  - Without competition
- Realized → part of fundamental niche that is actually being occupied by the species
  - With competition
  - *restricted niche



Fundamental vs. Realized Niche



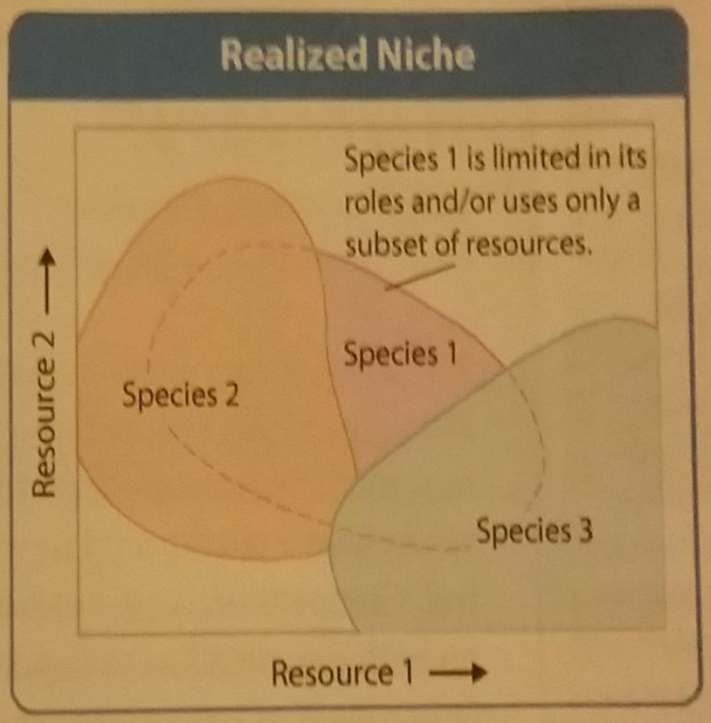


FIGURE 8 Fundamental and Realized Niche
(a) Without competitors, an organism can use its entire fundamental niche. **(b)** Competitors, however, limit an organism to a realized niche. The realized niche represents only a portion of what an organism can do and what resources it can use.

Rules of a Niche

- 1) No 2 species can occupy the same niche at the same time
- 2) Too much niche overlap leads to competition
- 3) direct competition results in a winner and a loser (+,- relationship)
- 4) species can co-exist if there is a lack of niche-overlap

Kudzu Vines in S.E. U.S.A

Beaver Habitat and Niche

Describe the habitat and niche:

Brown creeper and Nuthatch

Avoiding Overlap!

Redtail Hawk and Cooper's Hawk

Avoiding direct competition!

Bart Owl and Screech Owl

Avoiding competition!

Avoiding niche overlap!

Squirrels

Avoiding niche overlap!

Generalists and Specialists

Generalists

- Species with broad niches
- Tolerate a range of conditions
- Use a variety of resources

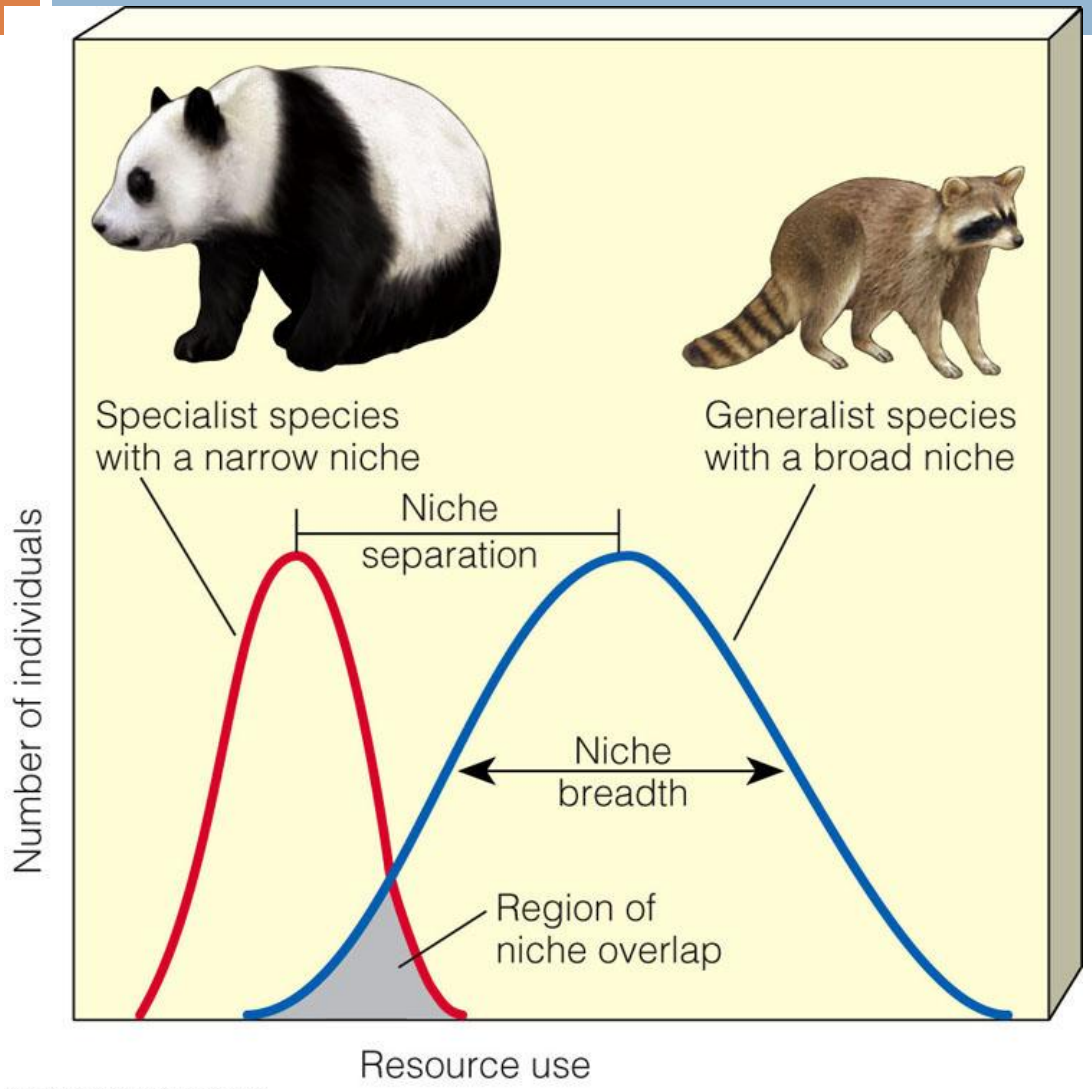
- Ex: Raccoons

Specialists

- Organisms with narrow niches
- Cannot tolerate a wide range of conditions
- Have to have certain foods an climate
- Some species with more than one niche during a lifetime

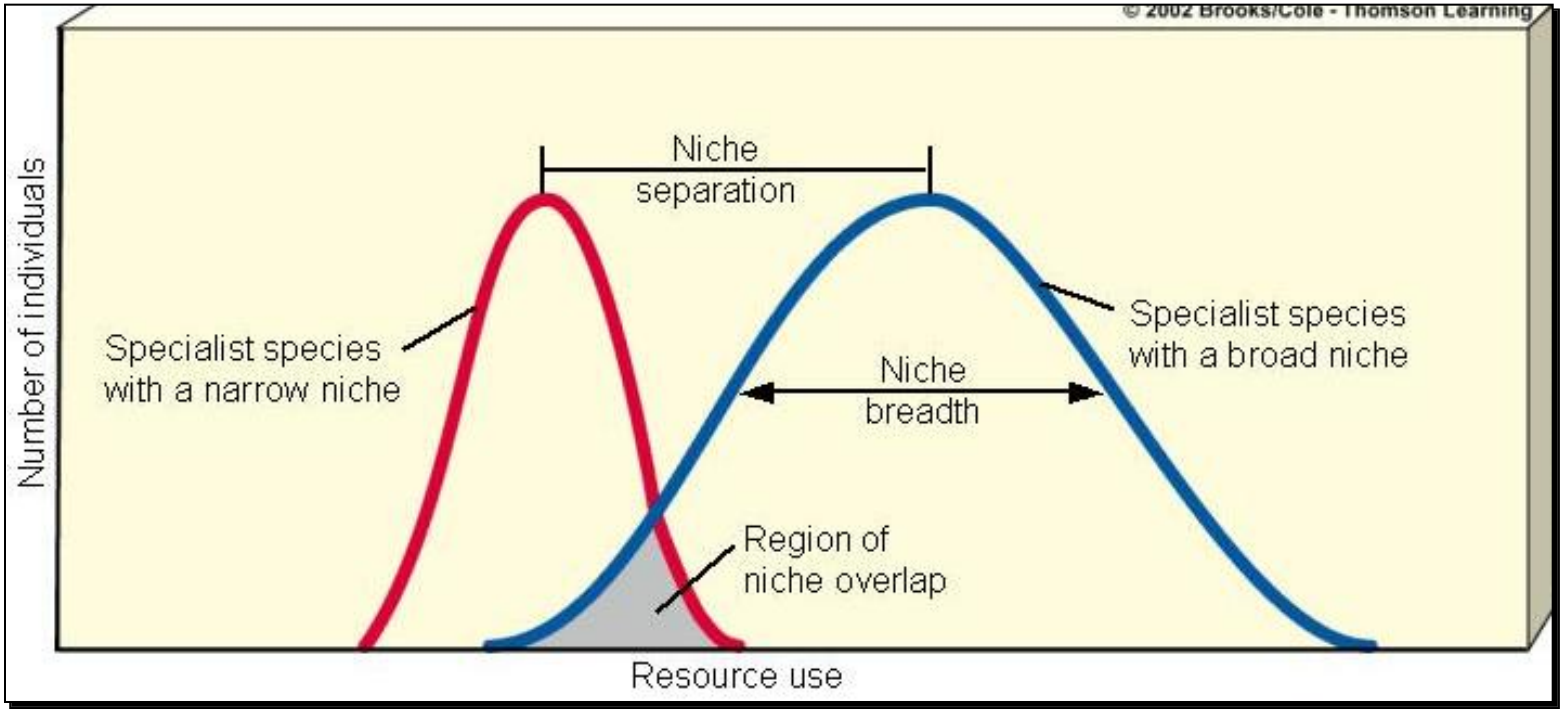
- Ex: Koalas → eucalyptus-only diet, Polar Bears, Penguins

Generalist and Specialist Species: Broad and Narrow Niches



- Generalist species tolerate a wide range of conditions
- Specialist species can only tolerate a narrow range of conditions

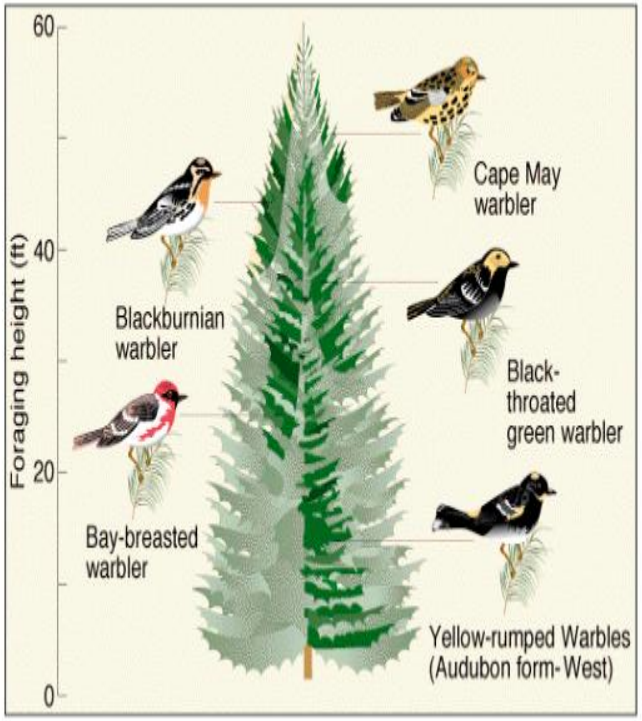
Is it better to be a Generalist or a Specialist?



Species Interactions

Competition

- Organisms compete when they seek the same limited resource.
- In rare cases, one species can entirely exclude another from using resources.
- To reduce competition, species often partition resources, which can lead to character displacement.



Resource Partitioning