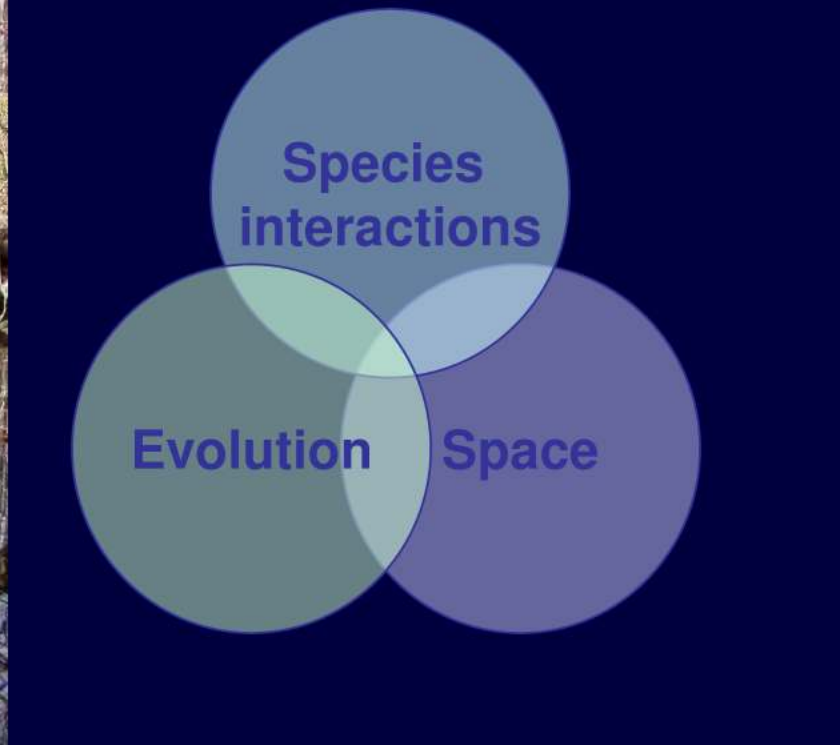
Introduction

Limnology

lecture 1


Species interactions
Evolution
Space

Where is most of the world’s freshwater?

How much fresh water?

2.6% of water is freshwater

77% of freshwater is in glaciers (2% of all water)

22.9% of freshwater is groundwater (0.59%)

0.1% is in lakes, ponds, streams (0.01%)

Why do we care?

1. Human needs

E. O. Wilson: human culture evolved to be hydrophillic

Reflected in art, culture, religion, real estate values

2. Conservation risk

2 million tons of human waste per day (UN)

2. Conservation risk

Since 1900 half of global wetlands lost (UN)

2. Conservation risk

40% of US waters not “fishable” or “swimmable”

(US EPA)

- *1972?*

2. Conservation risk

139 endangered or threatened fish, 105 mollusks

(USFWS)

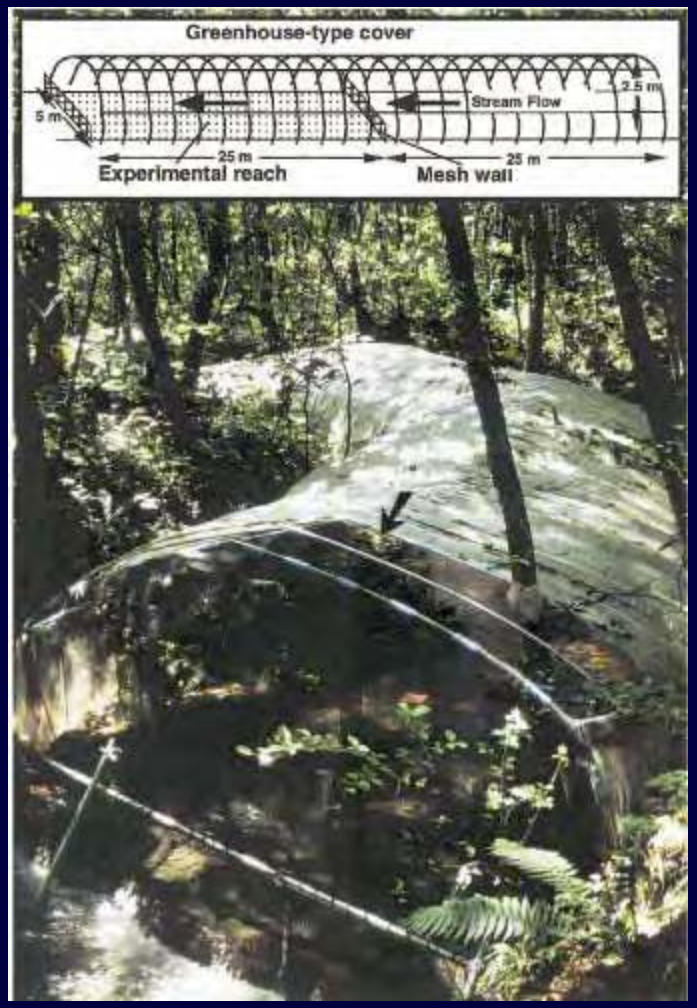
3. Ecosystem interconnections

E.g., Experimental manipulations of headwater streams (Nakano et al. 1999)

50% prey energy comes from riparian forest/stream

Eliminate terrestrial prey, fish eat algae-eaters → higher algae

Eliminate aquatic insect emergence → reduce riparian spiders



4. Importance as a study system

Ecology, 73(3), 1992, pp. 747–754

ARE TROPHIC CASCADES ALL WET? DIFFERENTIATION AND DONOR-CONTROL IN SPECIOSE ECOSYSTEMS[1]

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What is limnology?

- study of lakes and ponds (*Limne* = pool) ca. 1892

- study of inland waters ca. 1922
    - can include inland saline waters



Limnology

– Lentic
  - Still waters
  - Lakes, ponds, fens, marshes

– Lotic
  - Moving waters

What is a lake?

Lake – (physical) water body with thermal stratification
- usually > 3m deep

- (operational) water body > 1-10 ha

Pond – everything else
Reservoir – human created lake/pond

Major environmental gradients in limnology

- Permanence
- Depth
- Nutrients
- Flow

weeks

months

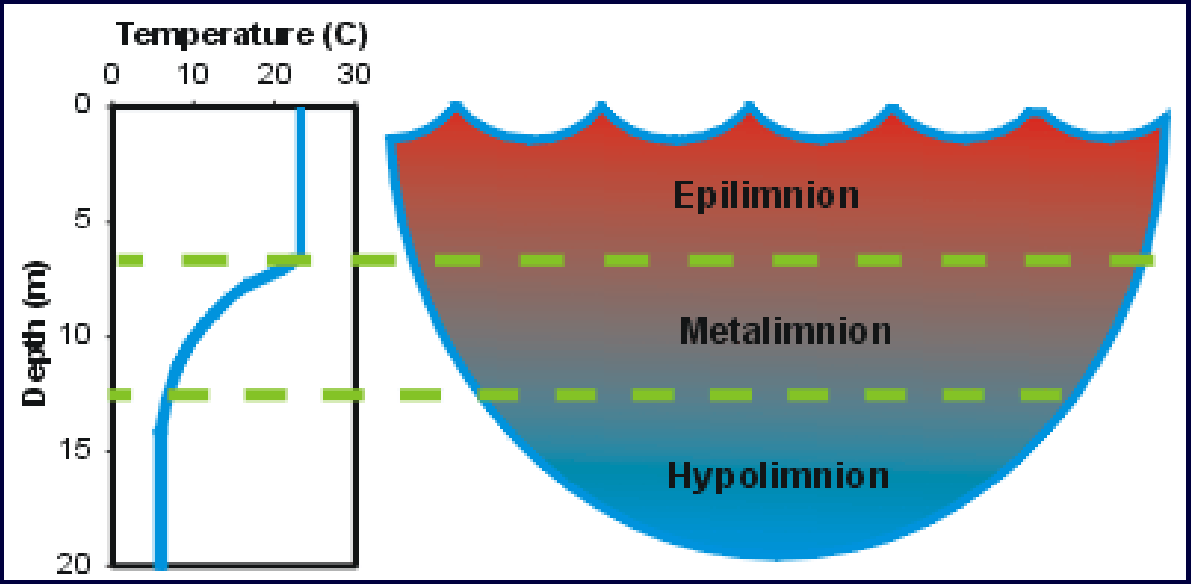
years

Permanence

1000s of years

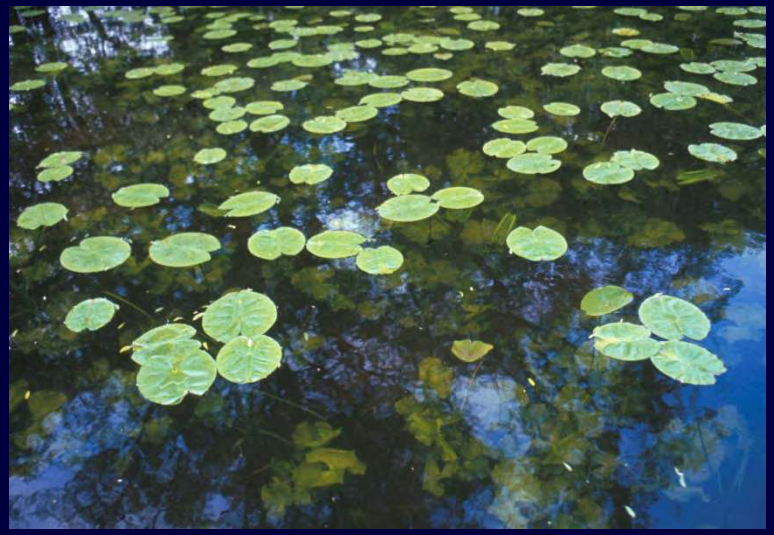
25,000,000 years

Depth/Stratification



Strong seasonal dynamics

- physical and chemical properties
- biota



Nutrients

Flow requires radically different adaptations

Today:

limnology - study of inland fresh waters
Critical gradients in freshwater

- permanence
  - wetlands, unstratified ponds, stratified lakes
- depth and stratification
- nutrients
  - clear, macrophyte vs. green
- flow
  - lentic and lotic water bodies

Thursday:
Lab notebooks
Ecology and evolution

Lab – Dunham Pond