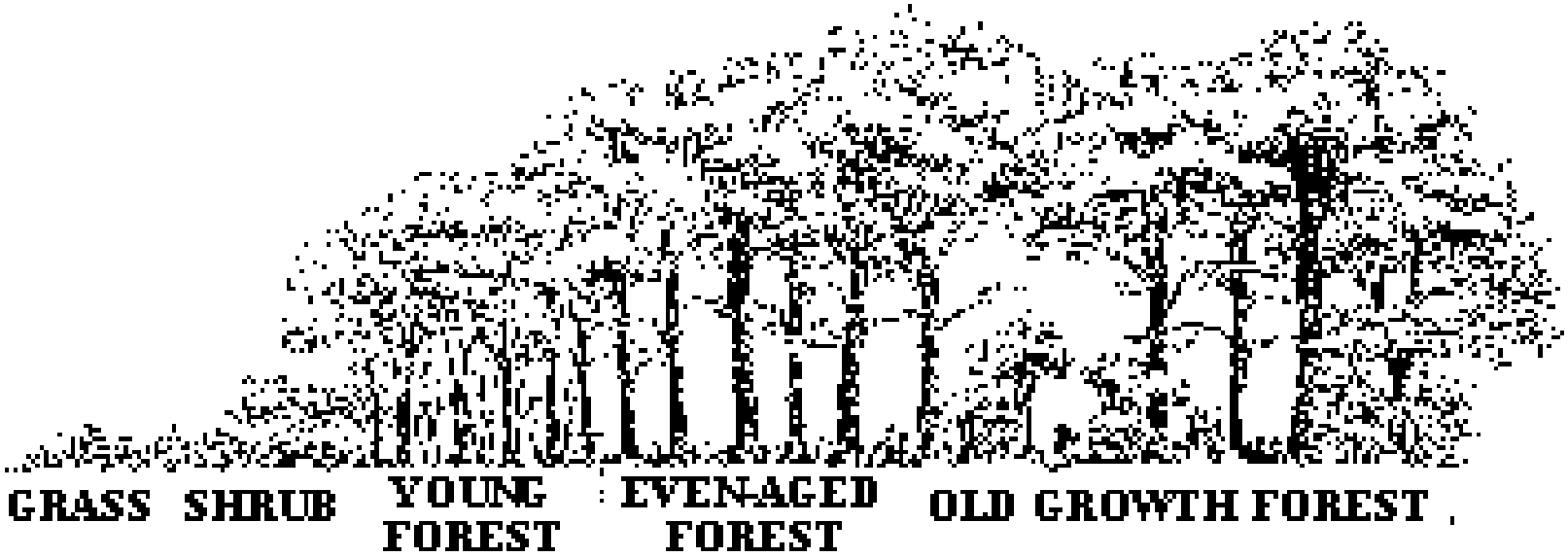
Ecological Succession



Population Changes in Context - in Communities!

Succession Defined:

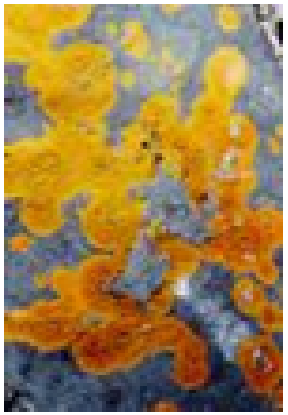
- The gradual, sequential change in the relative abundances of the dominant species in a biological community following a disturbance…
- **Primary succession**: A sequence of communities forming in an originally lifeless habitat (no soil). Very slow process due to lack of soil.

PRIMARY SUCCESSION

Pioneer Species = the first species to inhabit an otherwise lifeless area

For example: lichen

- Lichen is fungi and algae liv Inhabit = to live in mutually beneficial (symbiotic) relationship:
- Algae = makes its own food and provides food for the fungi
- Fungi = breaks down organic material and makes soil

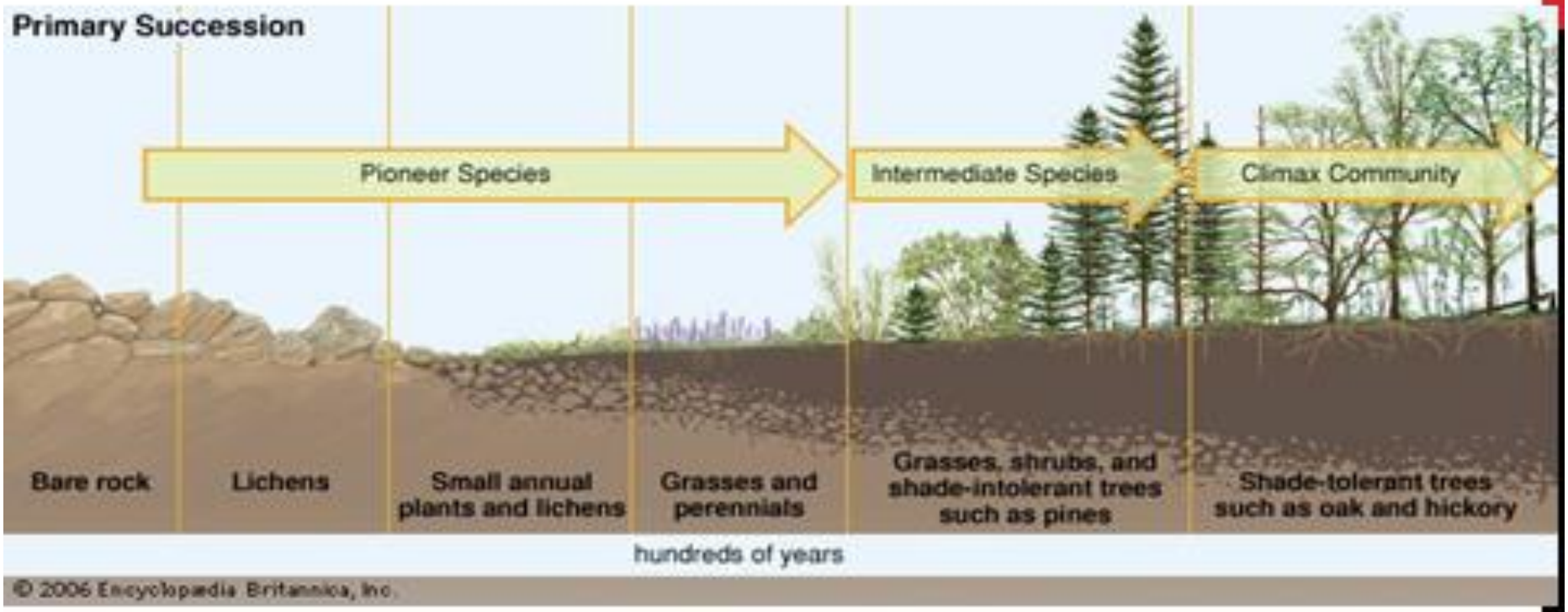


WHAT ARE SOME COMMON DISTURBANCES LEADING TO PRIMARY SUCCESSION OF AN AREA?

1.Volcanic eruption

2.Glaciers

3**.** Rock Slides.


Primary Succession
Pioneer Species
Intermediate Species
Climax Community
Bare rock
Lichens
Small annual plants and lichens
Grasses and perennials
Grasses, shrubs, and shade-intolerant trees such as pines
Shade-tolerant trees such as oak and hickory
hundreds of years
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Primary Succession (forest)

- Colonization: of bare rock, tiny seedless plants like mosses, and lichens, "pioneer species"
- Early: plants typically small with short lifecycles (annuals), rapid seed dispersal, "environmental stabilizers"
- Middle: plants typically longer lived, slower seed dispersal (herbs, shurbs, perennials)
- Late: plant species are those associated with older, more mature ecosystem-largest vegetation (trees)
- "Climax Community" mature forest in this case (but varies by biome)

**Note: Consumers and decomposer populations will also vary as producer populations change…as well as nutrient cycling…*

•**<u>Secondary succession</u>**: beginning from a major disturbance, but all forms of life are not destroyed

A sequence of communities forming in an area with soil.

Usually when a region has been cleared by a disturbance that does not destroy the soil.

•**What are some disturbance can lead to change?**

Flood

Fire

Hurricanes

Tornadoes

Human activity

SECONDARY SUCCESSION

Pioneer species comes in

First species of plant to arrive after a disturbance.

Generally are plants that grow quickly and produce many seeds.

(weeds)

As time progresses, taller grass grows and shades out pioneer species.

Better roots take nutrients from soil faster

Pioneer species cannot compete and die out.

Characteristics of Climax Community

1.A diverse, stable community.

2. Usually the final community in succession.

3.The vegetation is tolerant of environmental conditions.

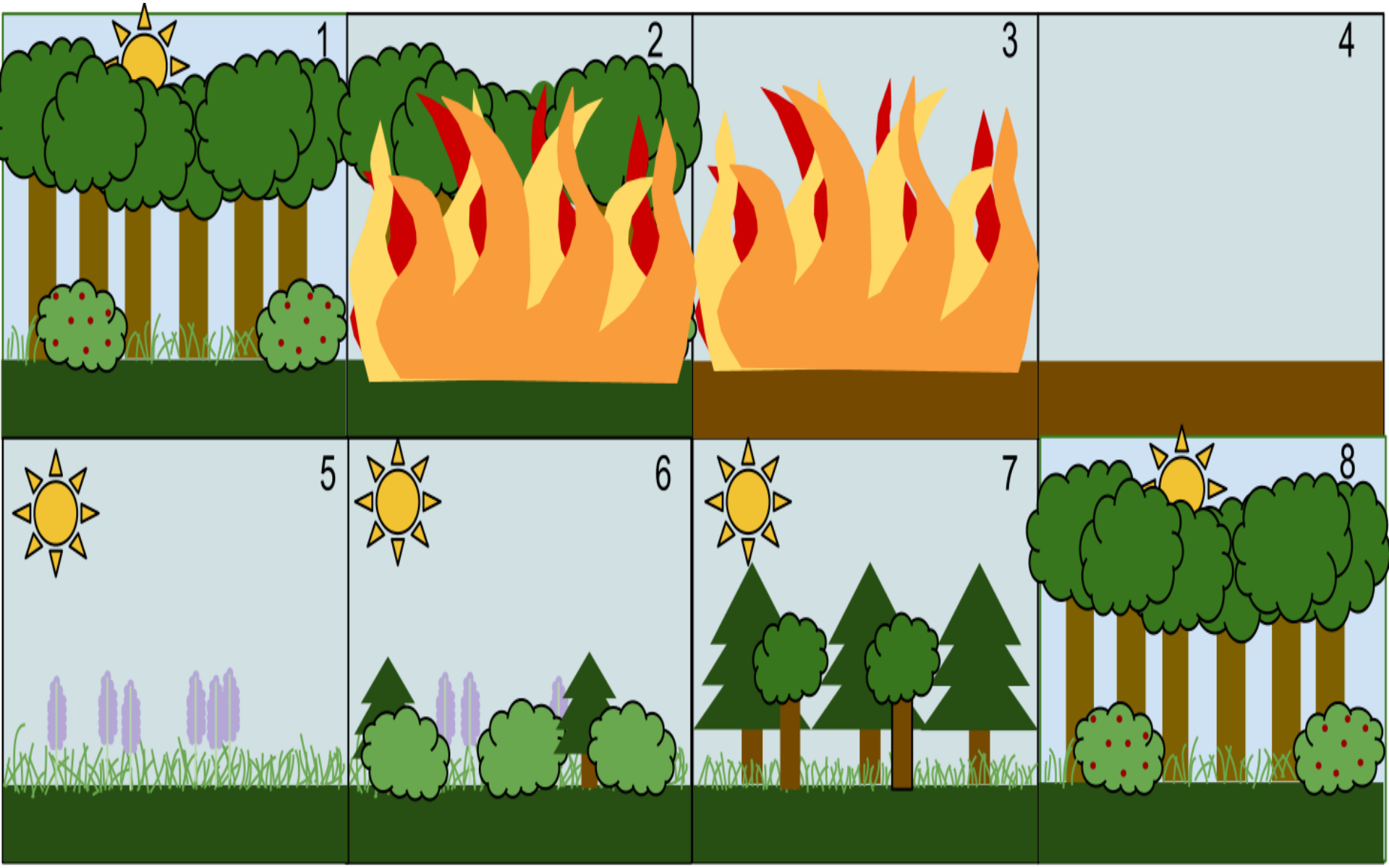
4. It has a wide diversity of species, a well-drained spatial structure, and complex food chains.

5.The climax ecosystem is balanced.

6.Individuals in the climax stage are replaced by others of the same kind.

7.It is an index of the climate of the area.

Secondary Succession



Types of climax

- Climatic Climax

  - one of the ecological climaxes possible in a particular climatic area whose stability is directly due to the influence of climate

Types of climax

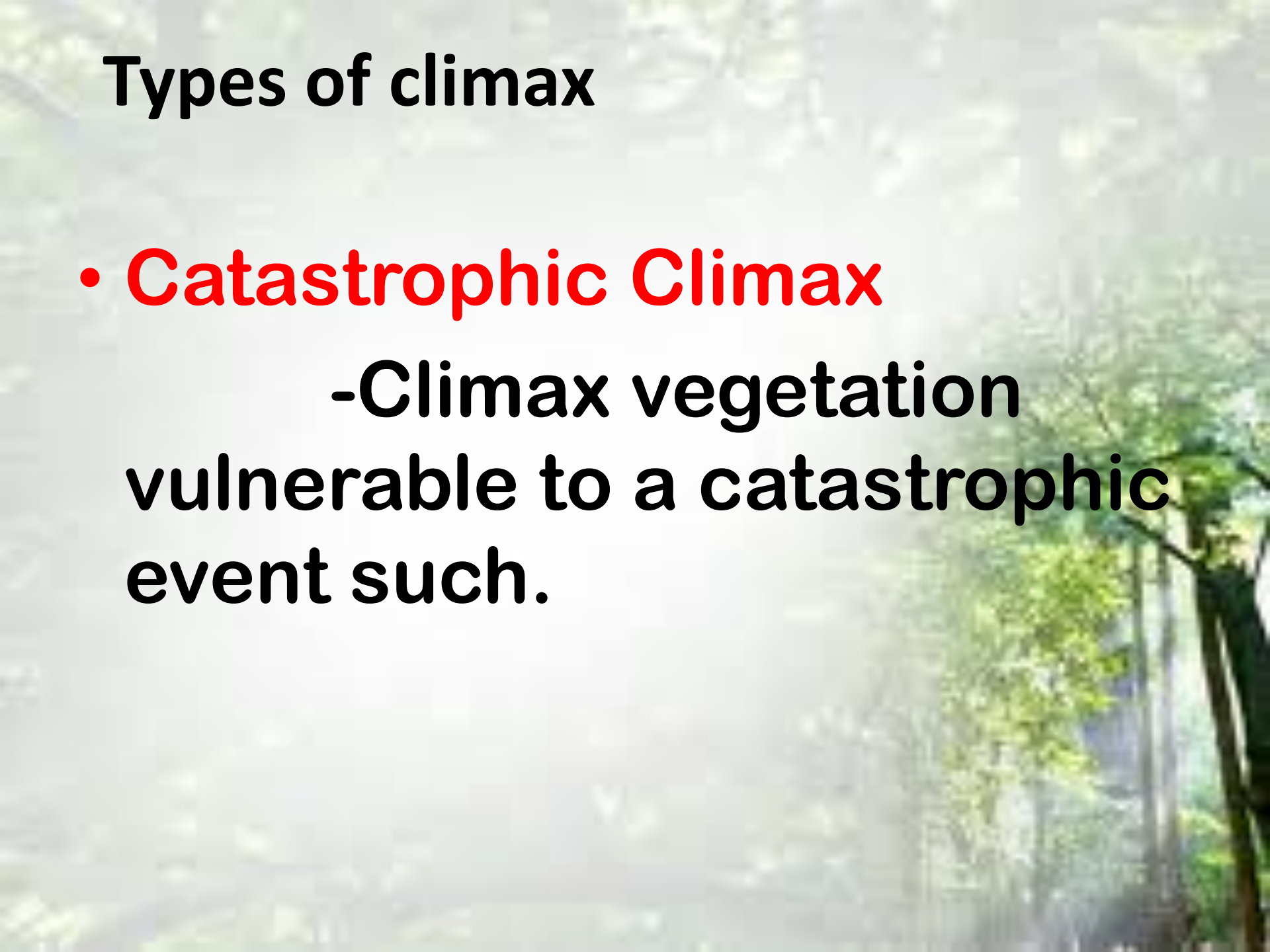
- **Edaphic Climax**

  -an ecological climax resulting from soil factors and commonly persisting through cycles of climatic and physiographic change

Types of climax

- **Catastrophic Climax**

  -Climax vegetation vulnerable to a catastrophic event such.



Primary or Secondary?

1988 Fires in Yellowstone NP

Hutcheson Memorial Forest Center (NJ)

Fifth Year

Hutcheson Memorial Forest Center (NJ)

Tenth Year

Hutcheson Memorial Forest Center (NJ)

Twentieth Year

Hutcheson Memorial Forest Center (NJ)

Twenty-Eighth Year

Changes in Biodiversity

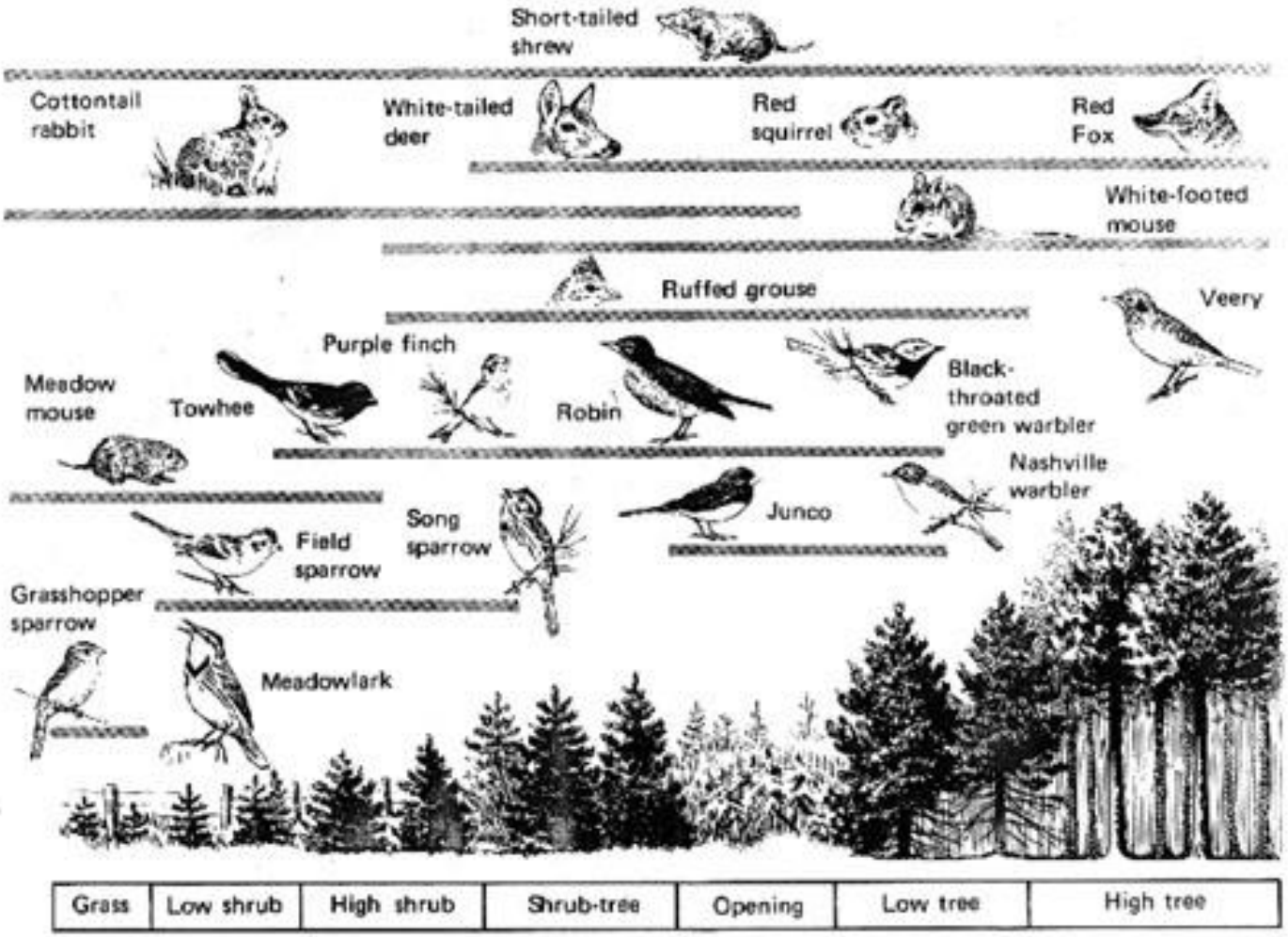
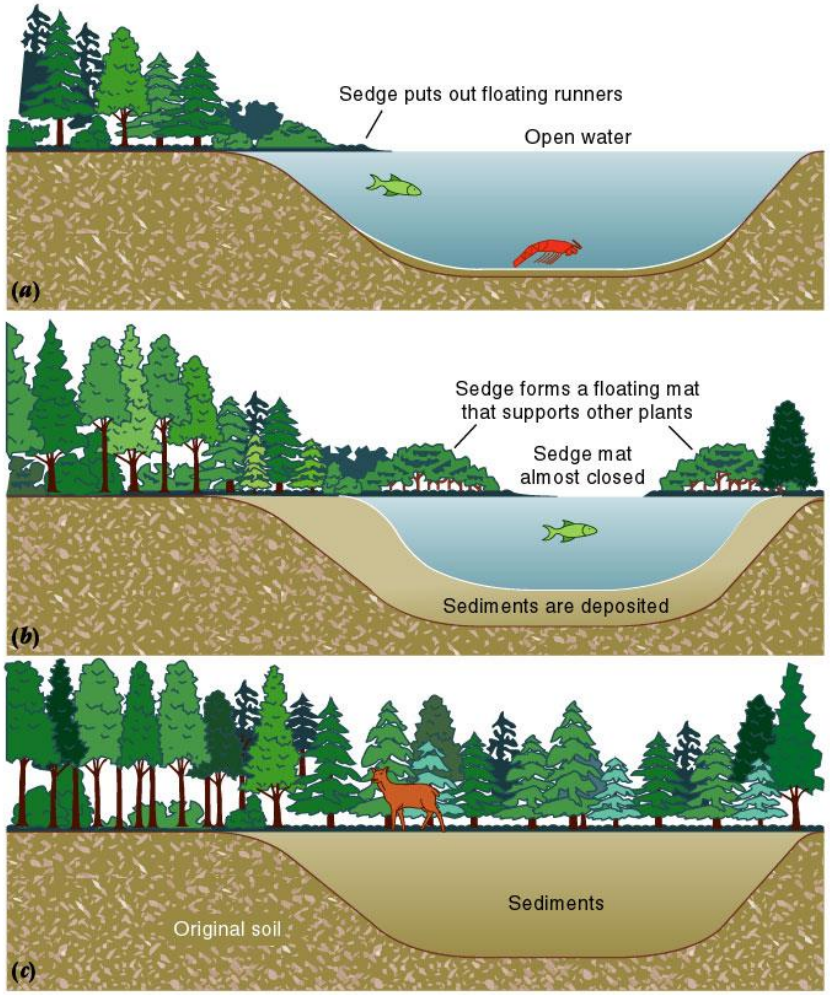


FIGURE 21-5
Wildlife succession in a conifer plantation in central New York. Note how some species

growth form results in increased vertical stratification and increased influence on environ-

Succession in Aquatic Ecosystems

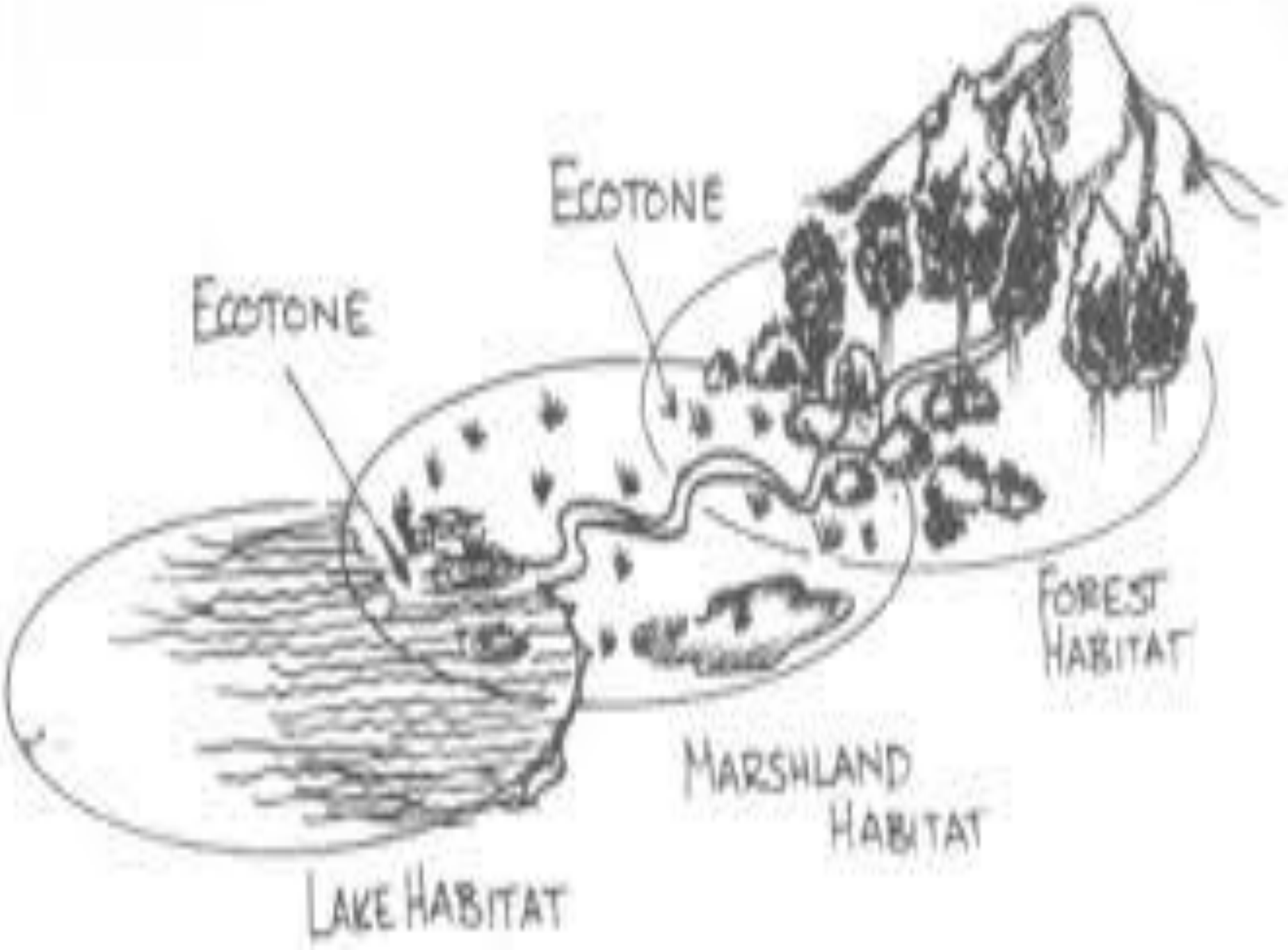


Succession in a Pond

1960s to 1990s

Ecotones

- Disturbances often create **ecotones**, but they also exist as natural transitions between biomes or ecosystems
- An **ecotone** is a transition area between two adjacent ecological communities
  - a sharp boundary or a gradual blending effect
  - particularly significant for mobile animals, as they can exploit more than one set of habitats within a short distance
  - this can produce an **edge effect** along the boundary line, with the area *possibly* displaying a greater than usual diversity of species


ECOTONE
ECOTONE
FOREST HABITAT
MARSHLAND HABITAT
LAKE HABITAT

Edge Effects

- Disturbances can fragment ecosystems and create **edge effects**
- An **edge effect** describes the differing abiotic and biotic conditions that exist at a border between contrasting environments in an ecosystem
  - the increased light, greater wind and temperature extremes and lower humidity at the boundaries of fragments favor some plant species over others (native colonizing species or invasive species)
  - this can make the combination of species present near the boundary different from that inside the fragment (more diverse or less depending on the factors)

Types of Edge effect

- **Inherent— Natural features stabilize the border location.**
- **Induced—Transient natural or human related activities, subject borders to successional changes over time.**
- **Narrow—One habitat abruptly ends and another begins.**

Remember This Edge Effect?

Kudzu at DCEP