Outline

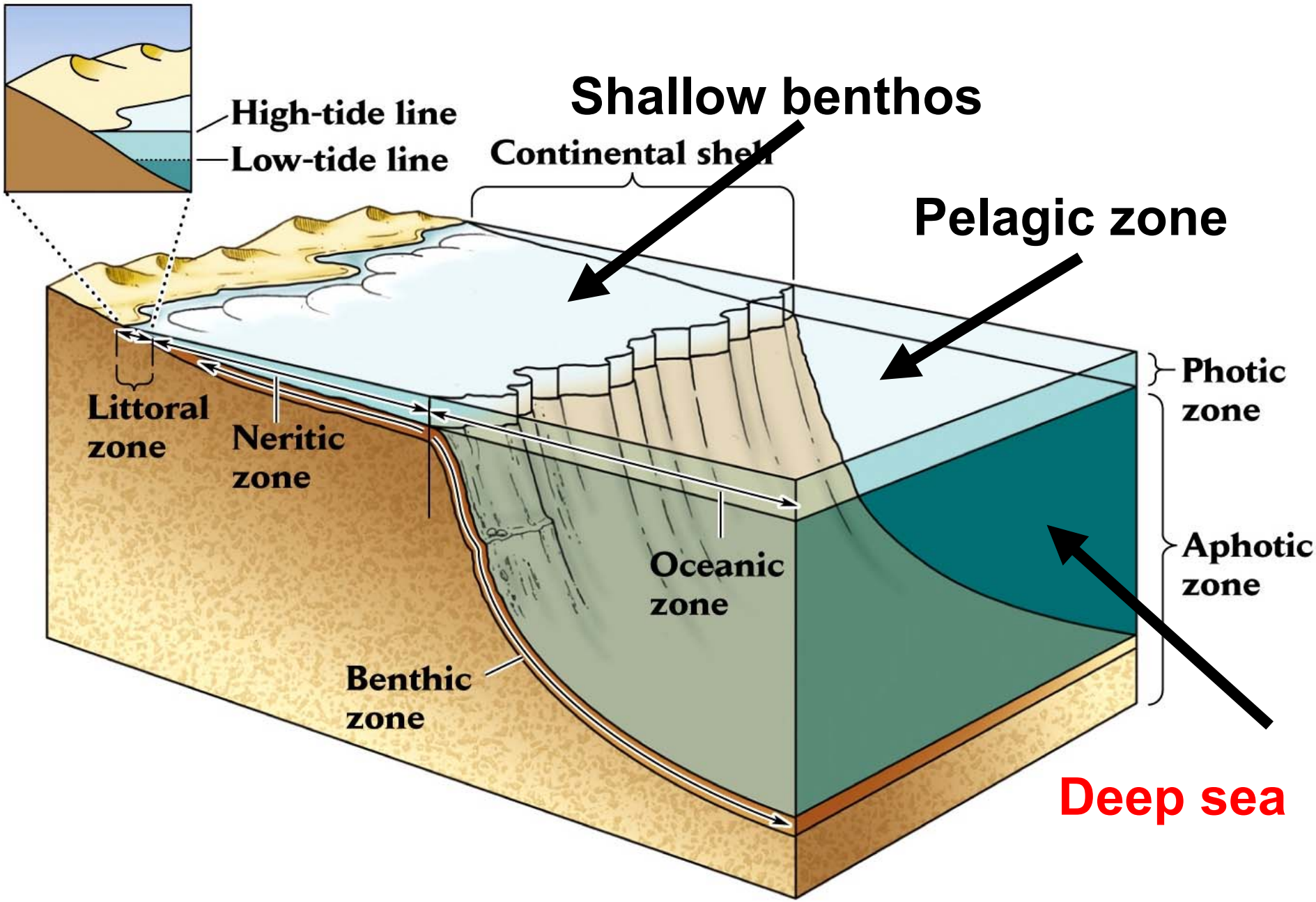
The biome concept

Survey of the biomes

Variability in Connecticut

Aquatic systems

- Marine
  - Pelagic zone (open ocean)
  - Deep sea
  - Shallow benthos
  - Coral reefs
- Freshwater
  - Lakes
  - Streams/rivers


High-tide line
Low-tide line
Shallow benthos
Continental shelf
Pelagic zone
Littoral zone
Neritic zone
Oceanic zone
Benthic zone
Photic zone
Aphotic zone
Deep sea

Biome : Deep sea

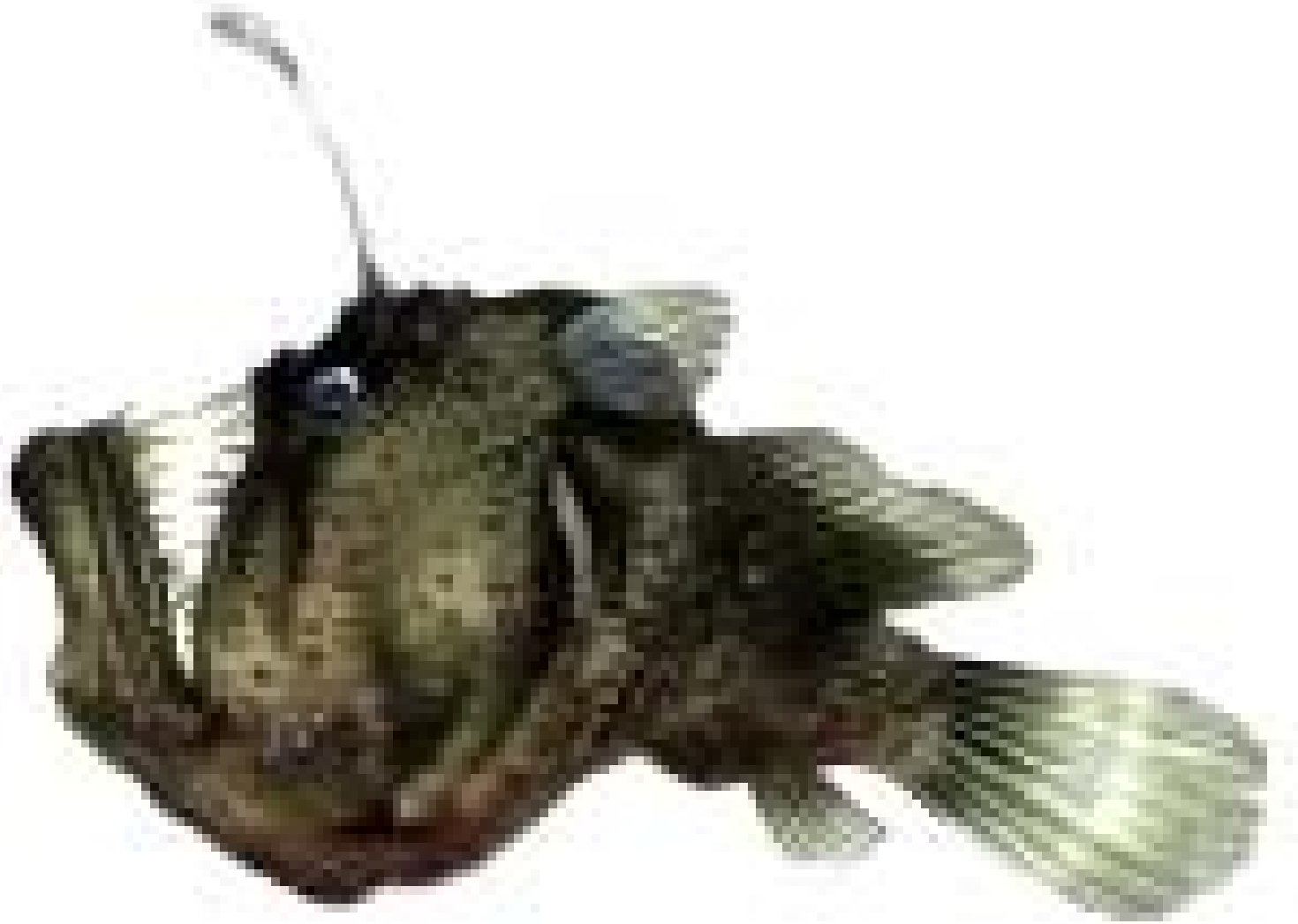
Climate: Extremely uniform – dark and cold
Very high pressure

Vegetation: None

Animals: Unusual things

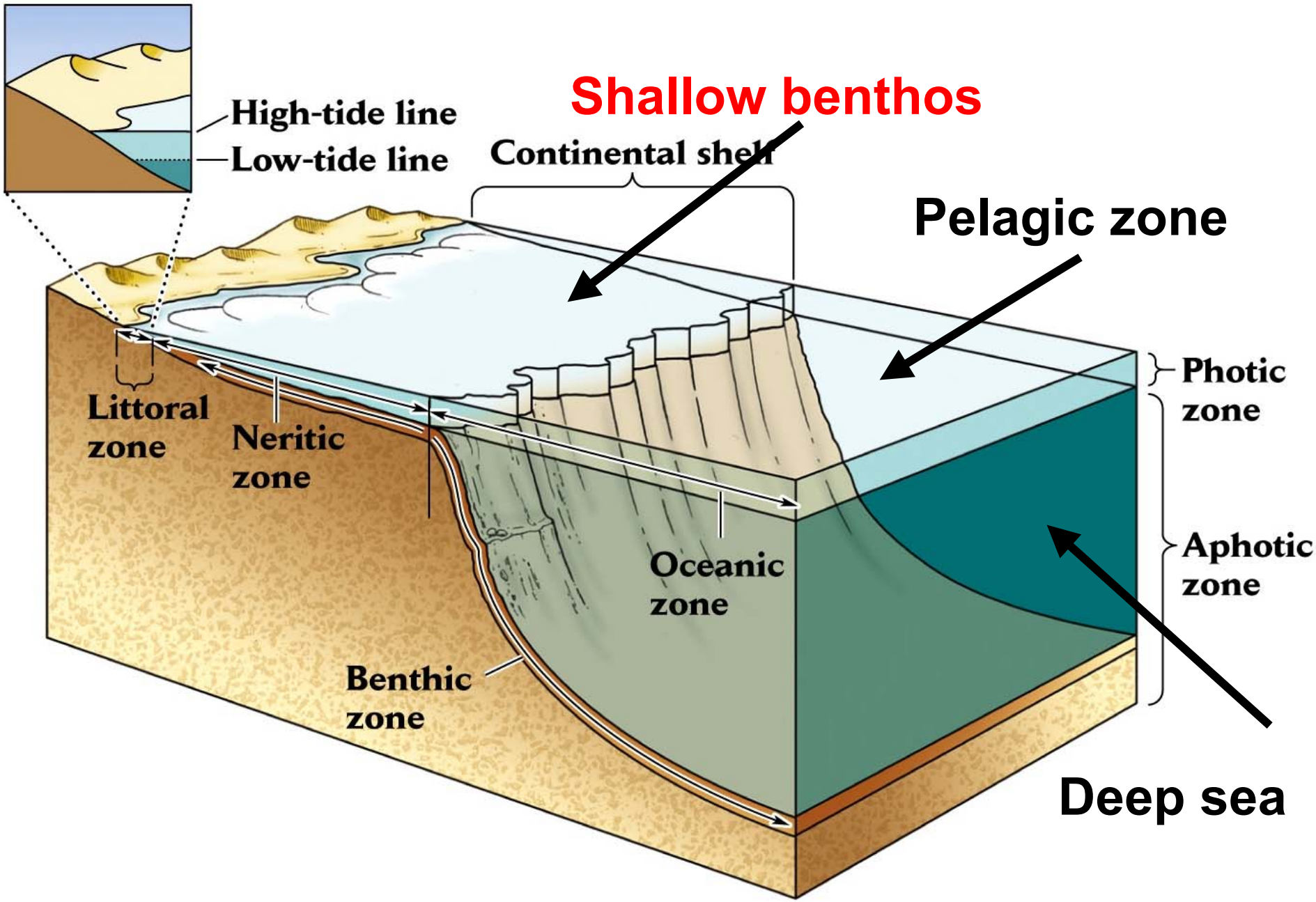
Net Productivity: Low

Diversity: Low – but higher than pelagic zone



If no photosynthesis and no vegetation, what supports the organisms that live in the deep sea?

What do they eat if they can't eat plants?


High-tide line
Low-tide line
Shallow benthos
Continental shelf
Pelagic zone
Littoral zone
Neritic zone
Oceanic zone
Benthic zone
Photic zone
Aphotic zone
Deep sea

Biome : Shallow benthos

Climate: Depends on area – relatively warm and well-lit

Vegetation: Kelp forests and other seaweeds

Animals: Urchins, starfish, sea cucumbers

Net Productivity: Moderate to high

Diversity: Moderate

Rocky intertidal

Kelp forests

Biome : Coral reefs

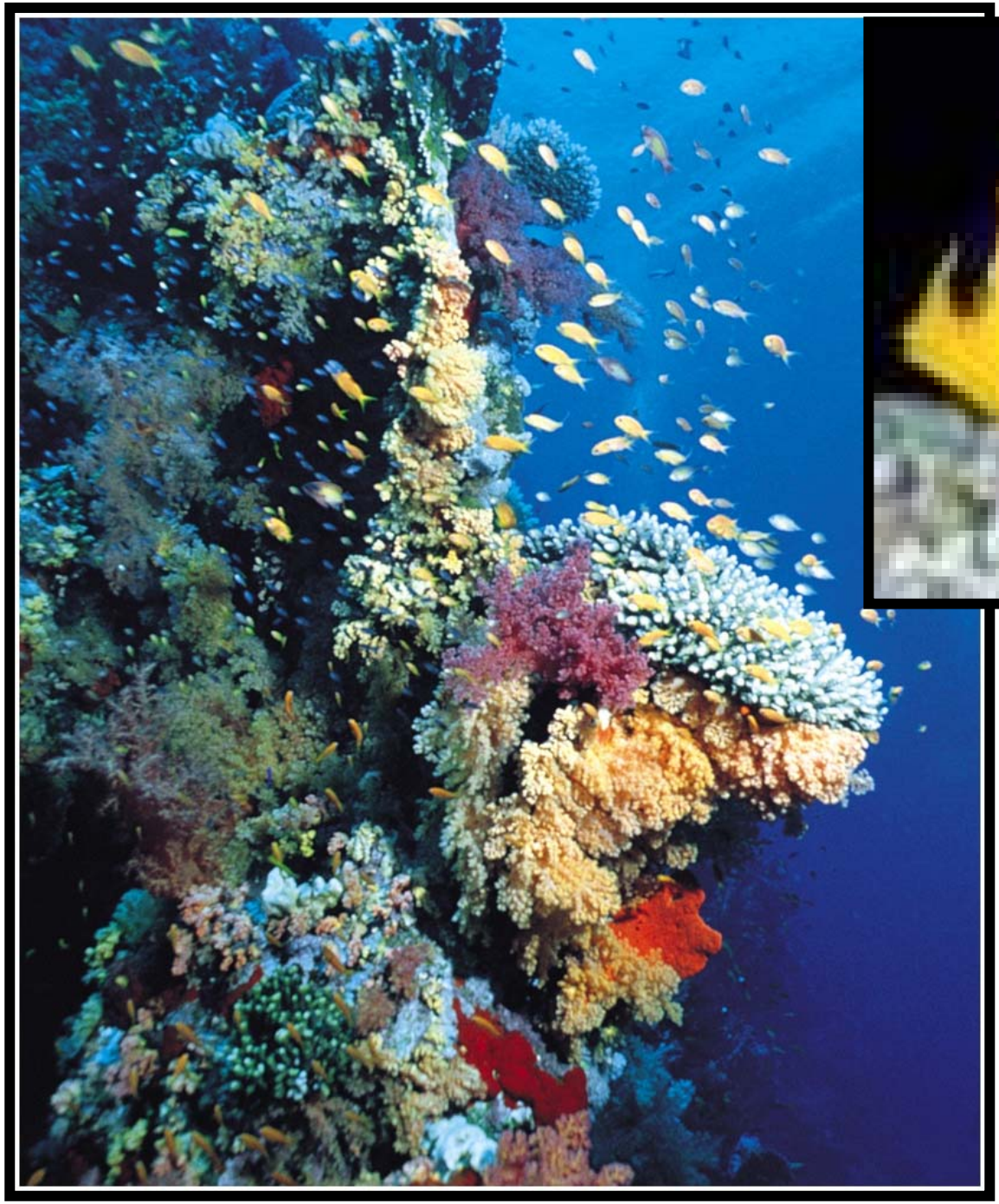
Climate: warm and well-lit

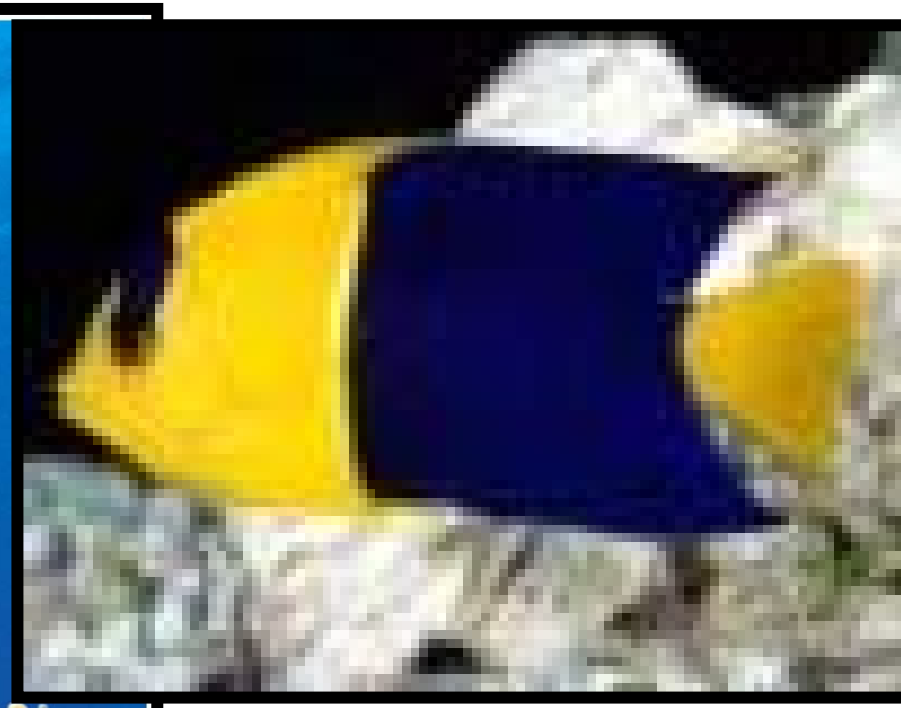
Vegetation: Algae

Animals: Coral, tropical fish

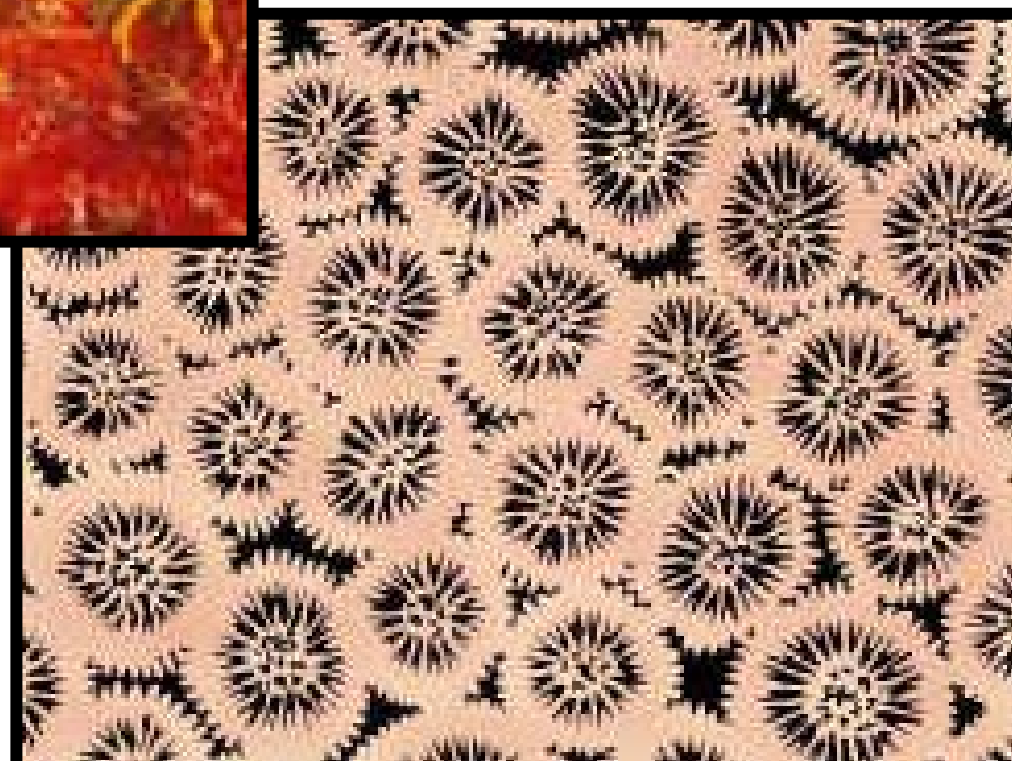
Net Productivity: High

Diversity: High – 25% of all marine species in 0.17% of ocean area





Live Coral



Dead coral

Aquatic systems

- Marine
  - Pelagic zone (open ocean)
  - Deep sea
  - Shallow benthos
  - Coral reefs
- Freshwater
  - Lakes
  - Streams/rivers

Biome : Lakes

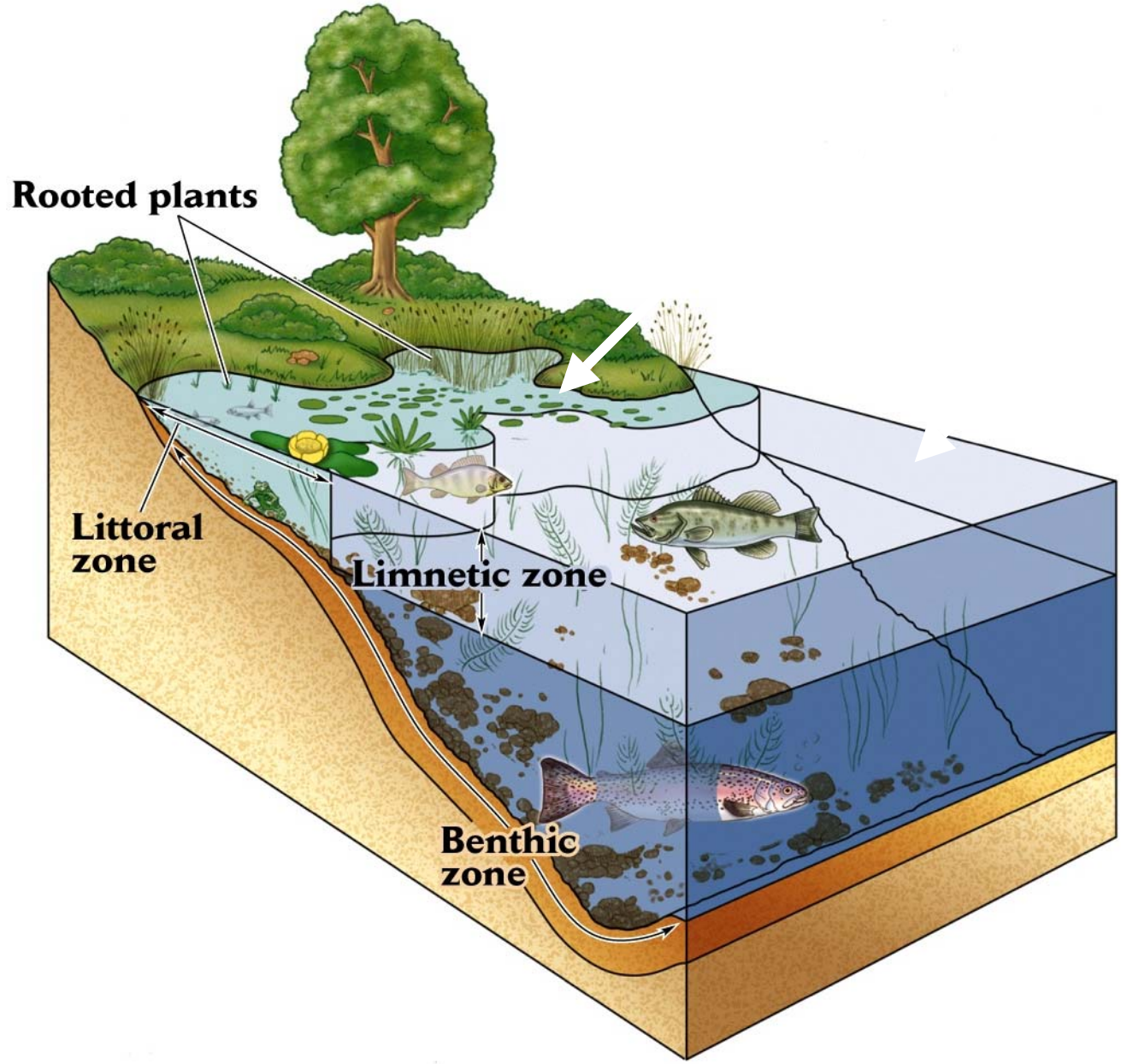
Climate: Highly variable

Vegetation: Phytoplankton, rooted plants on edges

Animals: Zooplankton, fish

Productivity: Low to high

Diversity: Low to moderate



Pelagic zone

Biome : Rivers/streams

Climate: Highly variable – less vertical variability than lakes

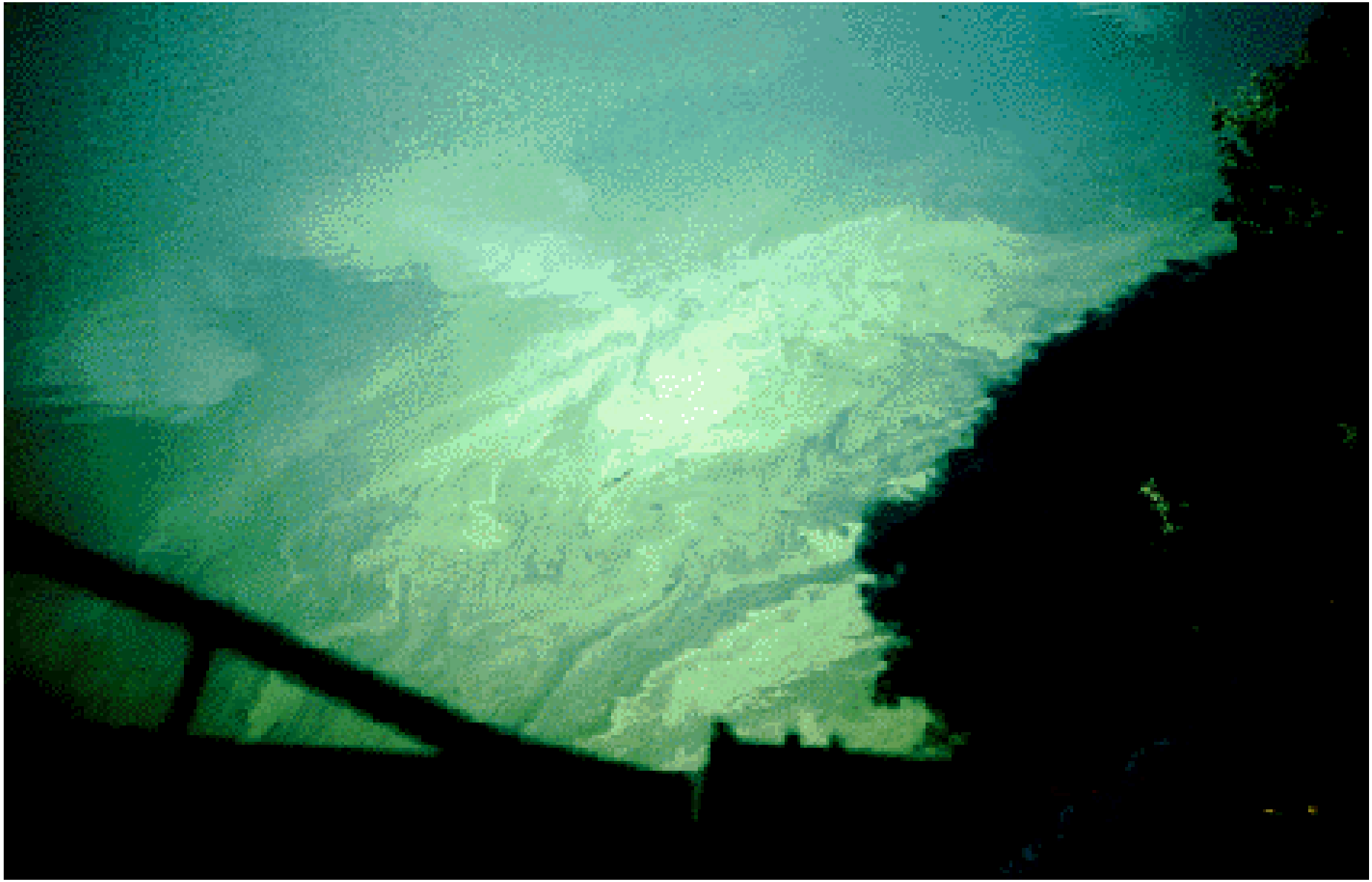
Vegetation: Algae, rooted plants in large rivers

Animals: Insect larvae, fish

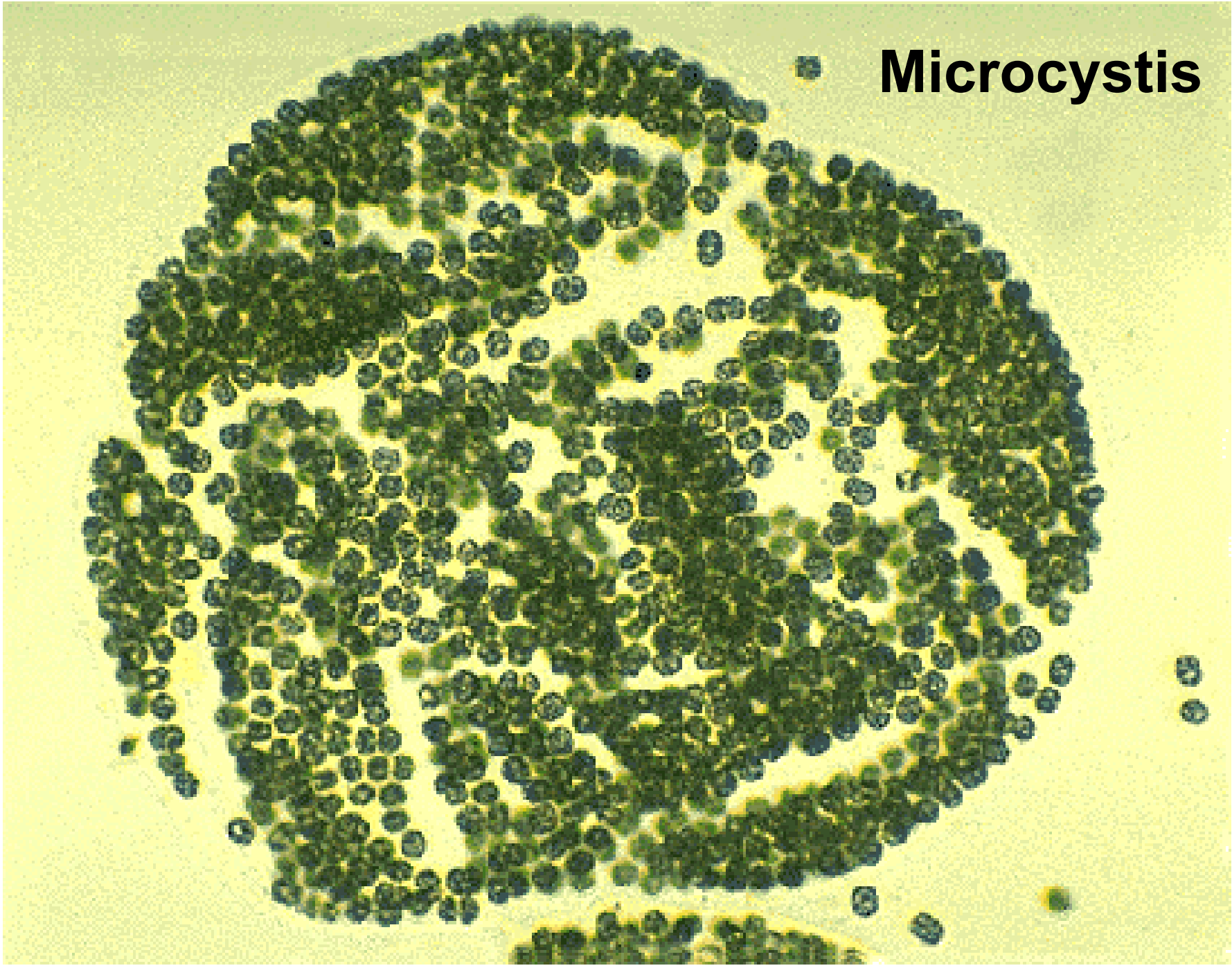
Net Productivity: Low to high

Diversity: Low to moderate

More horizontal than vertical variability in streams



Algal Bloom


Microcystis

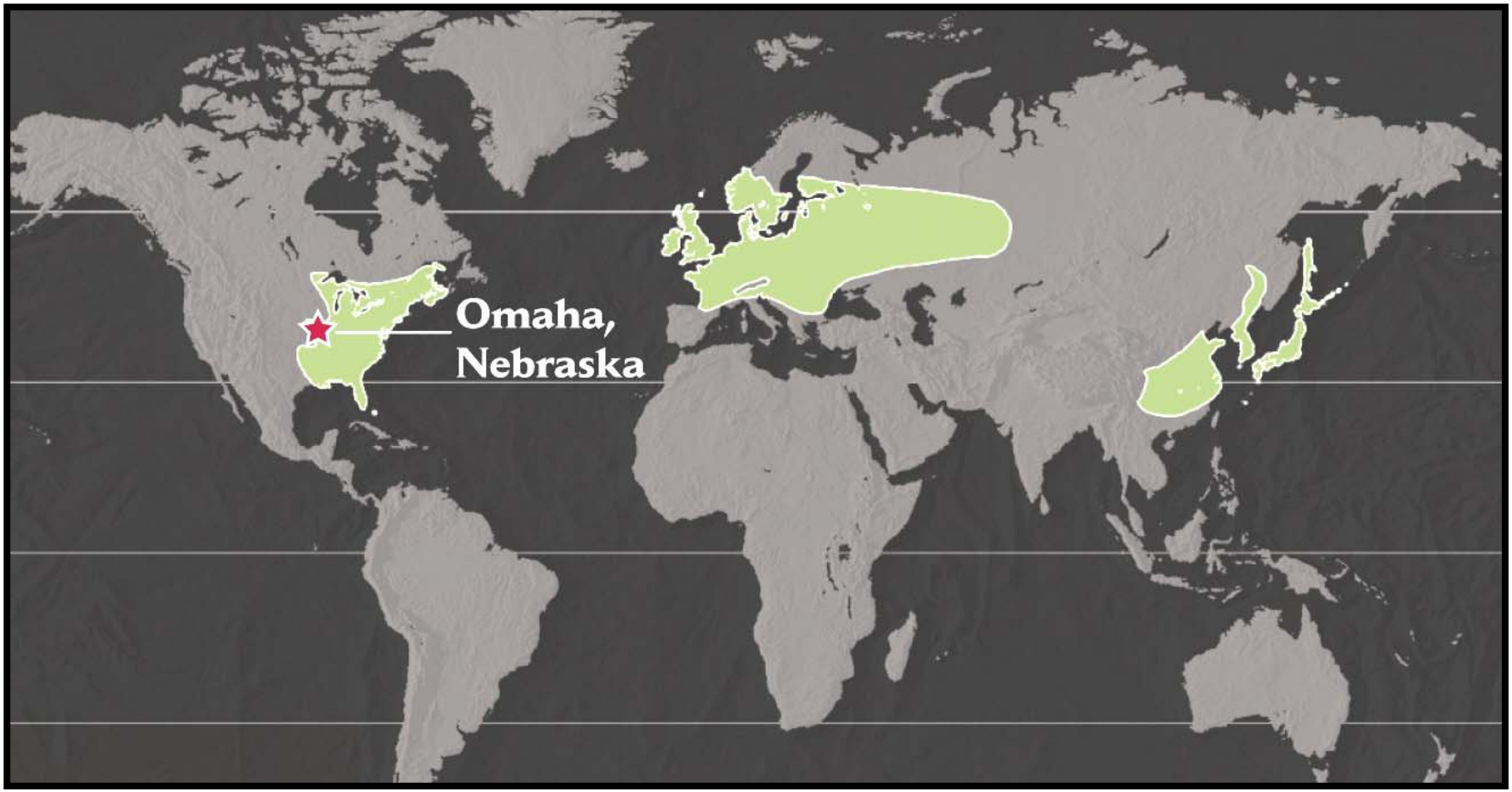
Outline

The biome concept

Survey of the biomes

Variability in Connecticut

CT - temperate seasonal forest biome



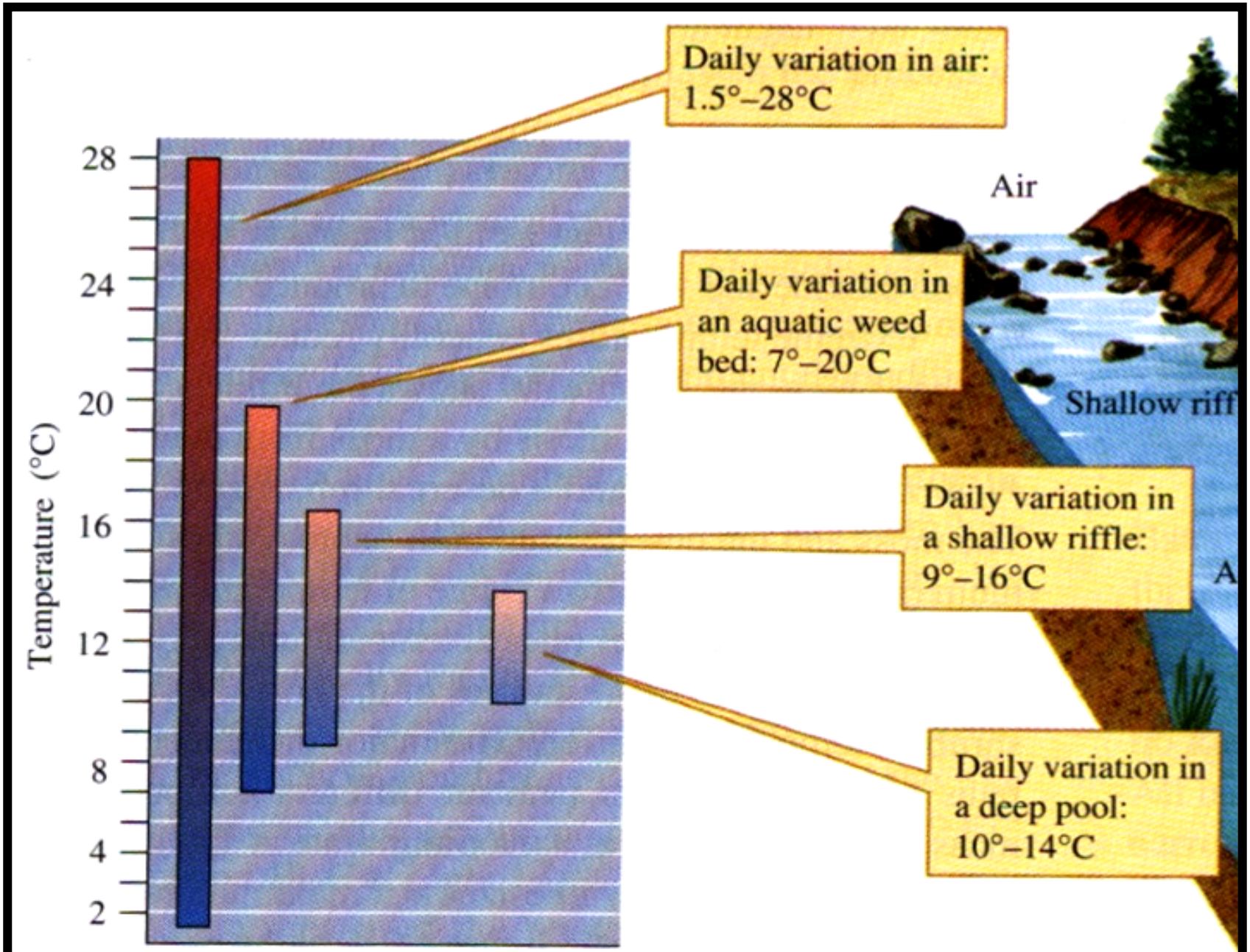
Different Land Cover Types in Connecticut

- Terrestrial
  - Oak Forest
  - Red Maple Forest
  - Hemlock Beech Forest

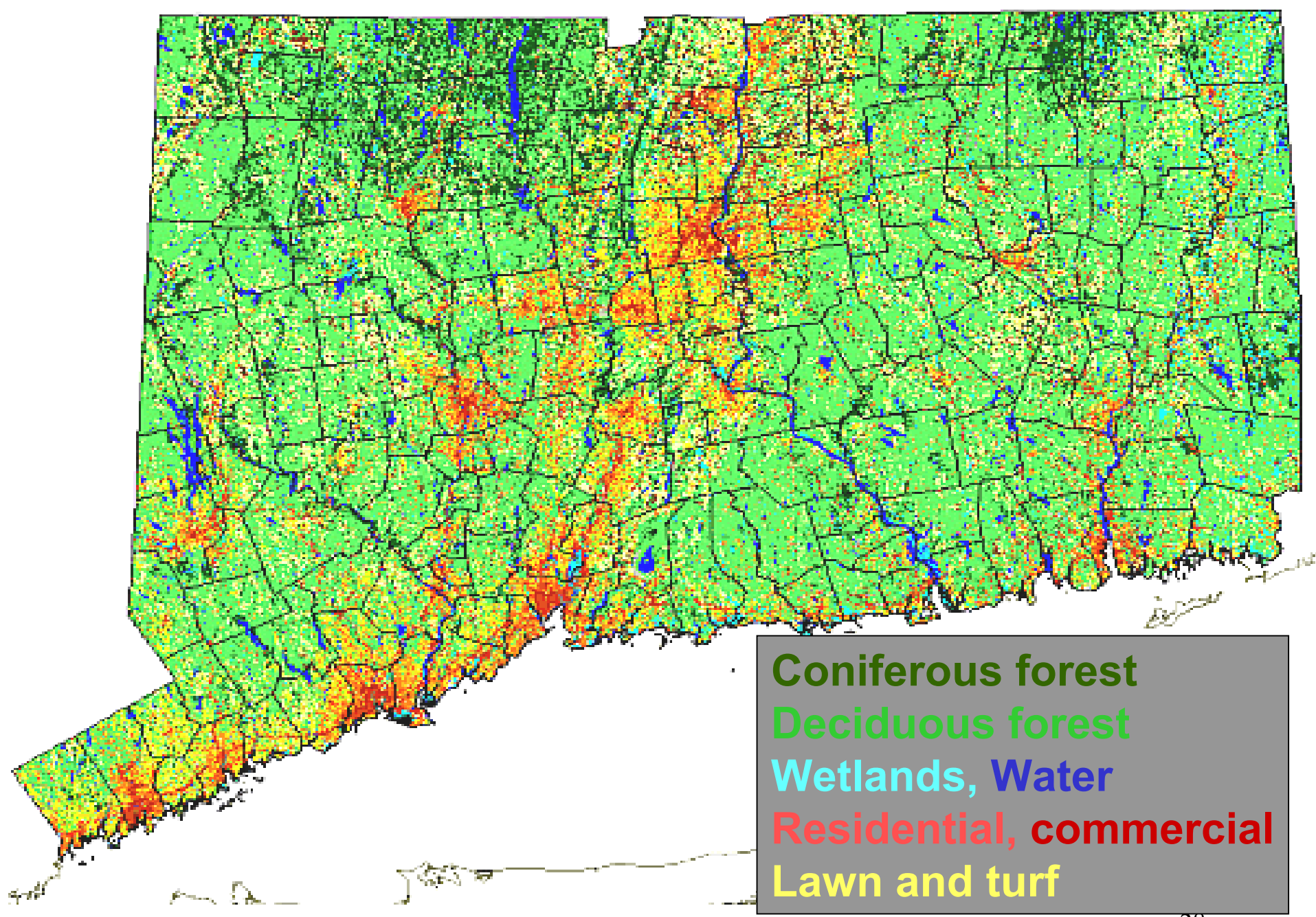
- Freshwater
  - Lake and reservoir
  - Streams and rivers
  - Freshwater wetlands and bogs

- Coastal
  - Salt Marsh
  - Beach/Sand dunes

Microclimate – climatic variation on a scale of a few kilometers, meters, or centimeters



URE 4.7 *Aquatic microclimates (data from Ward 1985).*


Coniferous forest
Deciduous forest
Wetlands, Water
Residential, commercial
Lawn and turf

5. Which of the following biomes have water deficits during the growing season?

a. tundra

b. desert

c. temperate shrubland (chapparal)

d. both b and c

10. **Only one of the following lists correctly ranks four terrestrial biomes from most to least productive. Which is it?**

a. **tropical rain forest, temperate forest, savanna, tundra**
b. **tropical rain forest, temperate forest, tundra, savanna**
c. **temperate forest, tropical rain forest, tundra, savanna**
d. **temperate forest, tropical rain forest, savanna, tundra**
e. **temperate forest, savanna, tropical rain forest, tundra**

Structure of course

Environmental variability

Organisms

Ecosystems

Populations

Species interactions

Communities

Applied Ecological Issues

Outline for organisms

Introduction and review of adaptation

What do organisms need to survive and reproduce?

How do organisms cope with variability?

Organism – **fundamental unit of ecology; an individual living being bounded by a covering which separates it from its environment**

Organismal approach – **focus on how the organism interacts with its environment to survive and reproduce**

Questions organismal ecologists ask

How does an individual's form, physiology, and behavior help it to survive in its environment?

Why is the distribution of an organism limited to certain environments?

Why do related organisms in different environments have different characteristics?

Adaptation – trait favored by natural selection

Natural selection – change in frequency of genetic traits in a population through differential survival and reproduction of individuals bearing those traits

Summary from page 15 of text:

Only individuals well-suited to environment will survive and reproduce – their heritable traits will be preserved.

Less well-suited individuals are less successful (in terms of survival and reproduction) and their less suitable traits are less common and may eventually die out.

Important things to remember about evolution

Populations evolve in response to environmental conditions or other organisms (stimulus) BUT traits do not arise because of the stimulus.

Mutations are RANDOM. Populations don't choose to evolve.

When is a trait an adaptation?

1. Trait must be heritable

2. Adaptation implies a comparison

3. Adaptation depends on the environment

Which of the following gives an example of an evolutionary change?

A. Over the last 1000 years, humans in Europe have increased in average height by 4 inches.

B. If you moved to the Andes mountains, after a year, your blood will transport 30% more oxygen than it does now.

C. Over the past 50 years, the frequency of antibiotic resistant strains of bacteria has increased.

A. Over the last 1000 years, humans in Europe have increased in average height by 4 inches.

A. Over the last 1000 years, humans in Europe have increased in average height by 4 inches.

- is a genetic component to height – that component can be selected for or against

- BUT also a strong environmental component – for example, height could increase because of better nutrition

B. If you moved to the Andes mountains, after a year, your blood will transport 30% more oxygen than it does now.

B. If you moved to the Andes mountains, after a year, your blood will transport 30% more oxygen than it does now.

- INDIVIDUALS CAN'T EVOLVE!

- Natural selection acts on individual fitness but evolution is a population-level phenomenon.

C. Over the past 50 years, the frequency of antibiotic resistant strains of bacteria has increased.

C. Over the past 50 years, the frequency of antibiotic resistant strains of bacteria has increased.

- change in the frequency of particular genes

- population-level change

- individuals with resistance genes are better able to survive and reproduce in current environment