Discovery of diverse freshwater picophytoplankton populations via flow cytometry

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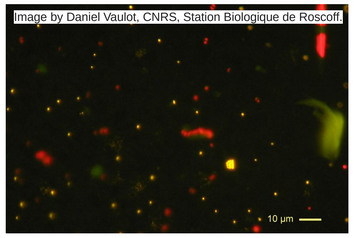
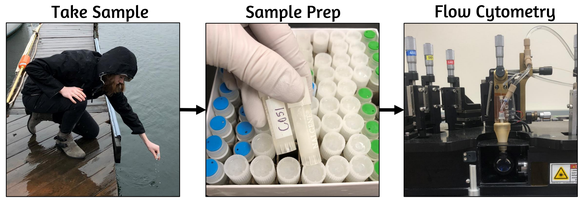
Introduction

Picophytoplankton
- 0.2 – 2 um diameter
- Unicellular
- Some microcolonies
- Photosynthetic
- Primary producers
- Carbon cycle drivers



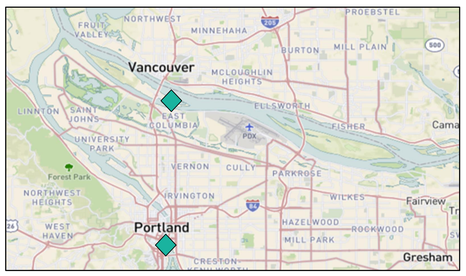
This project aims to quantify and characterize the photosynthetic microorganism populations present, by analyzing surface water samples taken over a year-long timeframe from both the Columbia and Willamette rivers in Portland, Oregon.

Methodology

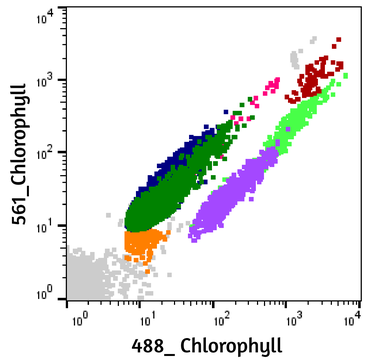


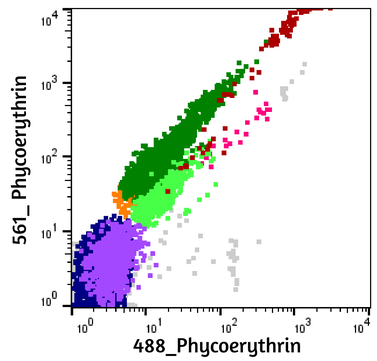
Research process (above)
- Weekly sampling regime since Sep. 2022
- Glutaraldehyde fixation + liquid nitrogen freezing
- Flow Cytometry (instrumentation)
- Analyzed data via FlowJo software

Sampling locations (below)
- Docks chosen relatively close to publicly available hydrological data



Results

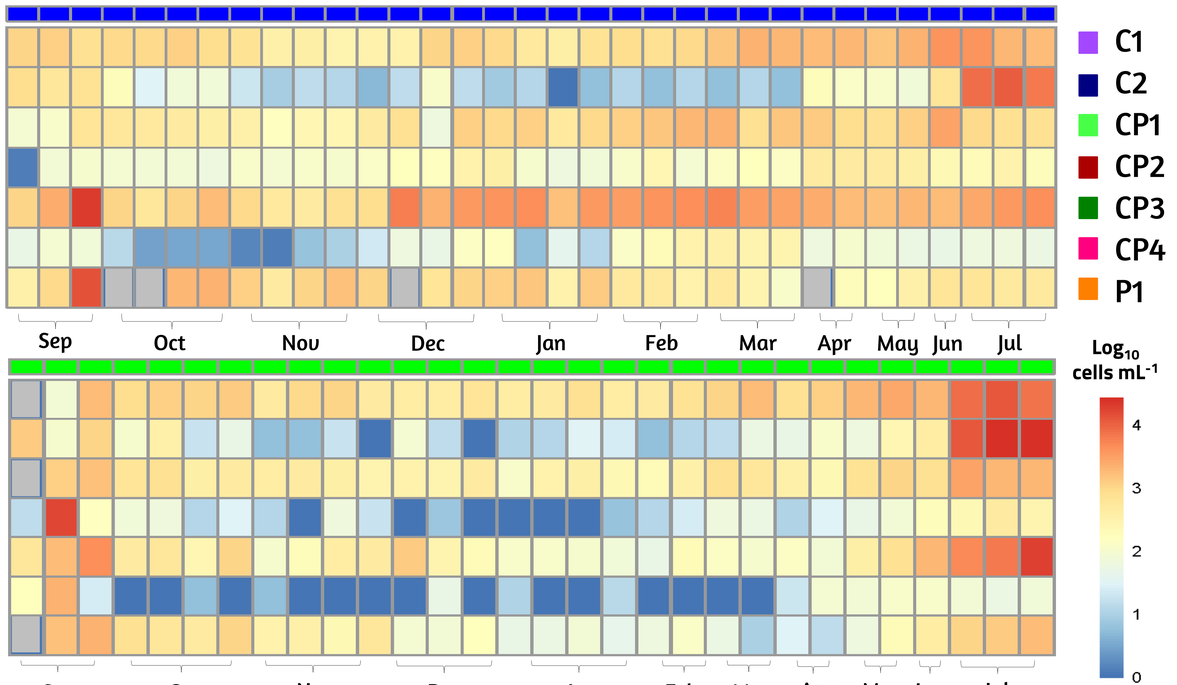


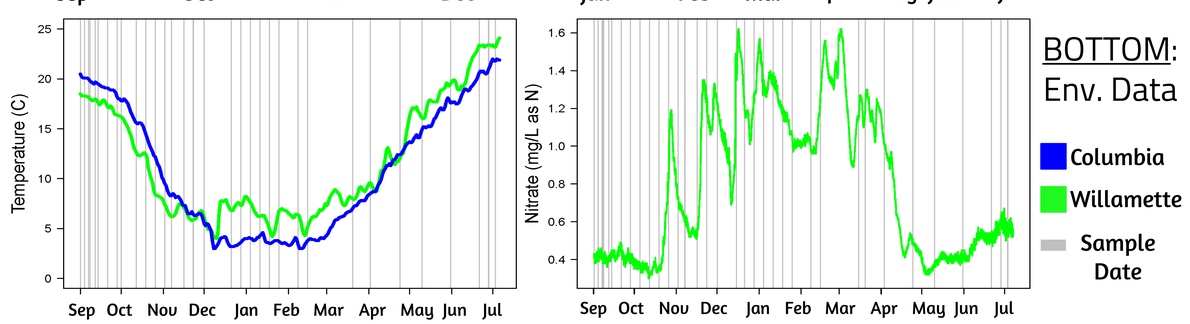


TOP: Pigment (Chlorophyll and Phycoerythrin) fluorescence ratios.

MIDDLE: Heatmap of population abundances over time.

Columbia Willamette





BOTTOM: Env. Data

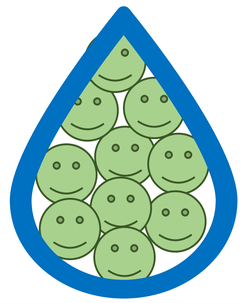
Columbia
Willamette
Sample Date

Findings

- **Discovered 7 distinct, coexisting picophytoplankton populations**
- **First study to distinguish between *Synechococcus* in these river systems!**
- **Importance: To understand the nutrient cycling within freshwater ecosystems.**

Next Steps

- Changes in cell size over time
- Environmental correlations
- Genetic identification



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