

# Harvesting Cattail Biomass for Water Quality Improvement in Armstrong Lake: A Pilot Study



SOUTH WASHINGTON  
WATERSHED DISTRICT

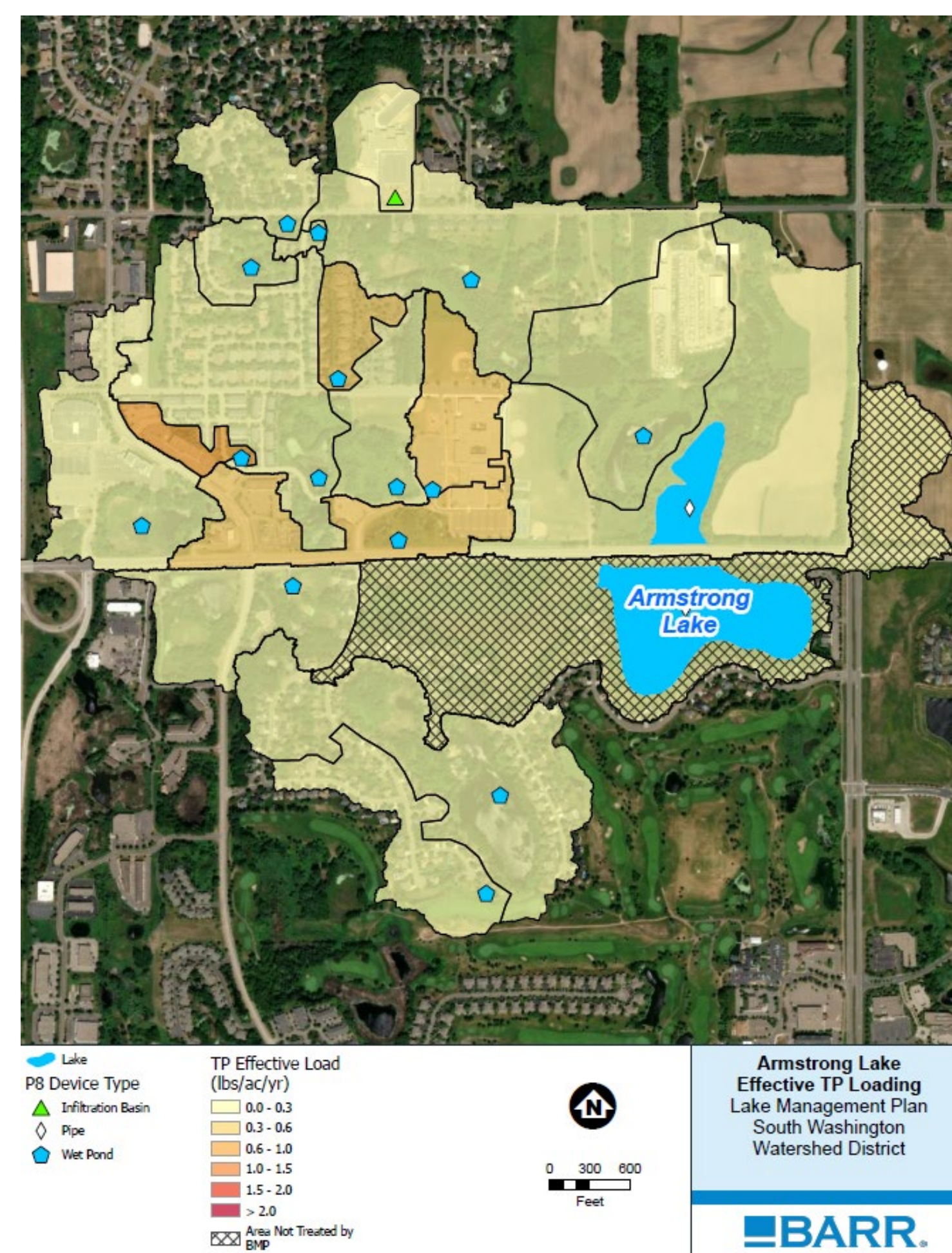
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## Background

Armstrong Lake is a shallow waterbody located in the headwaters of the SWWD. The southern basin is of primary interest at 22.7 acres in size and a maximum depth of 5.5 feet. The lake's contributing watershed is 572 acres.

## What was the problem?

While not currently on Minnesota's 303(d) impaired waters list, Armstrong Lake suffers from nuisance algae blooms resulting from high summer phosphorus levels (60-100 µg/L). Chloride levels have also steadily risen over the last 20 years, from 54 to 202 mg/L, approaching MPCA's chronic standard. Much of the watershed is fully developed, limiting the land available for impactful, regional BMPs. SWWD identified cattail harvesting as a potential BMP option in 2018.

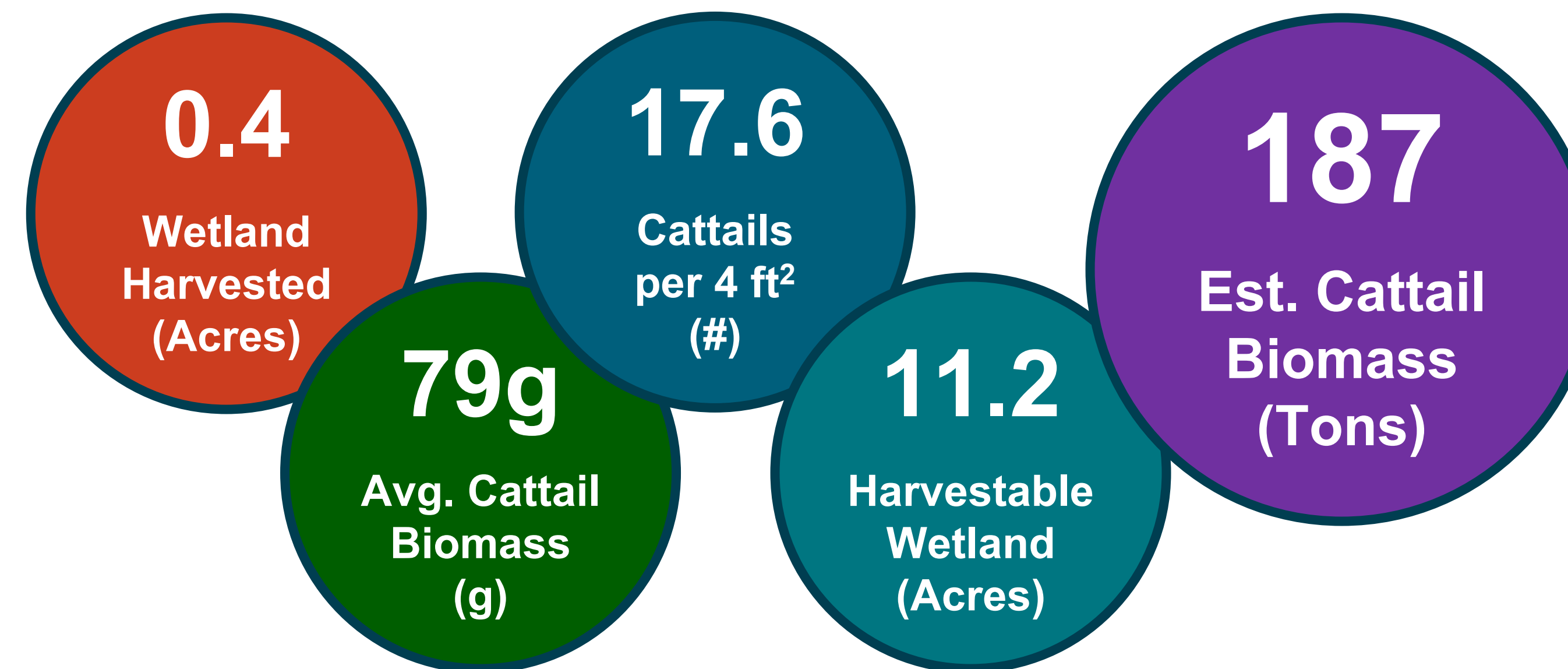


## What did we try?

Armstrong Lake is bordered to the west by a large 21-acre wetland complex (53% cattail-dominated). SWWD hired crews from the Washington Conservation District and Conservation Corps MN & IA to harvest invasive hybrid cattail (*Typha x glauca*) biomass from the wetland in late August 2025. SWWD collected and weighed samples in the field before transporting to the University of Minnesota's Research Analytical Laboratory for analysis. Stem counts were completed to estimate the number of cattail plants and biomass within the wetland. Biomass samples were taken again in February 2026 to compare seasonal changes in nutrient and chloride levels within the cattail biomass. Since the subject wetland is not a mapped public water, no special permitting was required for the harvesting activity.

Armstrong Lake Effective TP Loading (Barr, 2025)

## What happened?



Results of this field work estimate that approximately 187 tons of cattail biomass could be available for harvest in this wetland in late August. That estimate drops to 73 tons in the winter after seasonal senescence. Correspondingly, phosphorus (P) and chloride (Cl-) biomass concentrations also decrease in the winter as the plants die back and store resources in their root systems and the surrounding soil matrix. A full-basin growing season cattail harvest in this location could remove 788 pounds of P and 4.94 tons of Cl- from the system, versus only 184 pounds of P and 0.86 tons of Cl- in the winter.



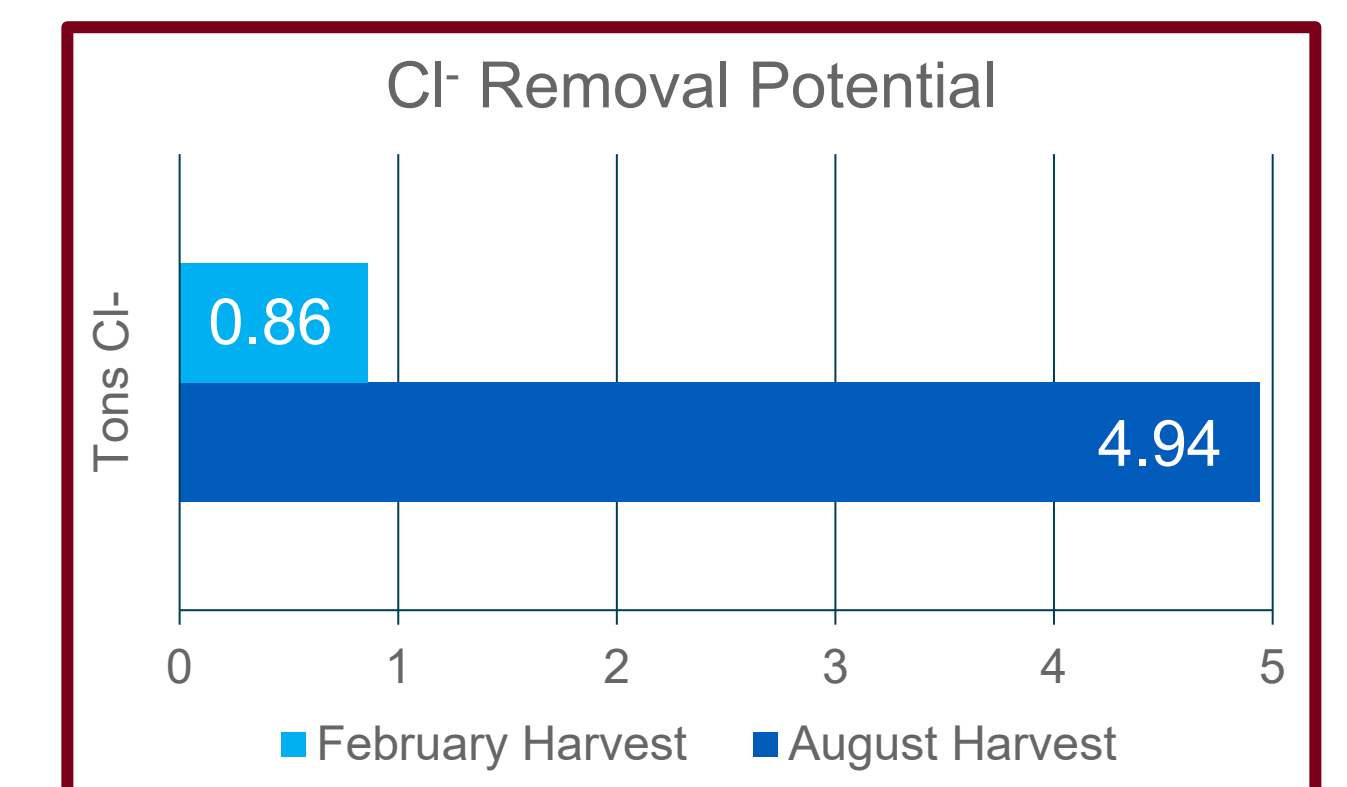
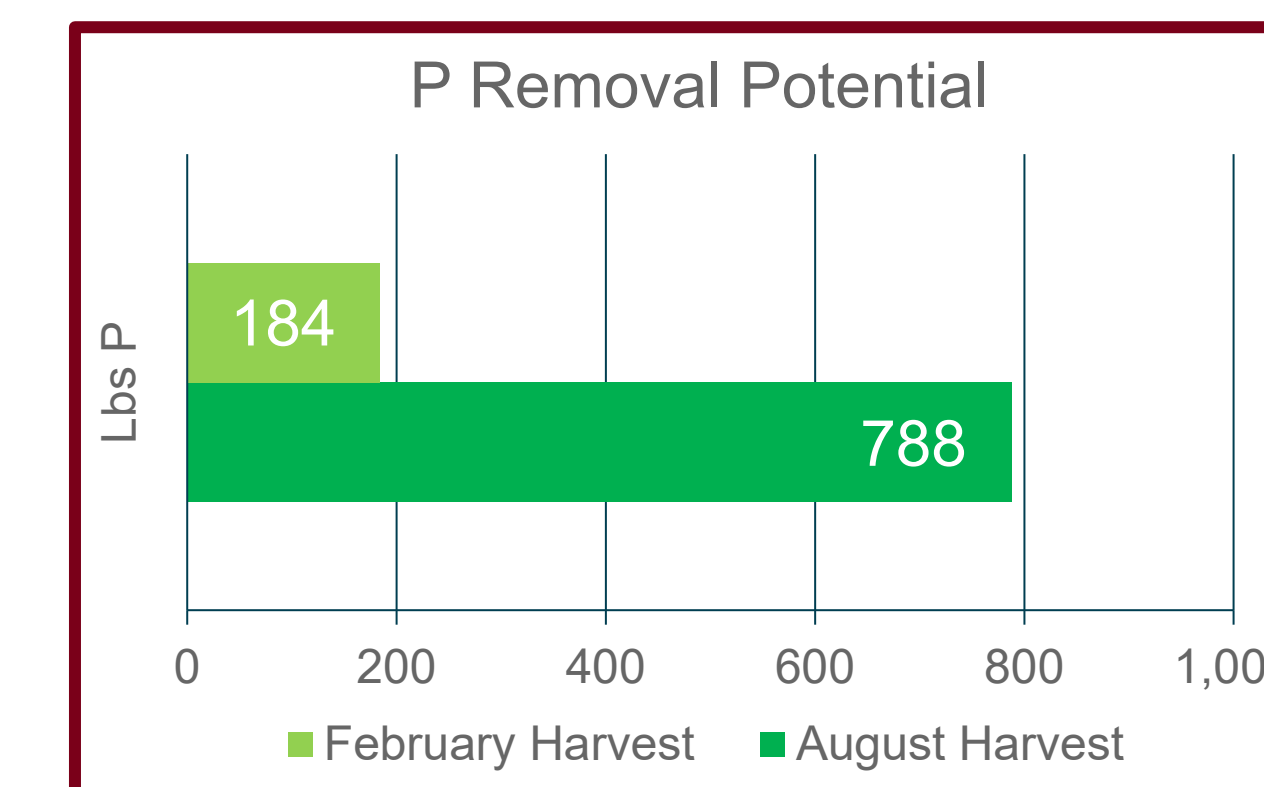
Armstrong Lake Wetland Delineation (Barr, 2023)

## Pilot Project Costs...

Field Labor for Harvesting (WCD & CCMI)	\$8,537
Biomass Disposal (Commercial Composting)	\$750
Laboratory Analysis (RAL)	\$1,590
<b>TOTAL (Funding provided by SWWD)</b>	<b>\$10,877</b>

This pilot study alone resulted in the direct removal of 28 pounds of TP from the Armstrong Lake system, at a cost-benefit ratio of **\$388 per pound of TP**. This is competitive versus typical structural urban BMPs, and non-structural urban BMPs, such as street sweeping.

## What did we learn?



- Completing a full-basin harvest during the growing season with a manual labor crew is not feasible (unstable cattail mat, unpredictable water levels).
- Fringe areas could be targeted in this manner, provided access and staging areas are available and suitable for the operation. Crew safety is a priority.
- Mechanical winter cattail harvesting on heavy ice has been shown to work. With less ecological damage and presumed lower cost; it may be a preferred approach despite lower (20-25%) P and Cl- removal compared to summer.
- SWWD sees potential in targeted manual cattail harvesting during the late growing season, with removal costs approaching \$300 per pound

## Additional Research Topics...

- Additional research is required to review the feasibility and cost of using amphibious harvesting equipment for a full-basin growing season harvest. SWWD has concerns about ecological damage and sediment resuspension.
- Is the high chloride content of cattail biomass a potential transport concern for commercial composting processes?