Cedar Lake/Lake of the Isles Master Plan

A WATER QUALITY OVERVIEW

APRIL 14, 2022

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EOR water ecology community

PRESENTATION OVERVIEW

PART 1: LIMNOLOGY 101

An overview of drivers influencing lake character

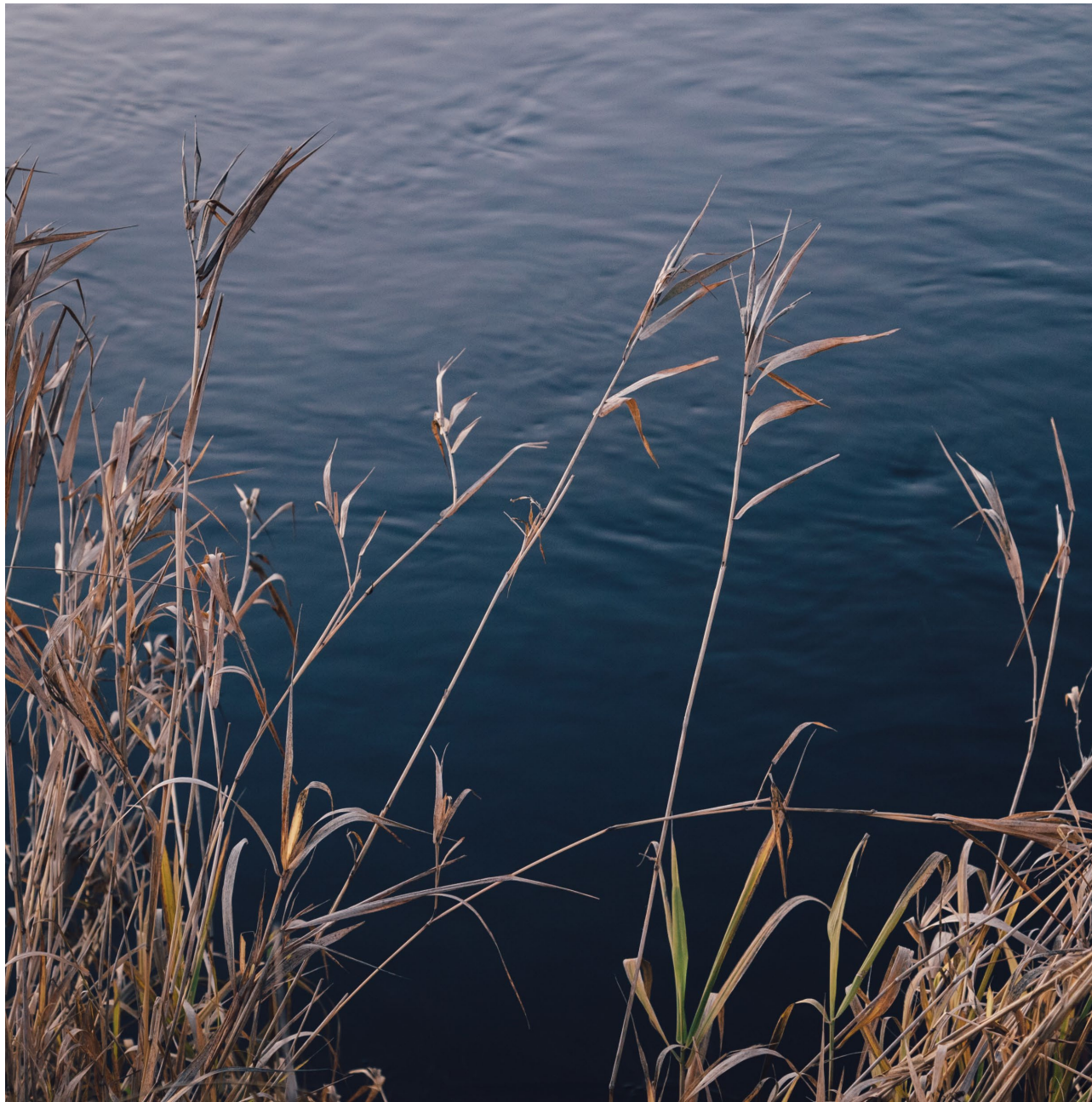
PART 2: CONTEXT

How are lake conditions evaluated?

PART 3: CONDITIONS

What is the current condition of each lake?

How has it changed over time?

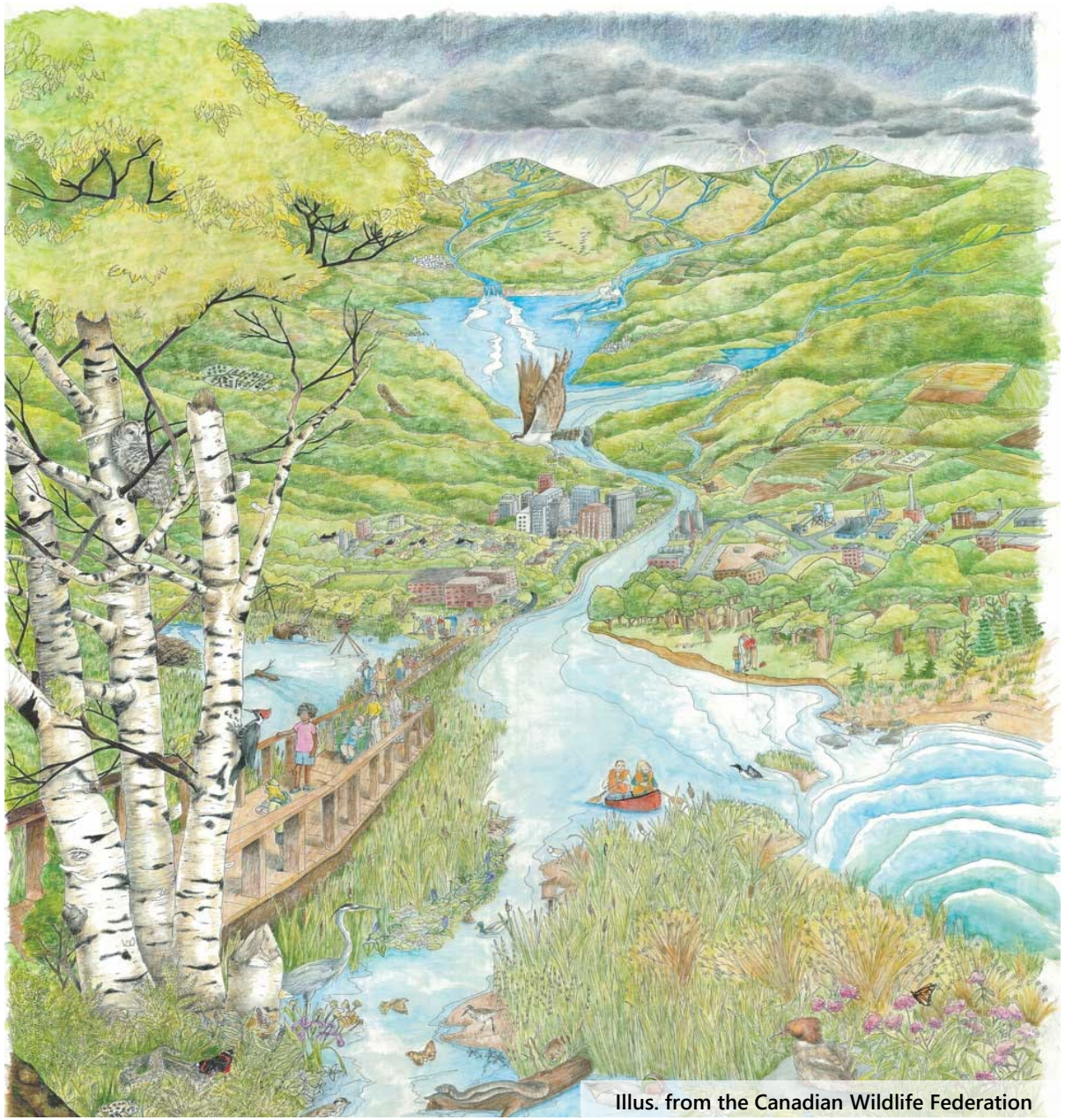


PART 1: LIMNOLOGY

WATERSHED INFLUENCE

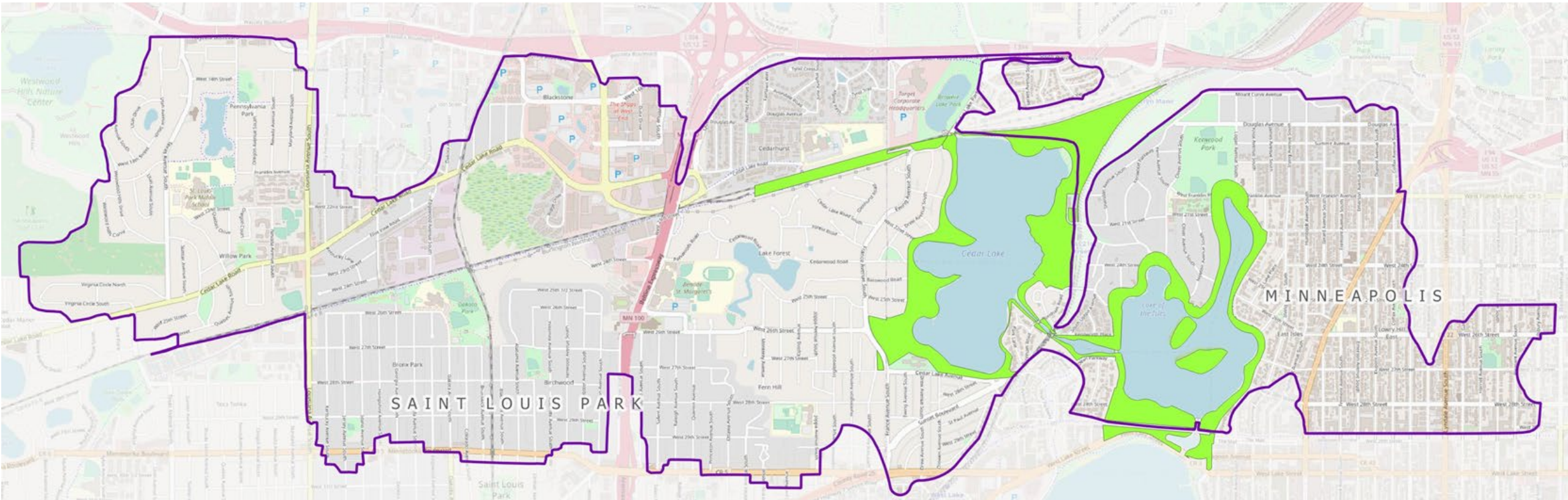
WATERSHED CHARACTERISTICS

- Size & shape
- Topography
- Soils
- Vegetative Cover & Land uses



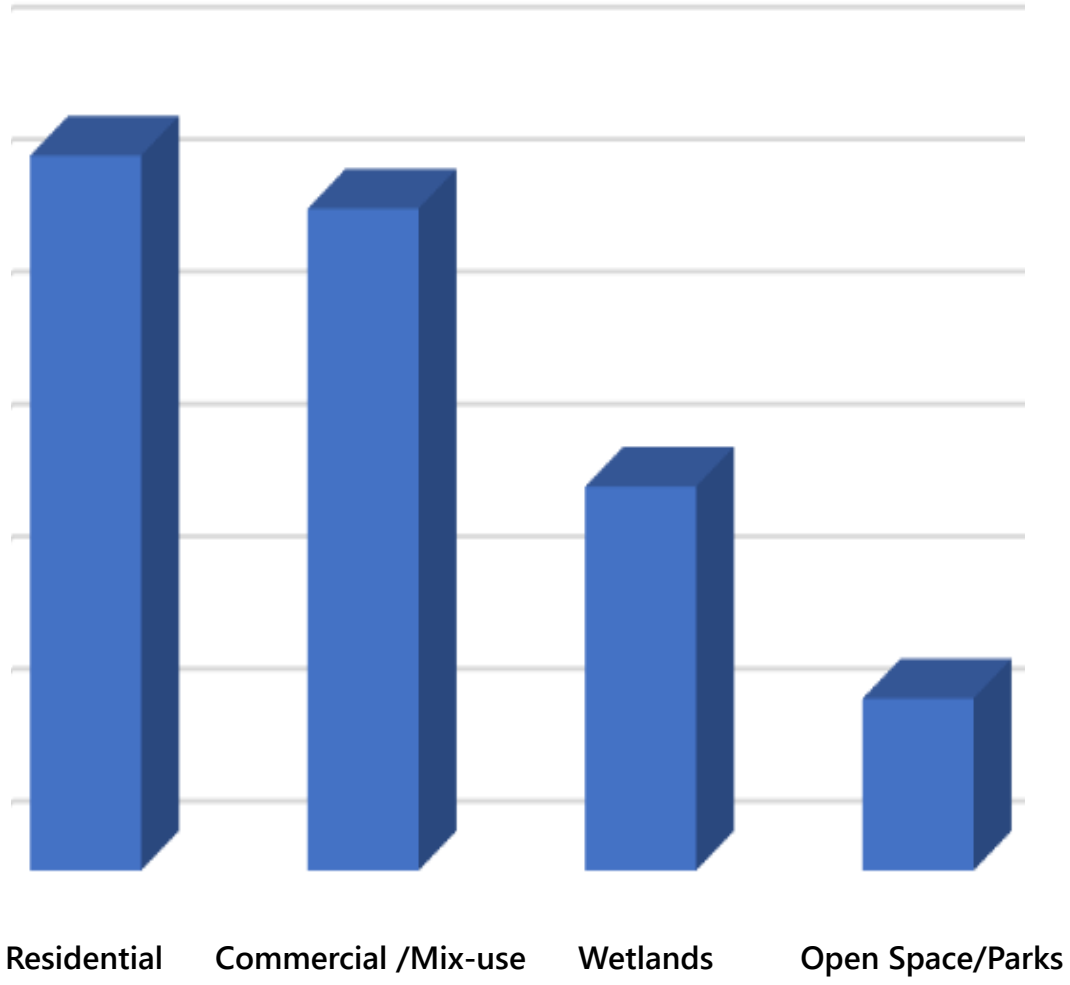
Illus. from the Canadian Wildlife Federation

WATERSHED INFLUENCE: LAND COVER



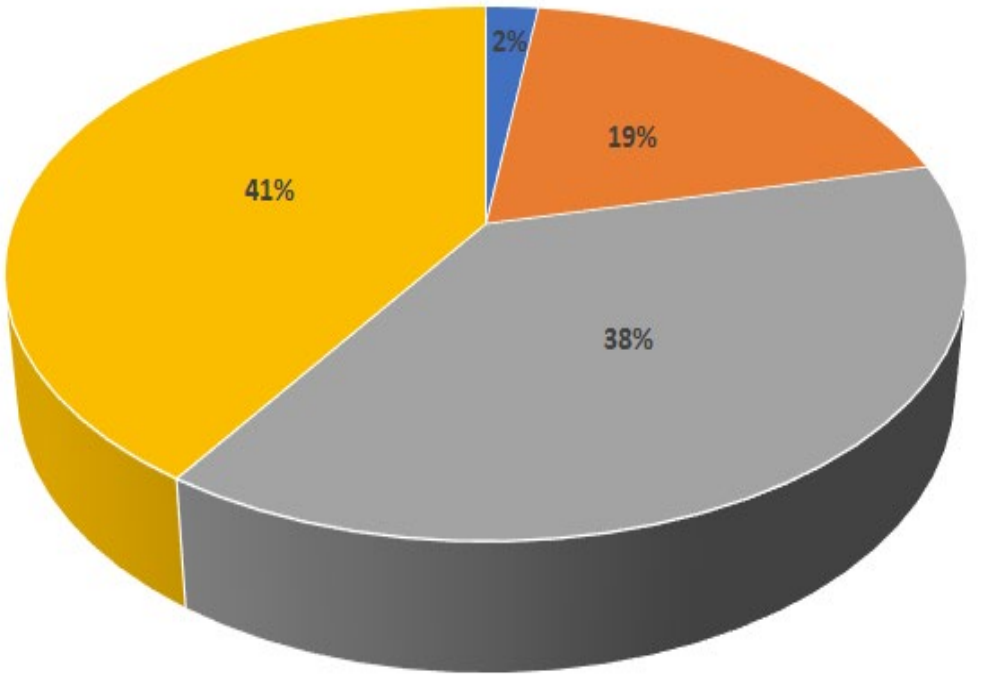
WATERSHED INFLUENCE: LAND COVER

PHOSPHORUS LOADING RATES

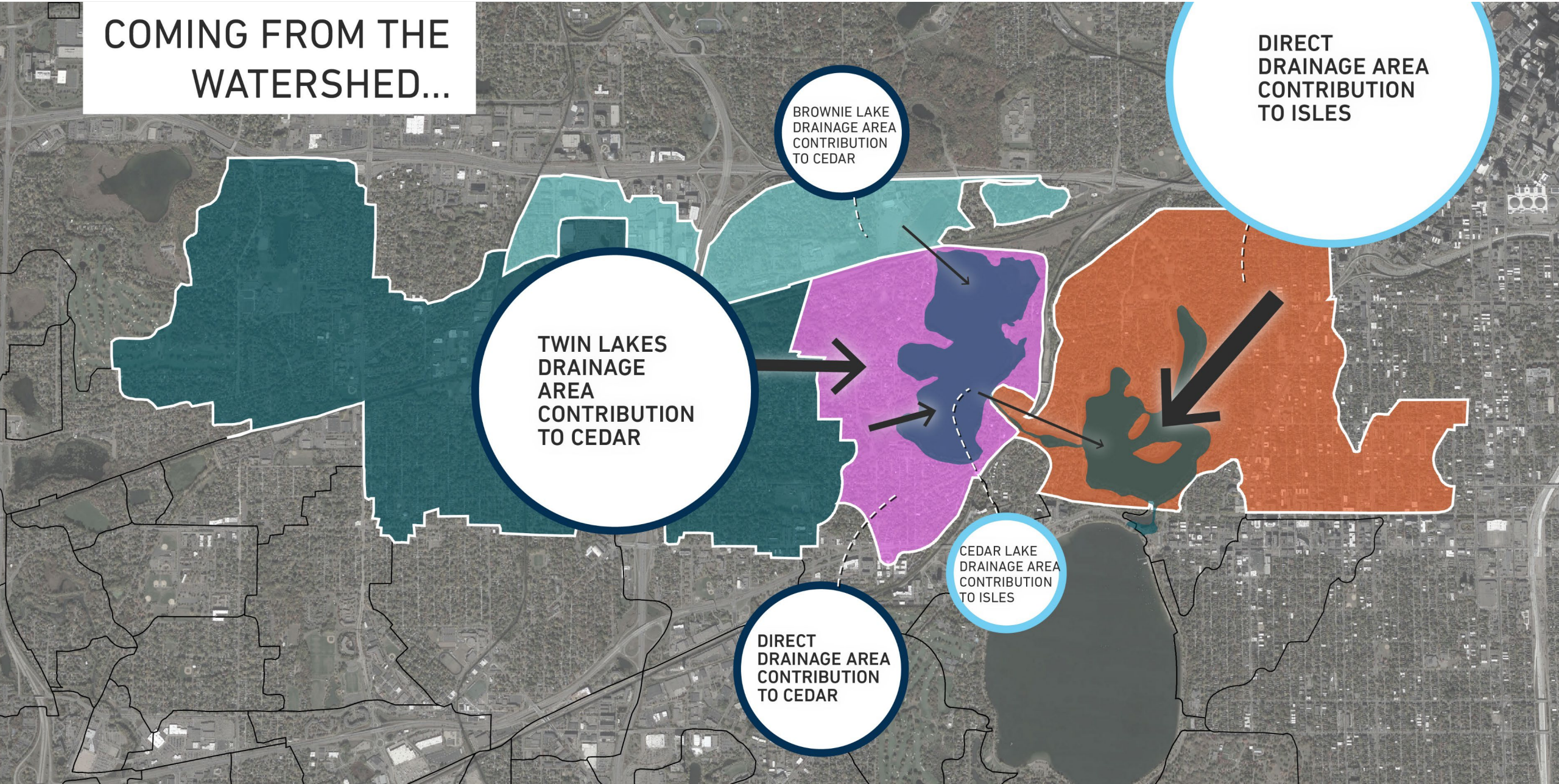


WATERSHED INFLUENCE: LAND COVER

WATERSHED LAND COVER



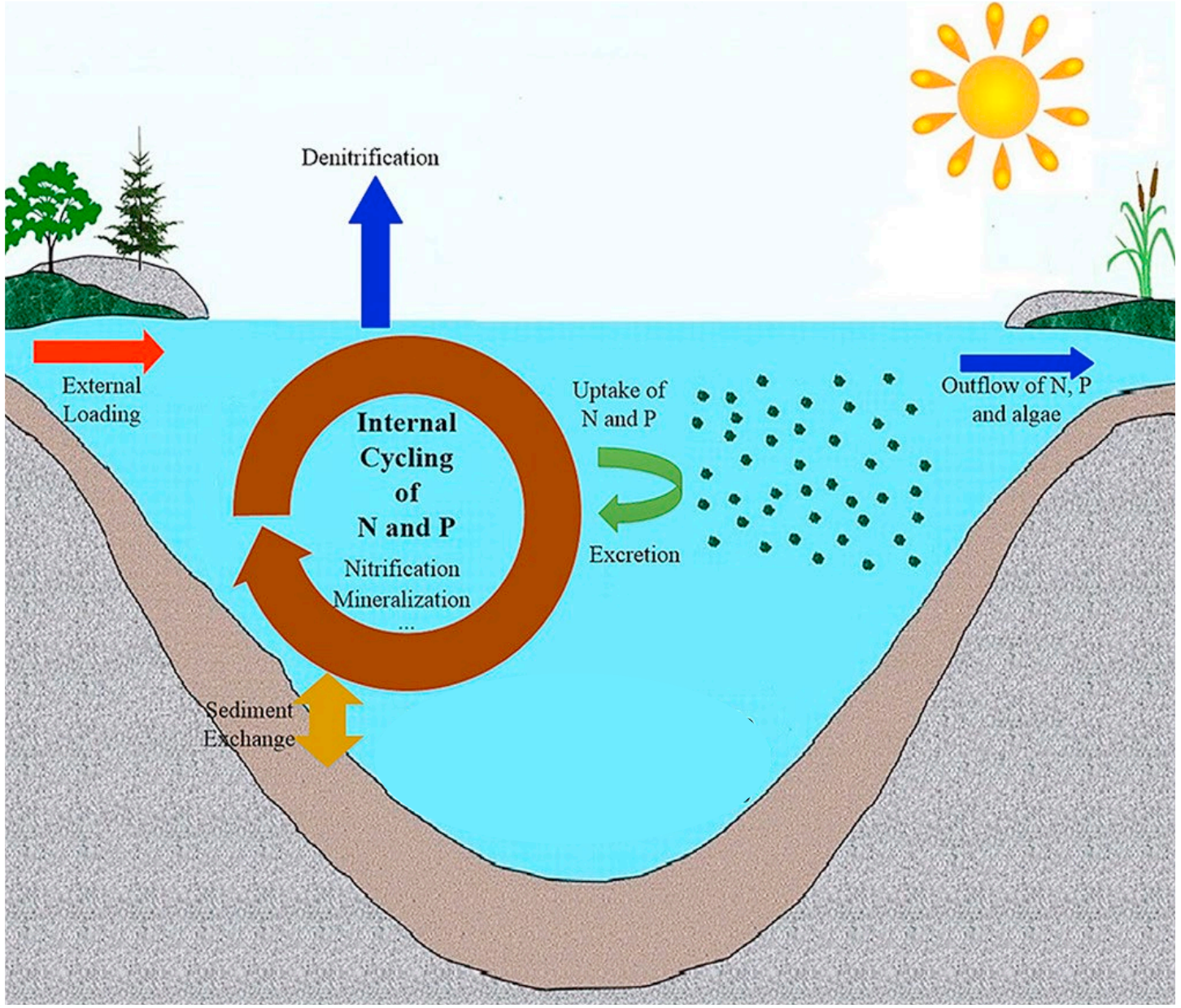
WATERSHED INFLUENCE



IN-LAKE DYNAMICS

NUTRIENT FATE

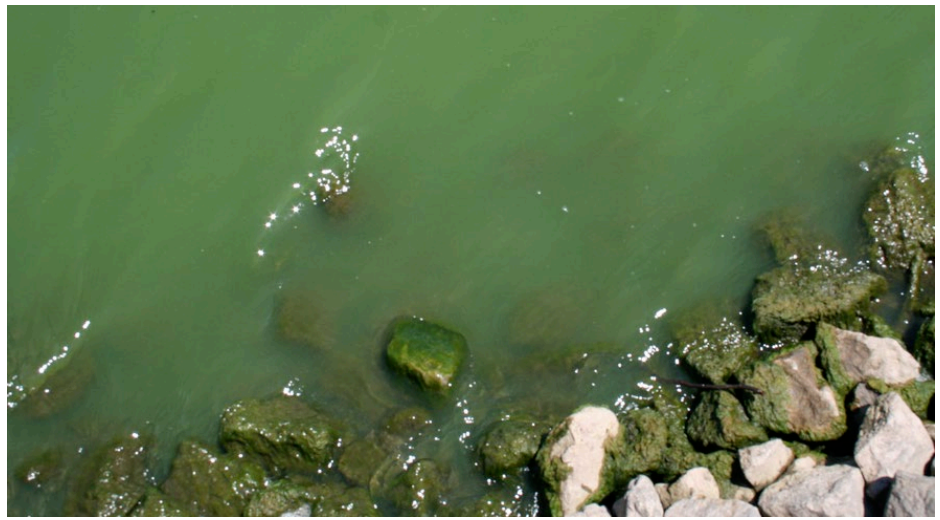
- Outflow
- Algal growth
- Plant uptake
- Nitrification (gas)
- Mineralization (sediment)

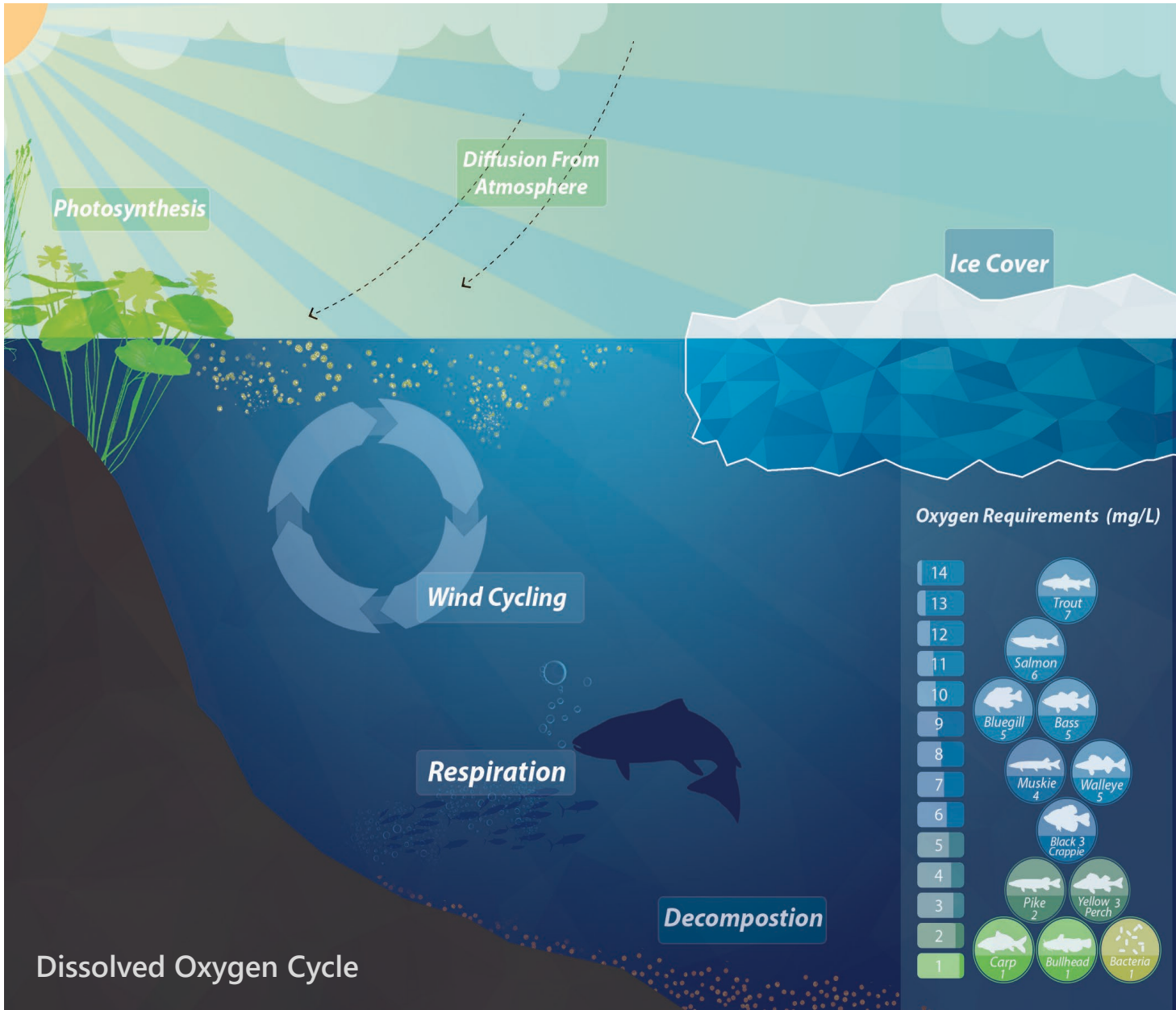


ALGAE - PHYTOPLANKTON

ALGAE

- Provide food for zooplankton, which in turn are food for fish
- Too much algae ('algae blooms') cause water quality impairment
- Decaying algae consume oxygen – impact fisheries





AQUATIC PLANTS – MACROPHYTES

AQUATIC PLANTS

- Nursery area for fish
- Zooplankton refuge
- Wave break
  – reduce shoreline erosion
- Can be a nuisance:
  milfoil, curlyleaf pondweed

HEALTHY LAKE ECOSYSTEMS

ALGAE vs. AQUATIC PLANTS

- Clear vs turbid water
- Food chain
- Zooplankton eat algae
- Plants provide refuge for zooplankton

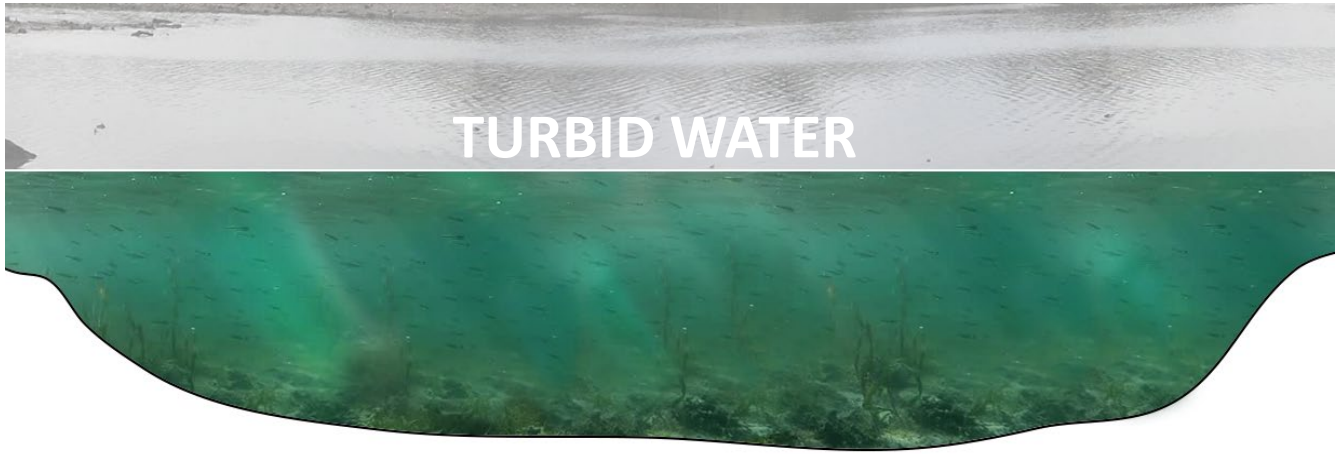
TWO STABLE LAKE STATES

AQUATIC PLANT DOMINATED STATE

- Clear water
- Balanced, diverse fish community
- Plants aid in keeping water clear

ALGAE DOMINATED STATE

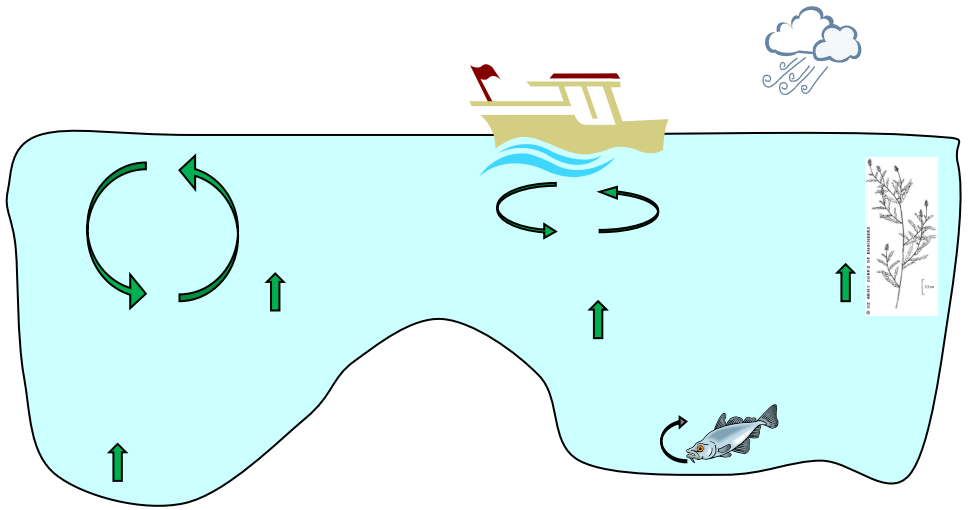
- Turbid water
- Dominated single fish group, pan fish &/or bottom dwellers
- Fish disturb sediment & plant roots, keeping water turbid

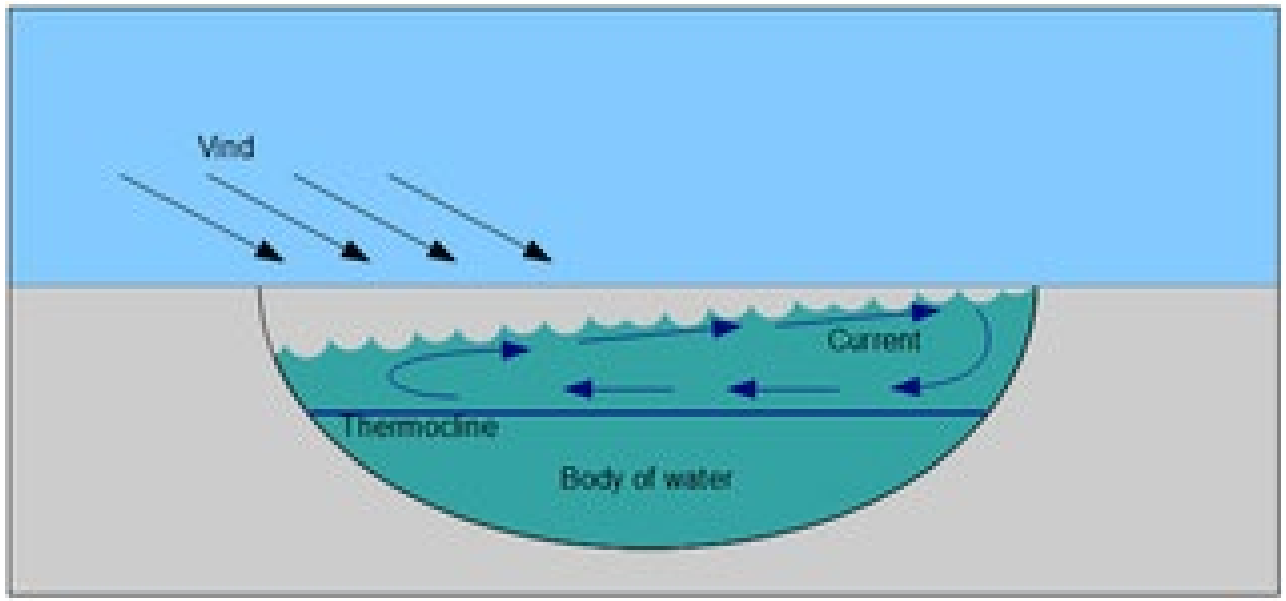


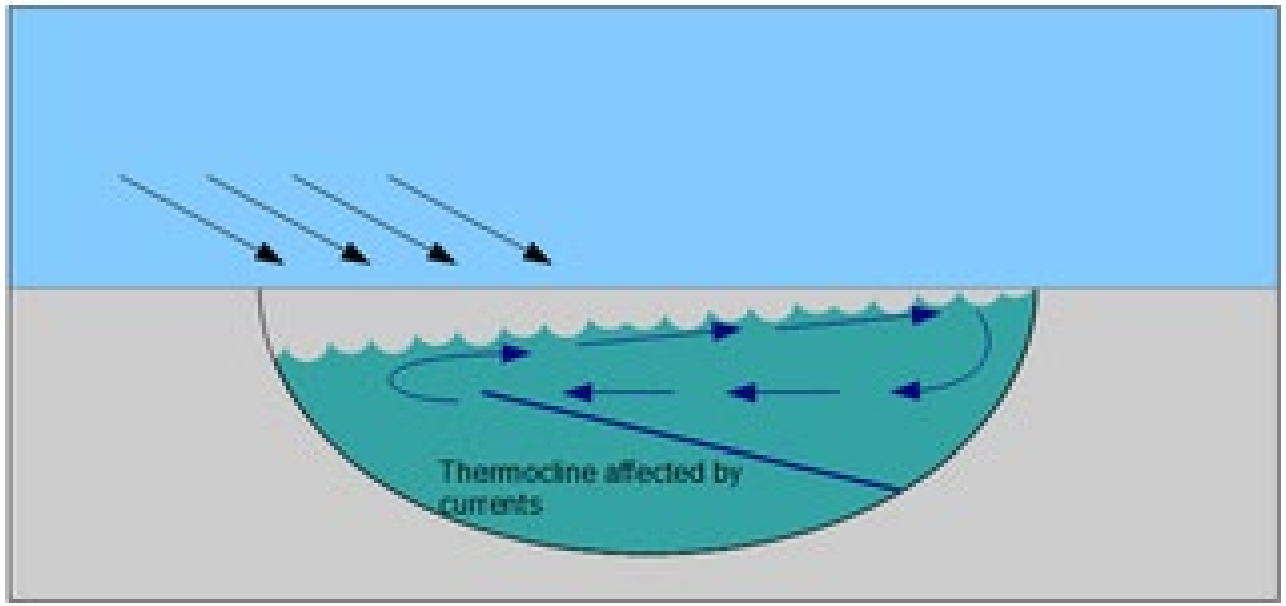
INTERNAL LAKE DYNAMICS

INTERNAL PROCESS

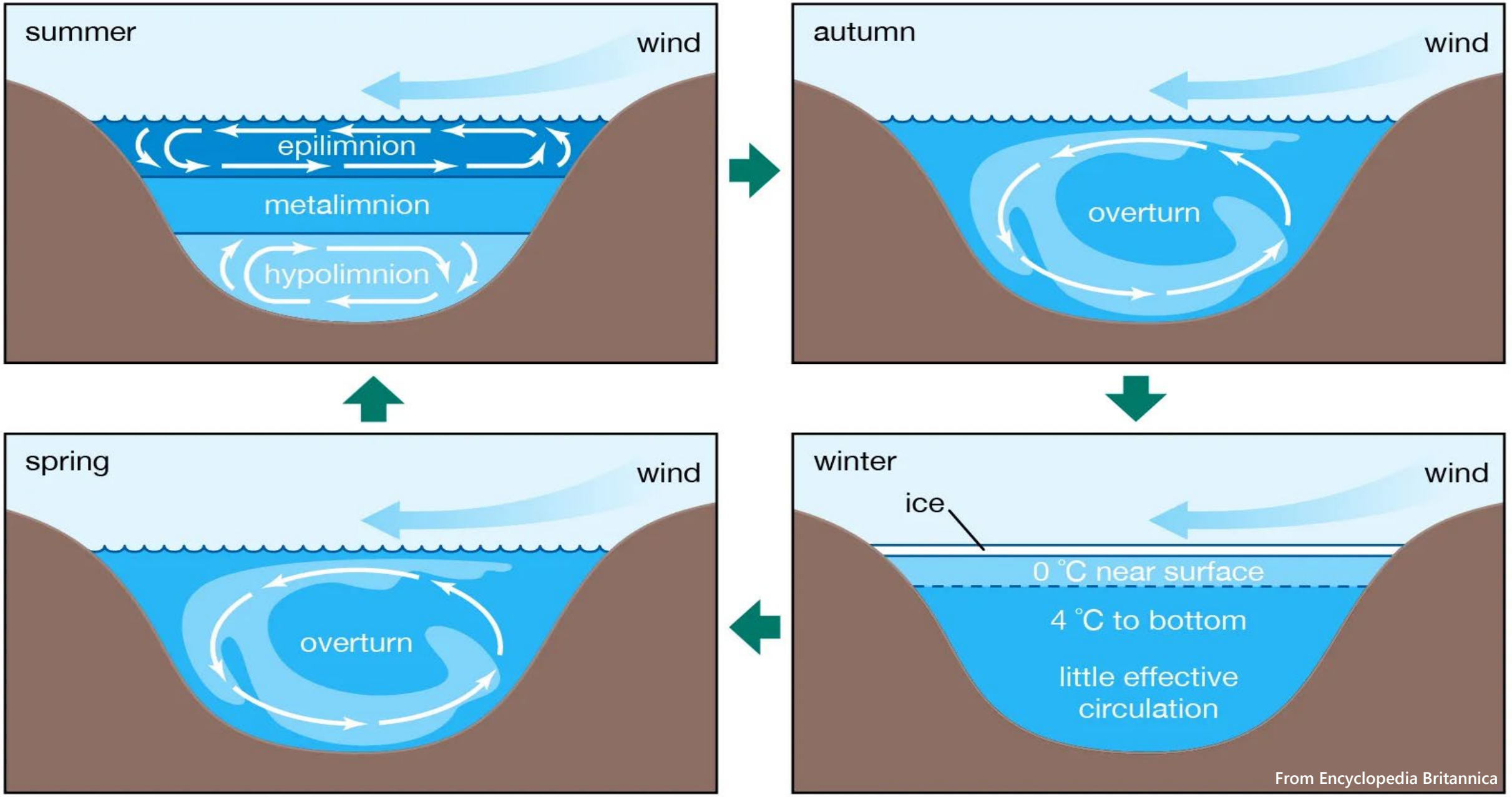
- Lake size & shape
- Wind & boat wave action
- Bottom feeding fish
- Sediment release







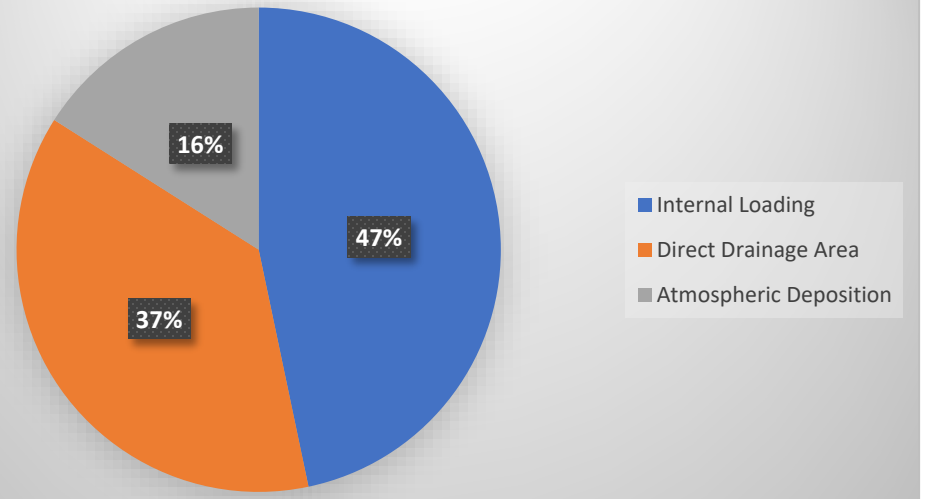
LAKE STRATIFICATION



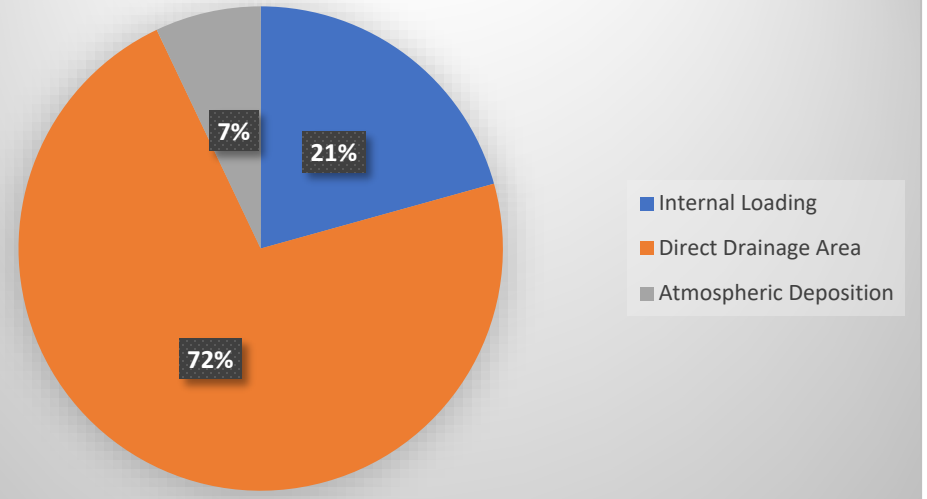
From Encyclopedia Britannica

WATERSHED VS INTERNAL LOADING

Dry Year (2021) Phosphorus Loading



Wet Year (2019) Phosphorus Loading



QUESTIONS?

THANK YOU!

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