

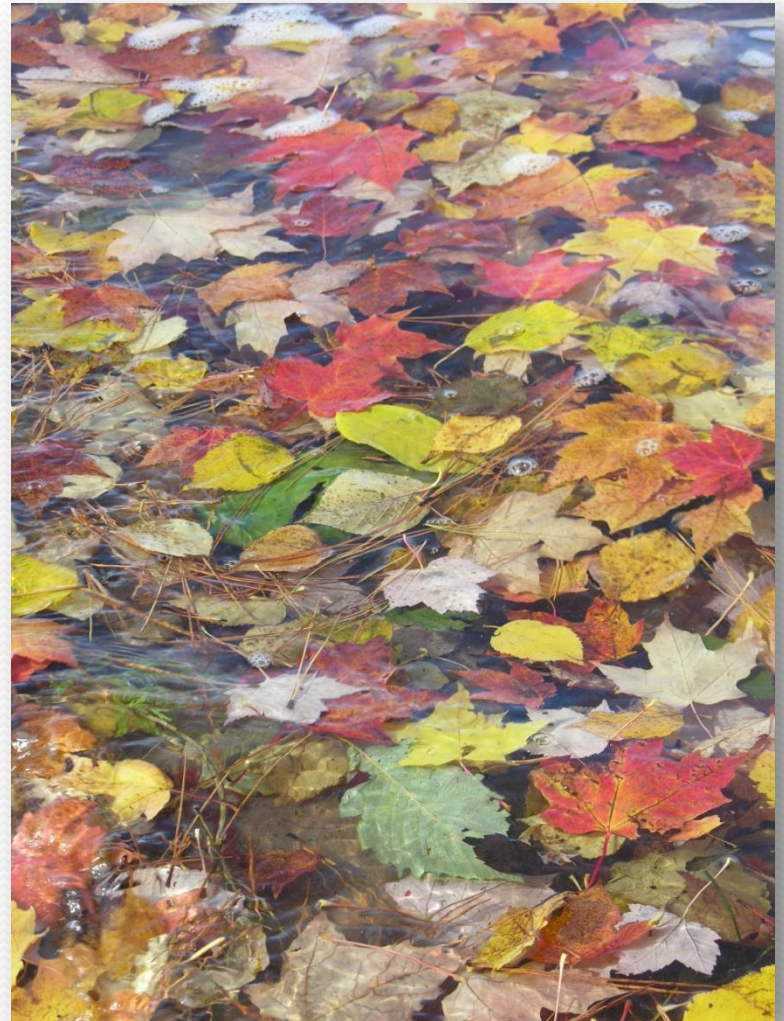
# Elm River Township Report on Lake Monitoring



Dean Premo, Ph.D., White Water Associates, Inc.  
Elm River Township Presentation – Sept. 26, 2011

# OVERVIEW

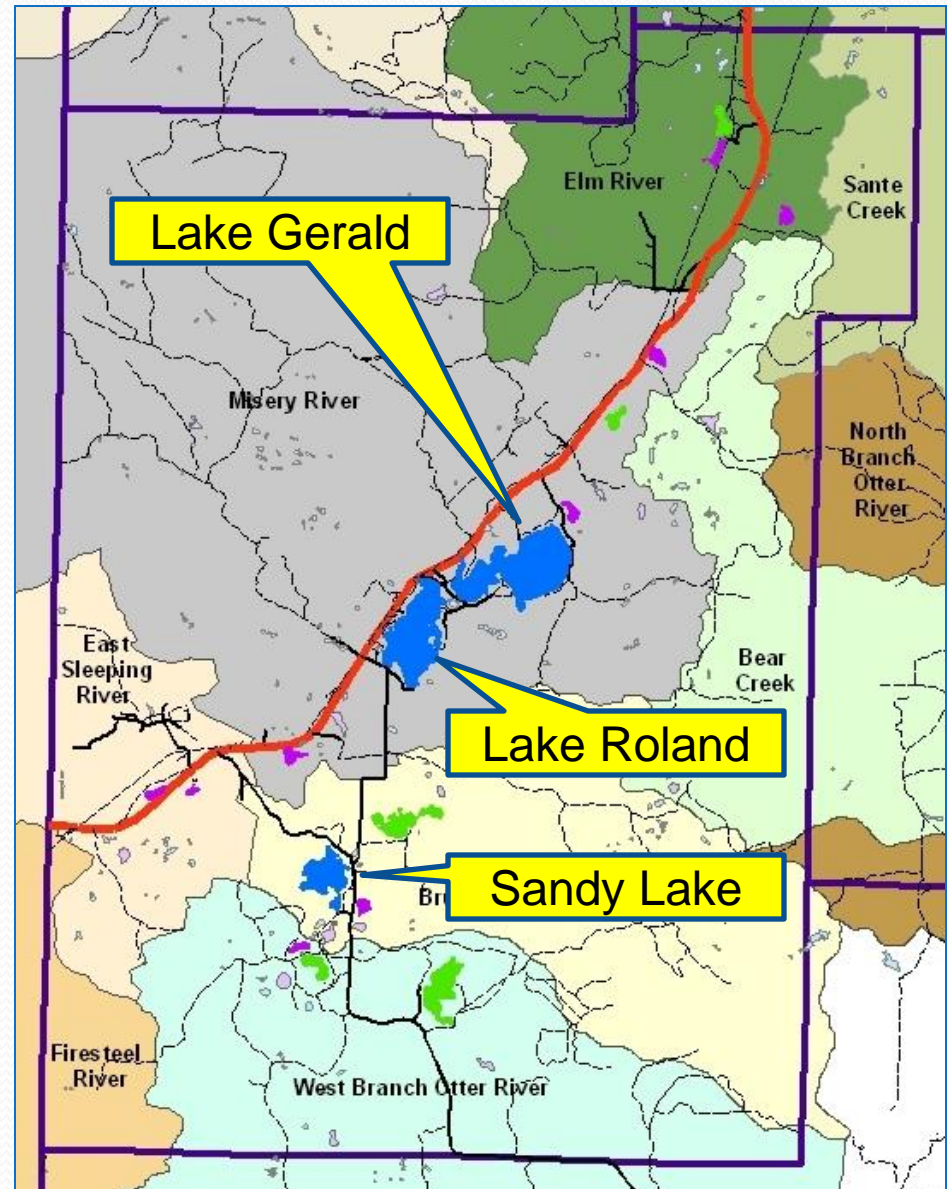
- Introduction
- Review of concepts
- What to monitor
- Report on Lakes
- Recommendations



# Elm River Township Lake Studies

## Baseline Assessments:

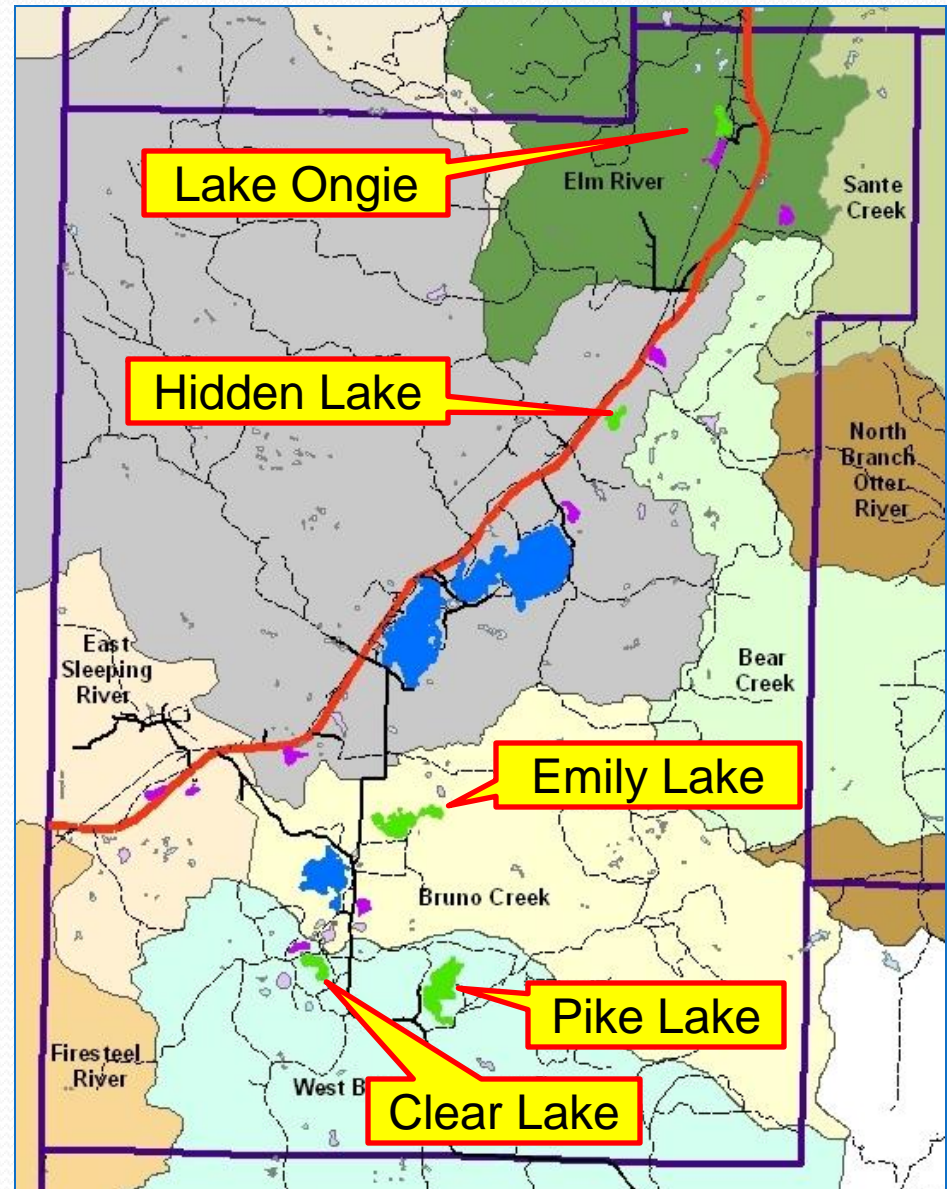
- White Water staff
- Surface & deep water chemistry samples
- Water transparency
- Temp/DO profile
- Littoral & riparian zone
- Three lakes: Sandy, Roland, & Gerald



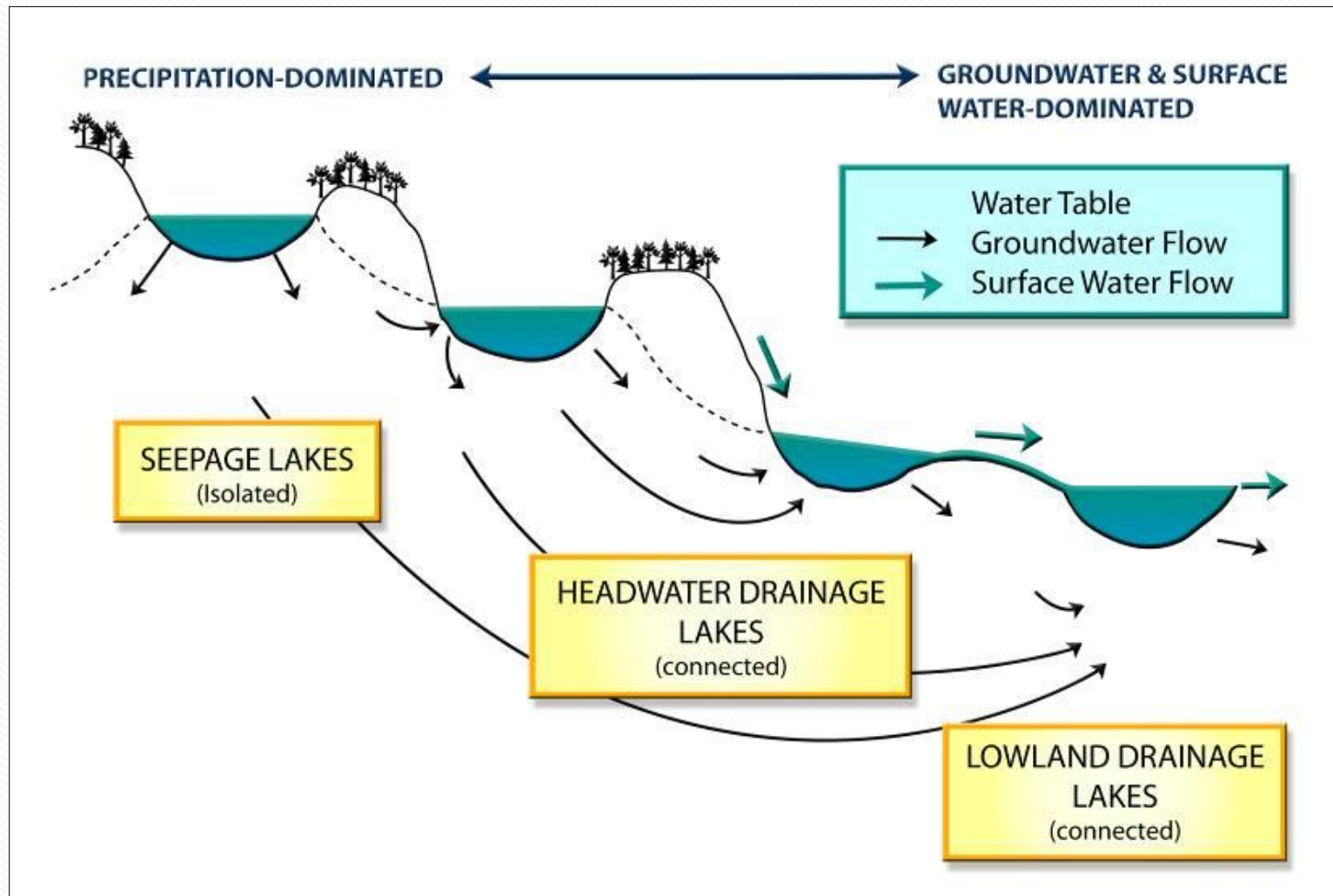
# Elm River Township Lake Studies

## Lake Chemistry Profile:

- Lake volunteers
- Surface water chemistry
- Five lakes: Ongie, Pike, Clear, Emily, and Hidden



# Lake landscape position influences physical, chemical and biological properties of lakes

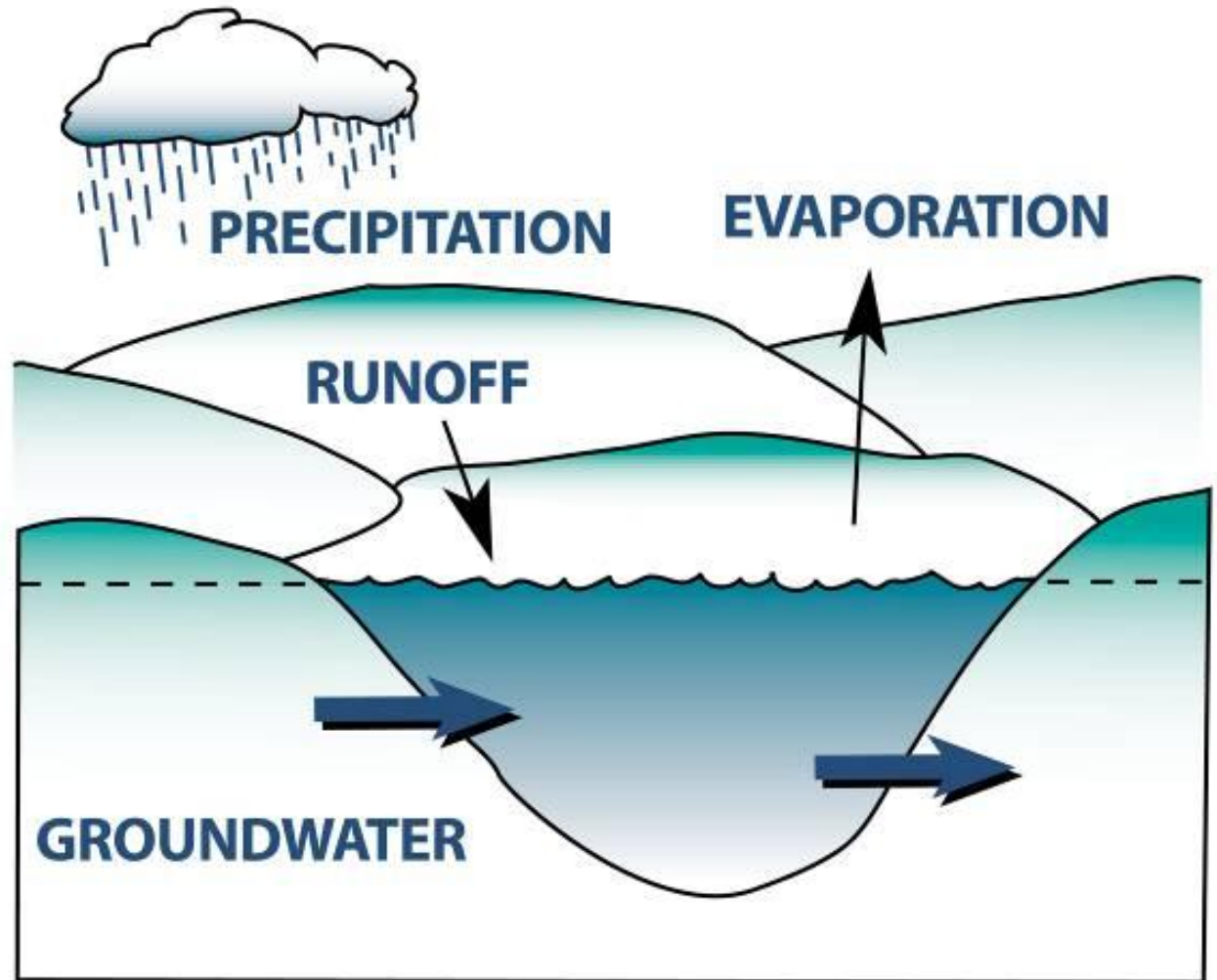


# Seepage Lake

Water source:

- precipitation
- groundwater
- runoff

No outlet/inlet

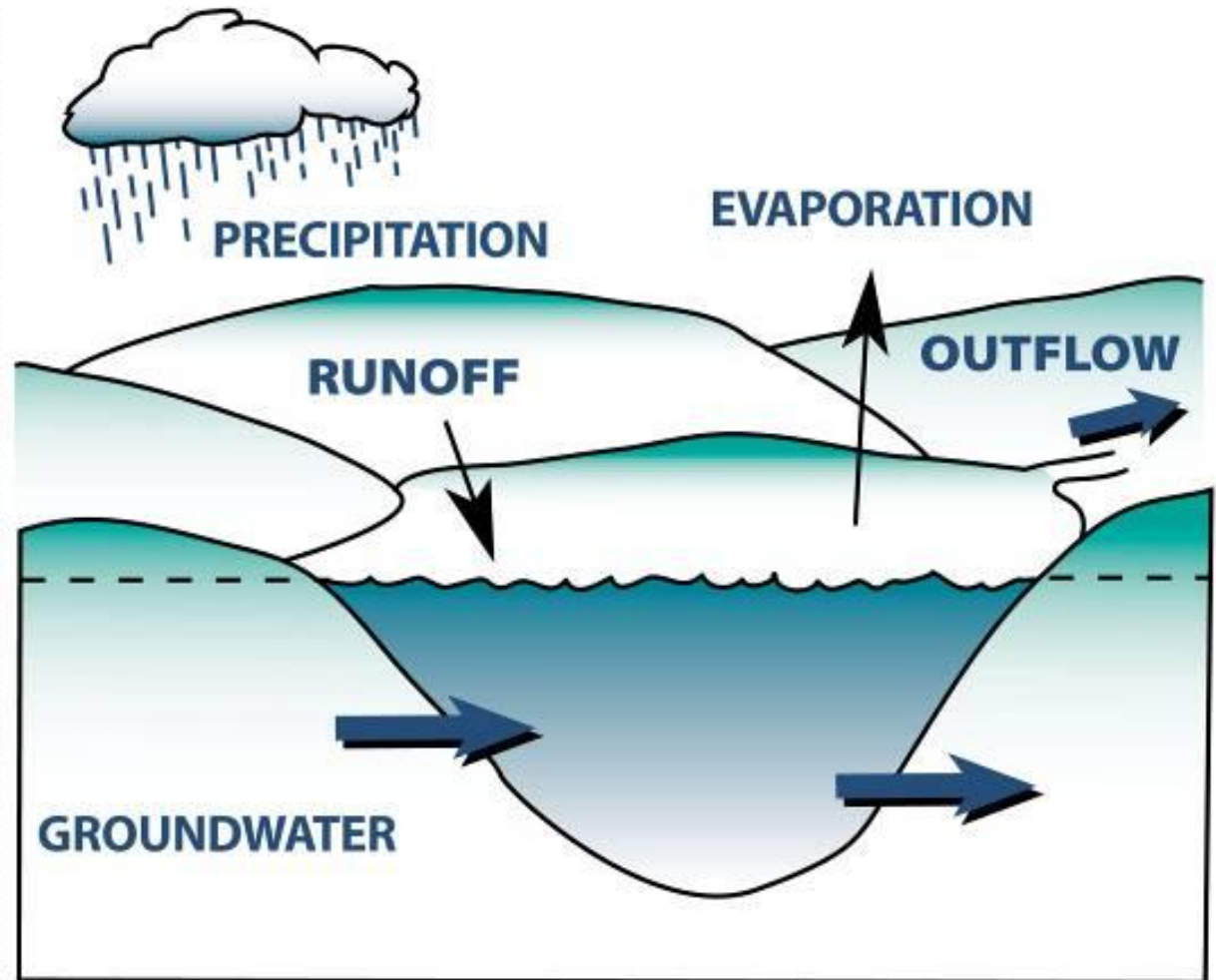


# Groundwater drainage lake

Water source:

- precipitation
- groundwater
- limited runoff

Stream outlet

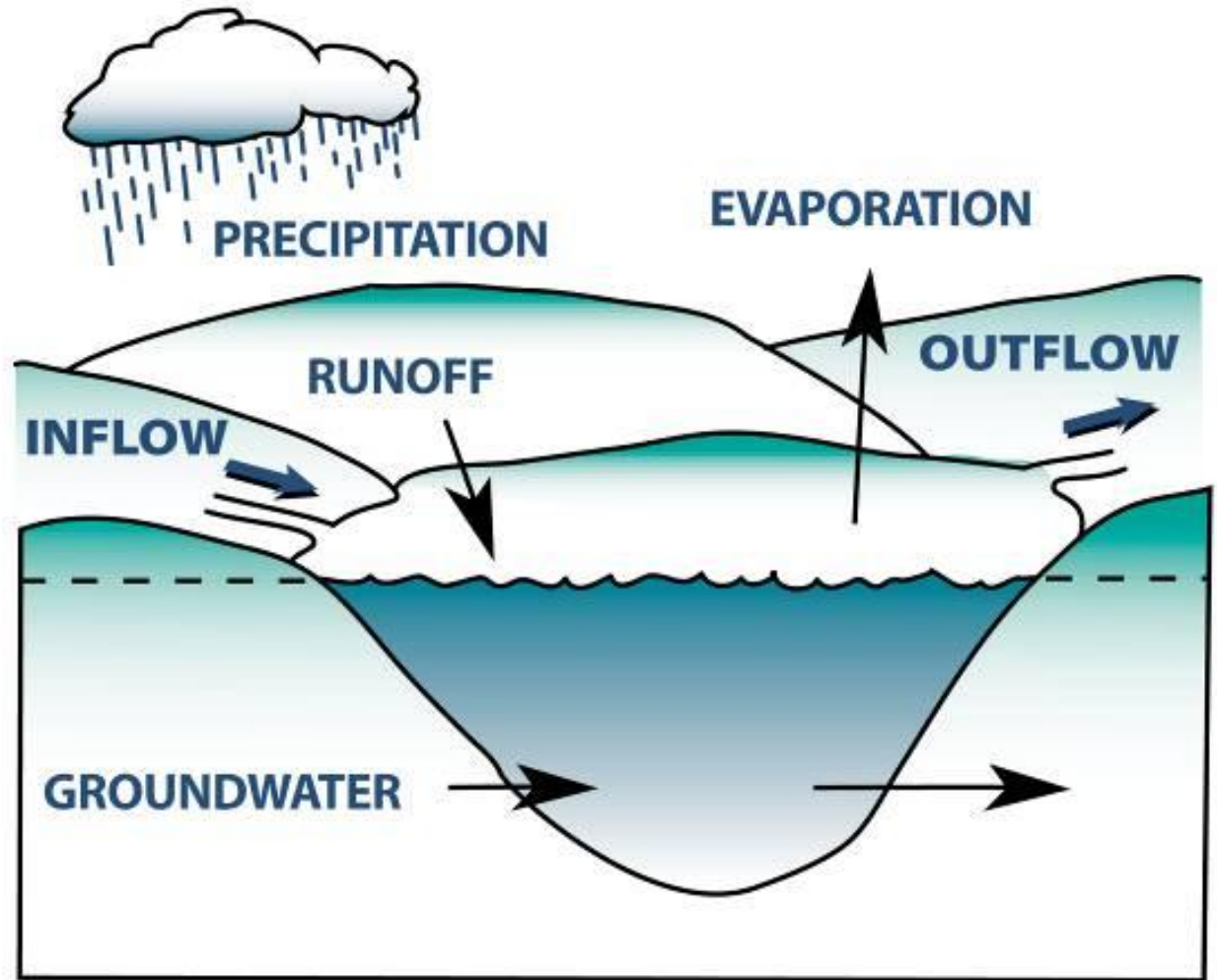


# Drainage Lake

Water source:

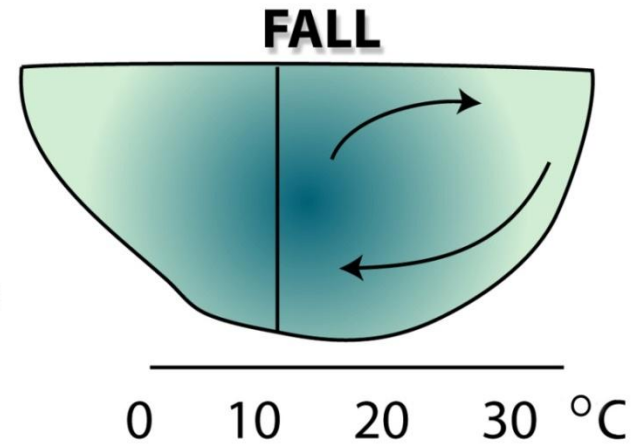
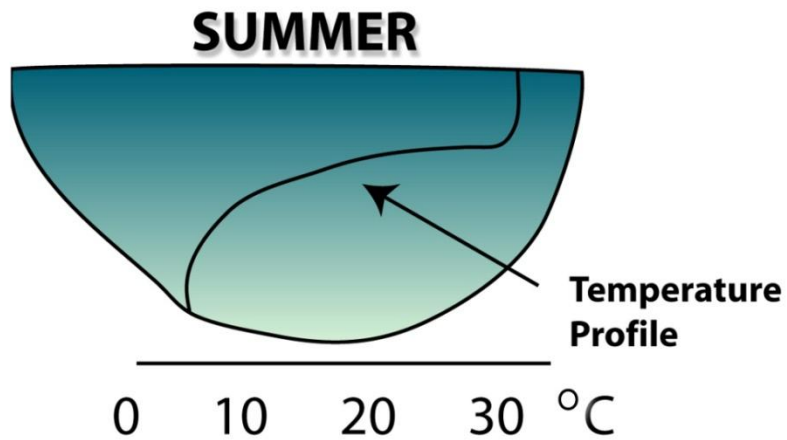
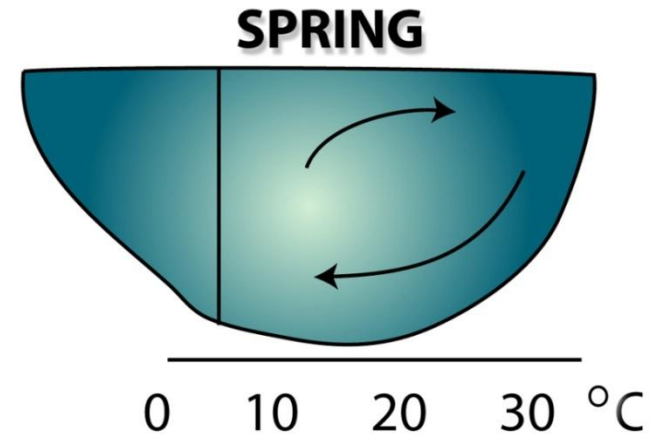
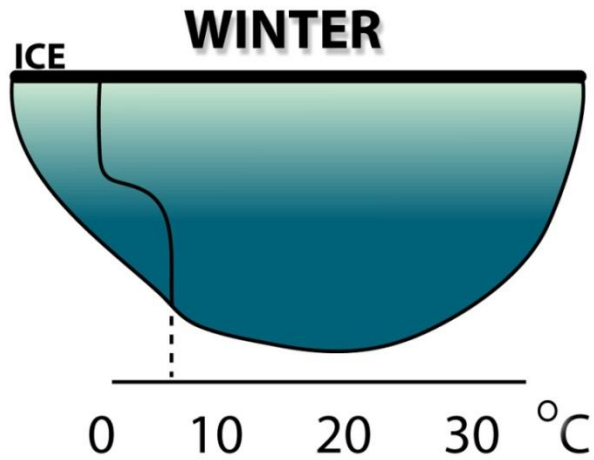
- streams
- precipitation
- groundwater
- runoff

Stream outlet





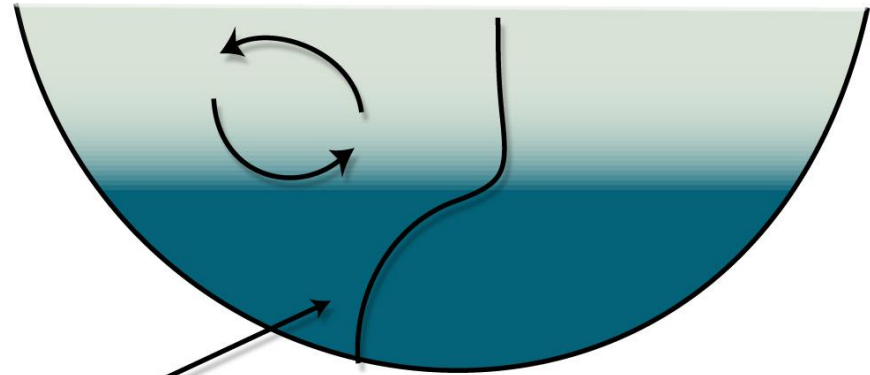
# Mixing & Stratification



# Lake Depth

## DEEP LAKE

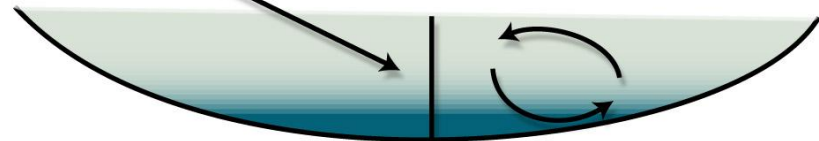
Deep Lakes  
Stratify



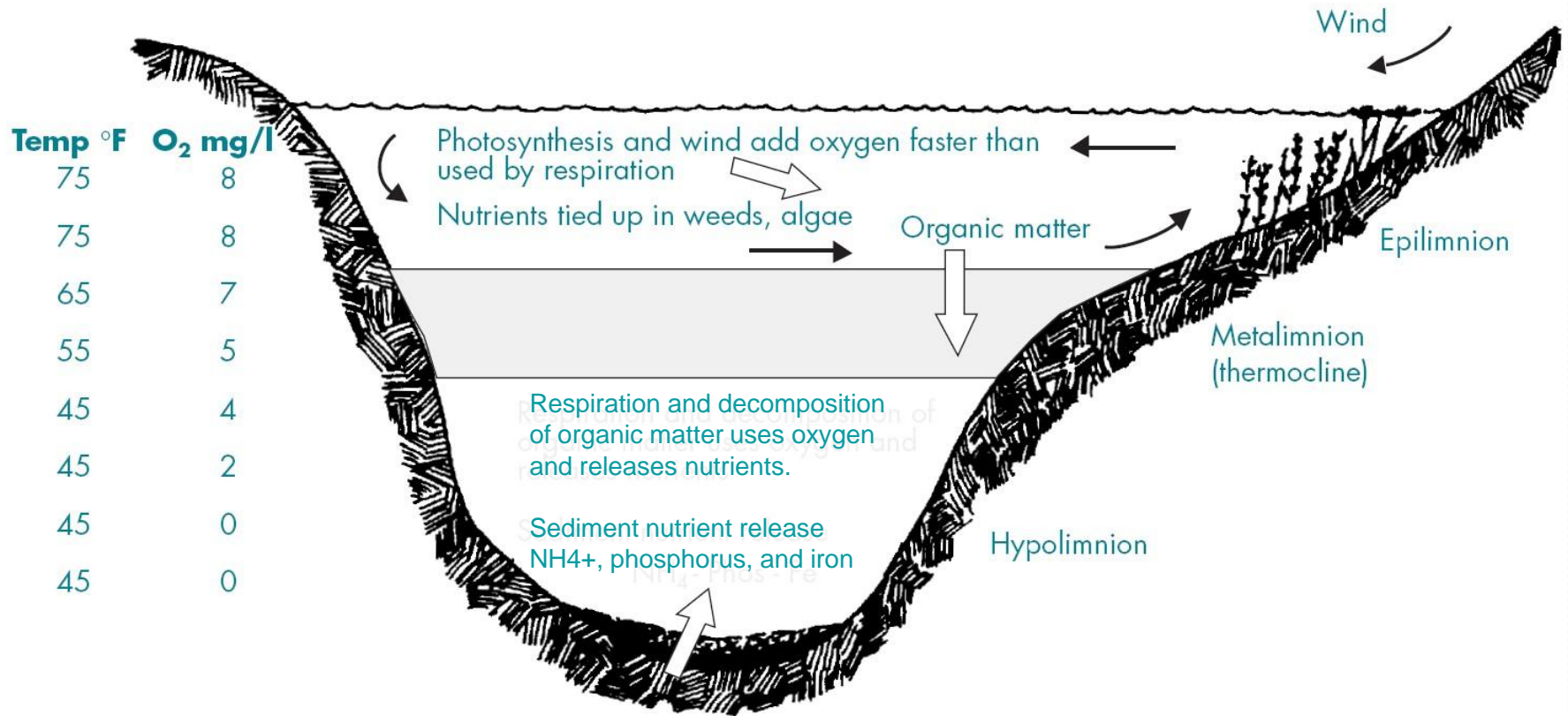
Shallow Lakes  
Continuous  
Nutrient  
Recycling

Temperature

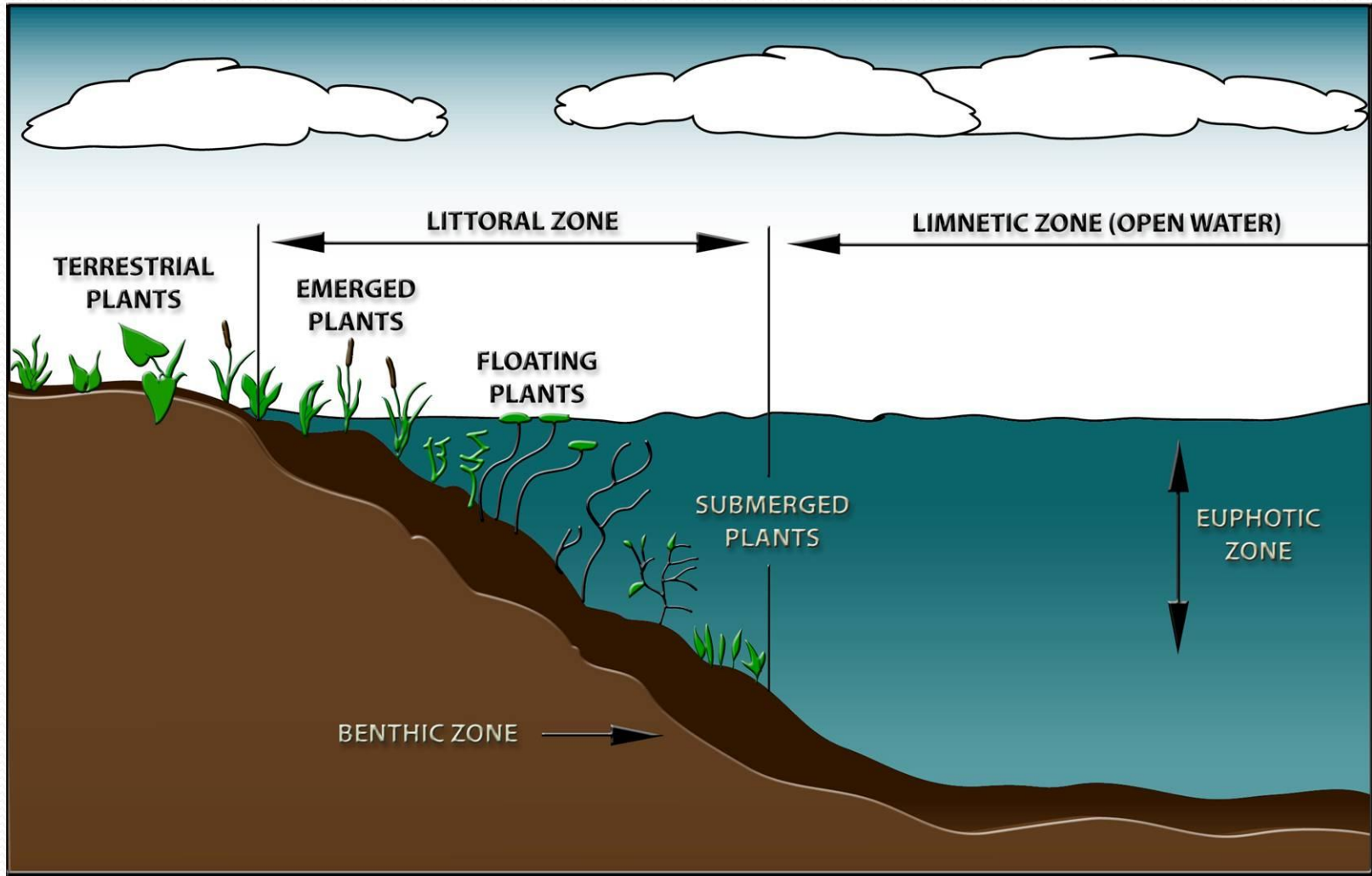
## SHALLOW LAKE



# Summer stratification



# Lake Habitat Zones



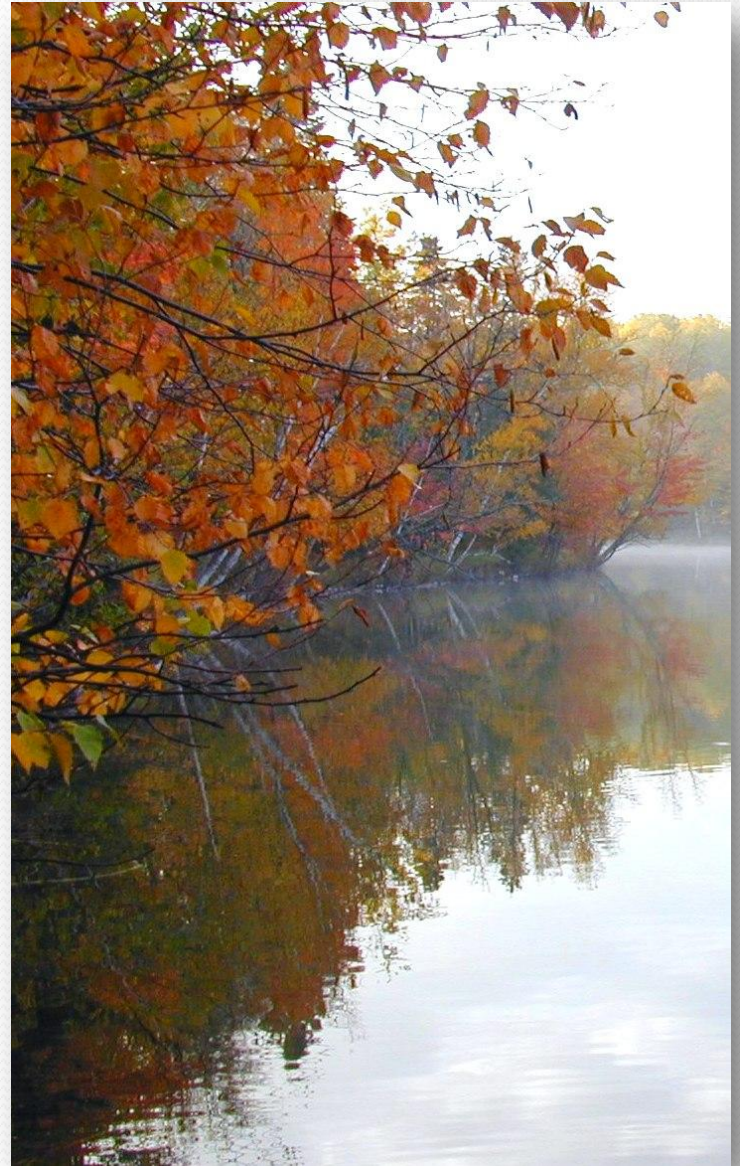
*90% of all lake life is born, raised, and fed in  
the area where land and water meet.  
(Ontario Ministry of Natural Resources)*



# Lake Littoral Zone

## Functions include:

- Intercepts Nutrients
- Refuge from Predators
- Nursery for Fish
- Highly productive of plants and invertebrates



# Features of Littoral Zone Habitat

- Vegetation
- Substrate
- Woody cover
- Overhanging bank cover
- Depth and depth gradients



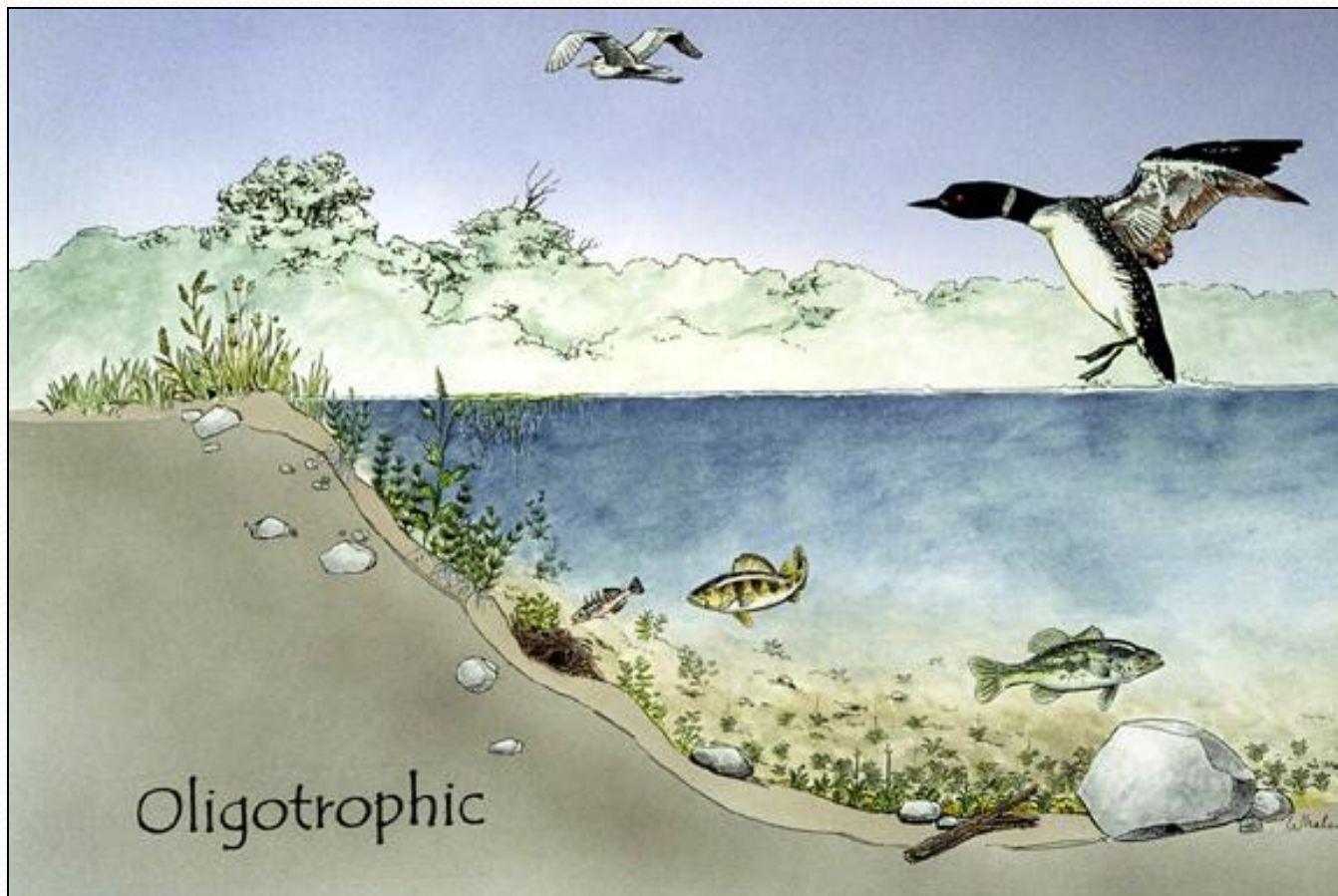
# Lake Trophic State

- Nutrients & Productivity
- Sediment & Accumulation
- Species Shifts
- Species Richness

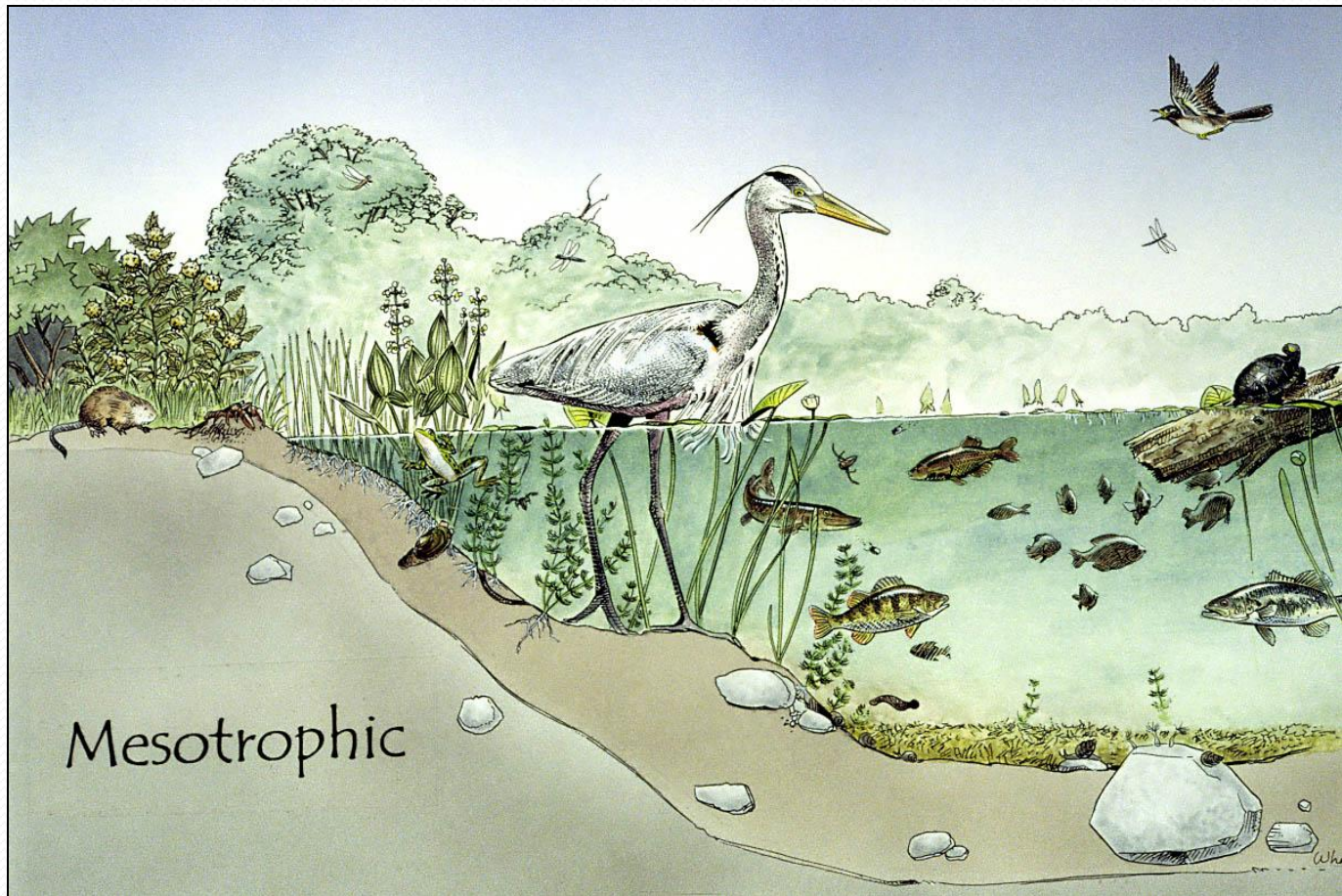
*Oligotrophic – Mesotrophic – Eutrophic*



- Clear, deep, and free of weeds or large algae blooms
- Low in nutrients and do not support large fish populations
- Food chain capable of sustaining large game fish



- These lakes lie between oligotrophic and eutrophic stages
- Devoid of oxygen in late summer, hypolimnion limit cold water fish and cause phosphorus cycling from sediments



- High in nutrients and support large biomass
- Often dense plants or subject to algal blooms, or both
- Support large fish populations, but susceptible to low O<sub>2</sub>
- Small, shallow lakes vulnerable to winterkill
- Rough fish may be a part of the community



# What things can be monitored?

- Transparency
- Dissolved oxygen & temperature
- Nutrients: phosphorus & nitrogen
- pH
- Hardness & alkalinity
- Chlorophyll a
- Trophic status
- Habitat
- Aquatic plants, animals, AIS

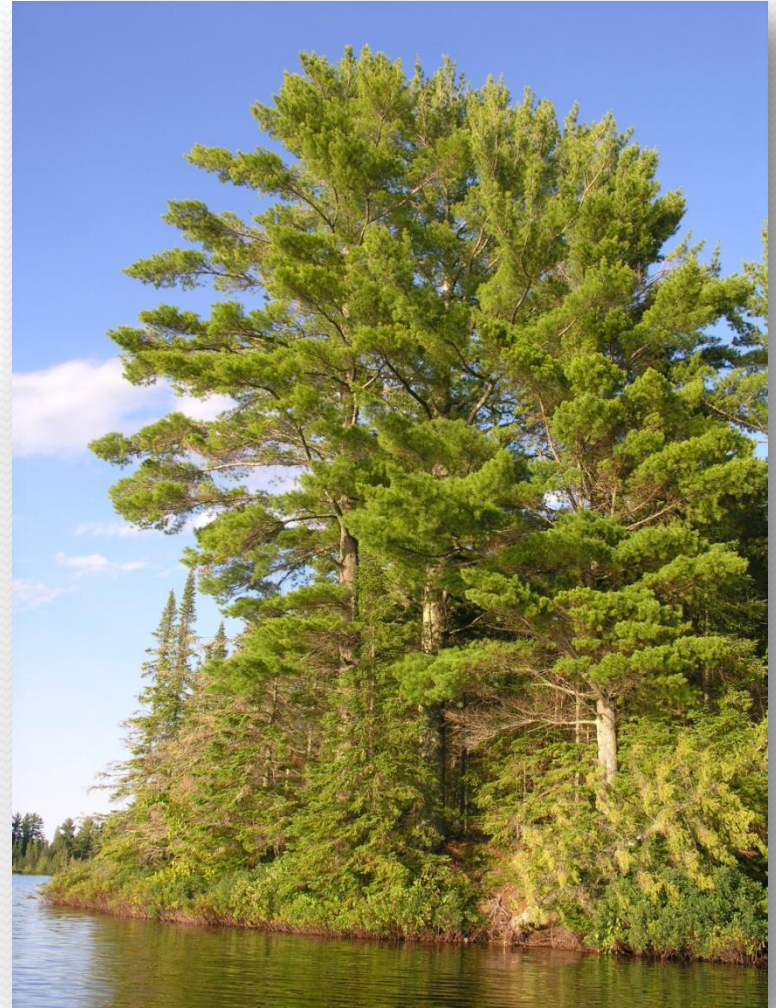
# Trophic Status

Designation of oligotrophic, mesotrophic, or eutrophic is based on measures of transparency, phosphorus, & chlorophyll a

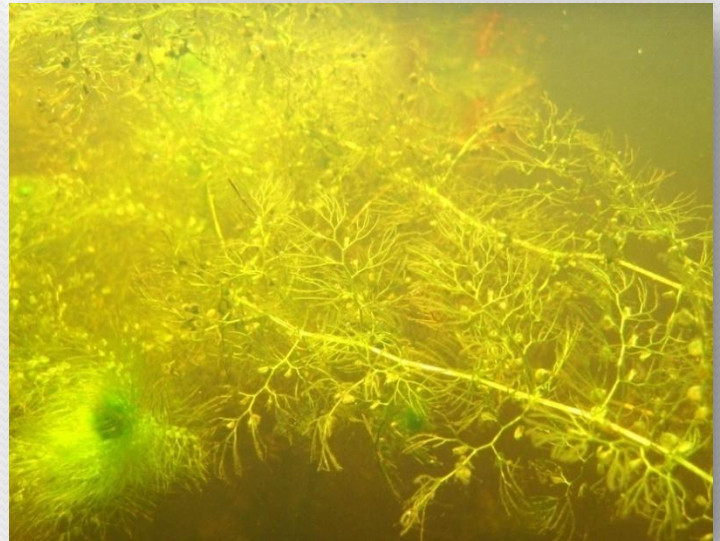


# Habitat

Monitoring littoral zone and riparian habitat quality



# Aquatic Plant Surveys



# Report on the Lakes

| <b>Name</b>        | <b>Human Development</b> |
|--------------------|--------------------------|
| <b>Clear Lake</b>  | Fairly undeveloped       |
| <b>Emily Lake</b>  |                          |
| <b>Pike Lake</b>   |                          |
| <b>Ongie Lake</b>  |                          |
| <b>Hidden Lake</b> |                          |
| <b>Sandy Lake</b>  | Moderately developed     |
| <b>Lake Gerald</b> | Highly developed         |
| <b>Lake Roland</b> | Most highly developed    |

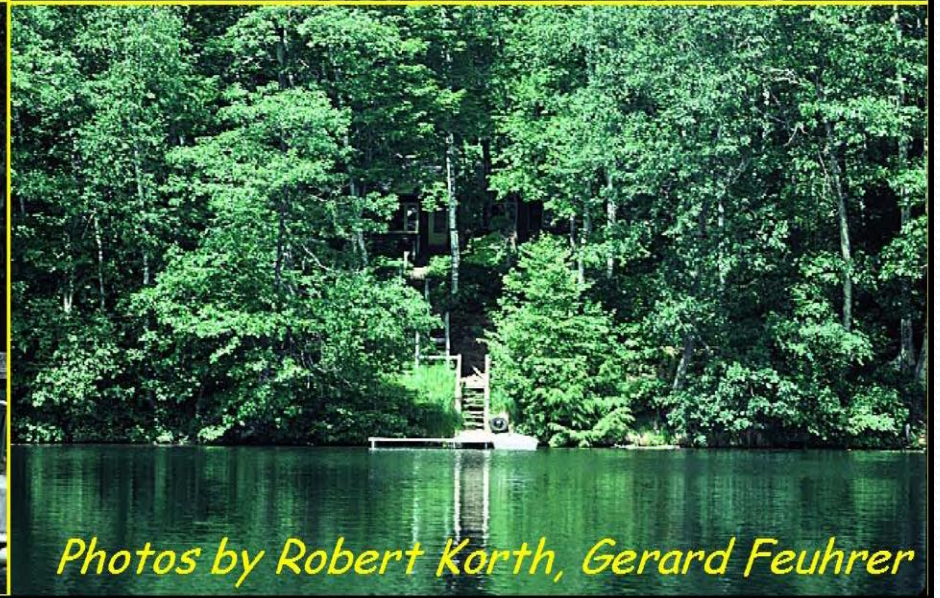


# Threats to Lakes

- Poor lakeshore habitat (riparian vegetation) is the number one stressor of lake ecosystems. Poor littoral zone habitat is number two.
- Lakes with poor lakeshore habitat are 3 times more likely to exhibit poor biological condition as measured by the planktonic community (food web).
- By managing for sound lakeshores (littoral & riparian), we can make a difference in lake biological integrity (health).
- This means both development standards (shoreland ordinances) as well as BMP's (leave wood in place, minimize clearing of littoral vegetation, natural armoring, etc).



# Human actions make all the difference



*Photos by Robert Korth, Gerard Feuhrer*

# The Domestication of Lakes



# Other Concerns

- Septic systems that are old or inadequate
- Use of chemicals (fertilizers, herbicides)
- Size and number of piers
- Lack of flushing (drought or other cause)
- Aquatic Invasive Species
- Fish community and fishing success
- Changes in aquatic plant community
- Nuisance levels of plants

# What happens next?

- Education of riparian owners
- Institute development BMPs
- Develop more restrictive zoning
- Continue monitoring water quality
- Monitor for Aquatic Invasive Species
- Follow up on other concerns

# More specific recommendations

- Encourage green buffers next to the lake and discourage expansive lawns.
- Encourage alternatives to break walls & rip-rap
- Encourage habitat protection (do not remove woody material or aquatic plants; don't add sand)
- Encourage small size piers and other structures
- Keep riparian habitat intact
- Using aquatic herbicide needs a plan & requires a permit

