Conceptualizing and quantifying the function of beaver dams and storm water ponds on the hydrology and biogeochemistry of urban streams

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Introduction

Urban streams have wide chemical variability and highly responsive discharge levels due to the high level of impervious surfaces that cause runoff. Beaver dams are shown to reduce stream velocity, increase baseflow, decrease storm flow, and enhance nutrient processing rates, *but these effects have yet to be studied in urban environments*.

Purposes of this study:

- 1)Establish a base flow and compare flood attenuation potential between sites
- 2) Analyze the impact of beaver on carbon flux dynamics in the primary stream

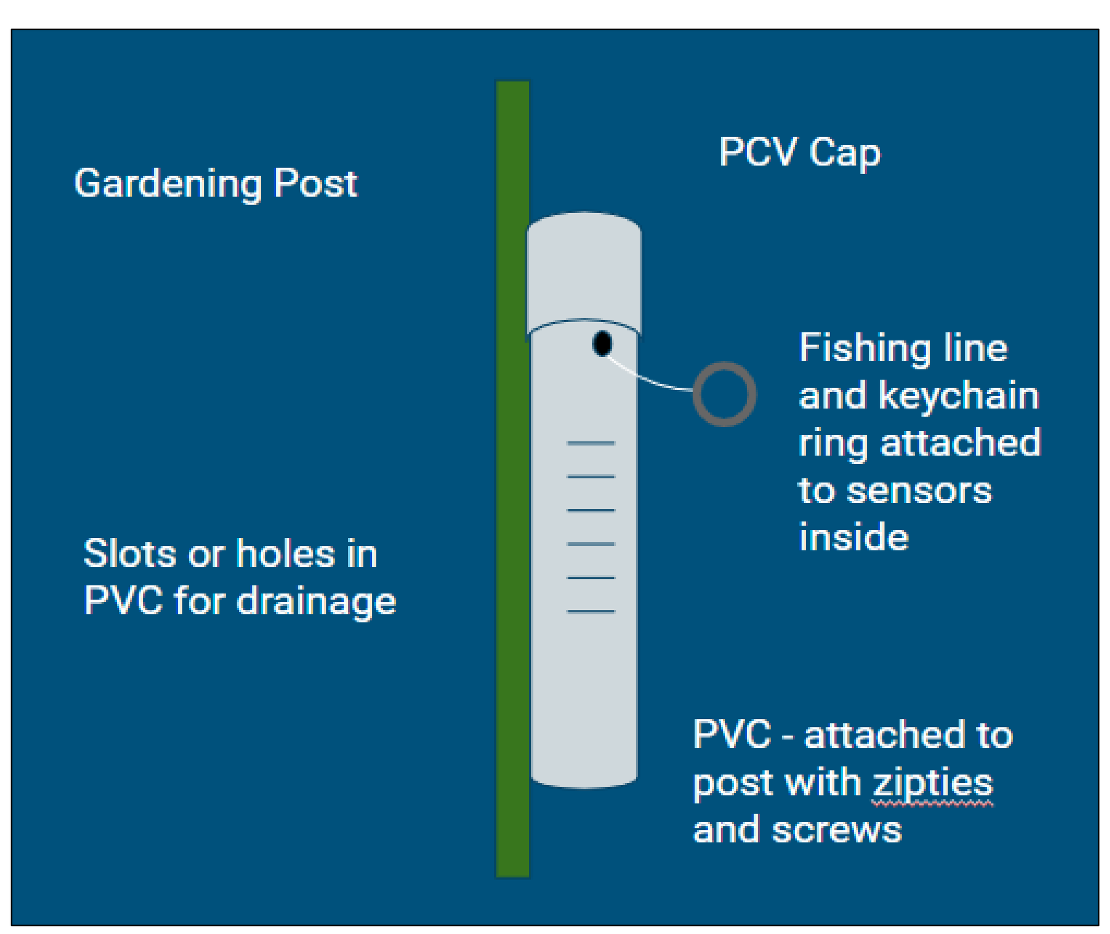

Figure 1: Illustration of sill containing the HOBO water level sensors

Methods

- Continuous water level monitoring at inlet and outlet of each site
- Synoptic measurements above and below where the outlet converges with the primary stream:
  - Carbon efflux using the EOS FD sensor
  - Dissolved carbon using the Vaisala sensor

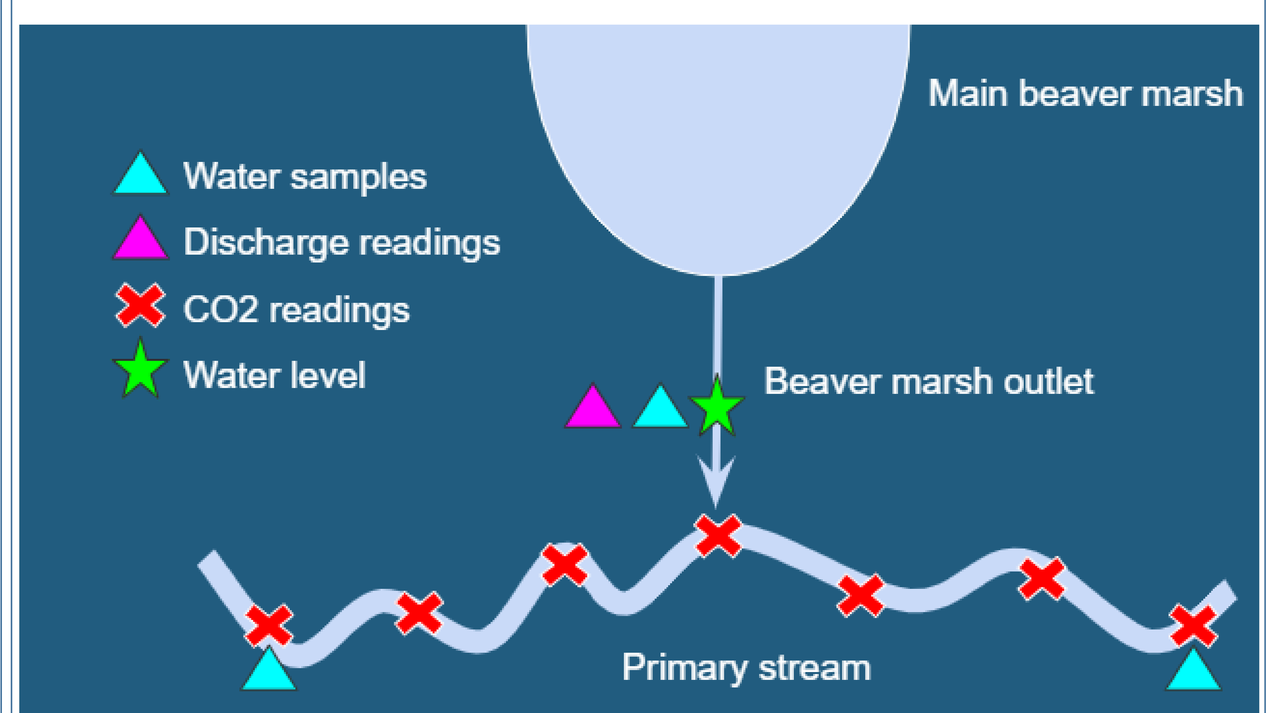

Figure 2: Diagram of measurements along the stream & near the outlet

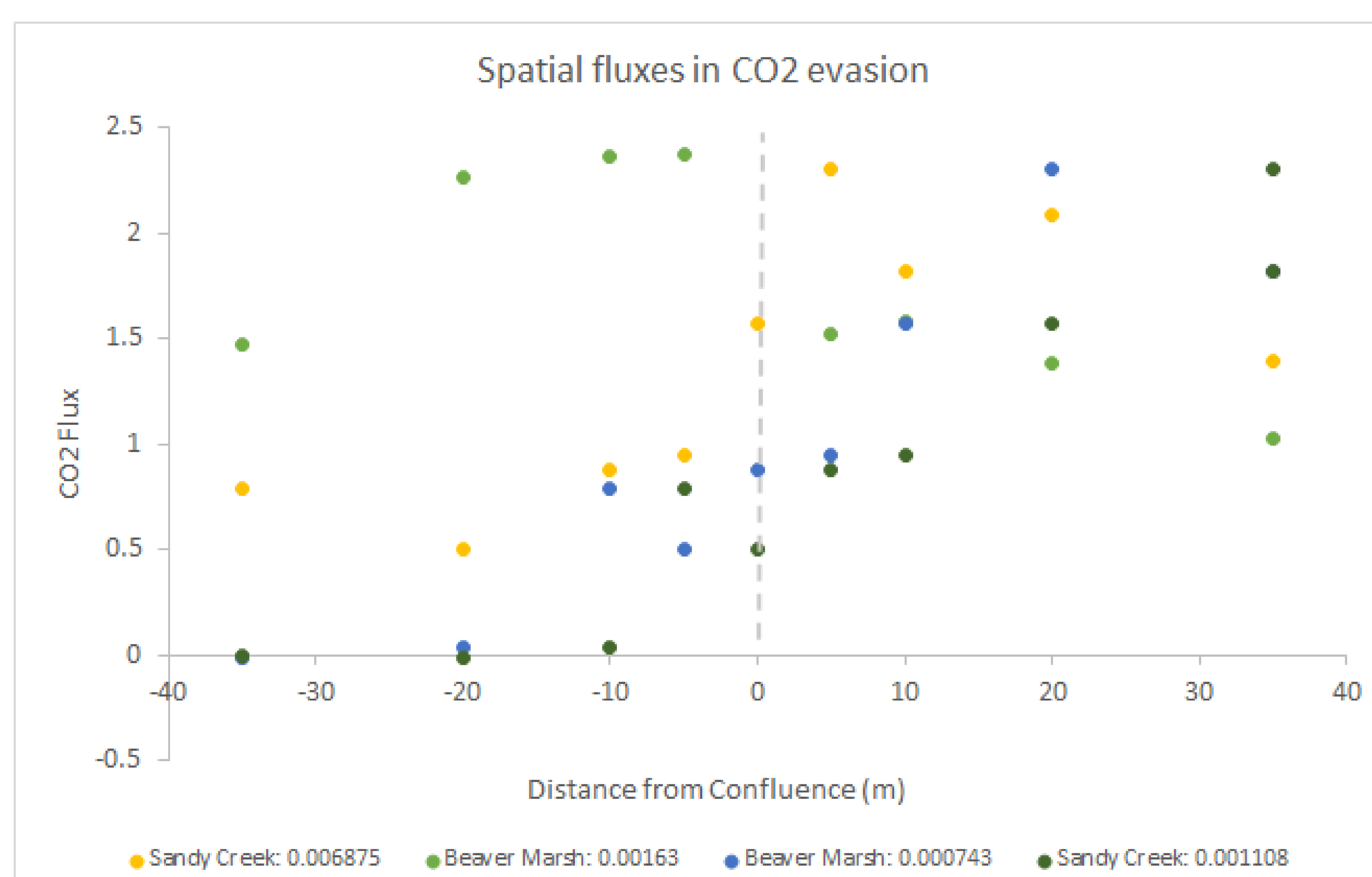

Figure 4: Spatial Fluxes in Carbon Flux at beaver marsh sites; outlet discharge for that day is included in legend

Results

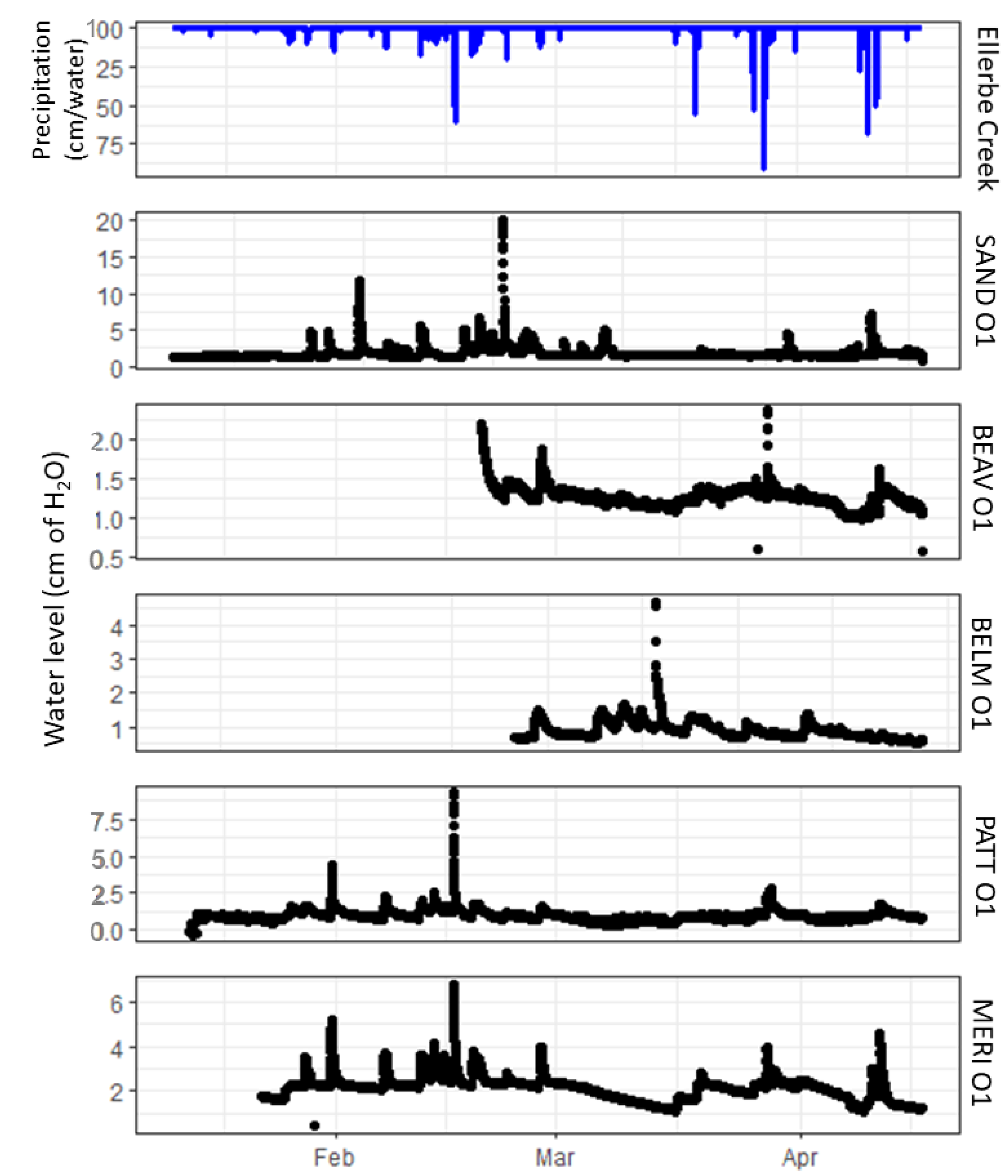

Figure 3: Water level (cm) at all sites' outlets and precipitation (cm)

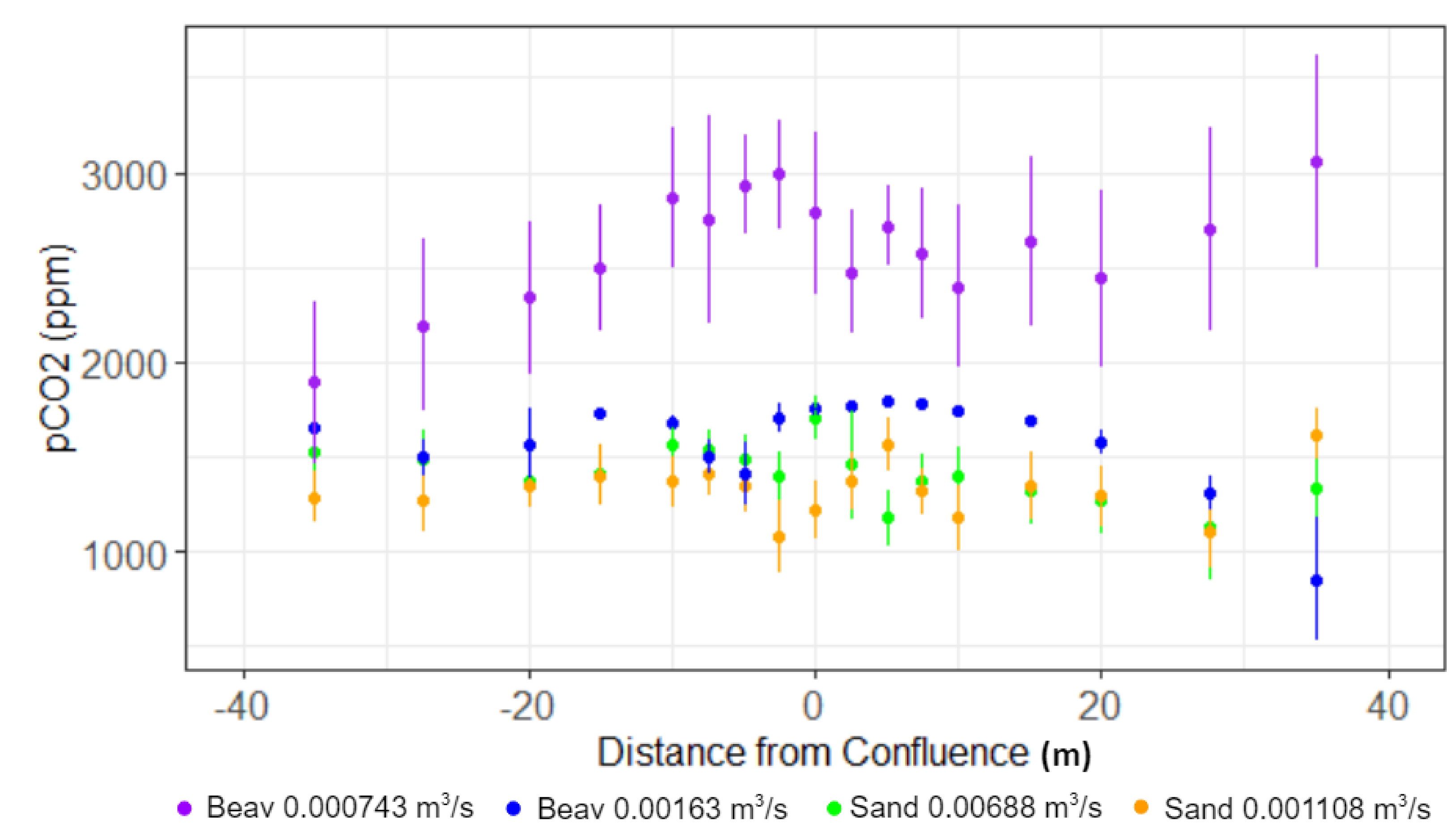

Figure 5: Dissolved CO2 over distance from confluence at beaver marsh sites; outlet discharge for that day is included in the legend

Conclusions and Future Directions

- **Conclusions**:
  - Compared with stormwater ponds, beaver marshes better attenuate water flow during period of low and high precipitation.
  - C dynamics in primary stream vary greatly according to hydrologic conditions at time of collection
  - Urban beaver marshes may play a role in CO2 attenuation when pCO2 is highest
- **Future Directions**:
  - Incorporate chemical analyses looking for nitrogen and other nutrients
  - Analyze water samples

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References

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