

FRESHWATER FOOD WEB RECOVERY RESPONSES

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Ontario



Ontario Centres of
Excellence



Vale **LIVING WITH
LAKES CENTRE**
**CENTRE POUR LA
VITALITÉ DES LACS** Vale

Sudbury story

- Mining town
- Moonscape
- Acid rain and acidic lakes



New chapter

- >90% reduction in smelter emissions
- Re-greening programs
- Lake and watershed liming

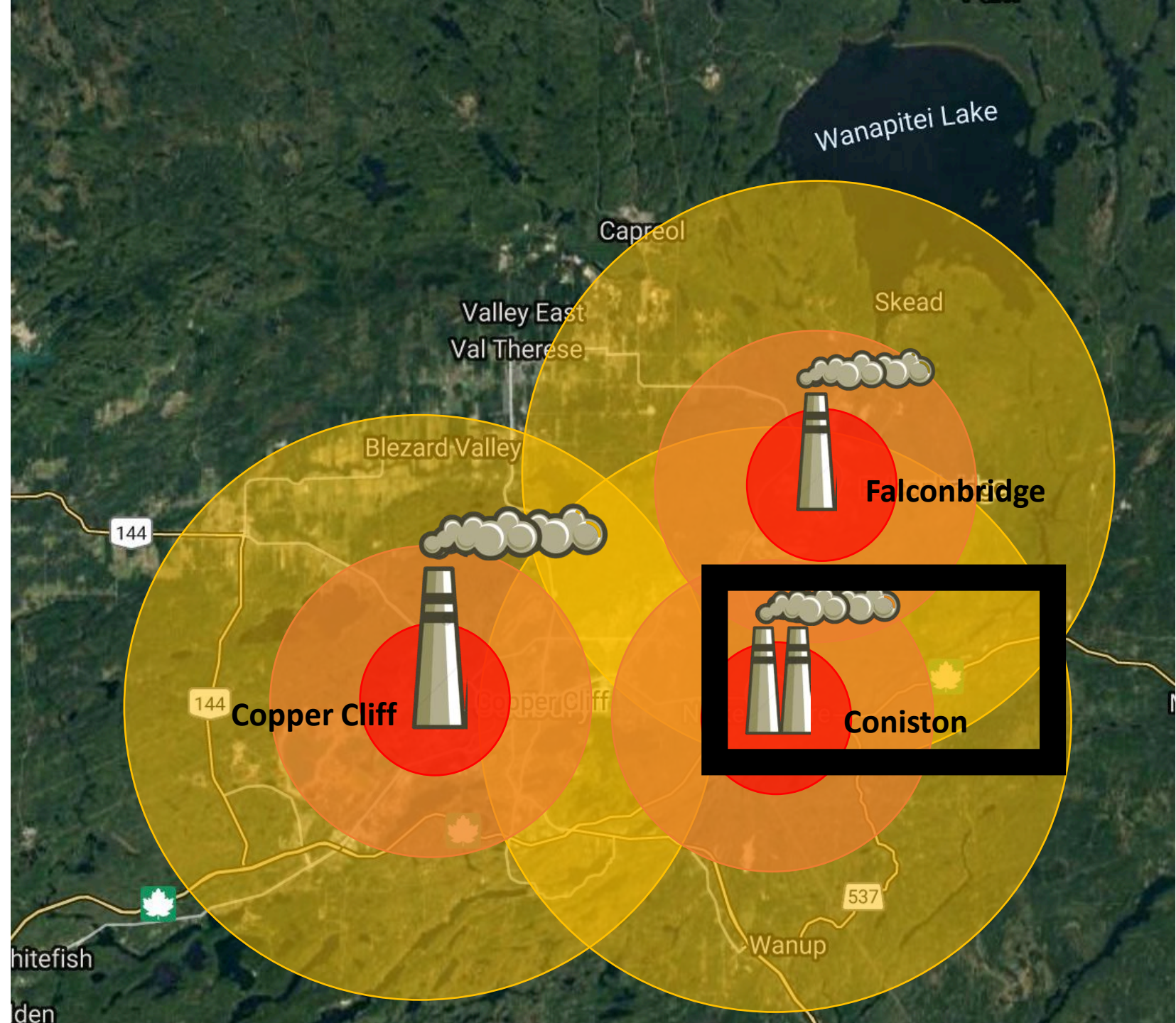
2000s







Impact gradient

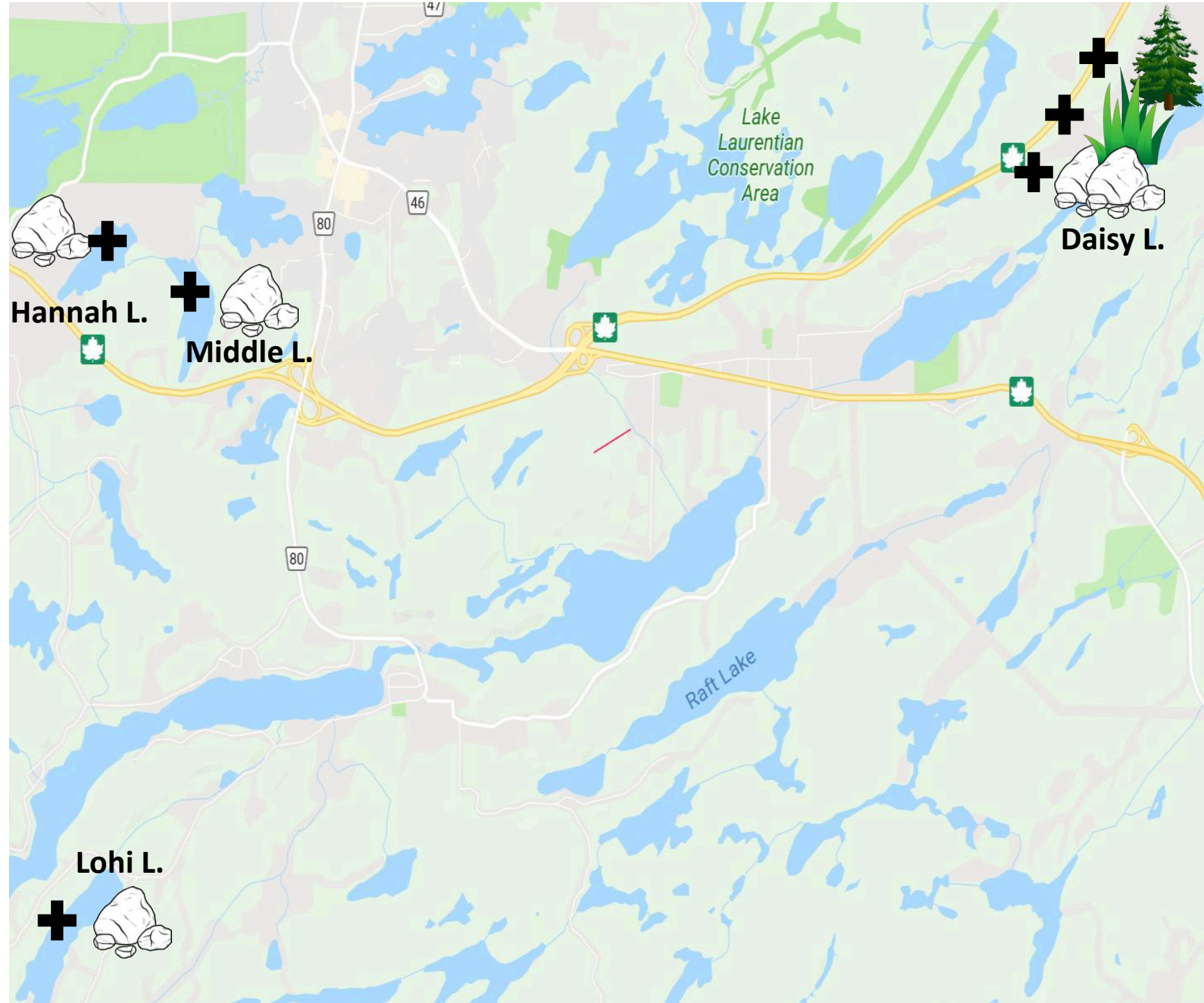
Distance from smelter

- SO₂ deposition
- Acidification
- Heavy metals



Treatment gradient

- Lake liming 
- Catchment and wetland liming 
- Grass seeding 
- Tree planting 



Additional variation

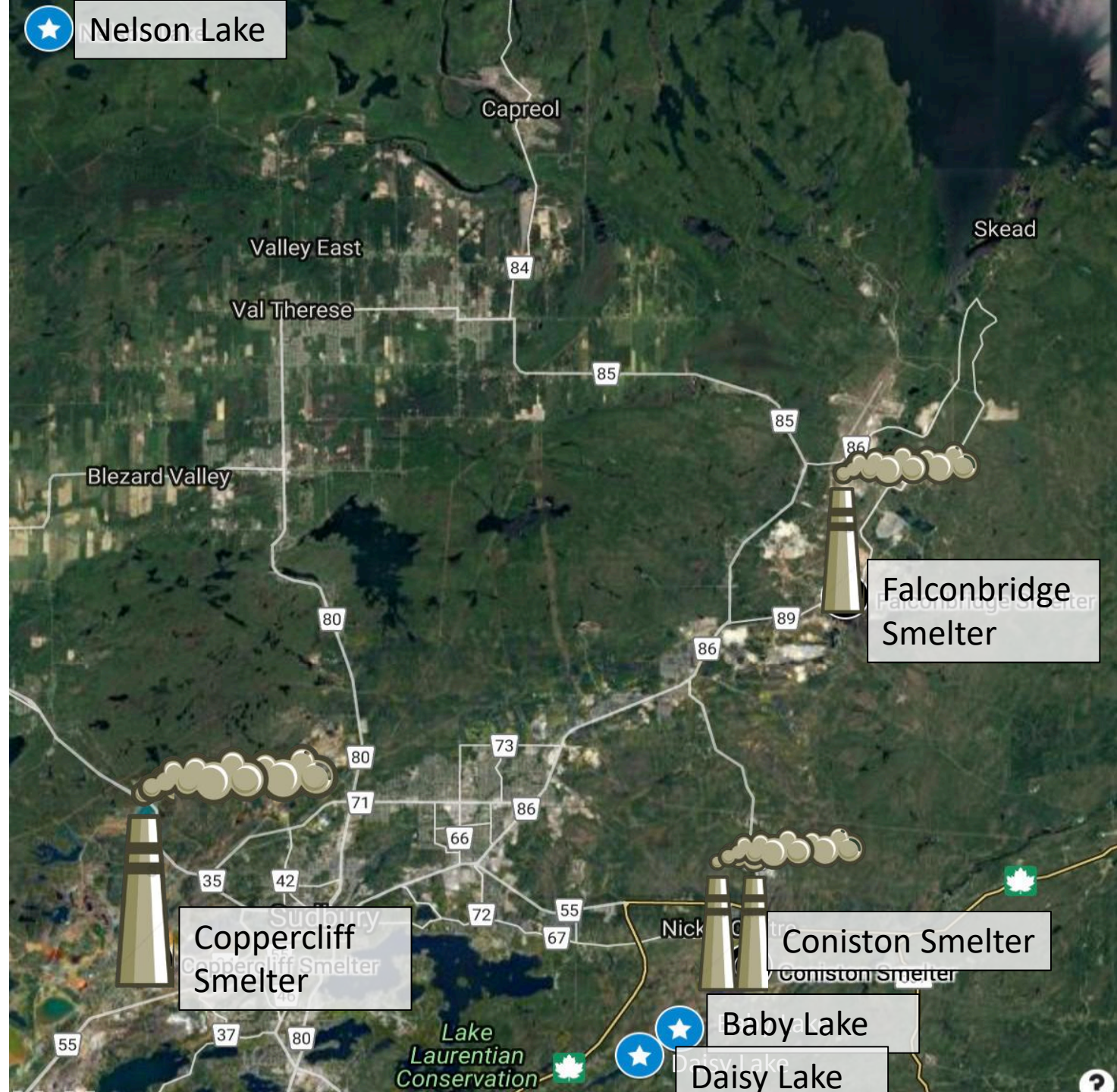
Spatial and temporal variation within impact gradient

- Re-visiting sites
- Water chemistry
- Catchment characteristics



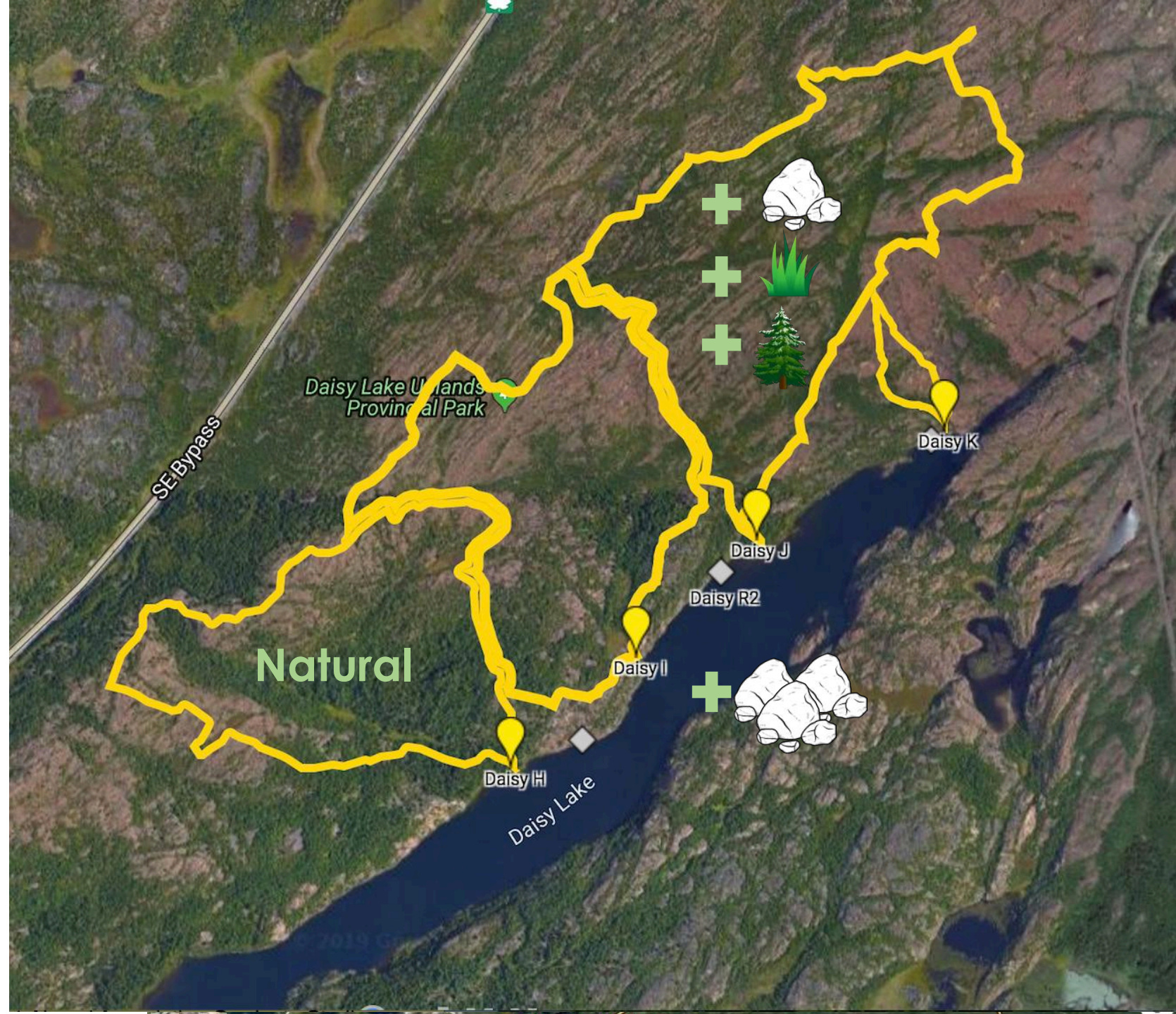
Study lakes

- Daisy Lake
- Baby Lake
- Nelson Lake



Daisy Lake

- High smelter impact
- Naturally-protected valley catchment
- Treated catchment (1990s)



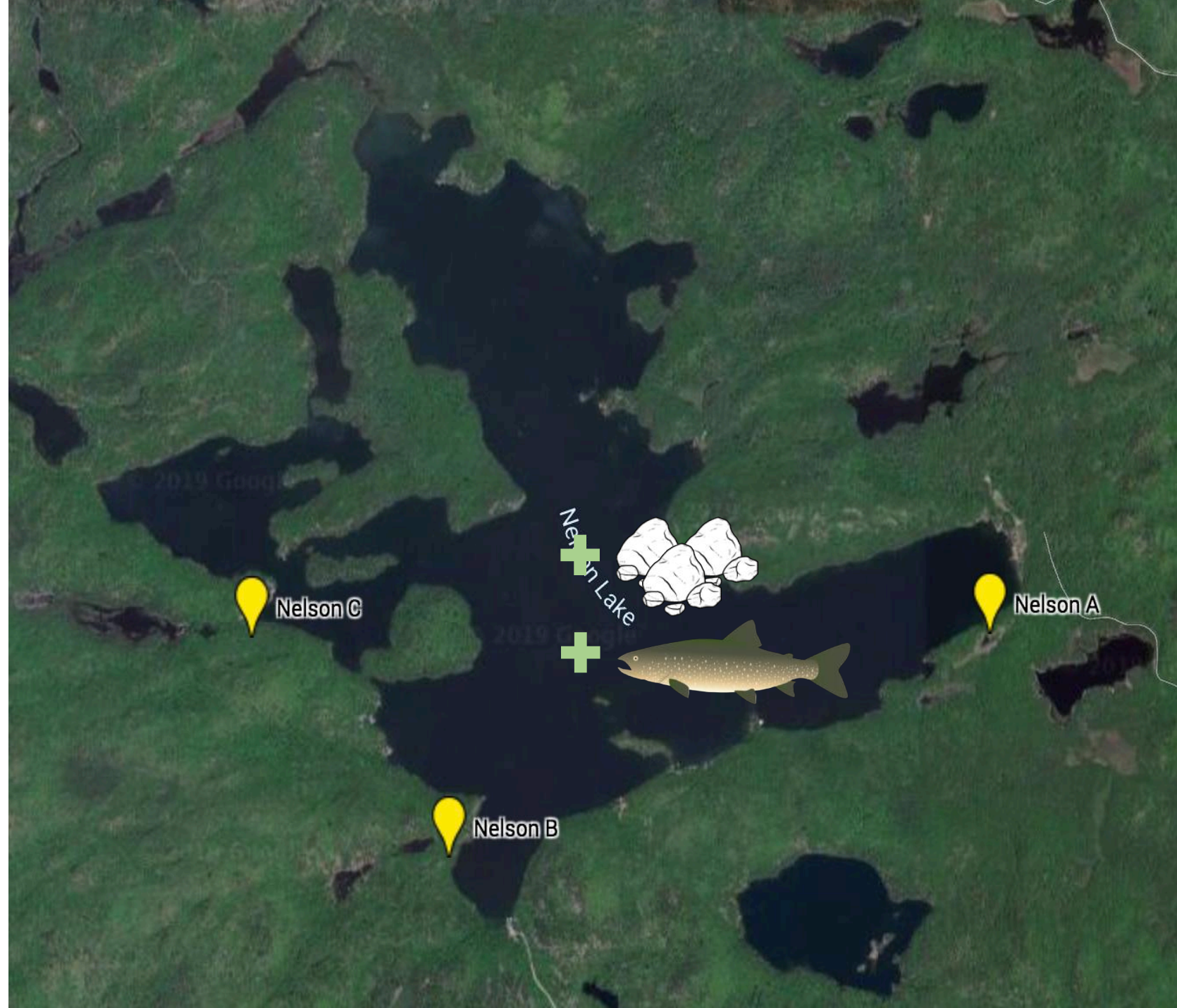
Baby Lake

- High smelter impact
- Catchment receiving inputs from Wanapitei R.
- No treatment



Nelson Lake

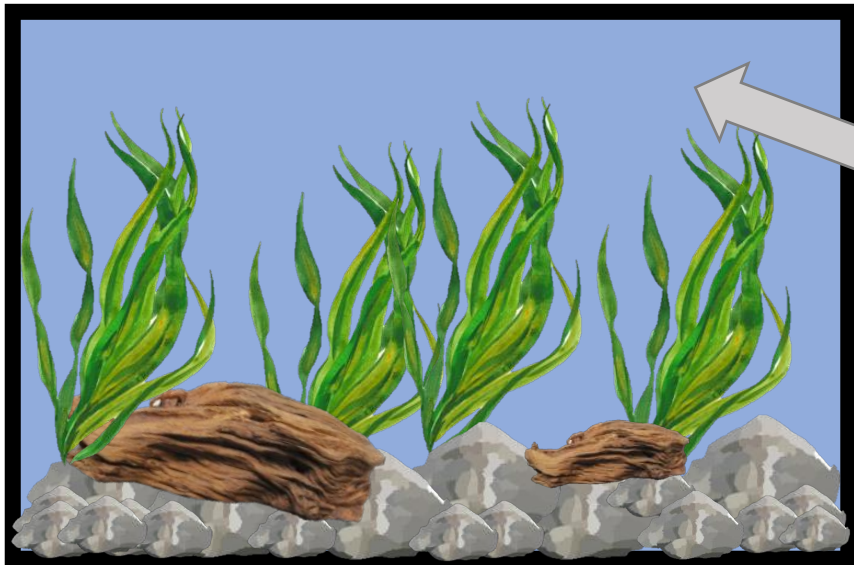
- High smelter impact
- Whole-lake liming
- Lake trout stocking



Objectives

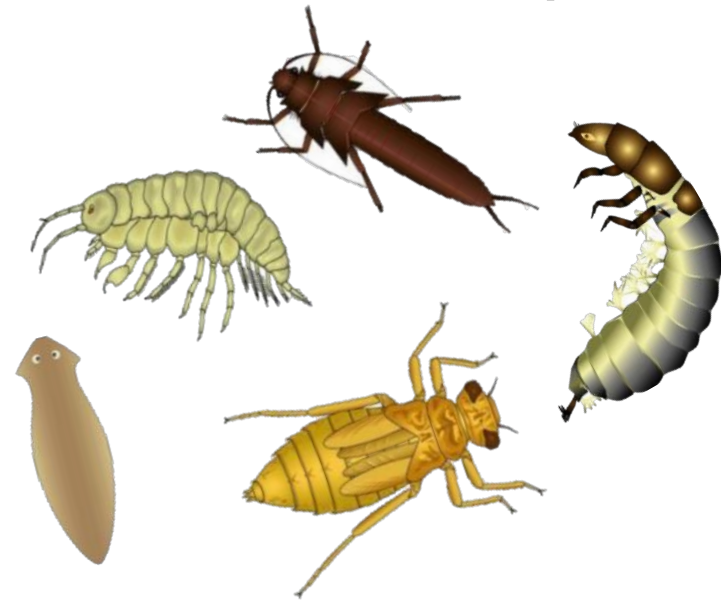
Quantifying and comparing site and biota characteristics across smelter-damaged lakes with varying degrees of treatment using:

Habitat Availability



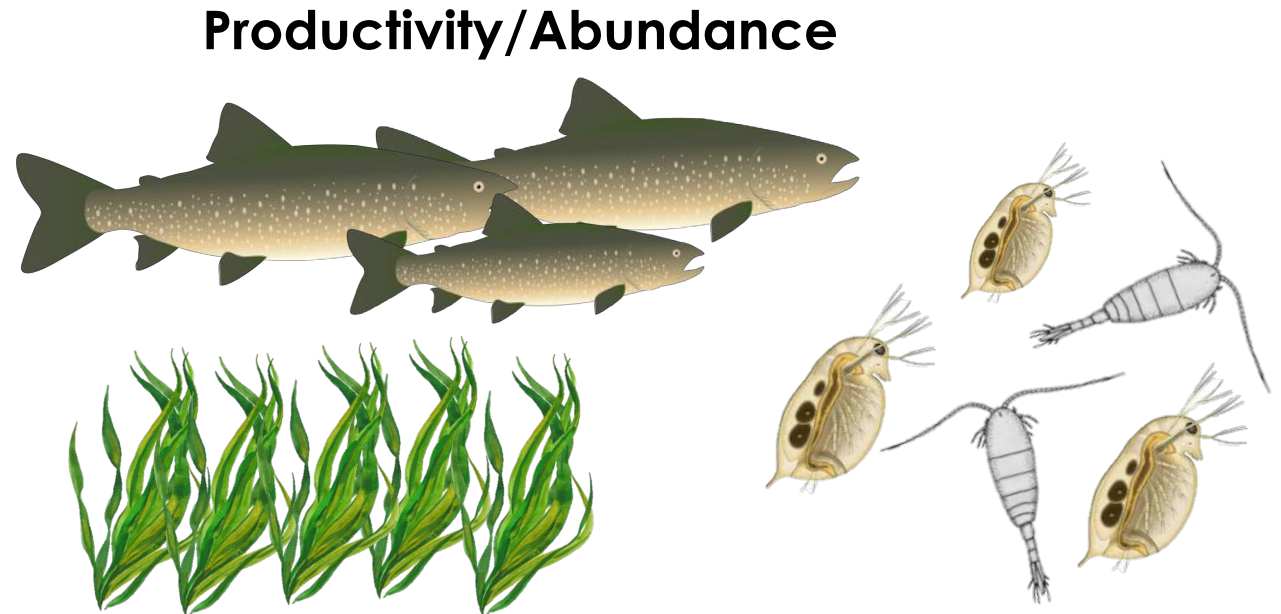
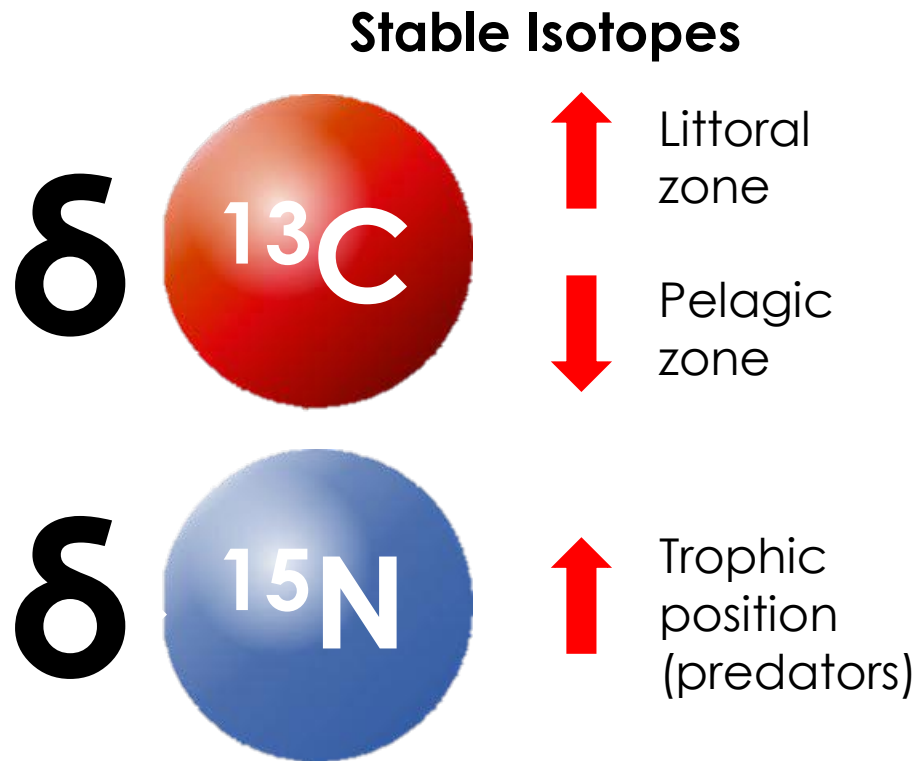
pH
DOC
TKN
TP
Ca
metals

Invertebrate Community Diversity



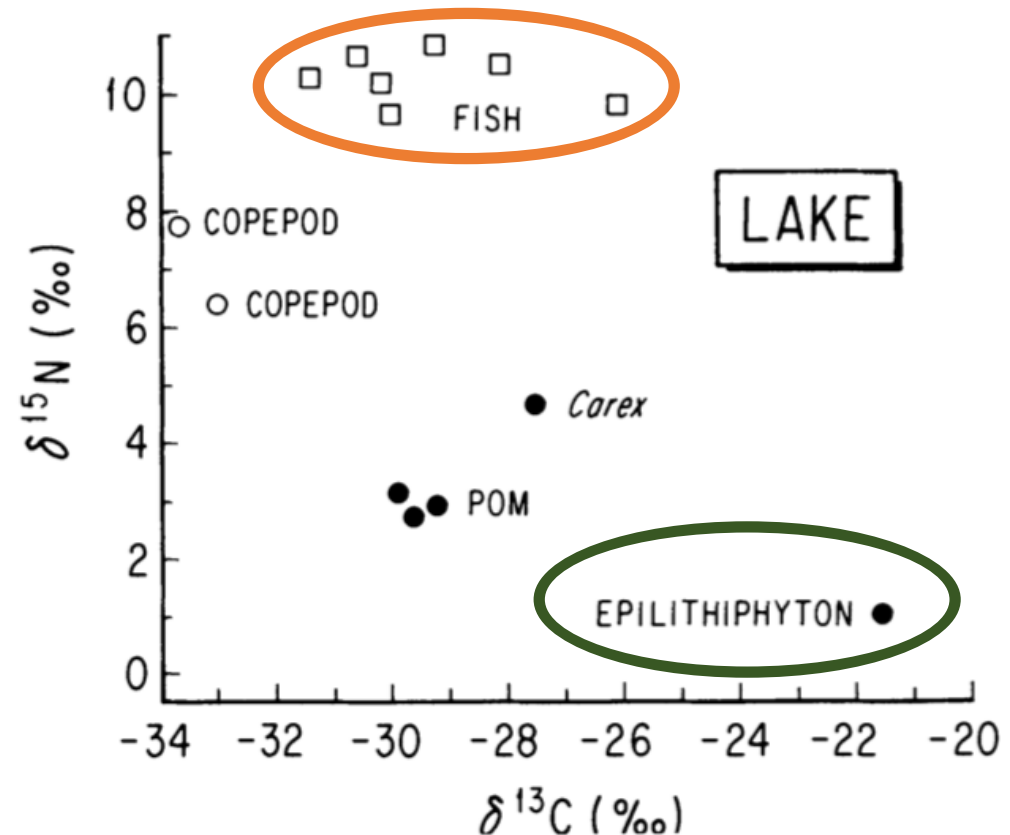
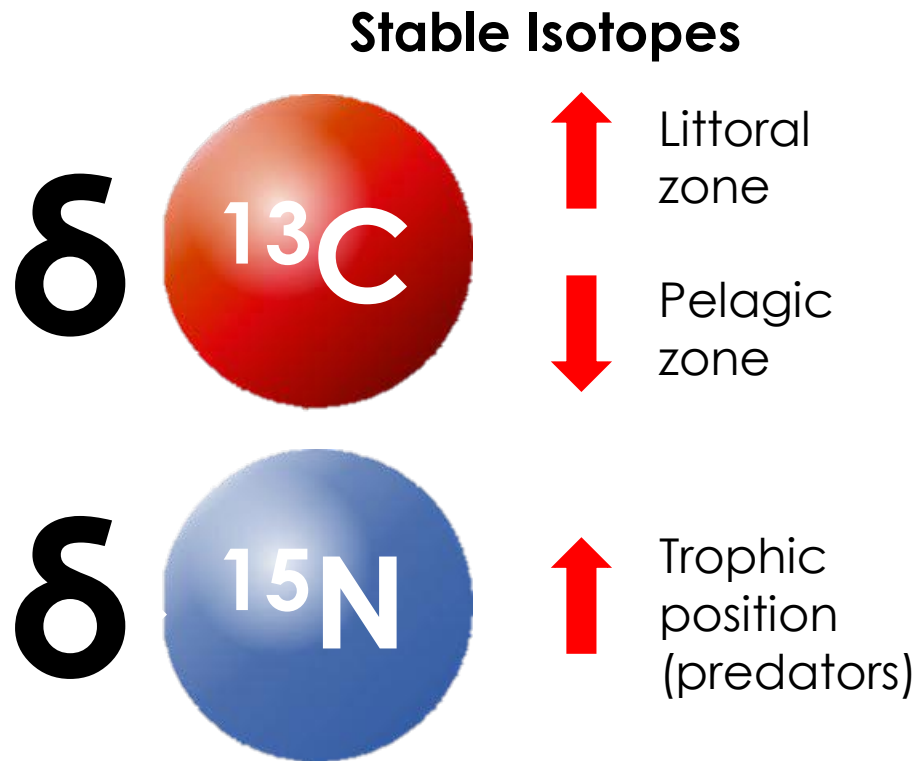
Objectives

Understanding and modelling trophic interactions in smelter-damaged lakes using:



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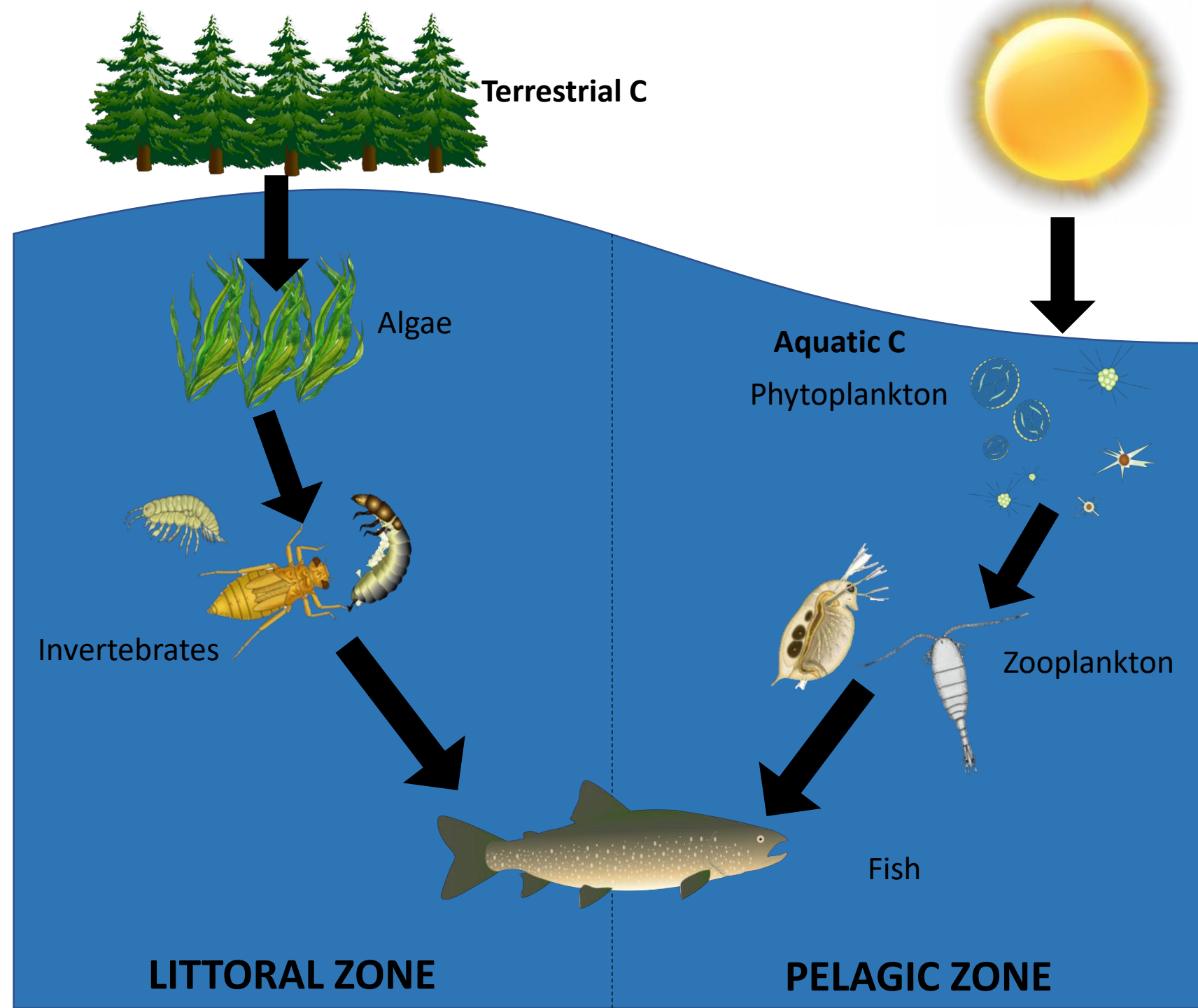


Fry, B. 1991.
Ecology 76(6).

Carbon dynamics

Stable isotope analysis
across trophic levels

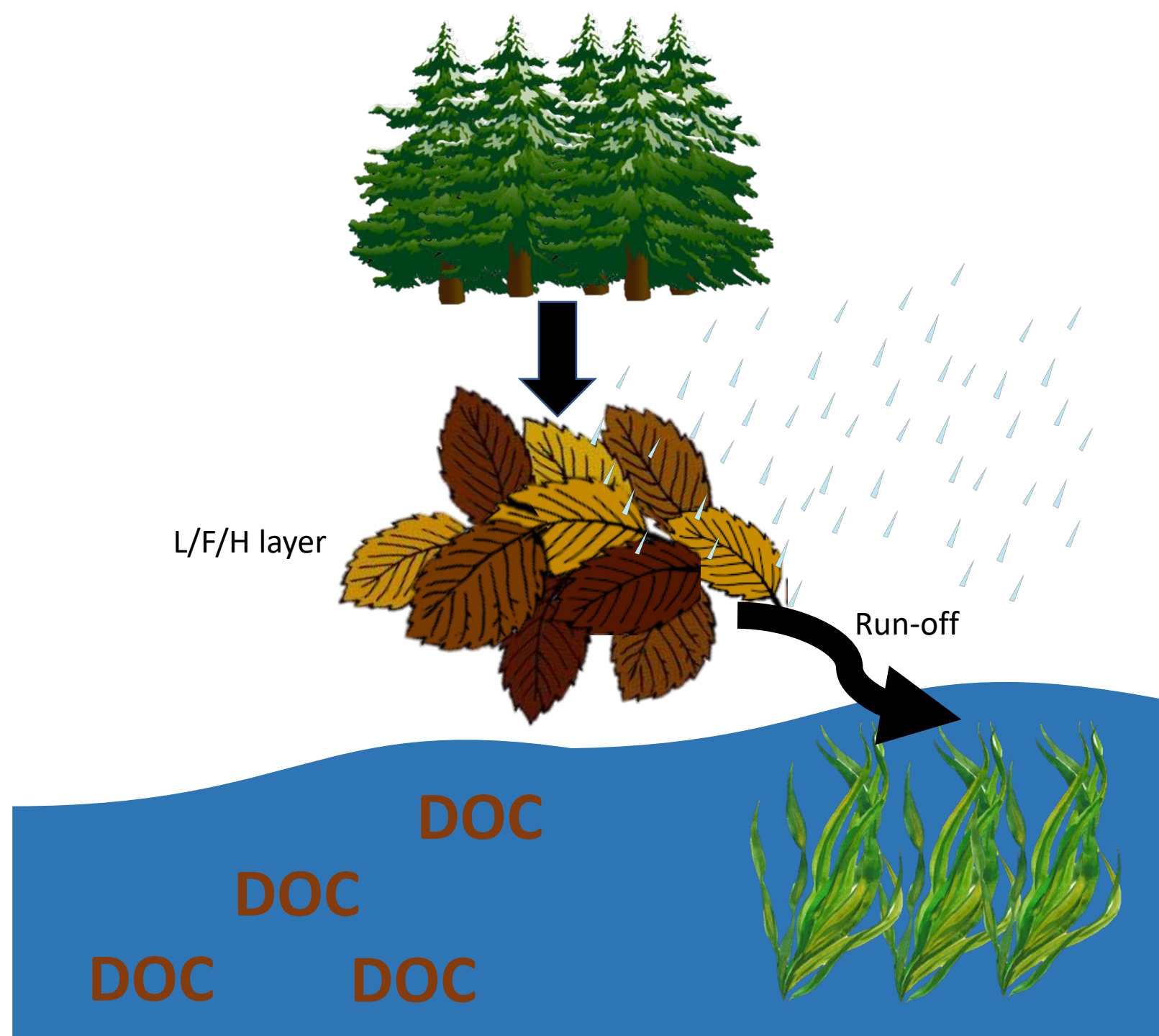
- Terrestrial vs. aquatic-derived C
- Tracking energy



Land-water linkages

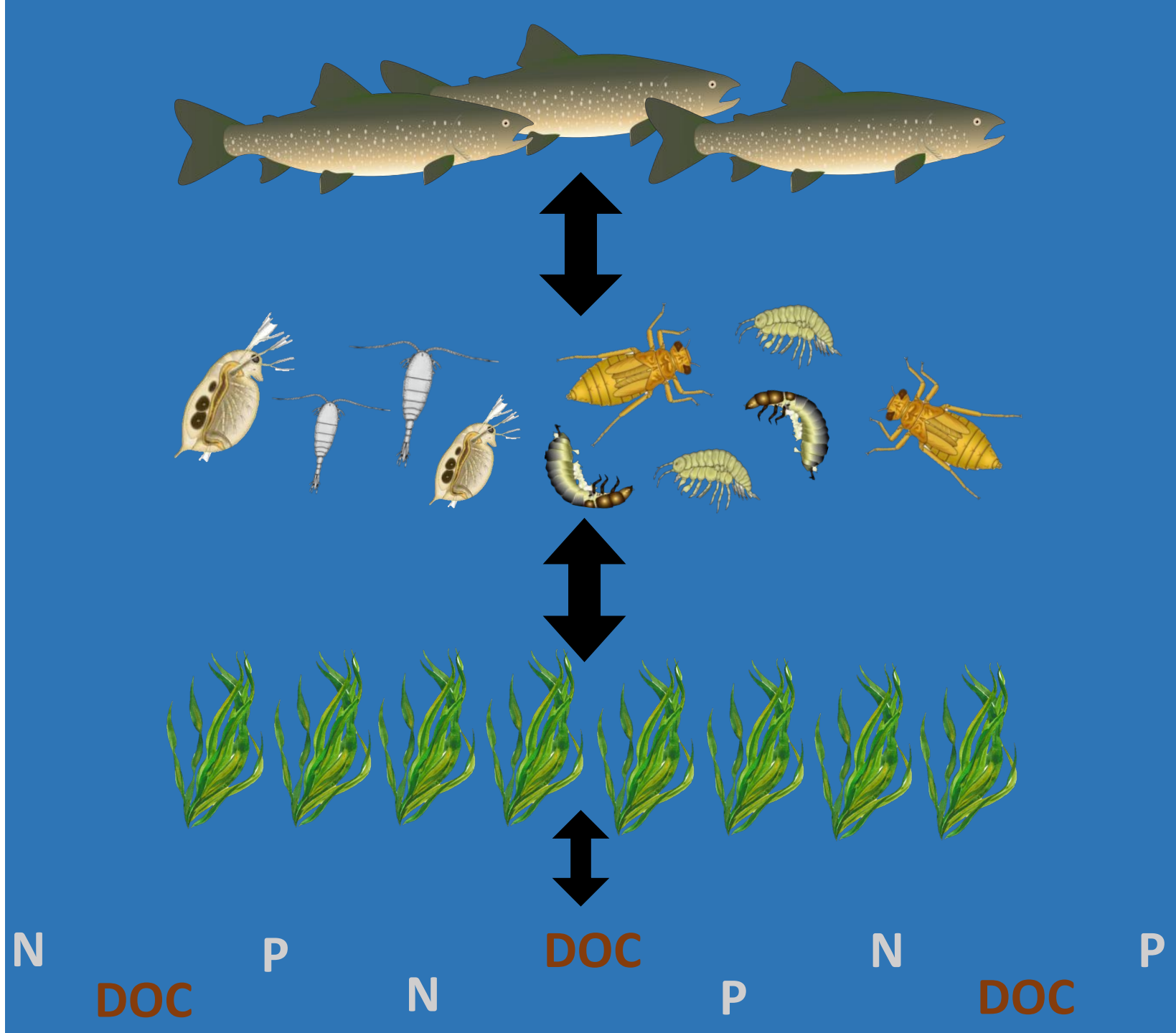
Transport terrestrial C and nutrients across land

- Run off
- Direct inputs
- Leaching



Trophic recovery

- Coherence or variation in recovery among trophic levels
- Top-down vs bottom-up controls
- Trophic cascades



Importance

- Food web responses to anthropogenic stressors
- Restoration technique evaluation
- Protection of freshwater resources



Thank you!

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