

The Contribution of Point and Diffuse Sources of Nutrients to Lake Diefenbaker: A Sensitivity Analysis

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Background

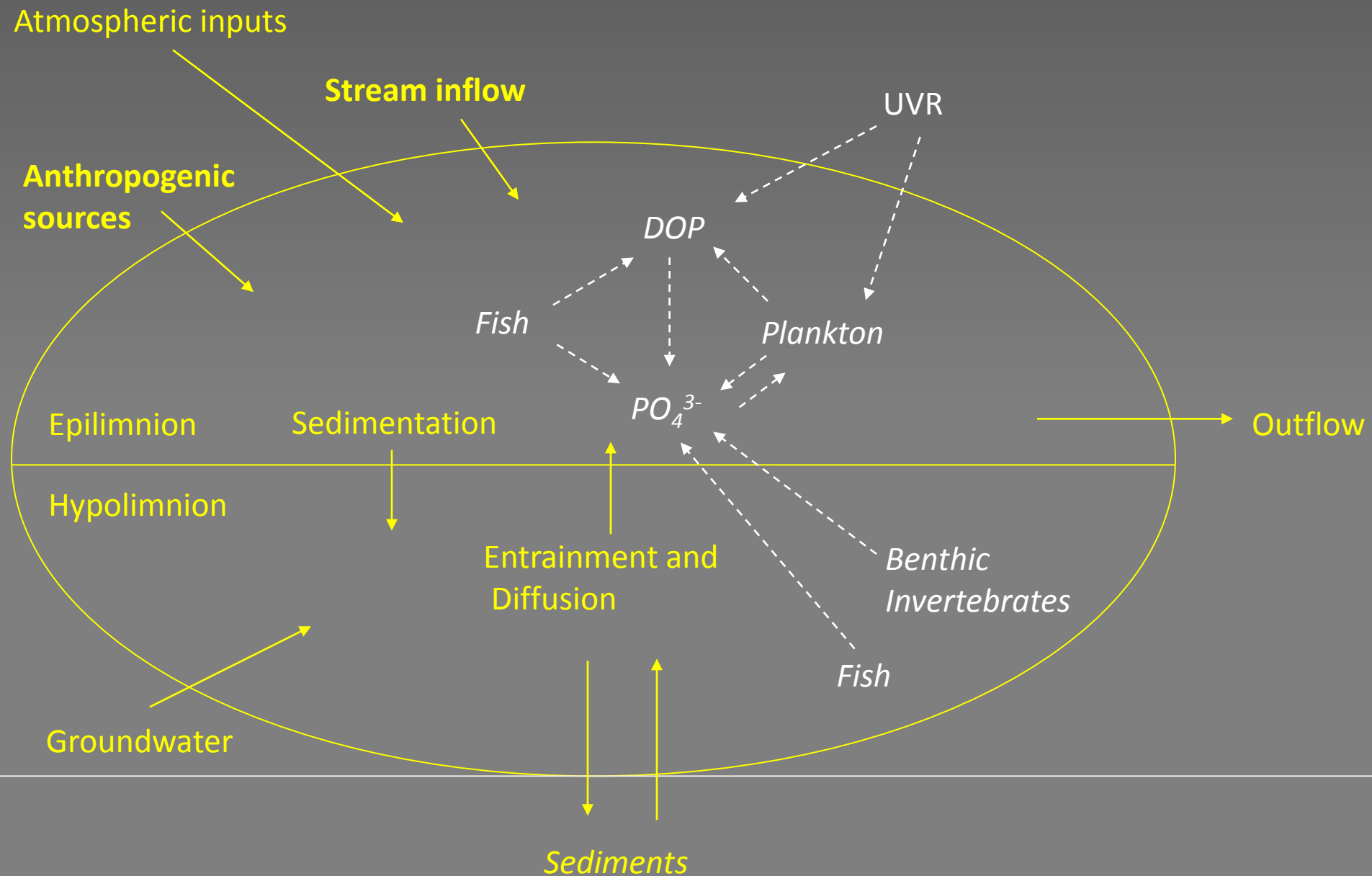
- Lake Diefenbaker:
 - Large reservoir
 - Surface Area: 500 km²
 - Shoreline: ~760 km
 - Mean depth: 33 m
 - Annual water level fluctuation: ~6m
 - Significant annual variation in water and nutrient loading

= A COMPLEX SYSTEM

Background Cont'

- Important site for recreation, industry (Aquaculture), irrigation, and municipal water
- Apparent increase in the frequency and intensity of algal blooms
 - May be a heterogeneous distribution of these blooms
 - Distribution may be related to in-lake processes and/or local nutrient sources

Pathways in the P Cycle of Lakes



Why Phosphorous?



Lake 226

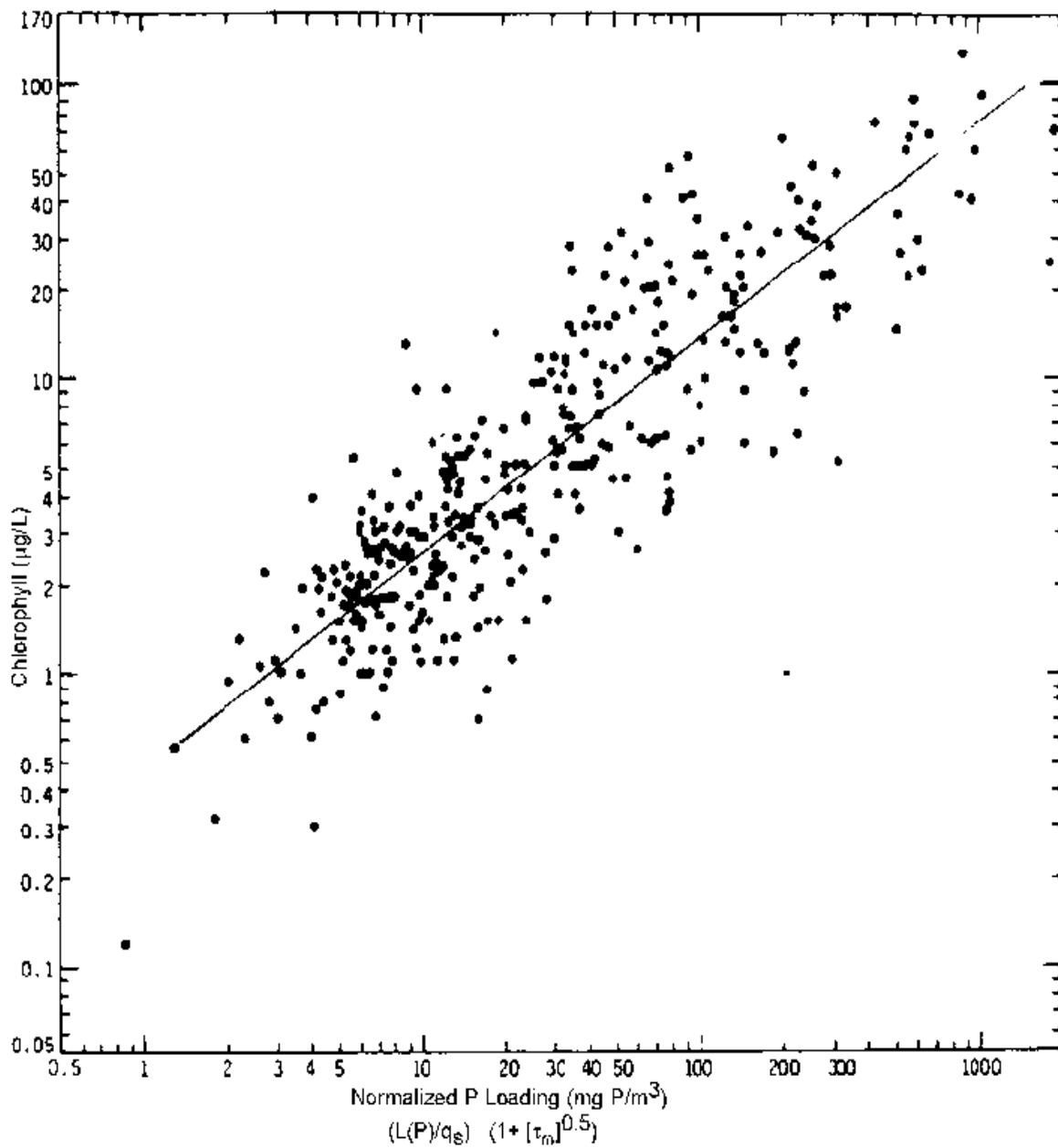
C, N

C, N, P

- Leibigs Law of Minimum
- Phosphorus is the nutrient that regulates primary productivity



Lake 227



Updated Vollenweider-OECD normalized
P loading/chlorophyll response relationship

Chlorophyll *a*
vs. Total P

Primary Research Objectives

1. Develop a nutrient mass balance (nitrogen and phosphorus)

- quantify major nutrient inputs and outputs
- quantify internal nutrient fluxes (i.e., sedimentation and internal loading)
- characterize the potential bioavailability of nutrients derived from each source

Primary Research Objectives Cont'

2. Characterize bacteria and algal sensitivity to nutrient inputs

- determine the type and degree of nutrient limitation both spatially and temporally

3. Characterize algal and bacterial groups

- determine the frequency, intensity and spatial distribution of algal blooms (field observations and satellite imagery)
 - Can we relate this to point source nutrients, in-lake processes, or weather?
- What is the assemblage composition? (i.e., Cyanobacteria, E-coli, Fecal Coliform)

Primary Research Objectives Cont'

4. Lake sediment dynamics

- determine the deposition rate of sediments and nutrients to the lake bottom
- determine the degree of nutrient saturation of the sediments and their potential to absorb further nutrients

5. Quantify diffuse nutrient input from agriculture

- dependent on land management (i.e., riparian zone) and agriculture practices (i.e., tillage, fertilizer application)
 - Model/study on small scale research plots along SC Creek?
 - Scale up to the rest of the lake?

Primary Research Objectives Cont'

6. A Community-Based Participatory Research Approach

- Provides the opportunity for stakeholders to:
 - 1) partner and actively participate with researchers in understanding their unique nutrient contributions to Lake Diefenbaker
 - 2) become educated on water resource issues and the scientific methods of water resource research and interpretation of results
 - 3) facilitate development of new policy and management ideas that address all stakeholders in decision making and that account for local industrial, community and agricultural arrangements