

# “WHAT CHANGES IN LAKES AS WATER LEVELS DECLINE”

**Buzz Sorge**  
**Lake Management Planner**

Snipe Lake  
Vilas County  
B. Korth 2008



# Lakes Provide Services



Ecosystem  
Cultural  
Recreational

07/08/2004

# ECOSYSTEM

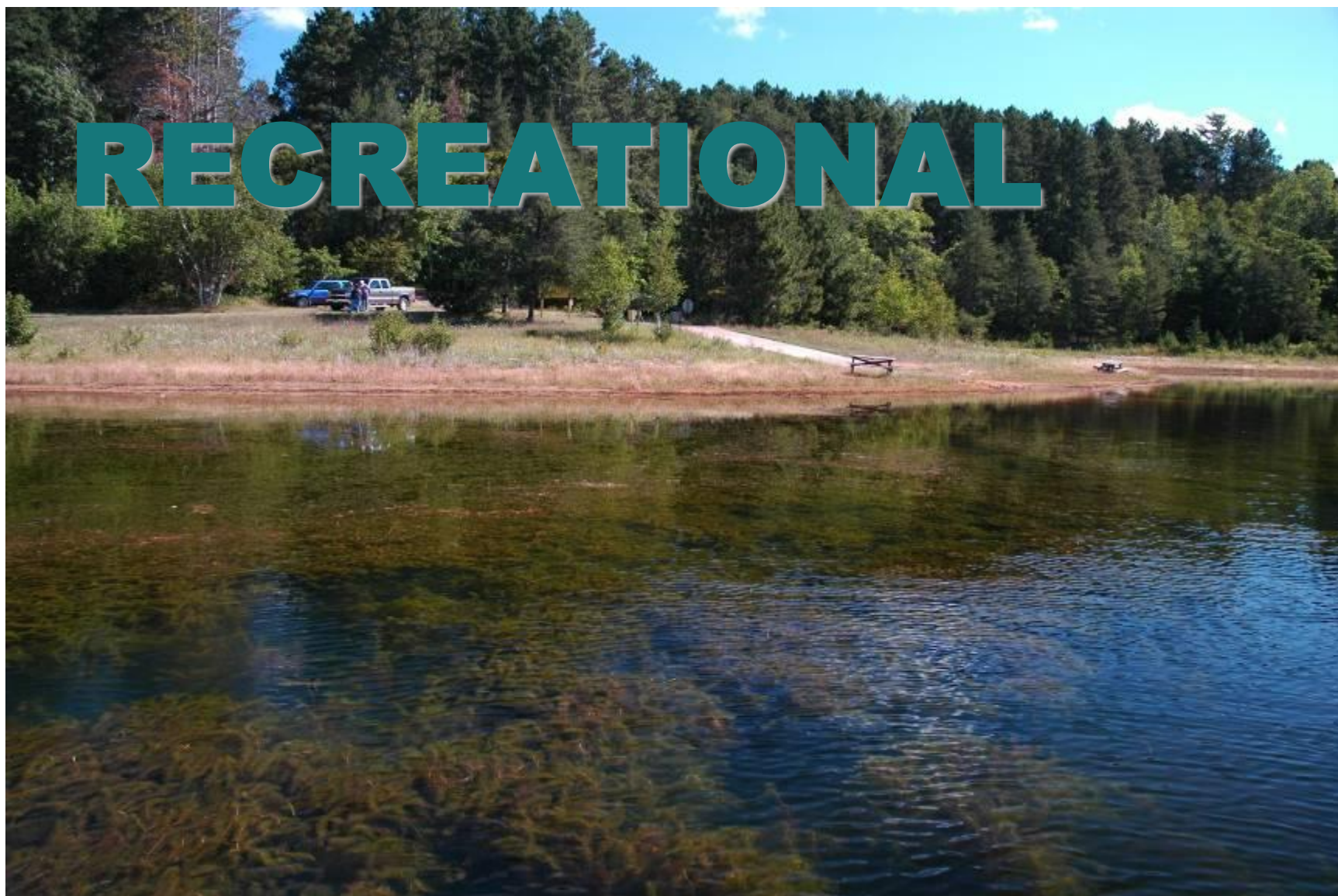


Plainfield Lake, Waushara County

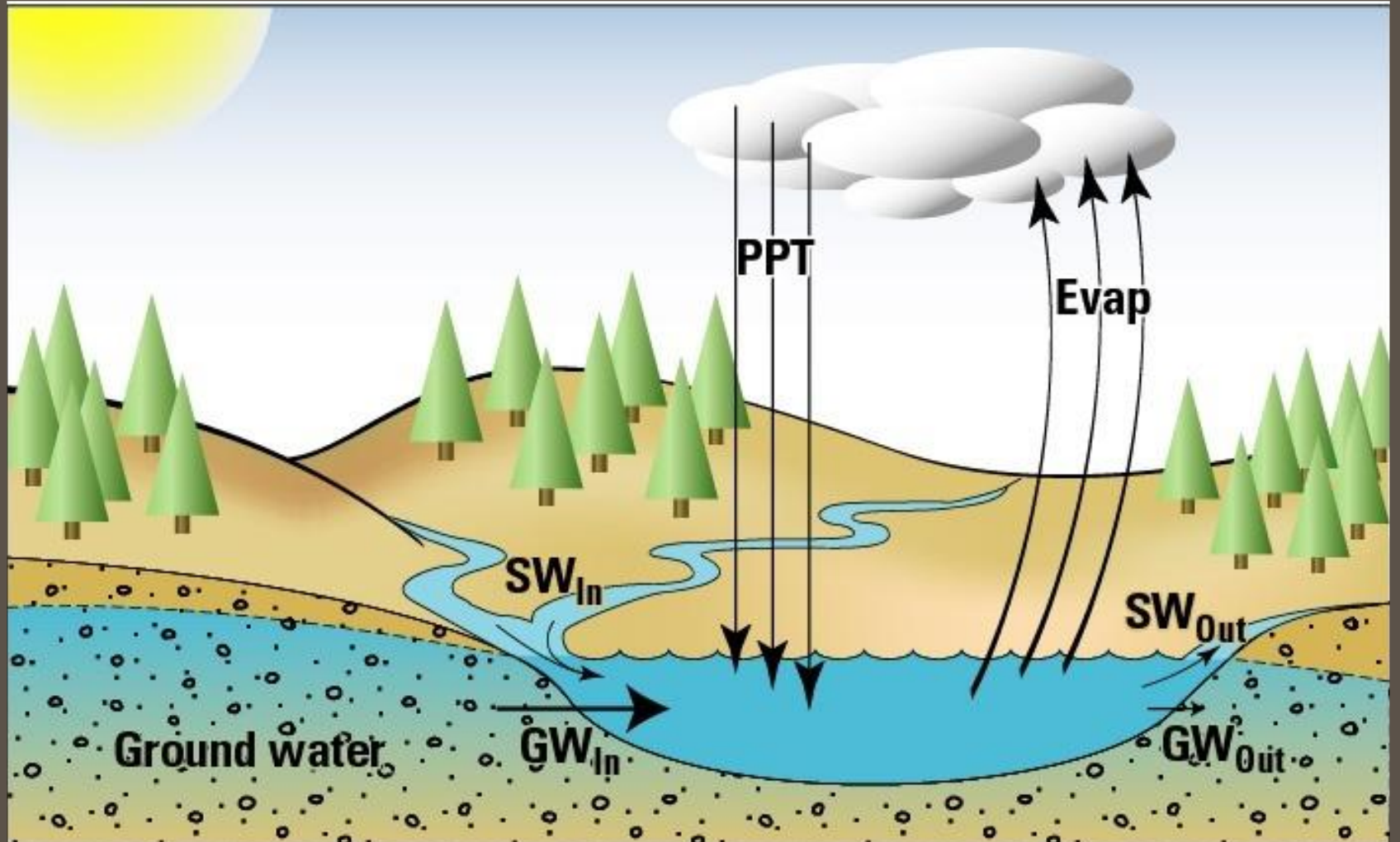
**CULTURAL**



Sandbar Lake, Bayfield County



Tomahawk Lake, Bayfield County





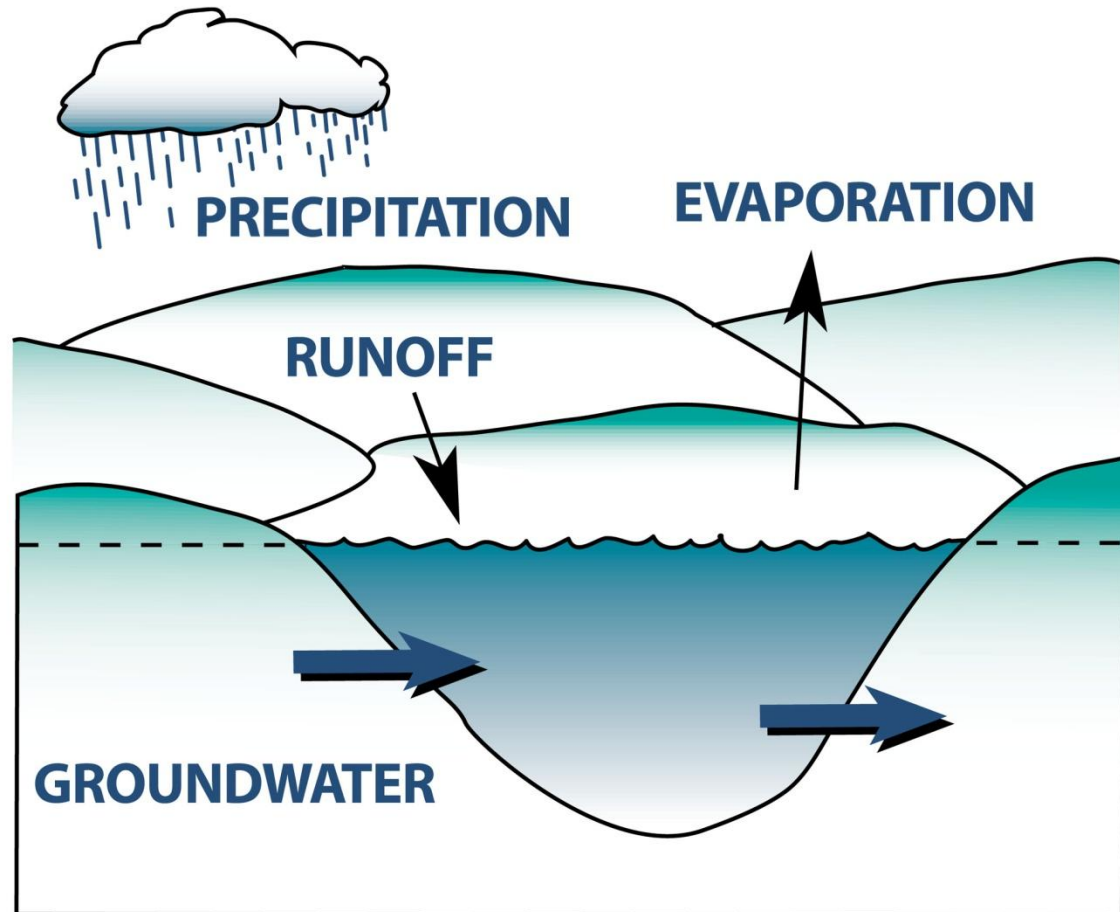
# LAKE TYPES

- Seepage
- Groundwater Drainage
- Drainage
- Impoundments
- Oxbow



# SEEPAGE LAKE

- Natural Lake
- Water Source
  - Groundwater
  - Precipitation
- No Stream Outlet/ Inlet



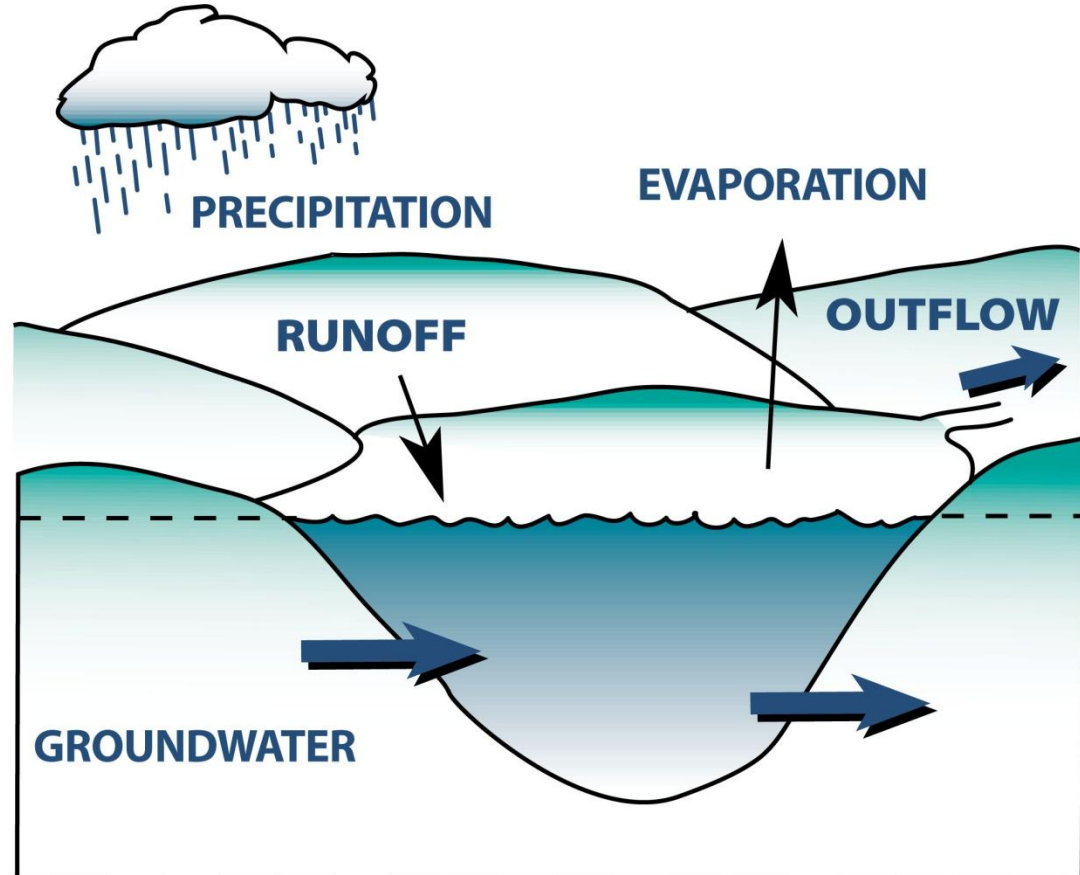




Fallison Lake, Vilas County

# GROUNDWATER DRAINAGE

- Natural Lake
- Water Source
  - Groundwater
  - Precipitation
  - Limited Runoff
- Has Stream Outlet



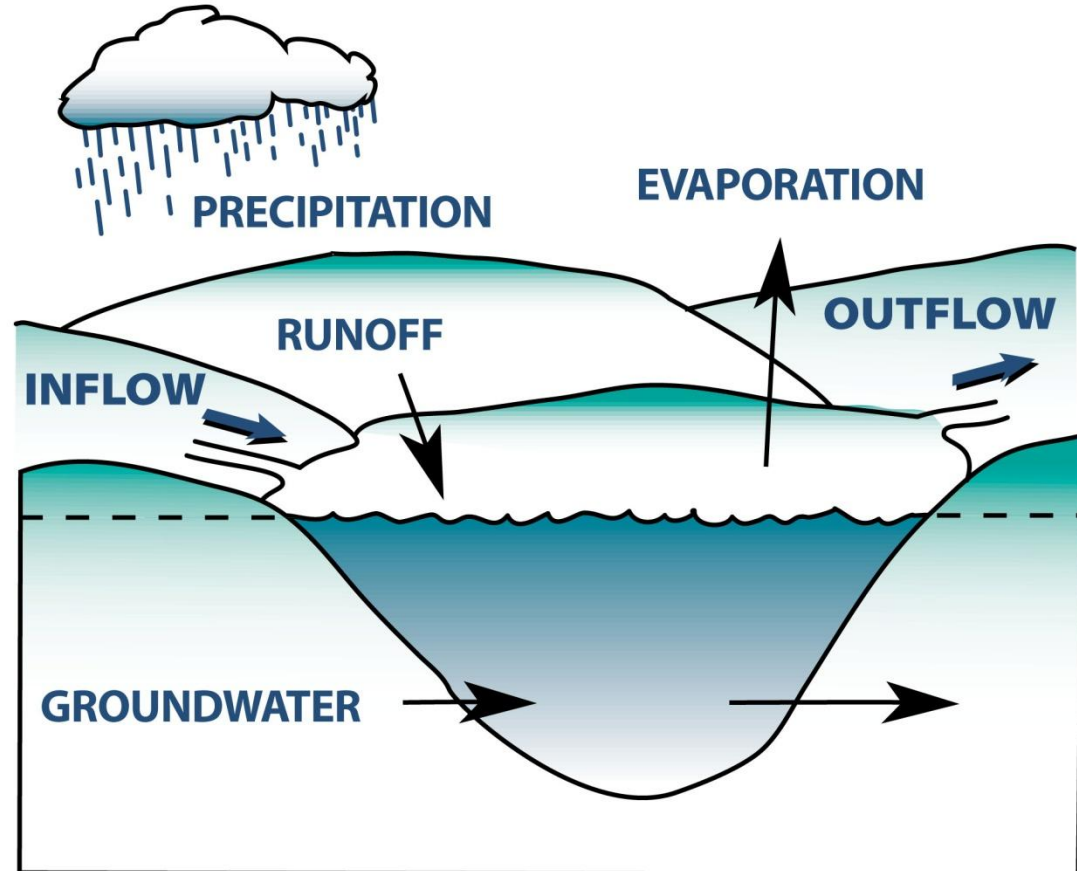
# GROUNDWATER DRAINAGE LAKE



■ Sand Lake, Chippewa County

# DRAINAGE LAKE

- Water Source
  - Streams
  - Groundwater
  - Precipitation
  - Runoff
- Stream Drained



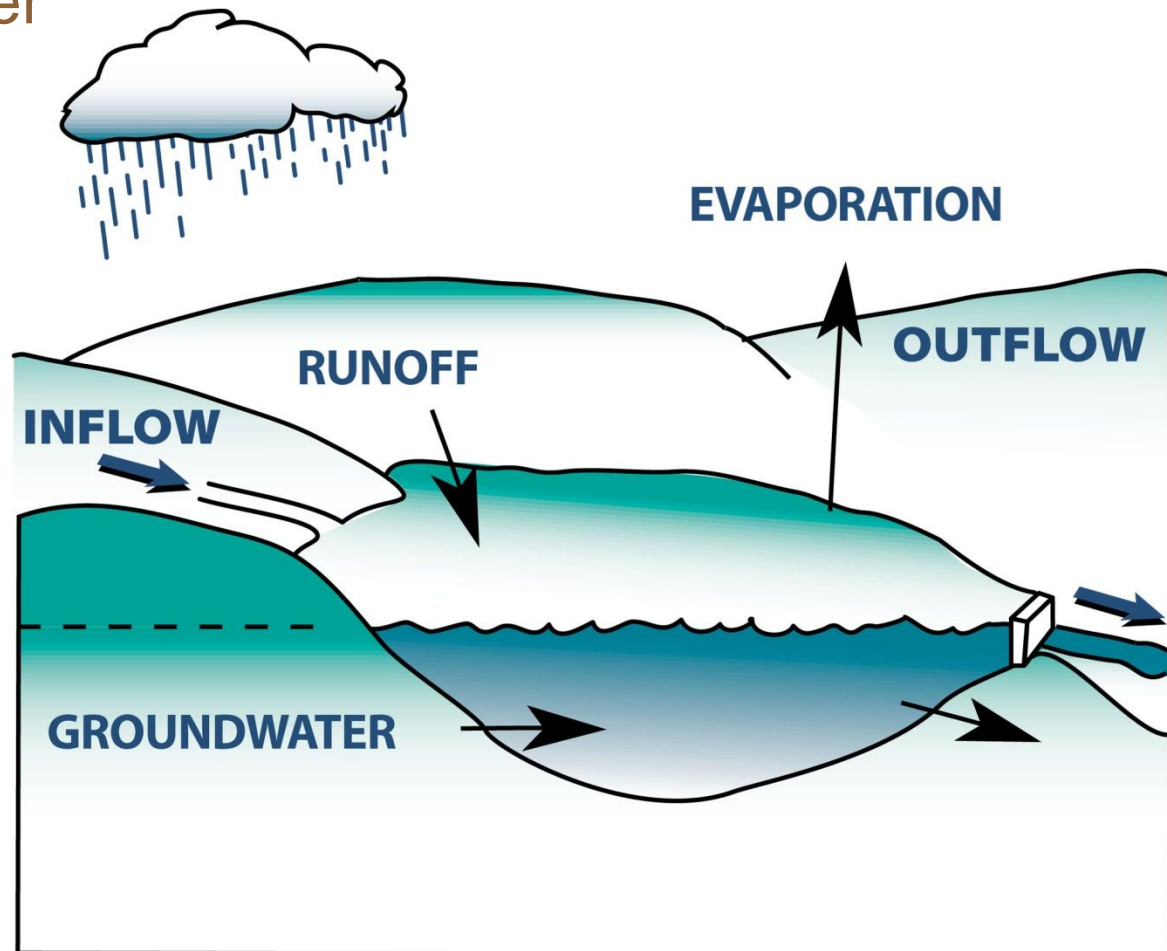
# DRAINAGE LAKE



■ Long Lake, Chippewa County

# IMPOUNDMENT

- A manmade lake
- Dammed River or Stream

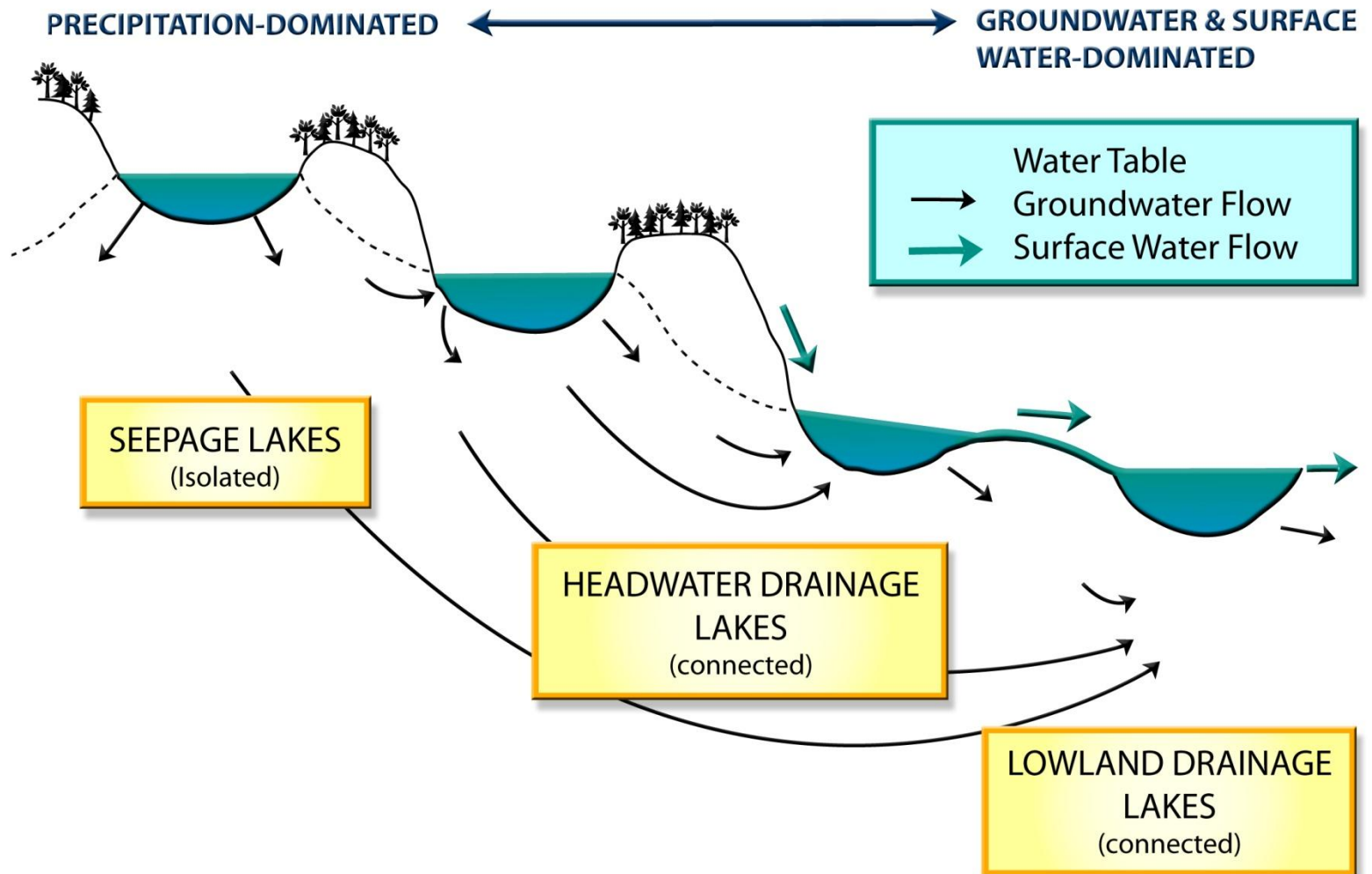


# IMPOUNDMENT



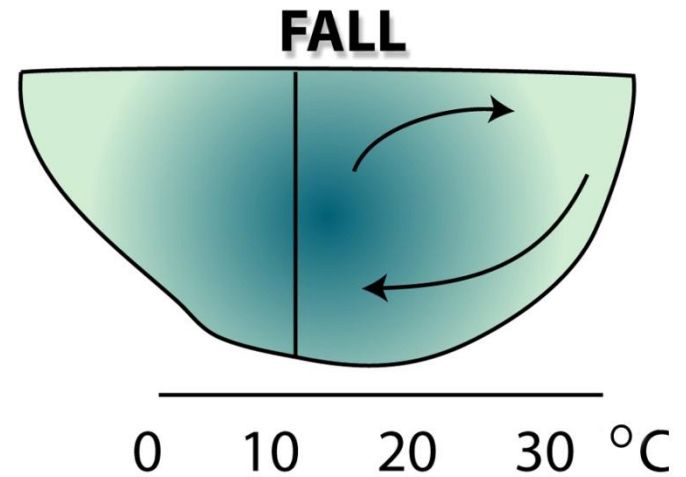
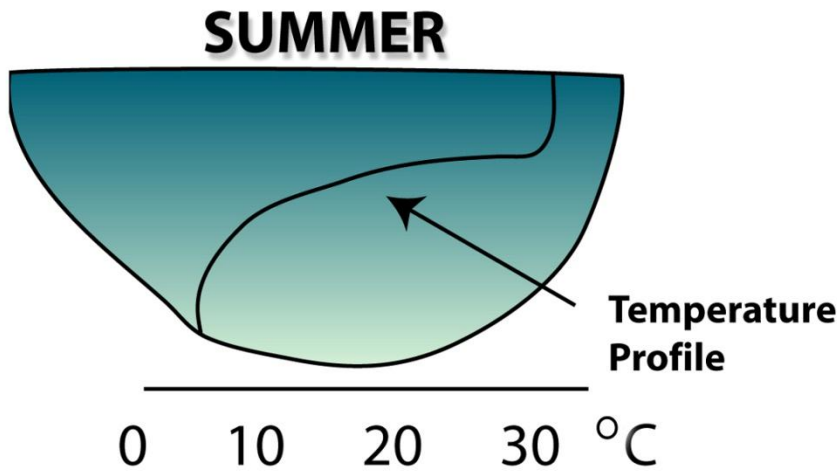
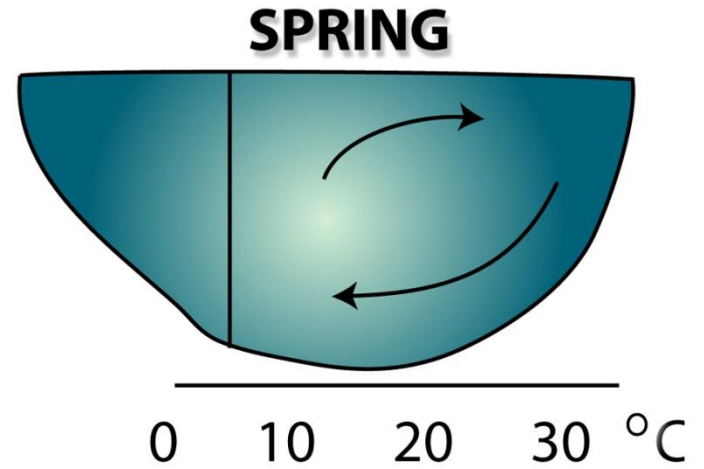
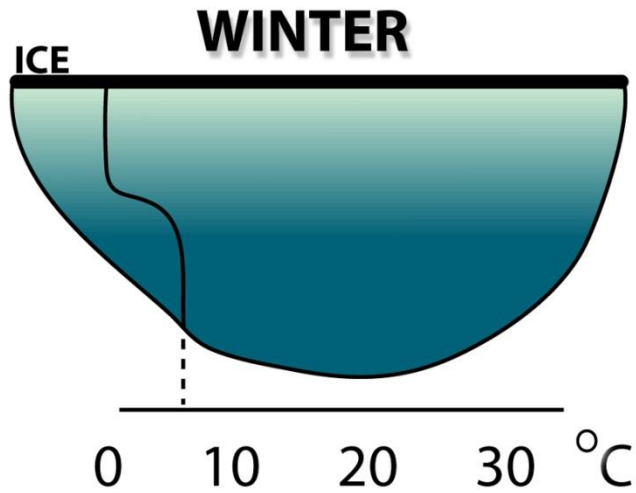
- Lake Altoona, Eau Claire County

# LANDSCAPE POSITION



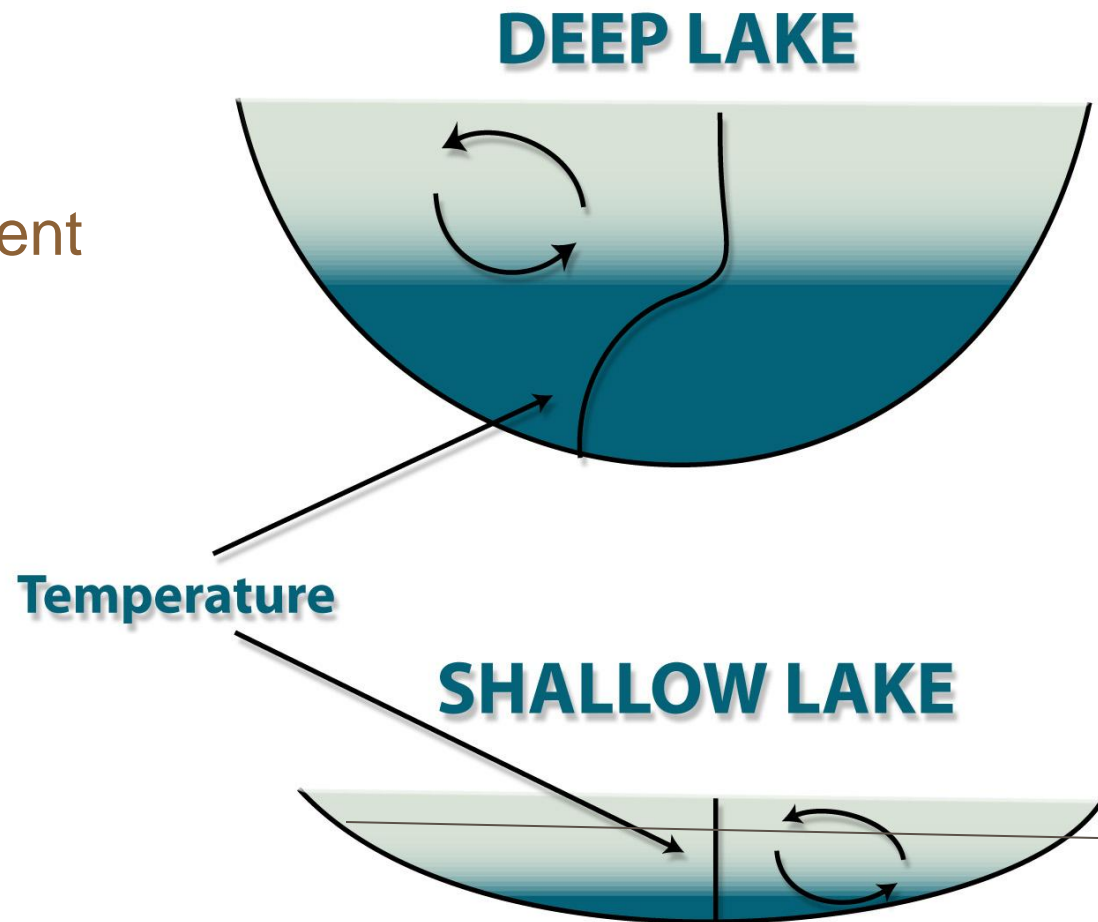


# MIXING/ STRATIFICATION

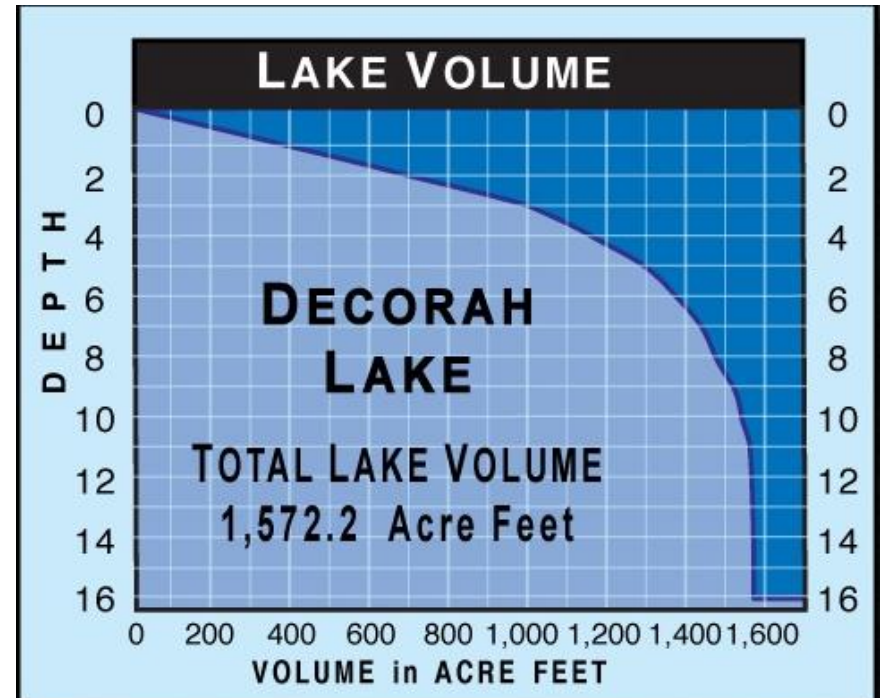
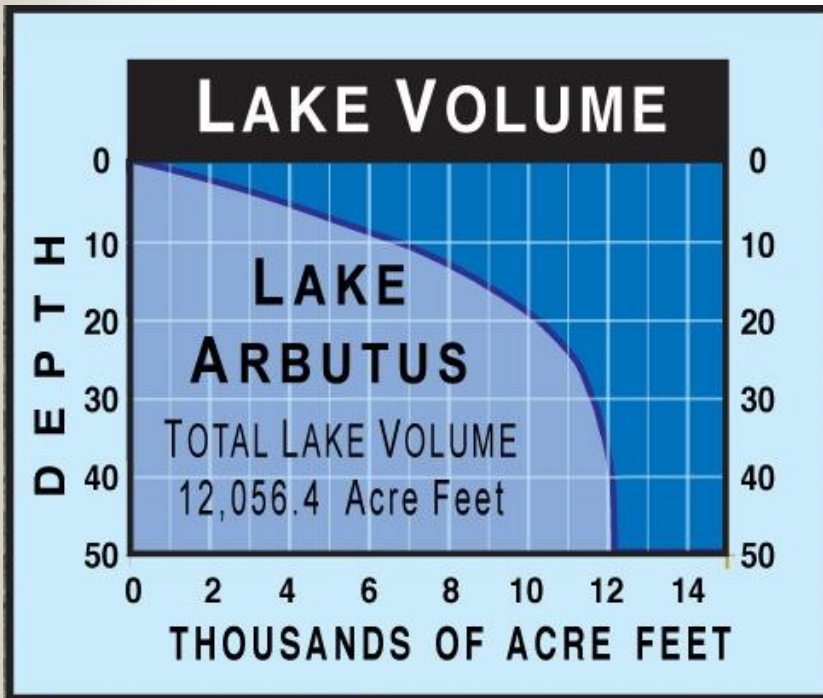


# LAKE DEPTH MATTERS

- **Deep Lakes**  
Stratify
- **Shallow Lakes**  
Continuous Nutrient  
Recycling



# Lake Level vs Lake Volume



## Pigeon Lake, Bayfield Co.



Photos from F. Koshere, WDNR





# CHEMICAL CHARACTERISTICS

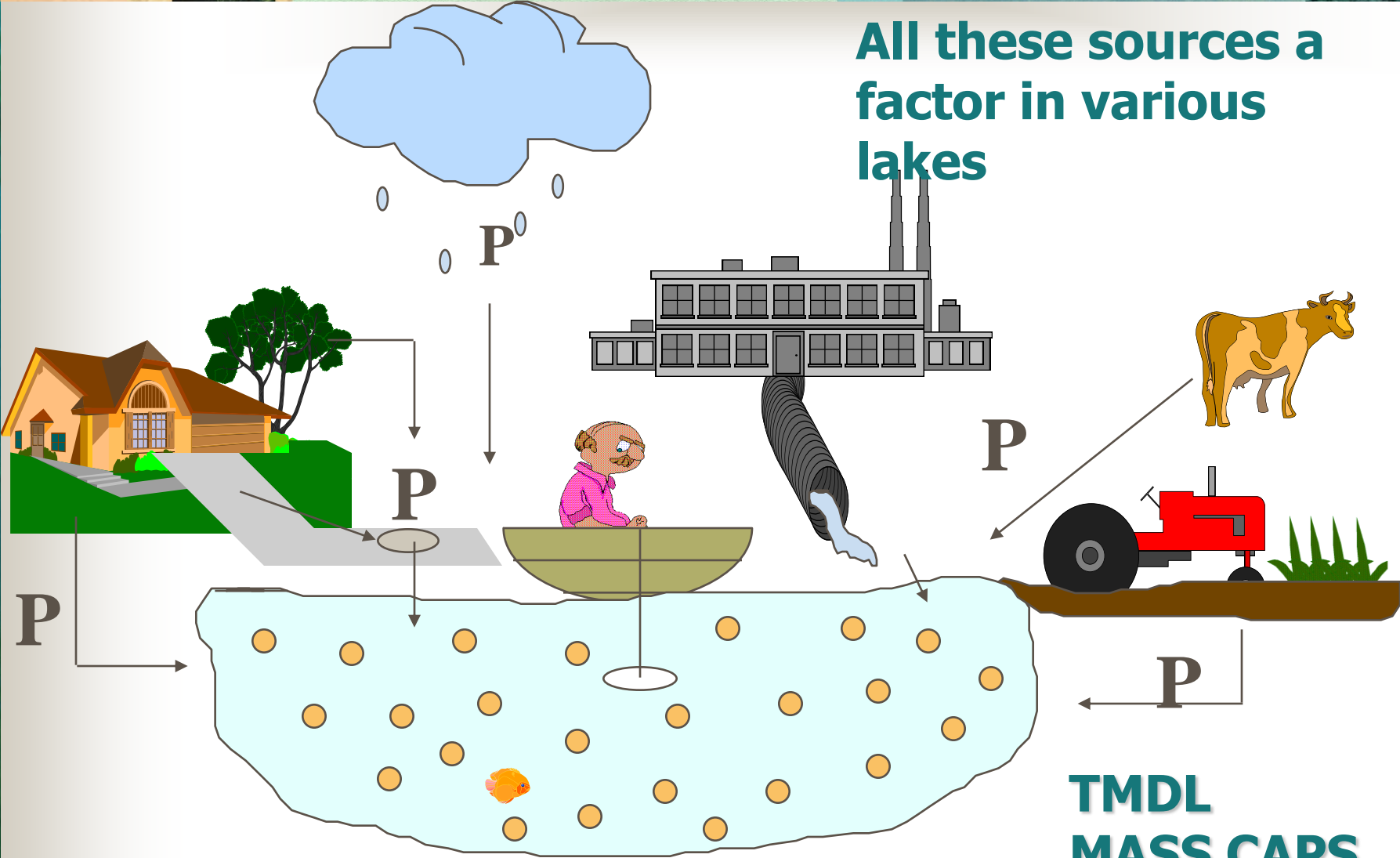
- Nutrients
  - P
  - N
- pH
- Hardness/ Alkalinity
- Dissolved Oxygen (optimum 5 ppm)

## NUTRIENT FUNCTIONS

ELEMENT	AVAILABILITY	DEMAND	AVAILABILITY DEMAND	FUNCTION
Na	32	0.5	64	Cell membrane
Mg	22	1.4	16	Chlorophyll, energy transfer
Si	268	0.7	383	Cell wall (diatoms)
P	1	1	1	DNA, RNA, ATP, enzymes
K	20	6	3	Enzyme activator
Ca	40	8	5	Cell membrane
Mn	0.9	0.3	3	Photosynthesis, enzymes
Fe	54	0.06	900	Enzymes
Co	0.02	0.0002	100	Vitamin B12
Cu	0.05	0.006	8	Enzymes
Zn	0.07	0.04	2	Enzyme activator
Mo	0.001	0.0004	3	Enzymes

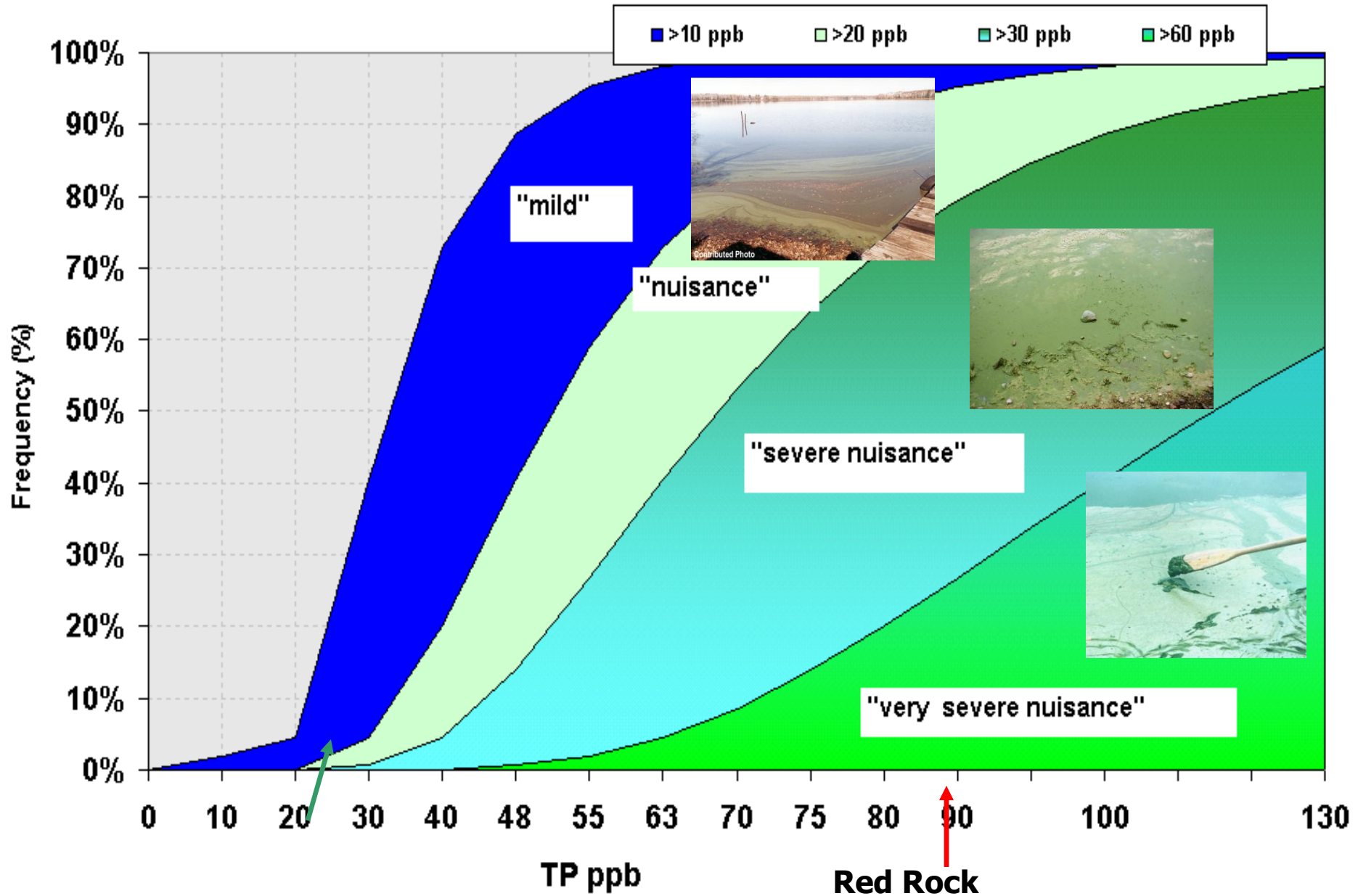


All these sources a factor in various lakes



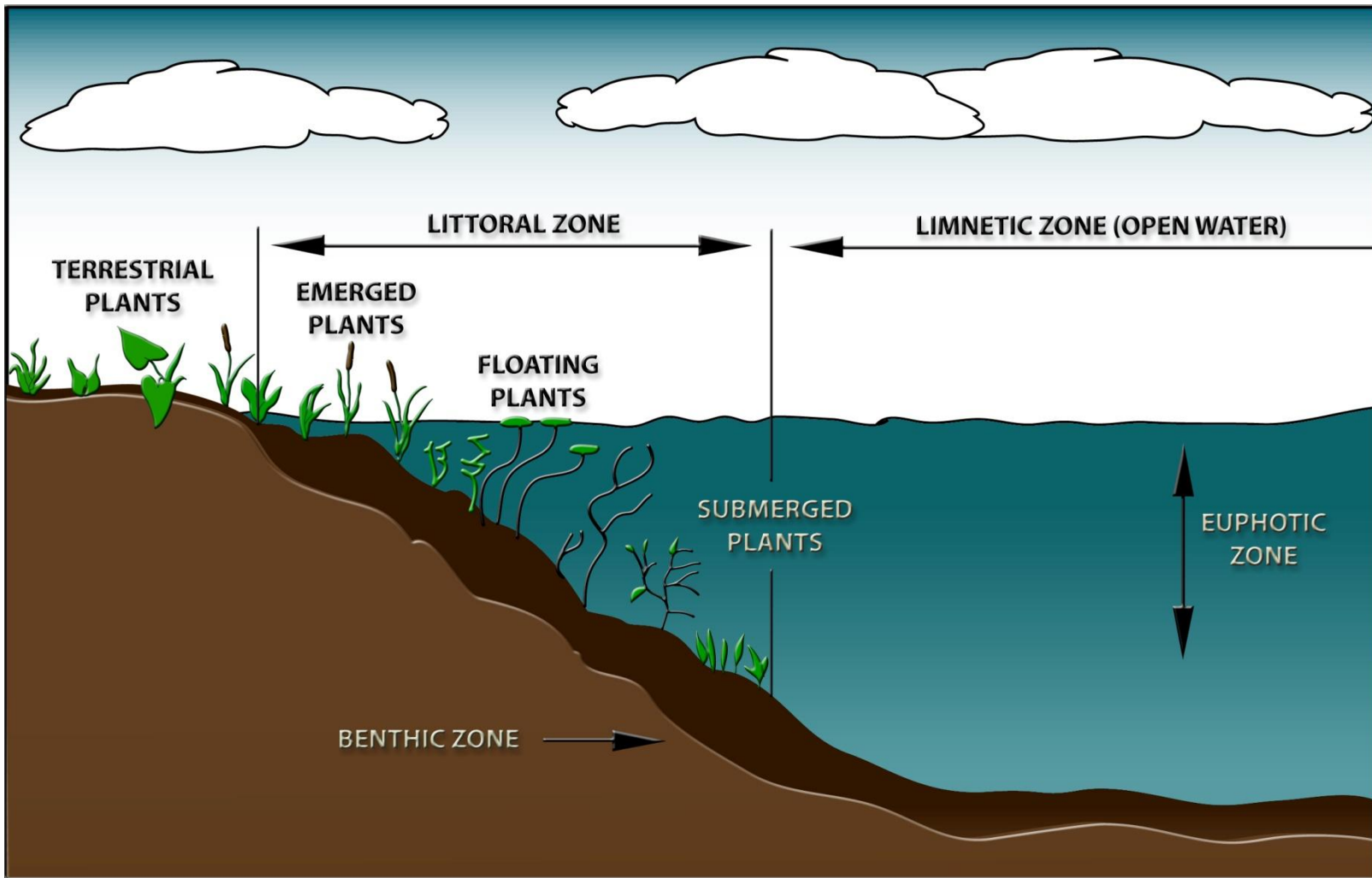
**TMDL  
MASS CAPS**

# Chlorophyll-a interval frequency versus total phosphorus.





# LAKE HABITAT ZONES





Without habitat, they are gone

