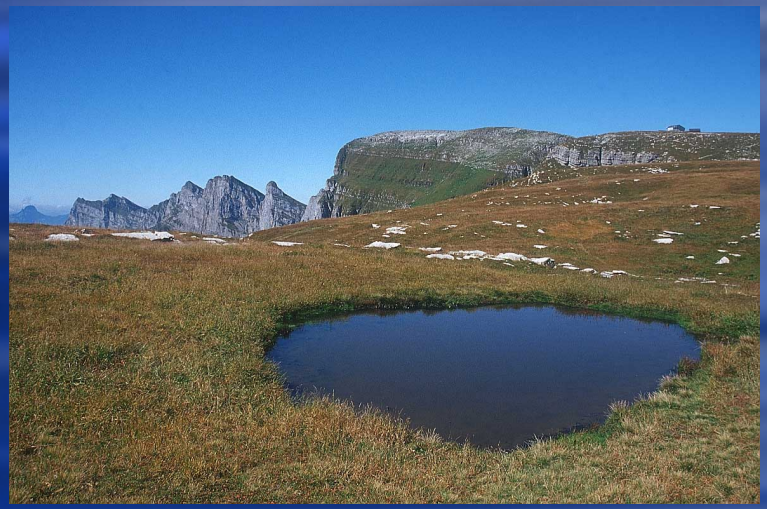
Freshwater Ecosystems

Ch. 6, part 2

Freshwater ecosystems

- Include standing water - lentic
- And flowing water - lotic

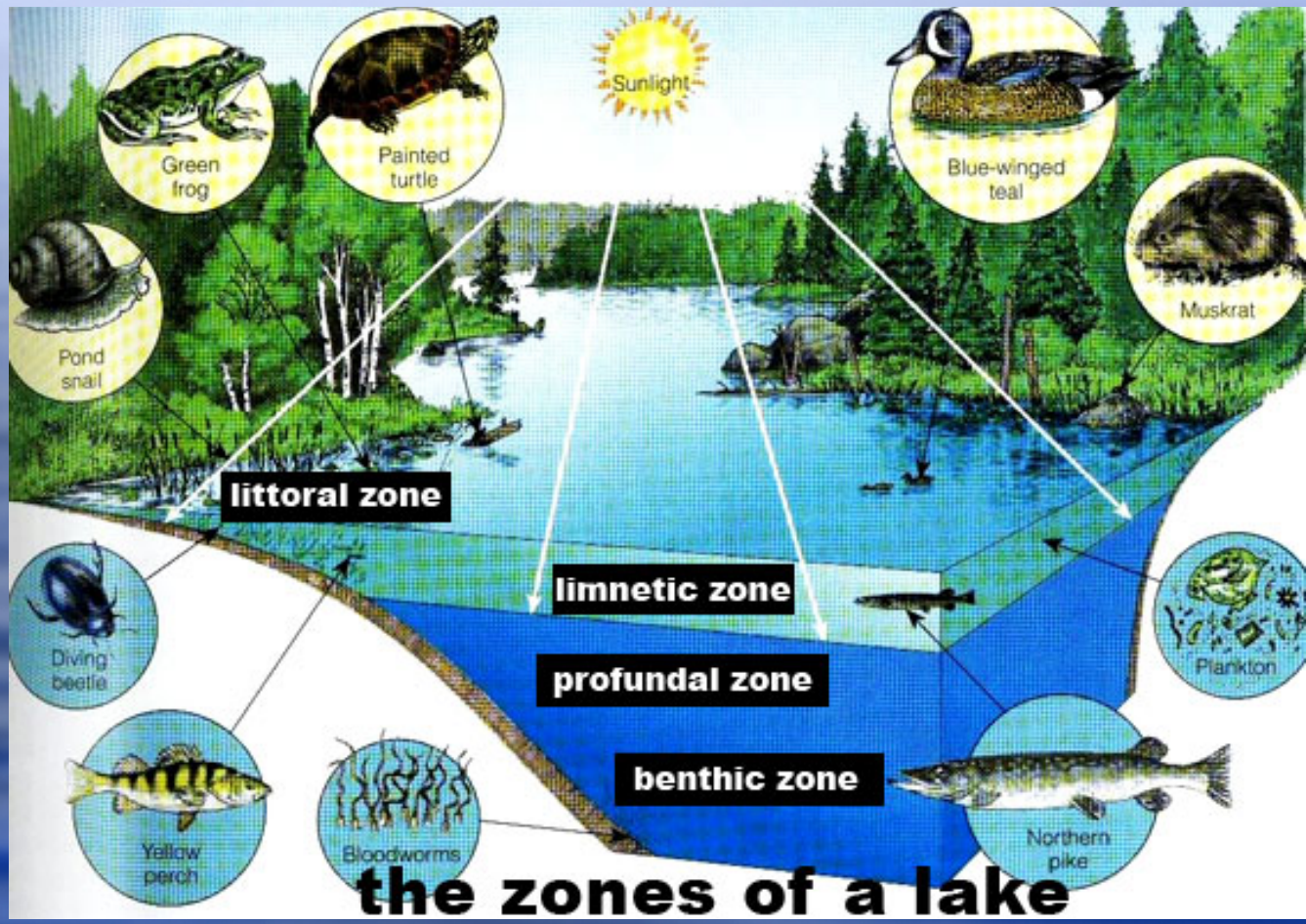


Freshwater ecosystems

- Provide many important economic and ecological services including:
  - Flood control
  - Groundwater recharge
  - Habitat for many species
  - Food
  - Drinking water
  - Irrigation water
  - Hydroelectric power
  - Transportation corridors
  - Recreation

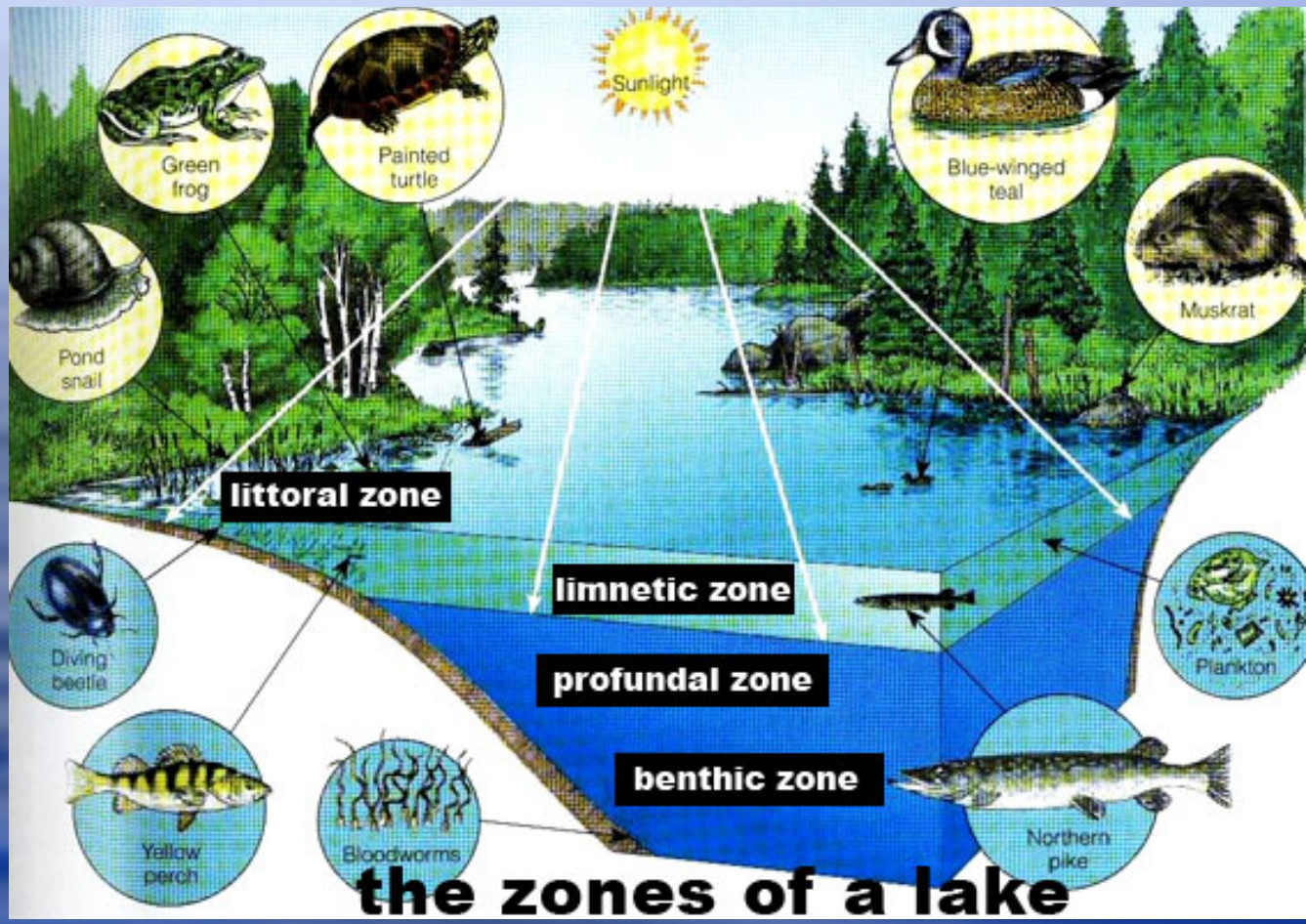
Life zones in lakes & ponds

- Top = littoral zone
  - near the shore
  - warm and sunlit
  - Rooted plants
  - Turtles, frogs, crayfish, perch, bass, carp
  - High biodiversity



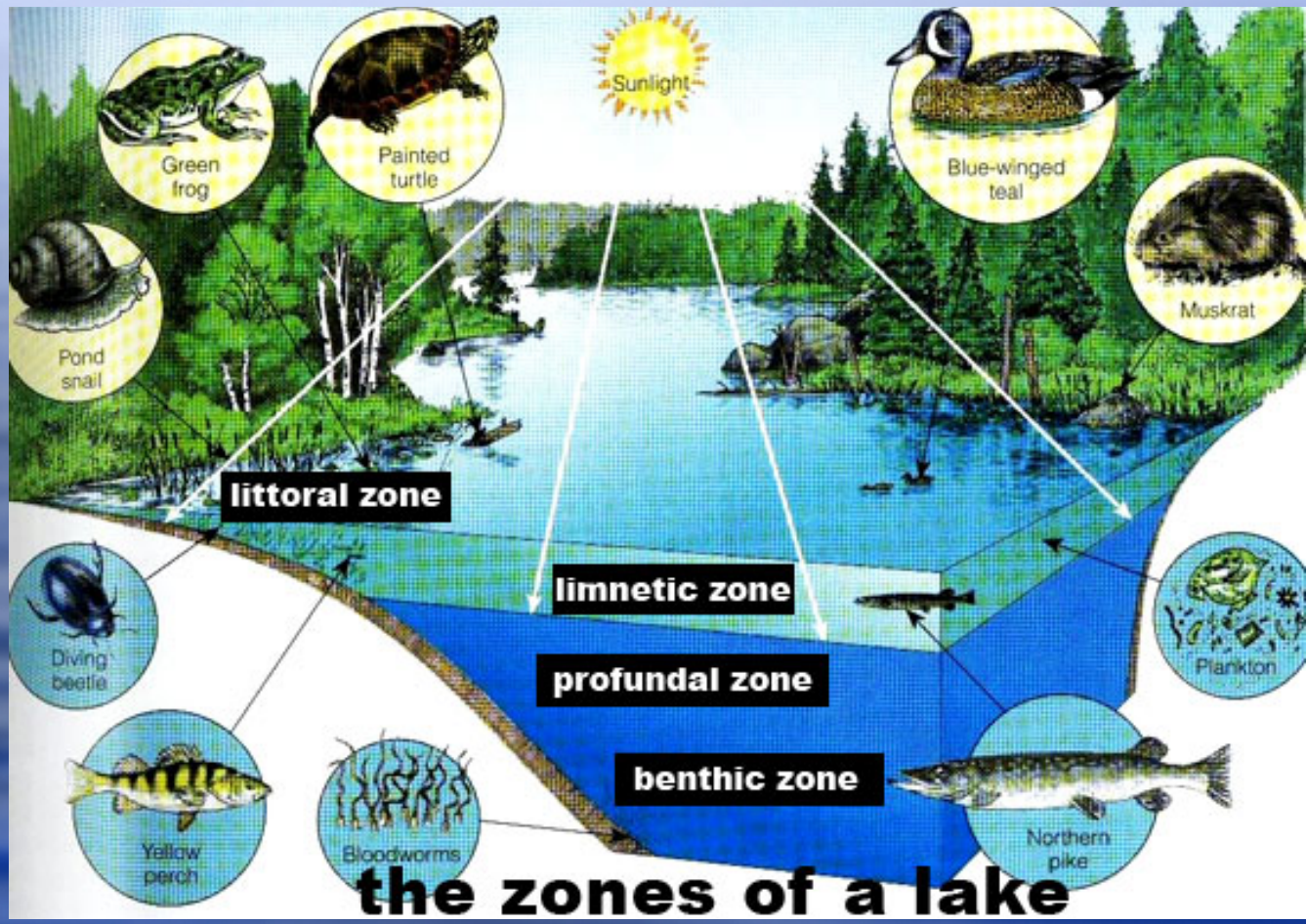
Life zones in lakes & ponds

- Top = limnetic zone
  - Open water
  - warm and sunlit
  - plankton
  - Supplies most of the food and O_2 for the lake
  - Larger fish like pike live here



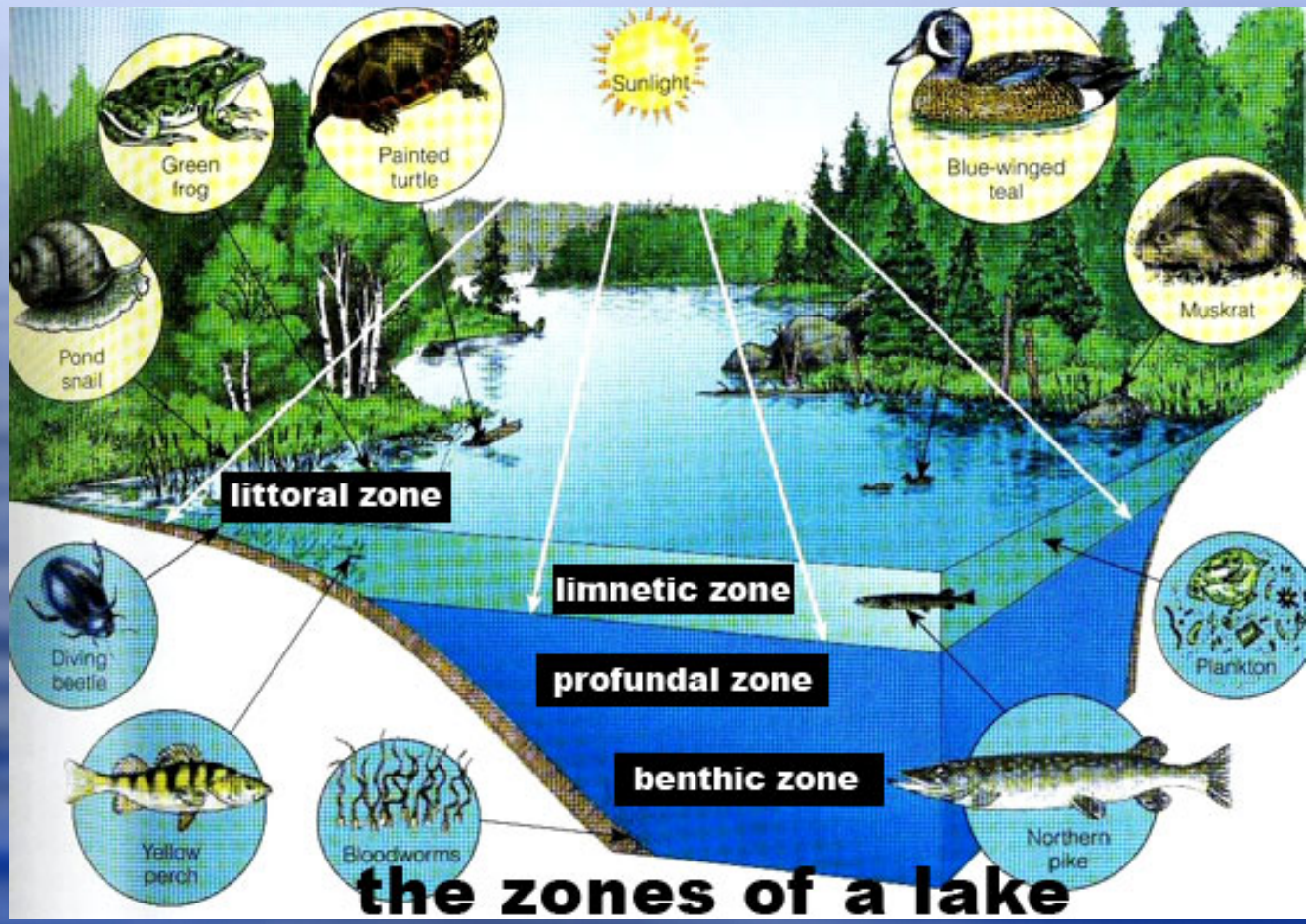
Life zones in lakes & ponds

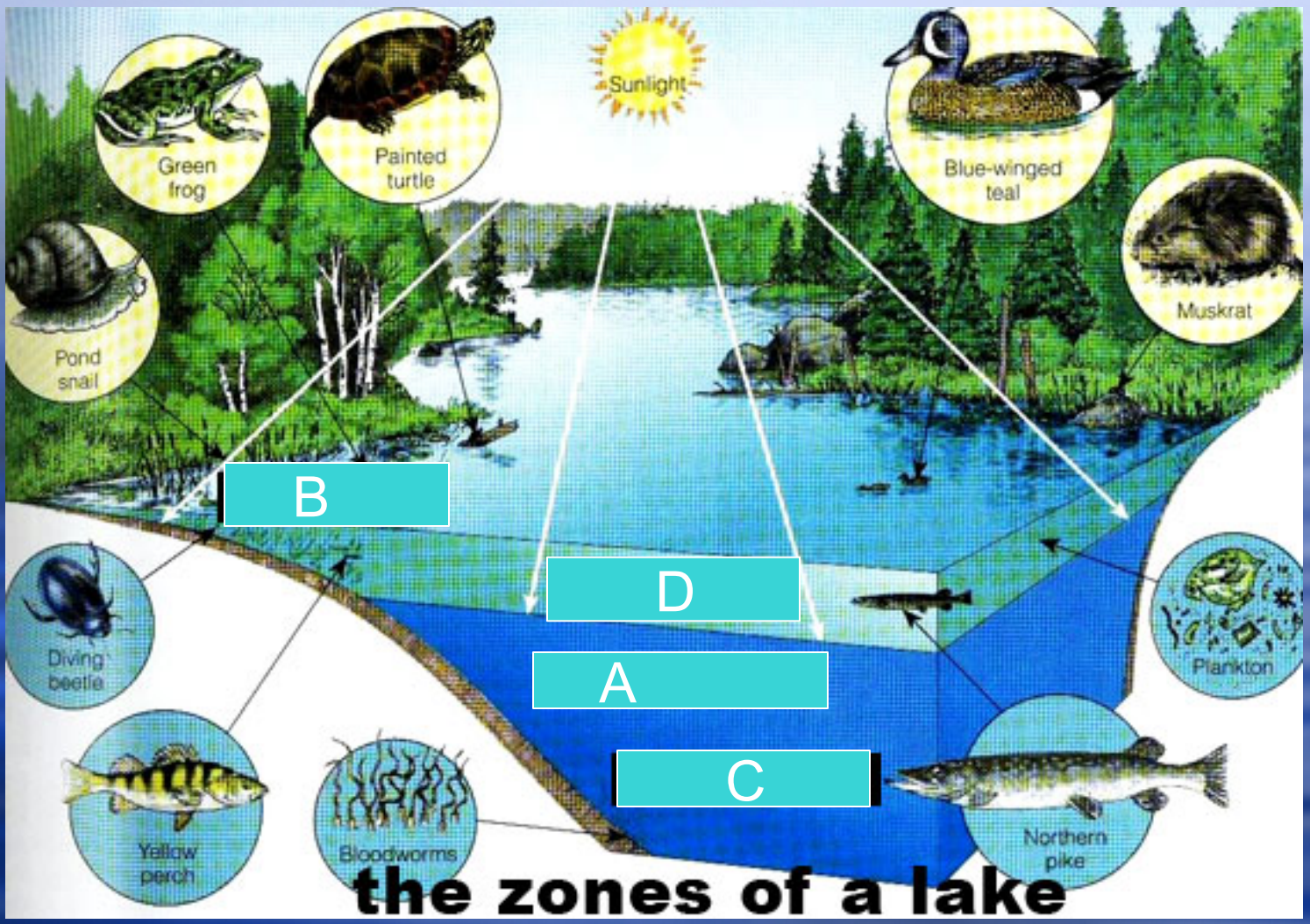
- Middle = profundal zone
  - Open water
  - Deeper
  - Colder
  - No plants
  - Low oxygen



Life zones in lakes & ponds

- Bottom = benthic zone
  - Dark
  - Mostly decomposers live here
  - Bottom dwelling fish and detritus feeders like bloodworms
  - Dead matter ends up here





What are?

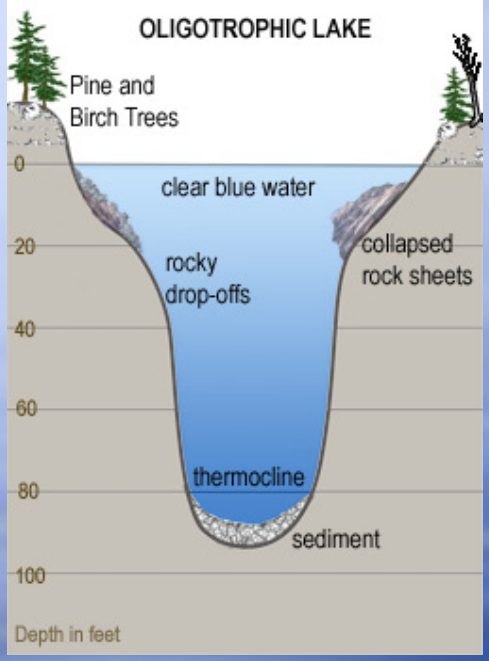
A.

B.

C.

D.

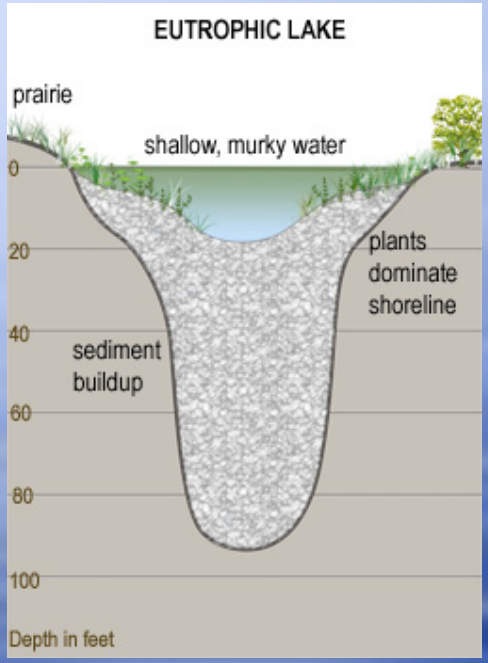
Lake types

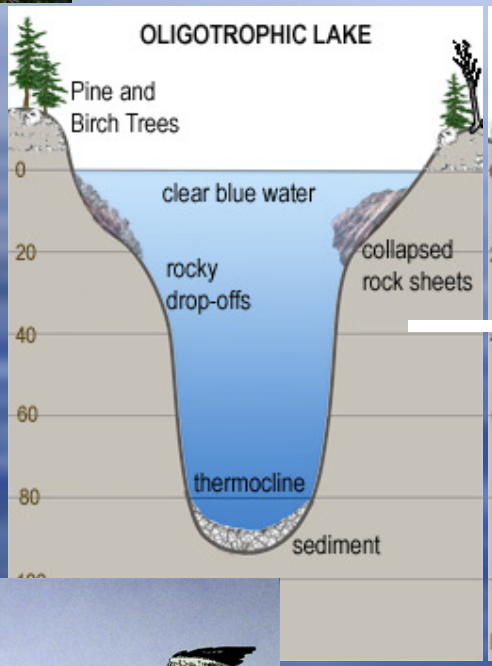


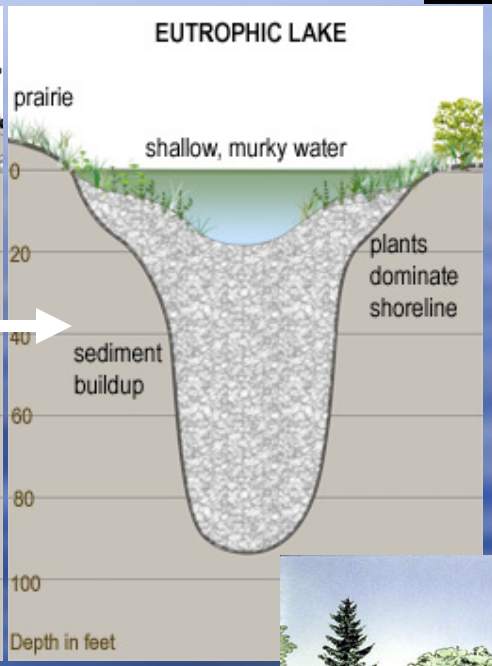
- Oligotrophic lakes
  - low nutrients for plants
  - Clear water
  - Often steep sided and deep
  - Usually replenished by snow, glacier melt
  - Examples: Lake Tahoe, Crater Lake

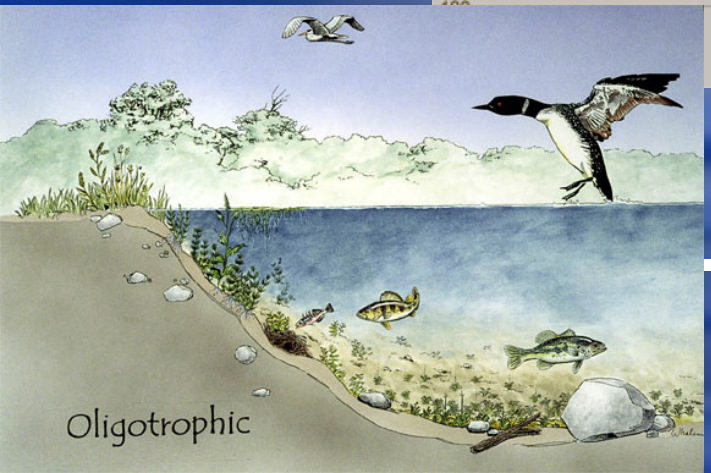
Lake types

- Eutrophic lakes
  - High nutrient levels
  - Murky, green water
  - Usually shallow
  - Usually replenished by rivers/streams




OLIGOTROPHIC LAKE
Pine and
Birch Trees
0
clear blue water
20
rocky
drop-offs
collapsed
rock sheets
40
60
thermocline
80
sediment

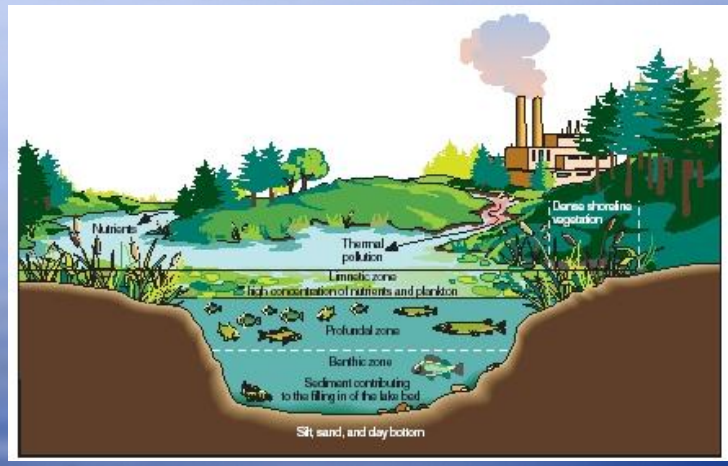

EUTROPHIC LAKE
prairie
shallow, murky water
0
20
plants
dominate
shoreline
sediment
buildup
40
60
80
100
Depth in feet


Oligotrophic


Eutrophic

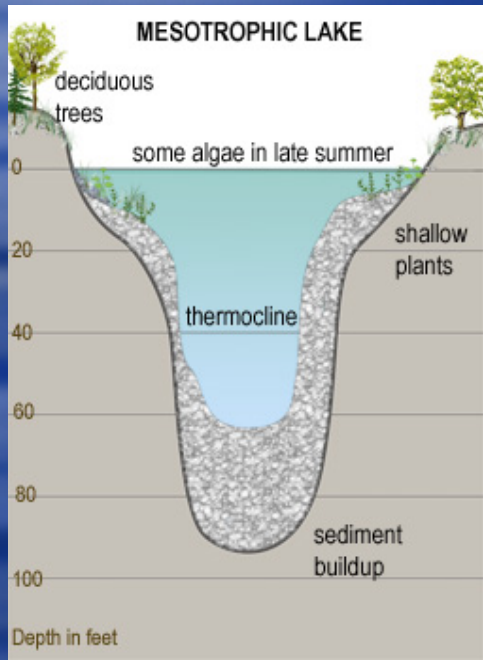
Cultural Eutrophication

- We artificially cause lakes to become eutrophic by
  - Runoff
  - Pollutants
  - Thermal pollution
- Lakes become hypereutrophic



Lake Types

- Most lakes somewhere in between oligotrophic and hypertrophic
- We call them Mesotrophic

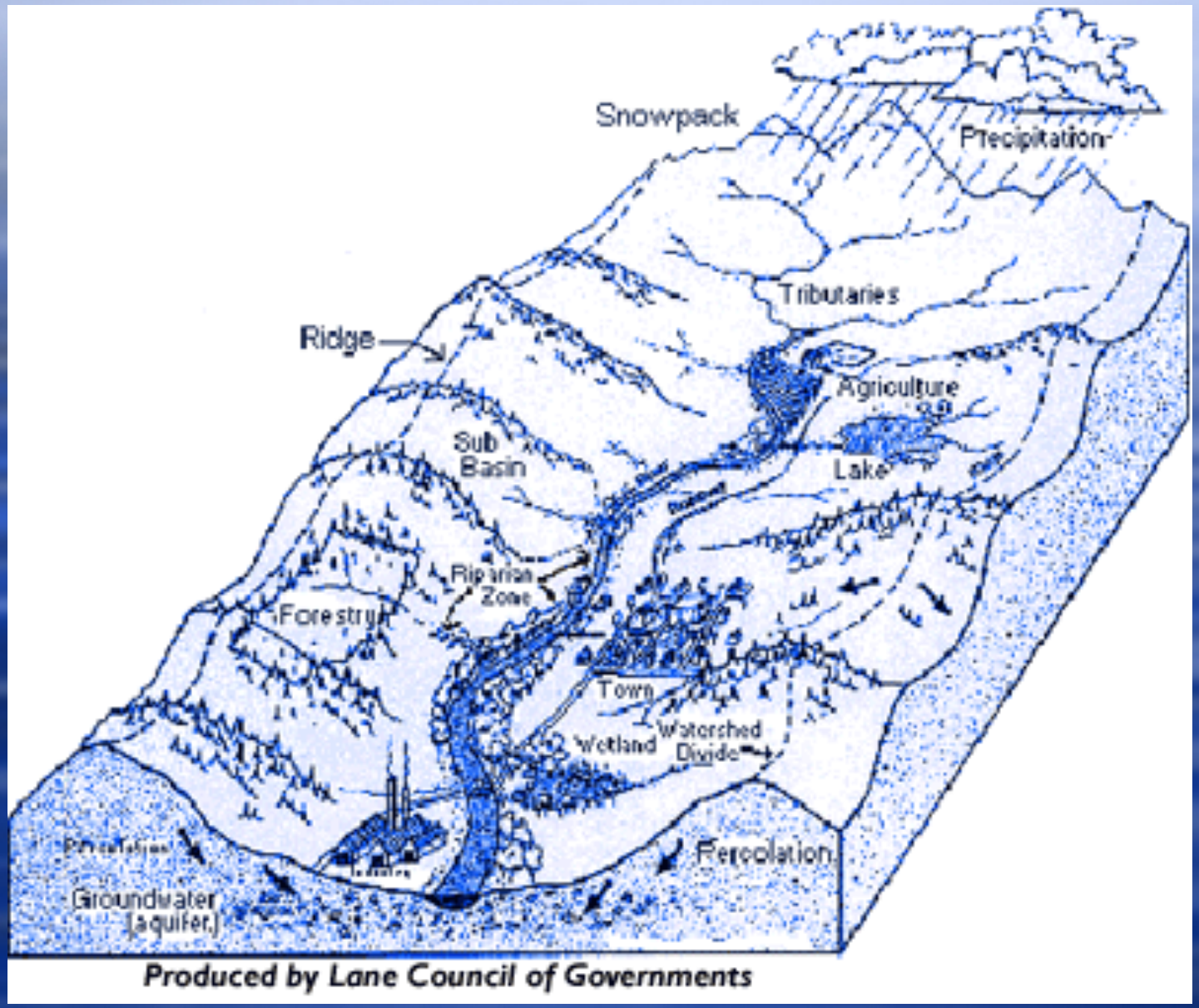


Where does each lake type fall on the line?

My favorite lake

Streams and Rivers carry water from mountains to the ocean

- Watersheds - aka drainage basin
  - The land area that delivers runoff, sediment, dissolved substances to a river or stream
  - 3 zones
    - Source zone
    - Transition zone
    - Floodplain zone


Snowpack
Precipitation
Tributaries
Ridge
Agriculture
Sub
Basin
Lake
Riparian
Zone
Forestry
Town
Watershed
Divide
Wetland
Percolation
Groundwater
(aquifer)
Produced by Lane Council of Governments

Middle San Joaquin-Lower Merced-Lower Stan Watershed -- 18040002

http://iaspub.epa.gov/tmdl_waters10/huc_rept.control?p_huc=18040002&p_huc_desc=MIDDLE%20SAN%20JOAQUIN-LOWER%20MERCED-LOWER%20STAN

Make a watershed

The 3 zones of a watershed

- Source zone
  - Aka headwaters
  - Narrow
  - Mountain streams
  - Fast flowing, lots of O2
  - Producers are algae & mosses that can attach to rocks
  - Many heterotrophs are adapted to fit under rocks

The 3 zones of a watershed

- Transition Zone
  - Headwater streams merge
  - Wider, deeper, warmer water
  - May be more turbid with less O2
  - More producers, more fish

The 3 zones of a watershed

- Floodplain zone
  - Streams join into wider, deeper rivers
  - Broad, flat land
  - Warmer, less O2
  - More turbid
  - More runoff

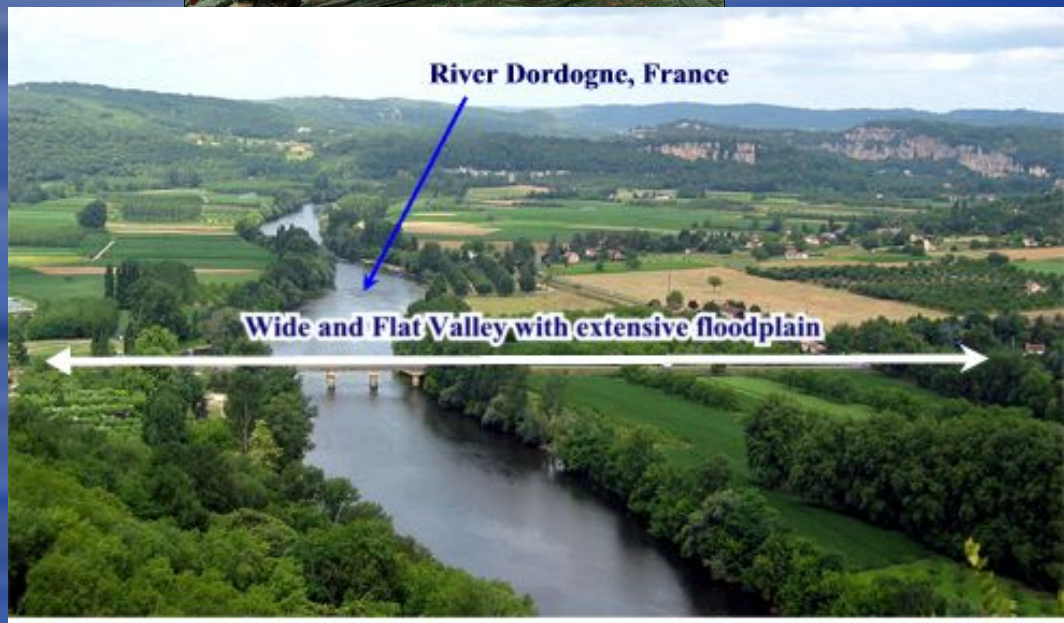


Photo Source: L Crisp - on www.geographyphotos.com

What zone are we in for the Sandy River?

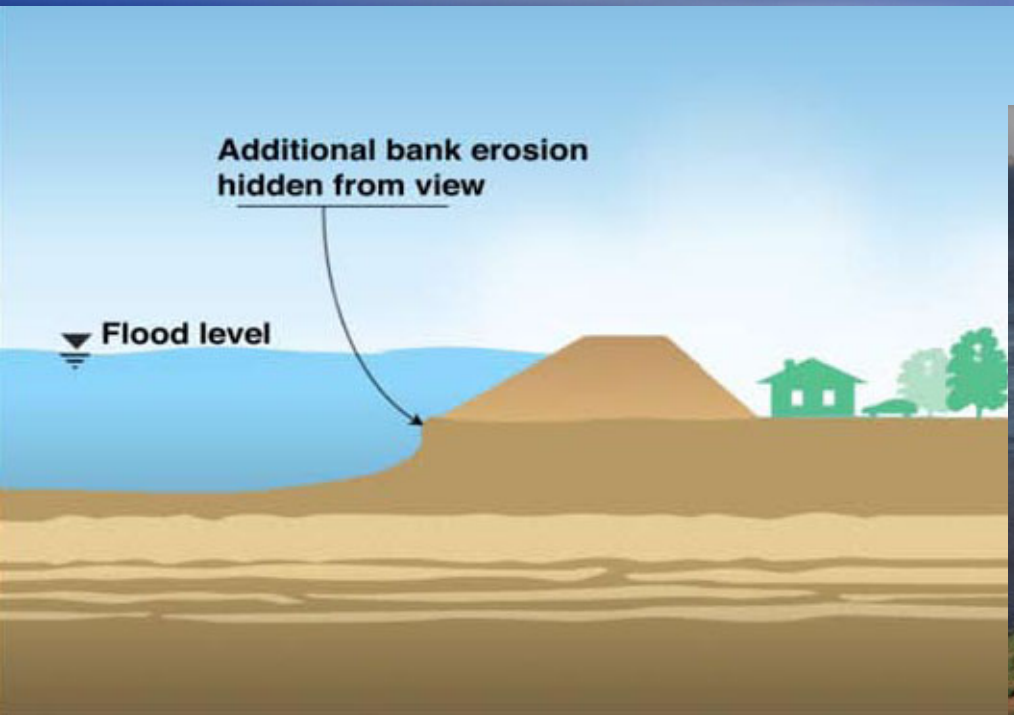
Human Impacts on Freshwater Ecosystems

1. Dams!
   - Fragment ~40% of the world's rivers
   - Change/destroy habitat

Hetch-Hetchy in
Yosemite Valley

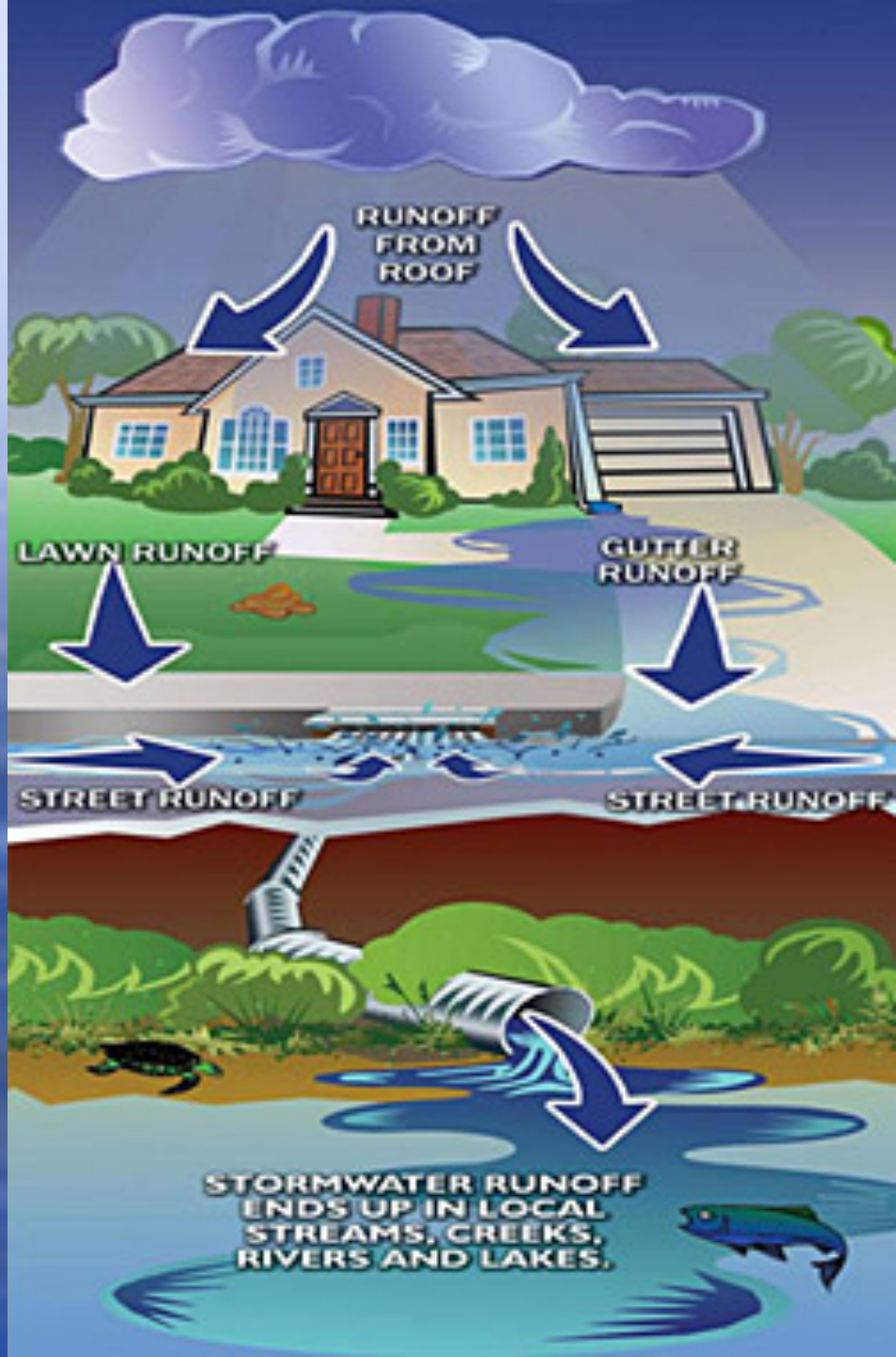
Human Impacts on Freshwater Ecosystems

2. Levees for flood control
   - Destroy habitat, especially wetlands



Human Impacts on Freshwater Ecosystems

3. Pollutants from cities and farms



Human Impacts on Freshwater Ecosystems

4. Loss of inland wetlands

filled in for crops, homes, buildings