University of Wisconsin-Stevens Point

Reconnecting a riverine wetland: Conducting a hydrologic budget for a restored wetland

American Water Resources Association: UWSP Student Chapter

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Introduction

The Little Plover River (LPR) is an important native brook trout fishery in Central Wisconsin. Over exploitation of water resources in this region has altered the hydrology of the river. Restoration work facilitated by the Little Plover River Watershed Enhancement Project was completed in 2019. Understanding the hydrology of this wetland is critical for any additional restoration activities on the LPR.

Hydrologic budgets for wetlands are not commonly conducted and are even less common in restored wetlands. However, a budget is vital to determine the wetland's potential for success. Estimating each hydrologic component will inform management strategies, aid other wetland restoration projects, advance the knowledge of students in the water resources and hydrology disciplines, and act as a public demonstration site for the importance of reconnecting streams to wetlands.

Hypothesis

We hypothesize that surface water inflow from the LPR will be the major input in the hydrologic budget of the restored wetland during storm events.

Methods

- A stratified, transect based approach was used to establish sites in the restored wetland (Figure 1).
- Stilling wells were installed upstream and downstream of the restored wetland and discharge measurements will be made to create stage-discharge relationships for the LPR (Figure 2). In each stilling well, Hobo U20 pressure transducers were installed to continuously measure stage height.
- Piezometers were installed into the groundwater adjacent to and inside the restored wetland. In each piezometer, Hobo U20 pressure transducers were installed to continuously measure depth to water table.
- A meteorological station with an air temperature sensor, and tipping bucket rain gauge was installed in the wetland (Figure 3). Another Hobo U20 pressure transducer was installed on the meteorological station to measure barometric pressure.
- At each sampling site elevation and GPS coordinates were collected to create a topographic map (Figure 4).

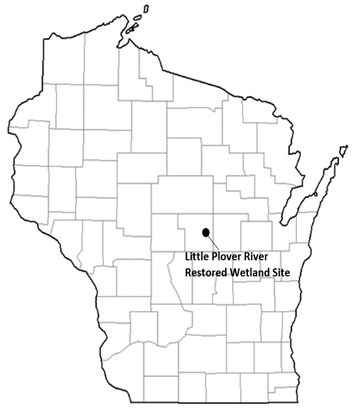

Figure 1. Map of the LPR restored wetland site in Portage County, Wisconsin.

Figure 2. Using a Flow Tracker to take discharge measurements near the upstream stilling well.

Figure 3. Installing the meteorological station.

Figure 4. Using a dumpy level to measure elevation in the wetland.

Expected results

- Collected data will be used create a hydrologic budget based upon this equation:
  $\Delta V/\Delta t = G_i + S_i + P - G_o - ET$
- Groundwater inflow and outflow, surface water inflow and outflow, net precipitation, and evapotranspiration will contribute to the hydrologic budget (Figure 5).

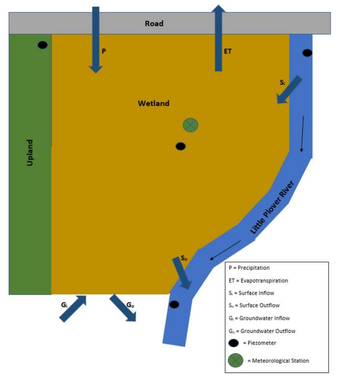

Figure 5. Expected inputs and outputs to the wetland

Discussion

- Data from this study will provide an estimate on how much water can be absorbed by the wetland during flood events and serve as a reference for restoration projects in the future.
- The restoration site also has the potential to be used for many other related projects that will provide experience for students:
  - Soil profiling to understand soil development, stored carbon, and microbial mass
  - Sampling of macroinvertebrates, amphibians, reptiles, and vegetation
  - Examining how a restored wetland could affect the water chemistry of the LPR

Acknowledgements

- We would like to thank the Village of Plover for granting us site access.
- We would also like to thank the Society of Wetland Scientists for providing the funds that enabled us to conduct this research.