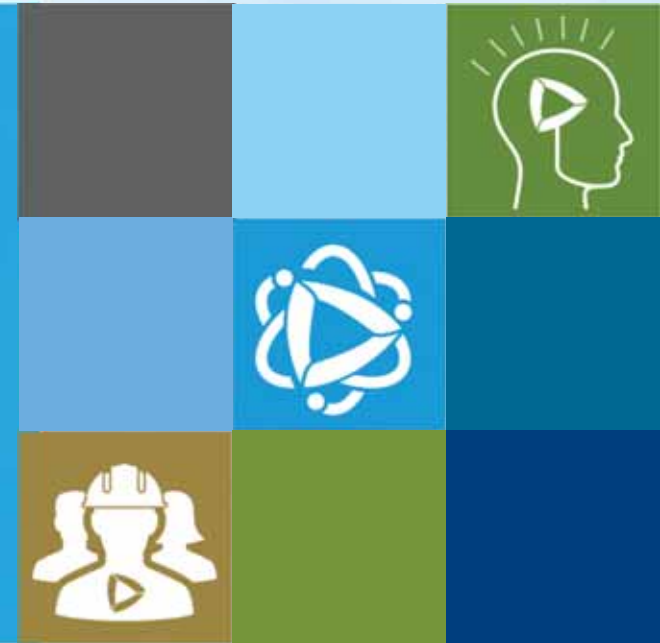




Des Plaines River Watershed Workgroup Nutrient Assessment and Reduction Plan (NARP)

August 18, 2022



THE
CONSERVATION FUND

Outline

- Project Overview
- Data Analysis
- Modeling Tools
- Next Steps

Project Overview

What is a NARP ?

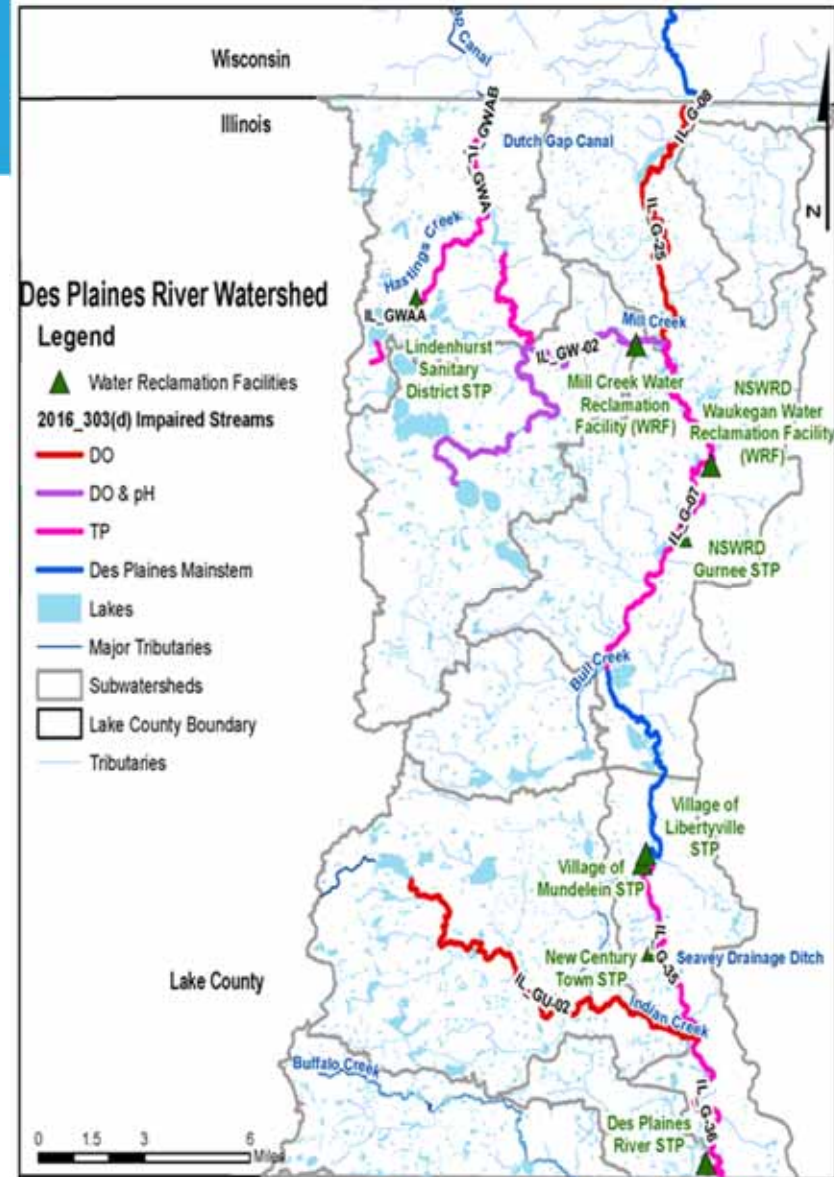
- Nutrient Assessment Reduction Plan – Dec 31, 2023
- Started with a 2018 Agreement between Illinois Association of Wastewater Agencies (IAWA), Illinois Environmental Protection Agency (IEPA) and Environmental Groups
- Special conditions in NPDES permits to address the P-related impairments in receiving waters
 - Dissolved Oxygen
 - Nuisance Algae
- Tangentially also a requirement in MS4 permit to meet TMDL (or alternative) requirements
- Flexibility to develop watershed-specific targets



Lower Des Plaines River.
Photo by Cynthia Skrukud.

DRWW NARP Conditions

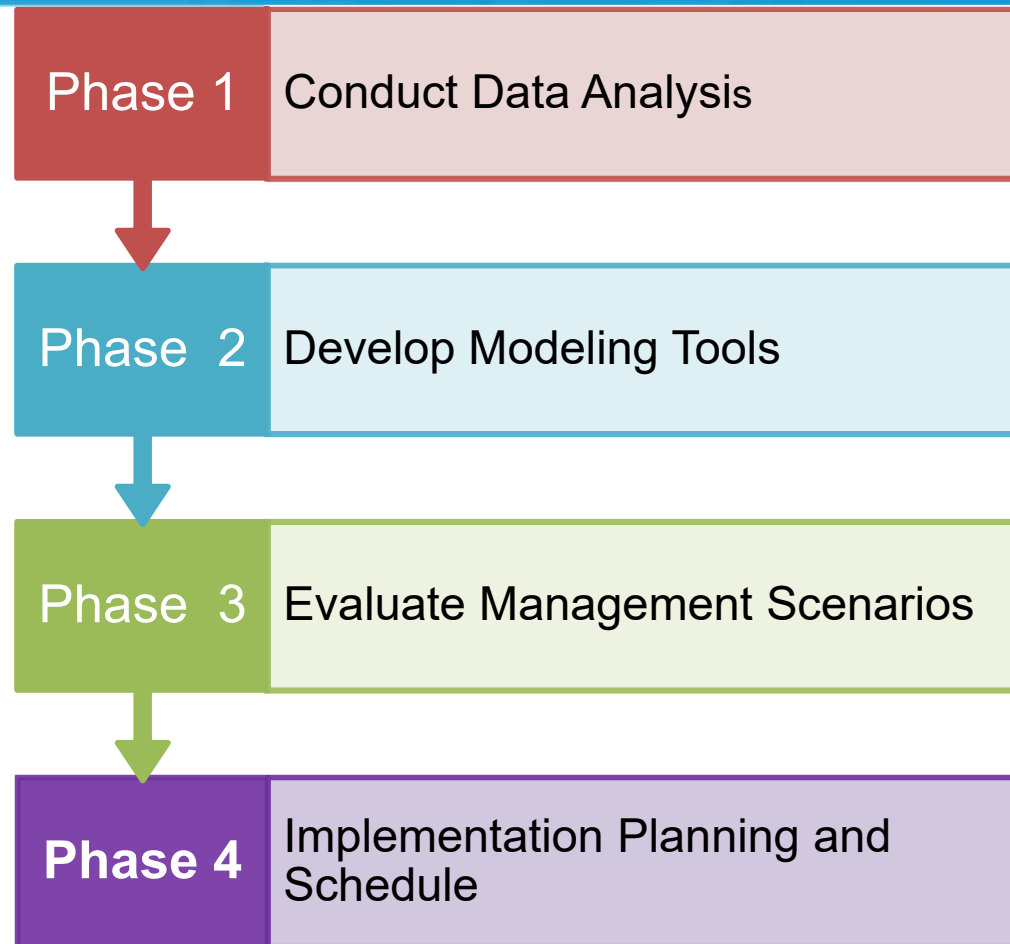
- NARP Special Conditions in POTW NPDES Permits
 - Phosphorus related impairments
 - 8 major POTWs
 - DRWW implementation of NARP workplan
- NARP Workplan
 - Developed by Geosyntec
 - Established NARP objectives
 - Monitoring and modeling recommendations
 - Schedule and scope for NARP development



Project Approach

Project Approach

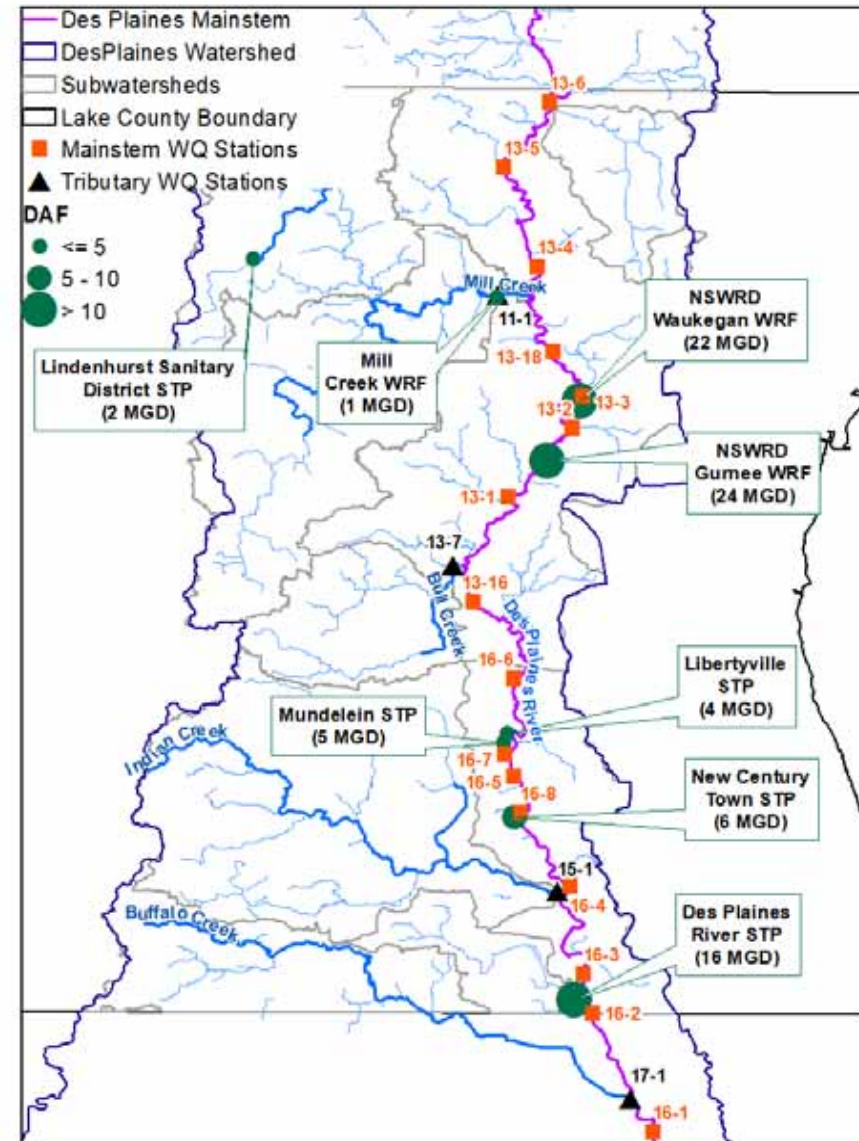
- Phased approach
- Each phase will be a NARP chapter



Data Analysis

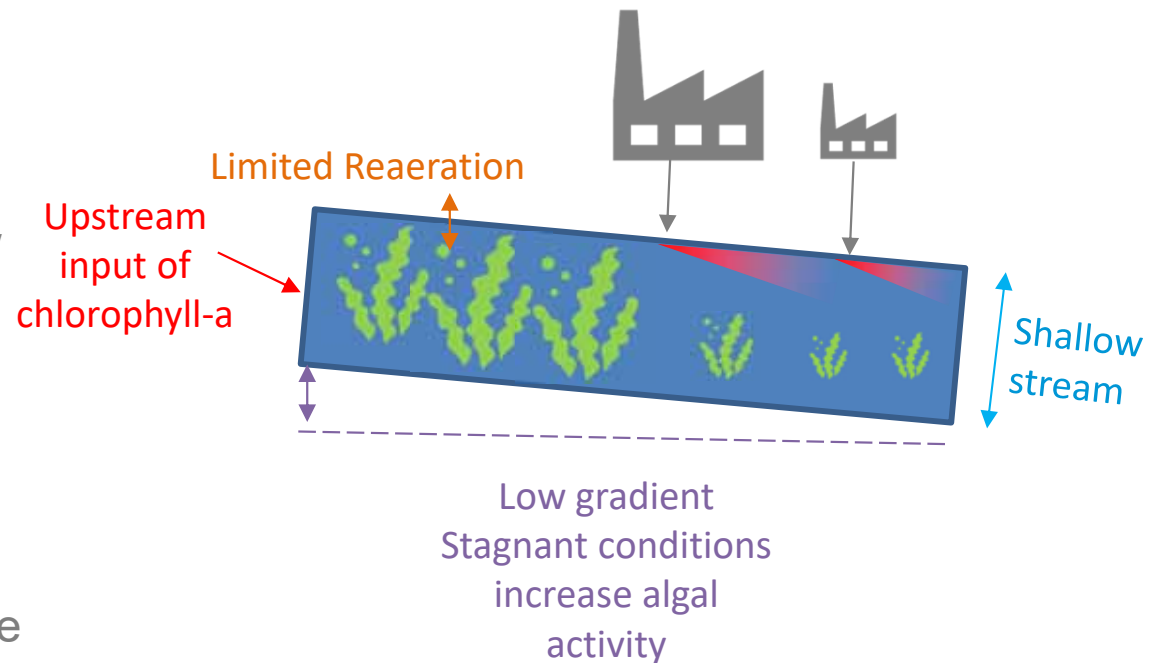
Methodology (2021)

- Analyzed flow and rainfall data to identify periods with critical low flows
- Developed understanding of potential relationships between phosphorus, algae, and dissolved oxygen using data
 - Illinois Risk of Eutrophication Criteria
 - Longitudinal Plots
- Presented results at DRWW General Membership meeting on August 19, 2021



Inferences

- Low dissolved oxygen is mostly due to:
 - High chlorophyll-a input from the upstream boundary increasing algal activity
 - Limited reaeration due to low flows and small slopes
- While treatment plants contribute to TP concentrations in the river:
 - TP concentrations are reduced after a short distance downstream the plants

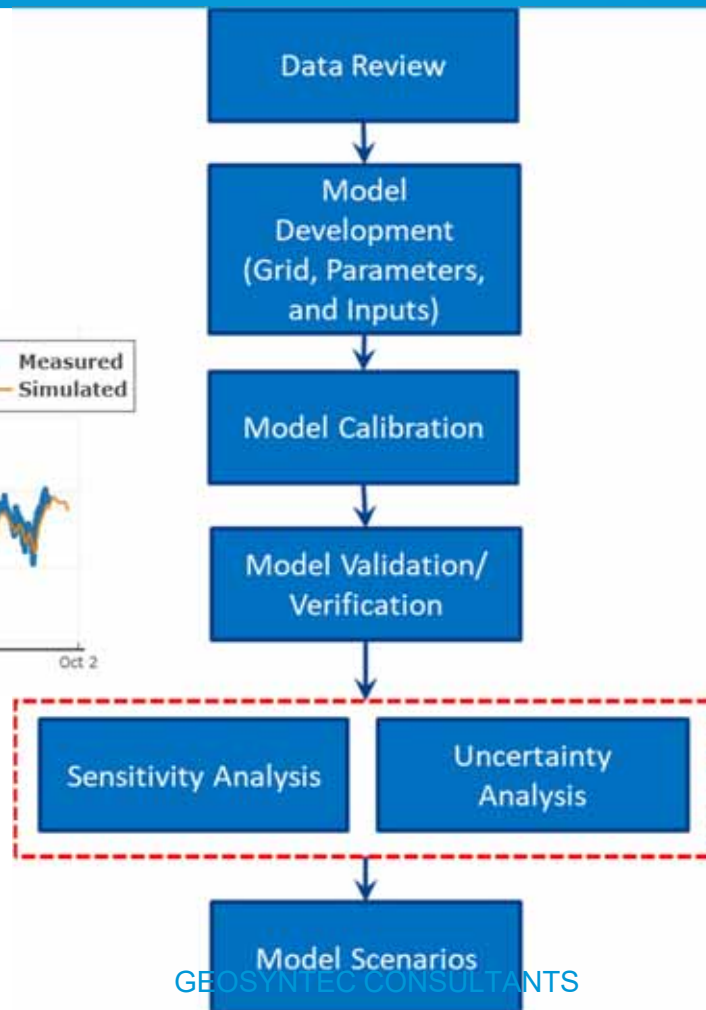
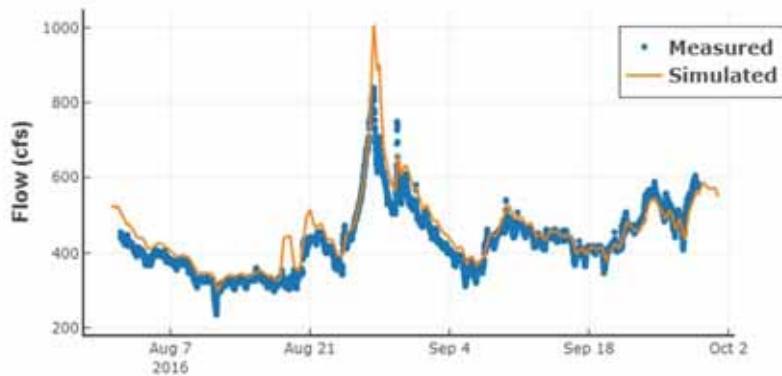


Modeling Tools

“All Models are wrong, some are useful”

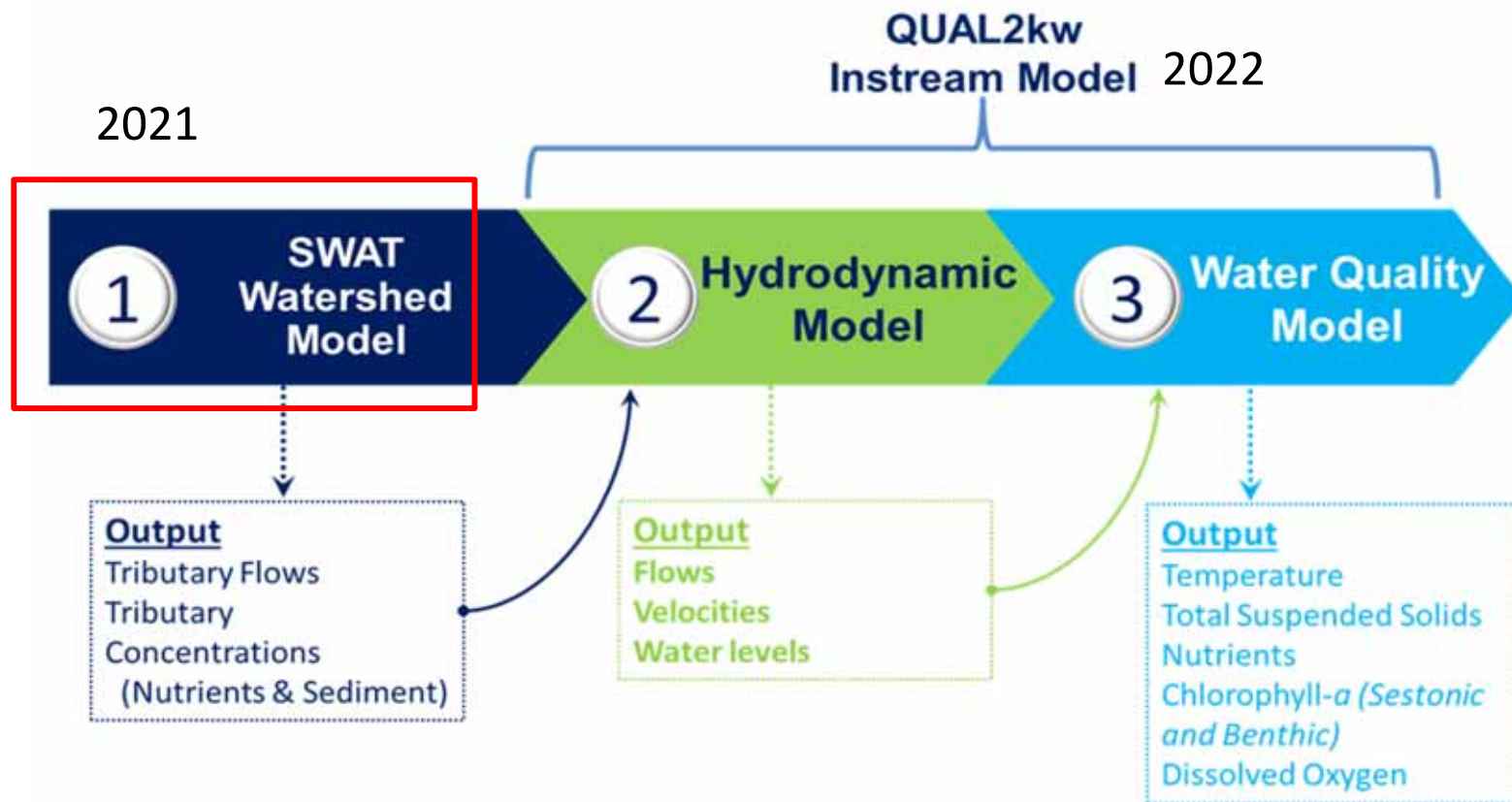


Model Development Process



Phase 2: Develop Modeling Tools

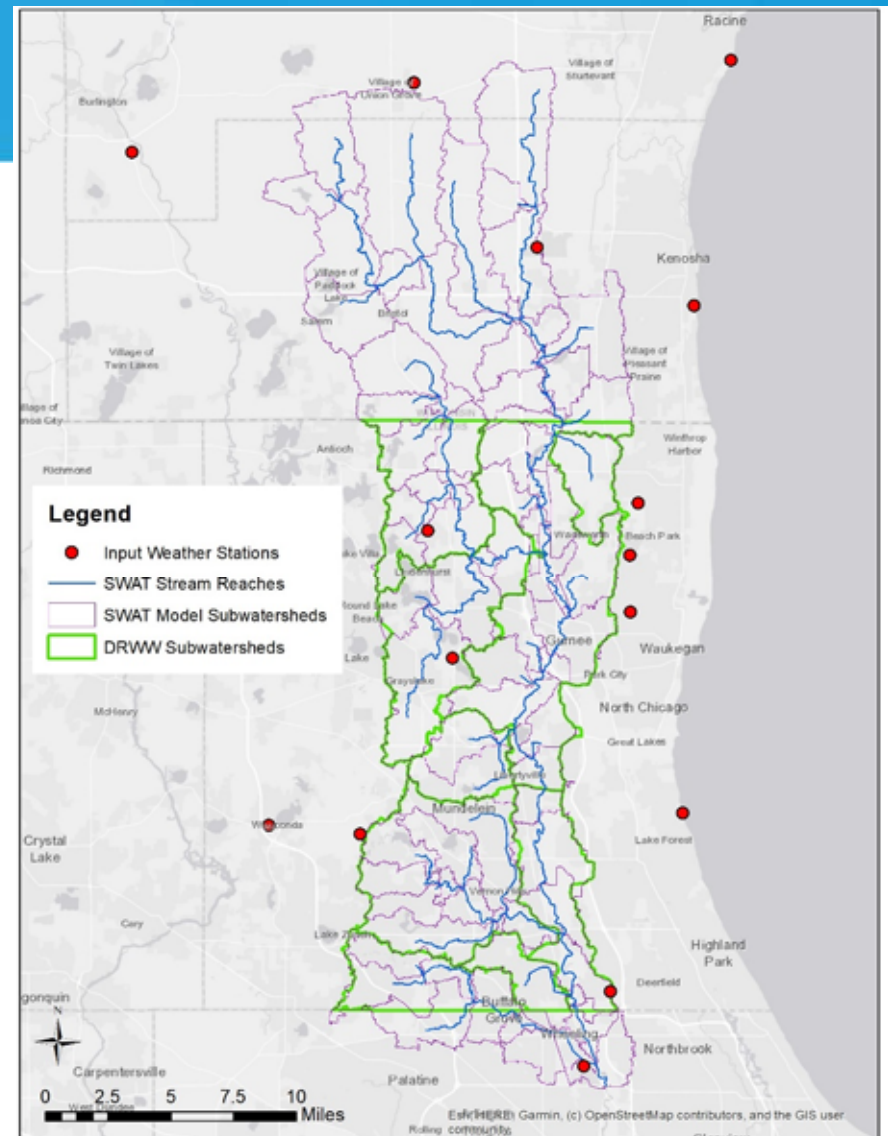
Define the linkage between the phosphorus inputs and related impairments



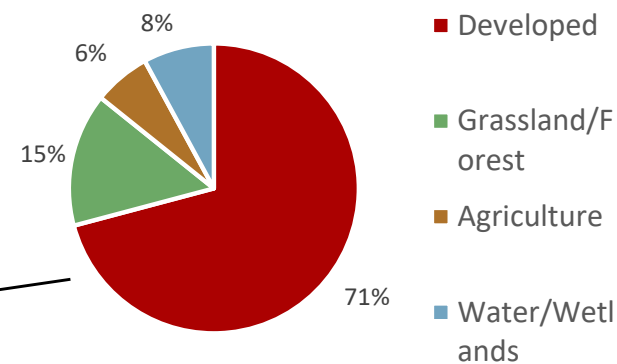
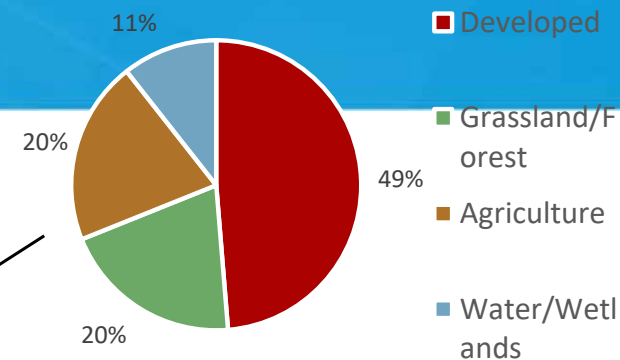
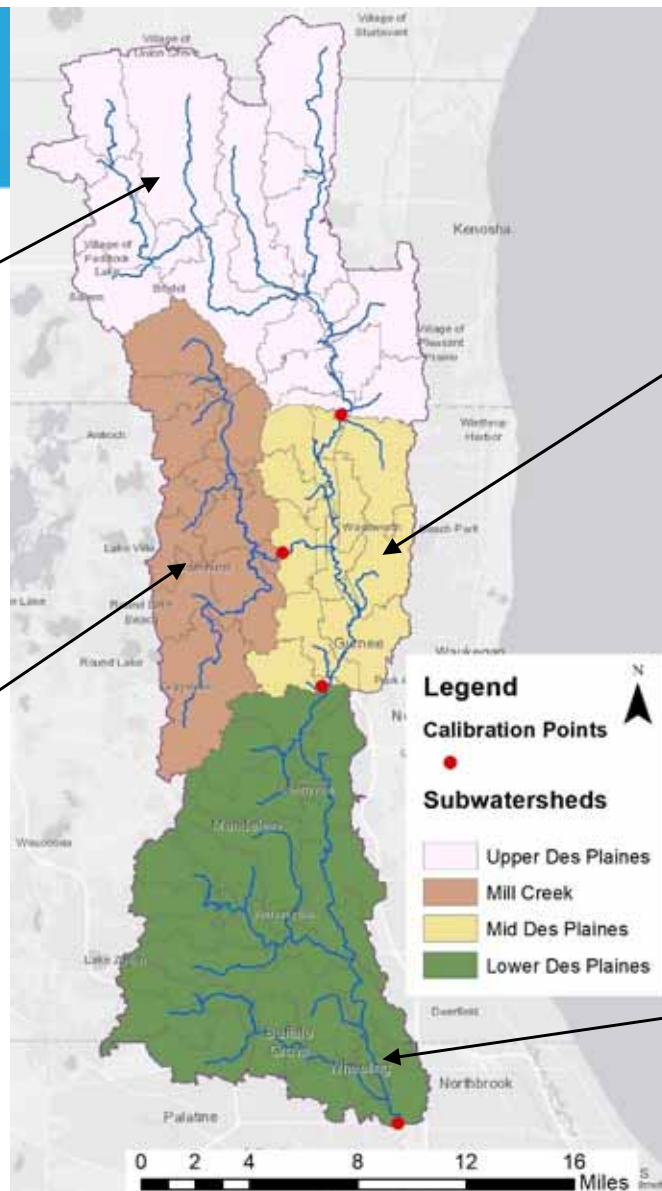
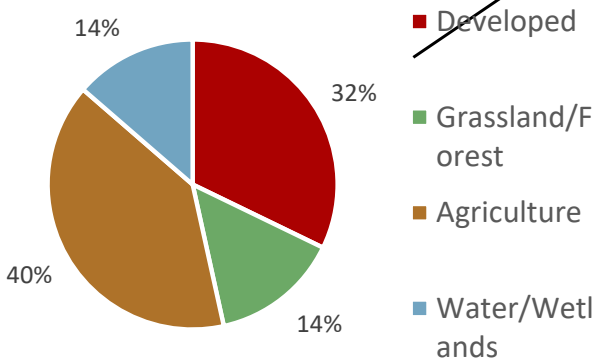
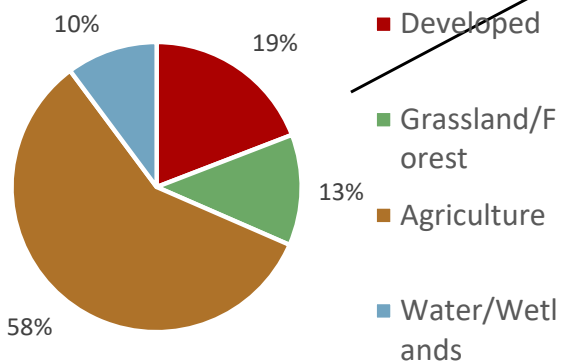
Watershed Model

Watershed Model Inputs

- Measured Data
 - Weather
 - Point Source Effluent
- Spatial Data
 - Elevation
 - Soils
 - Land Use
- 89 delineated subwatersheds

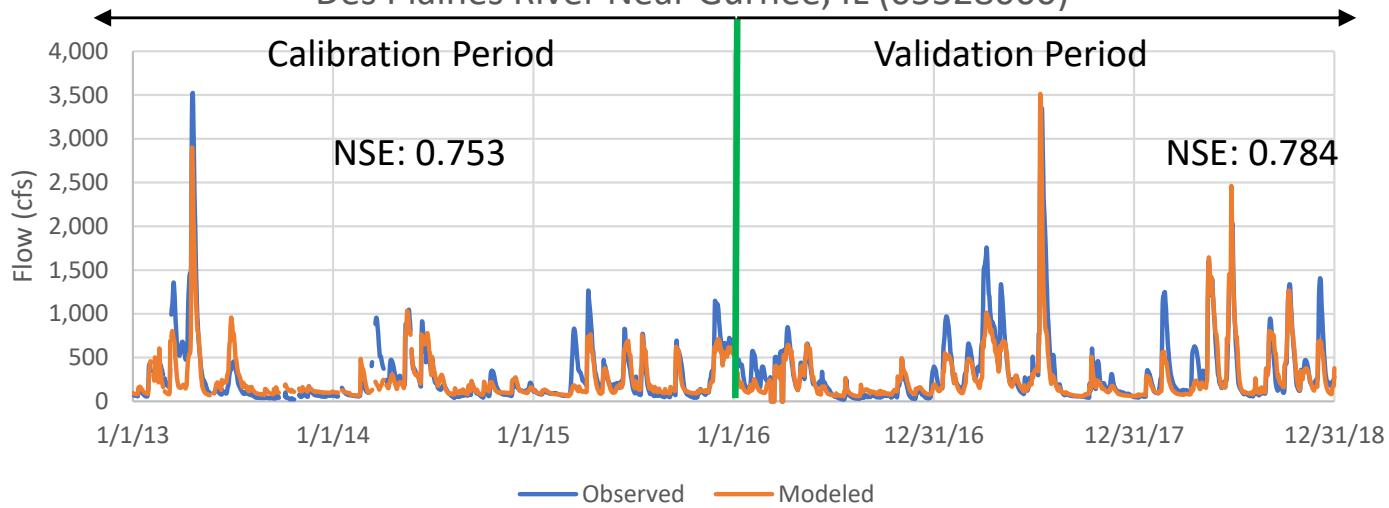


Landuse

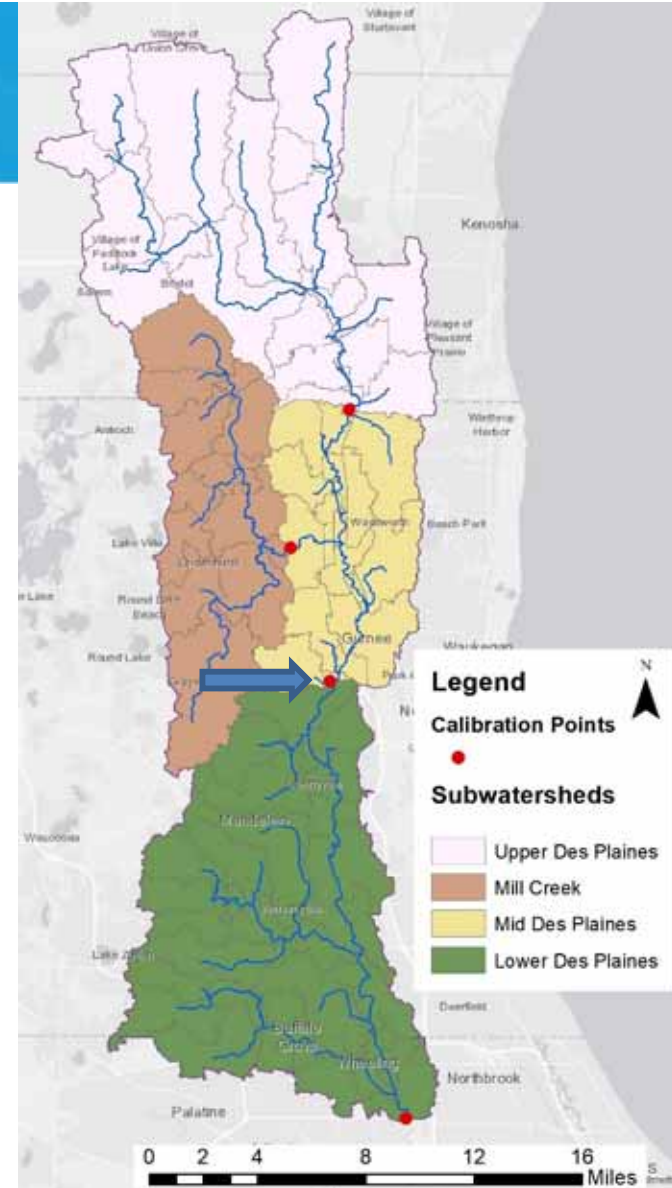
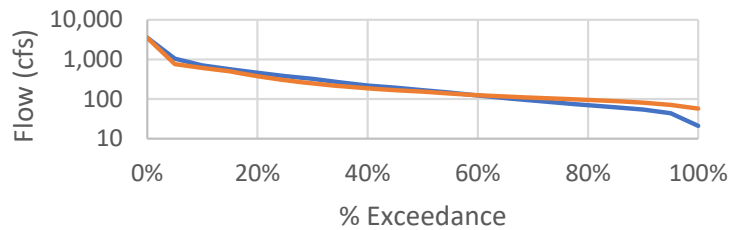


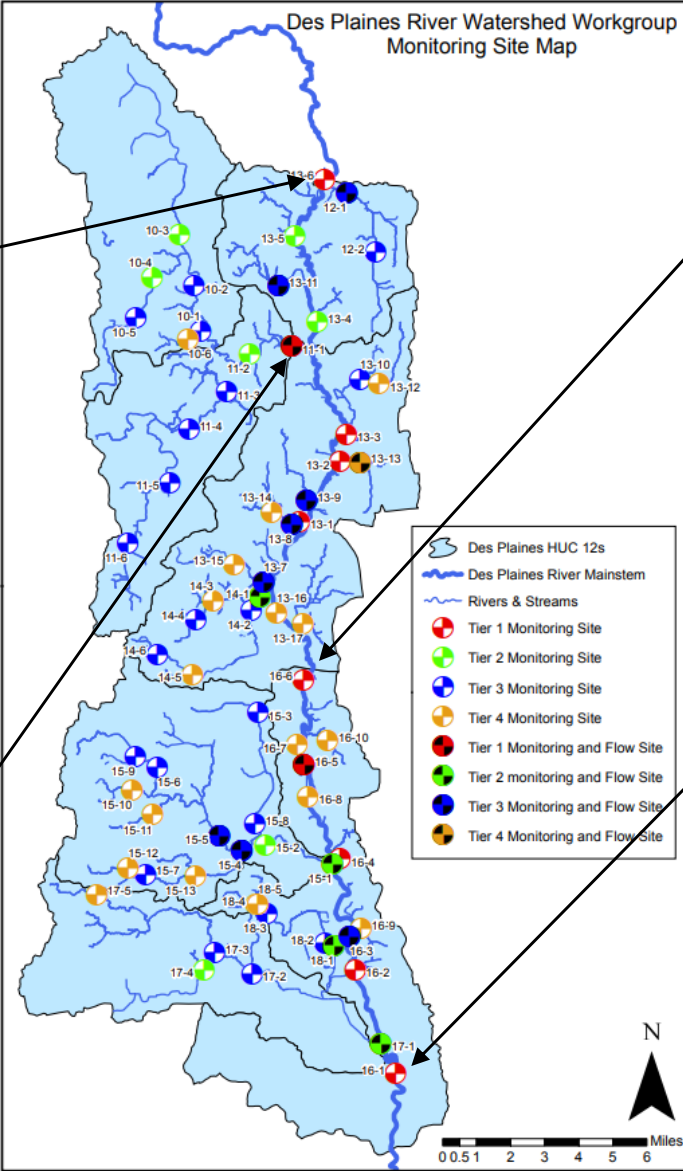
Hydrology Calibration

Des Plaines River Near Gurnee, IL (05528000)

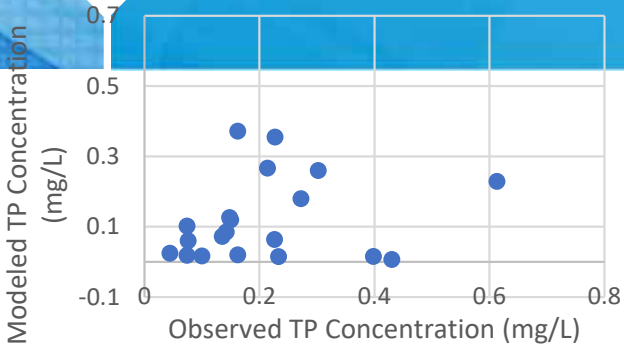


Des Plaines River Near Gurnee, IL
(05528000)

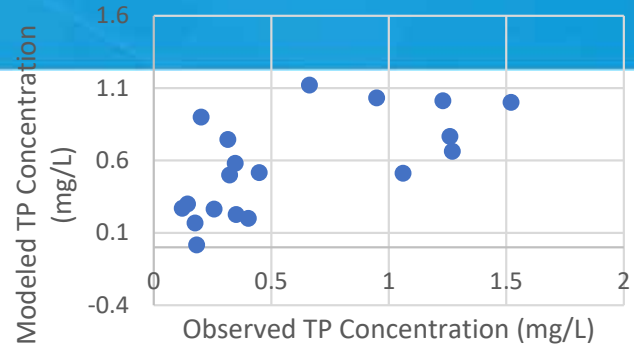




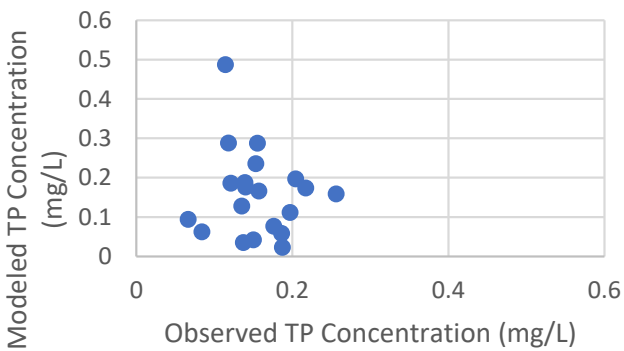
13-6



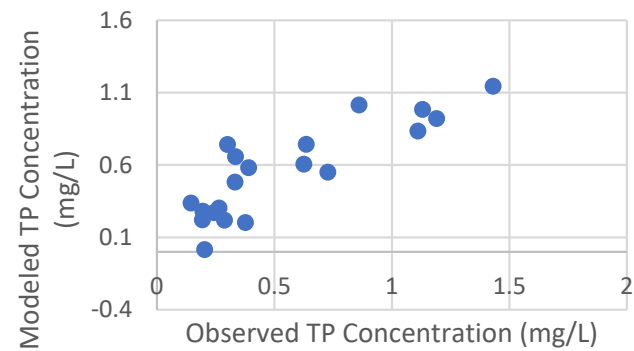
16-6



11-1



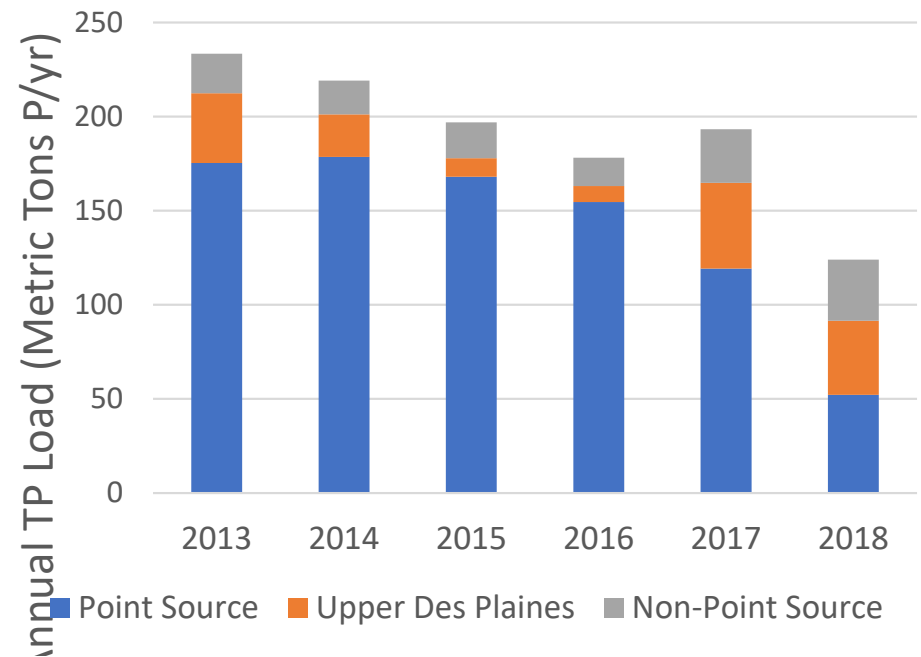
16-1



TP Load Distribution

- TP load dominated by point sources
- Significant improvement (decrease) in point source load in last few years of model runs

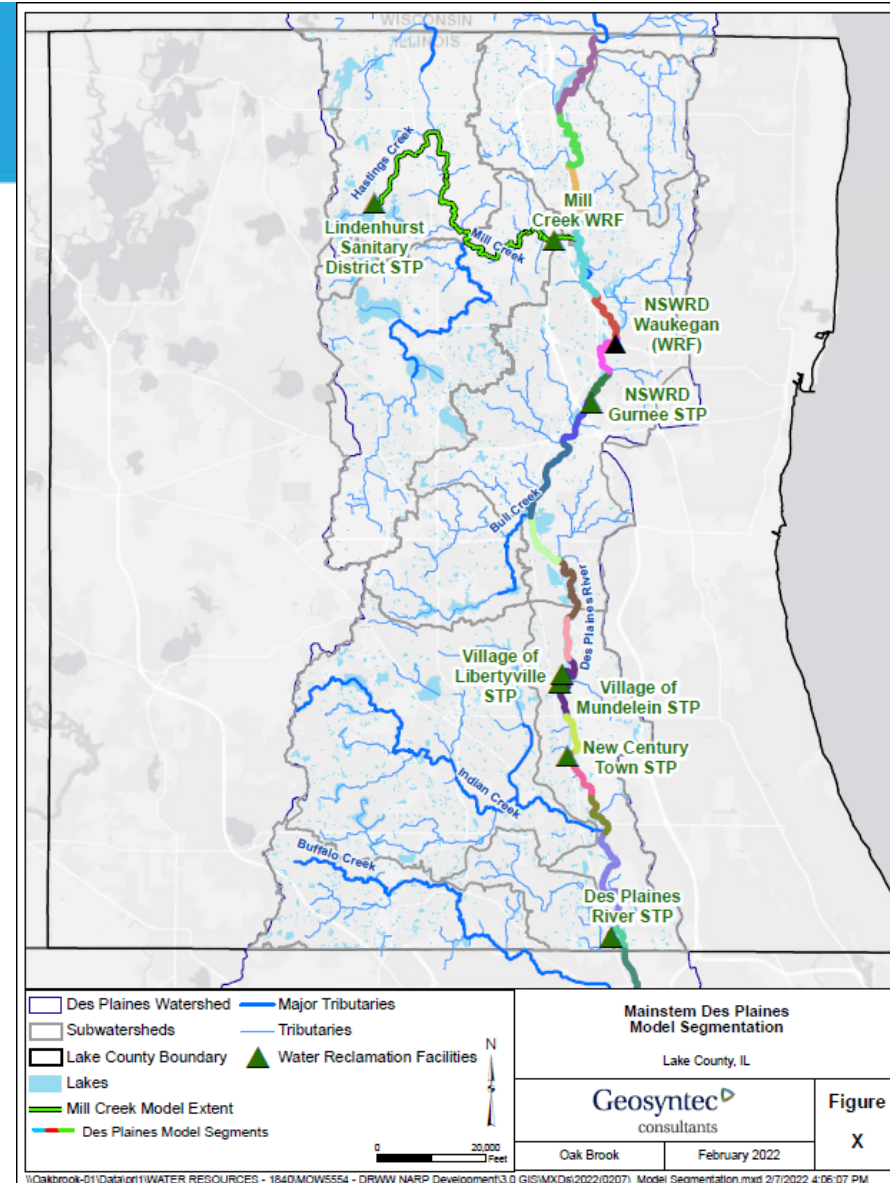
Modeled TP Load by Year and Source



Instream Model

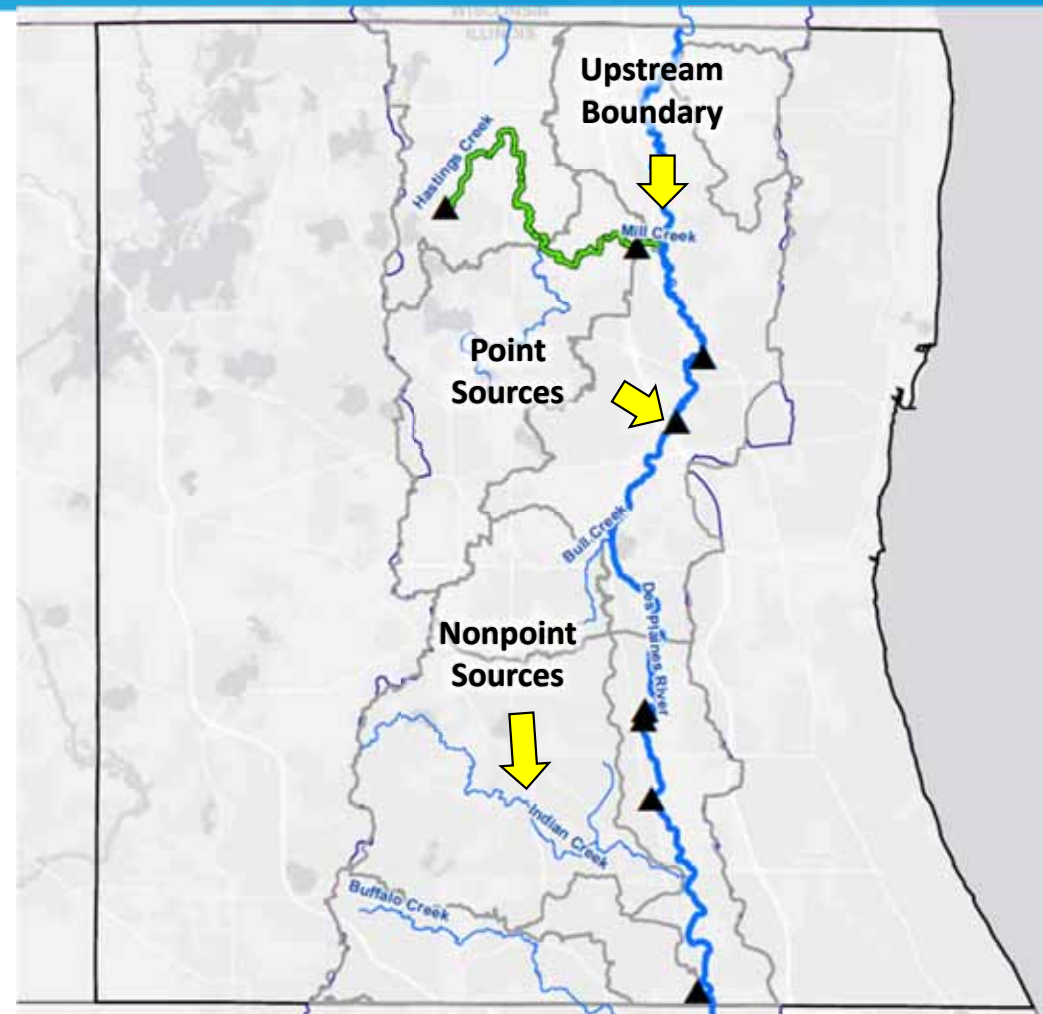
Instream Model

- Two separate models
 - Mainstem
 - Mill Creek
- Mainstem model 19 stream segments
 - Cross section data



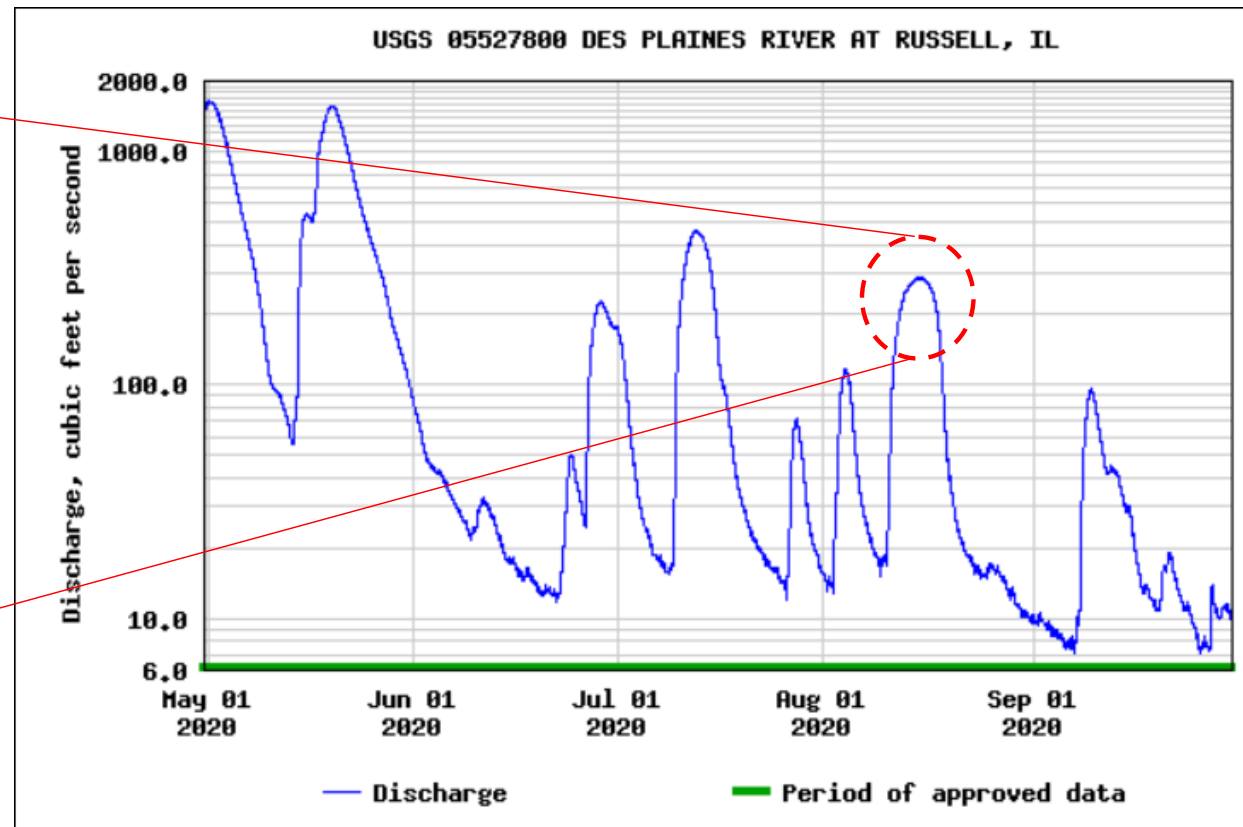
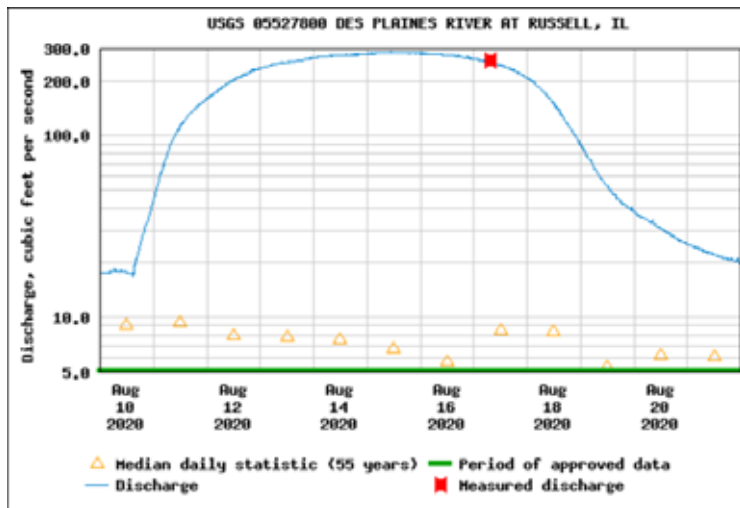
Mainstem Model Inputs

- **Model input**
 - Upstream boundary
 - Tributaries
 - Wastewater Treatment Plants (WWTPs)



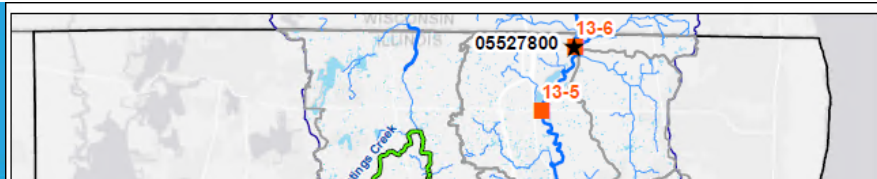
Upstream Flow

– SGS 05527800

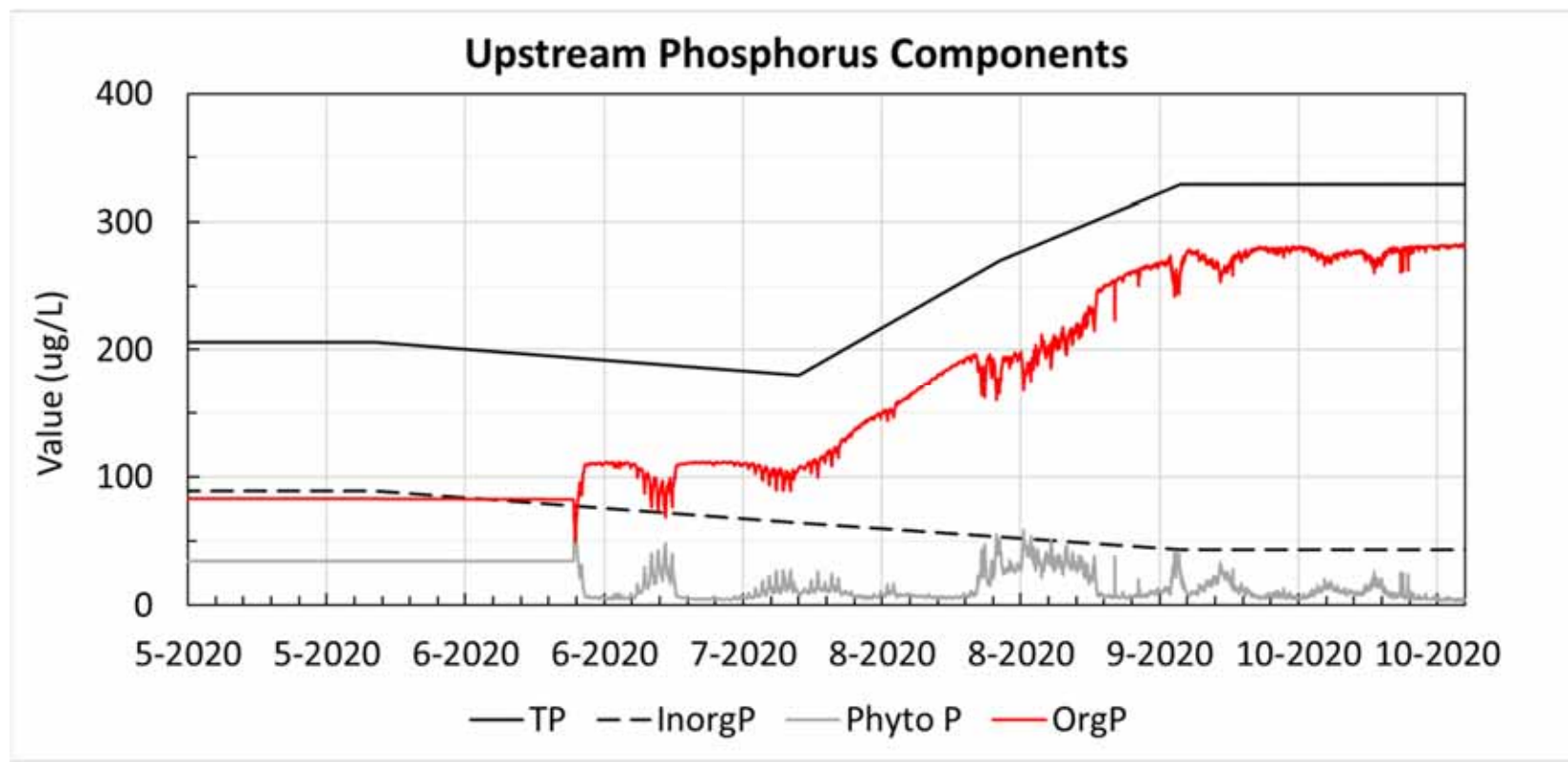


A Approved for publication -- Processing and review completed.

Upstream TP

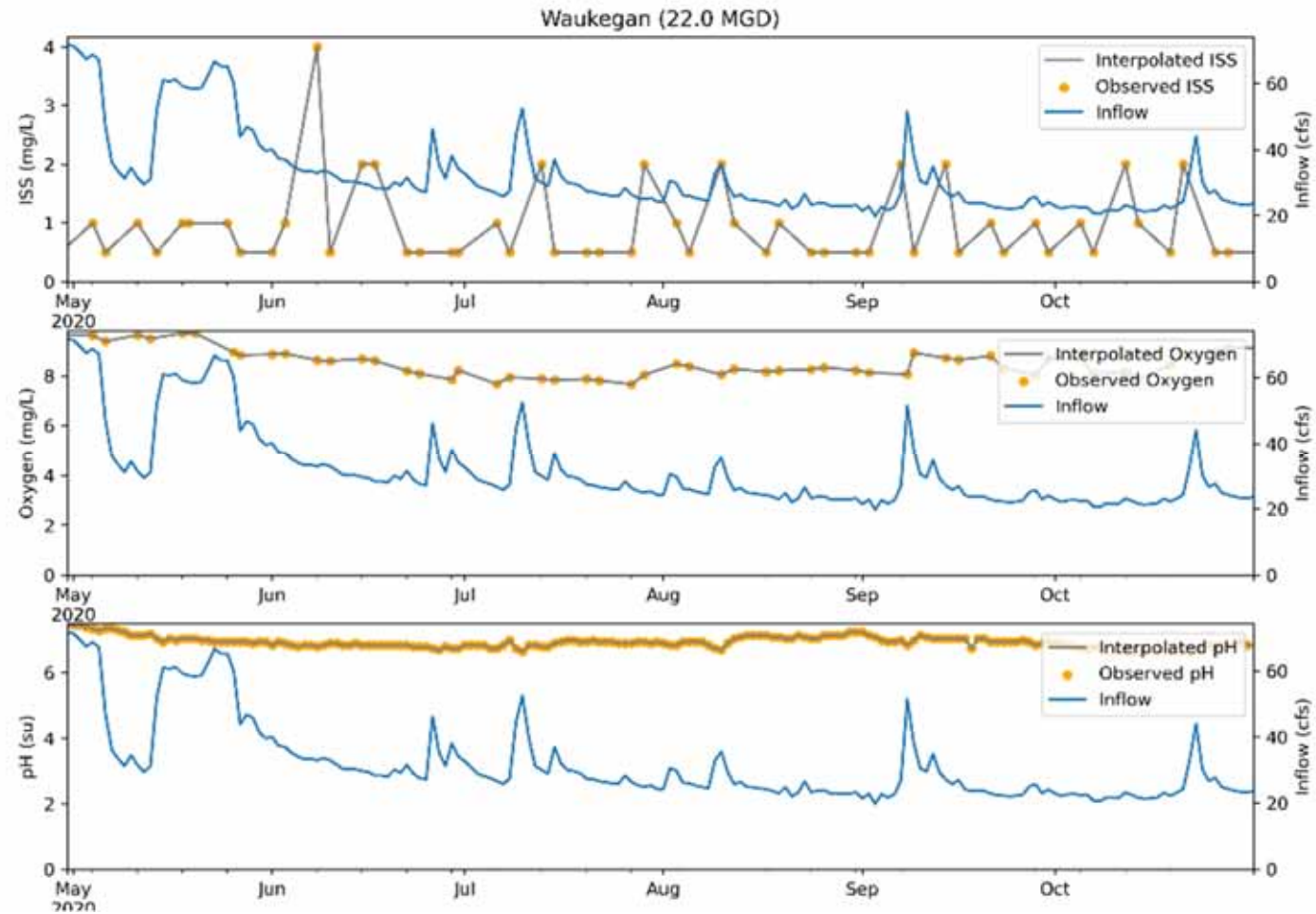


Based on measured Rusell Road Station data



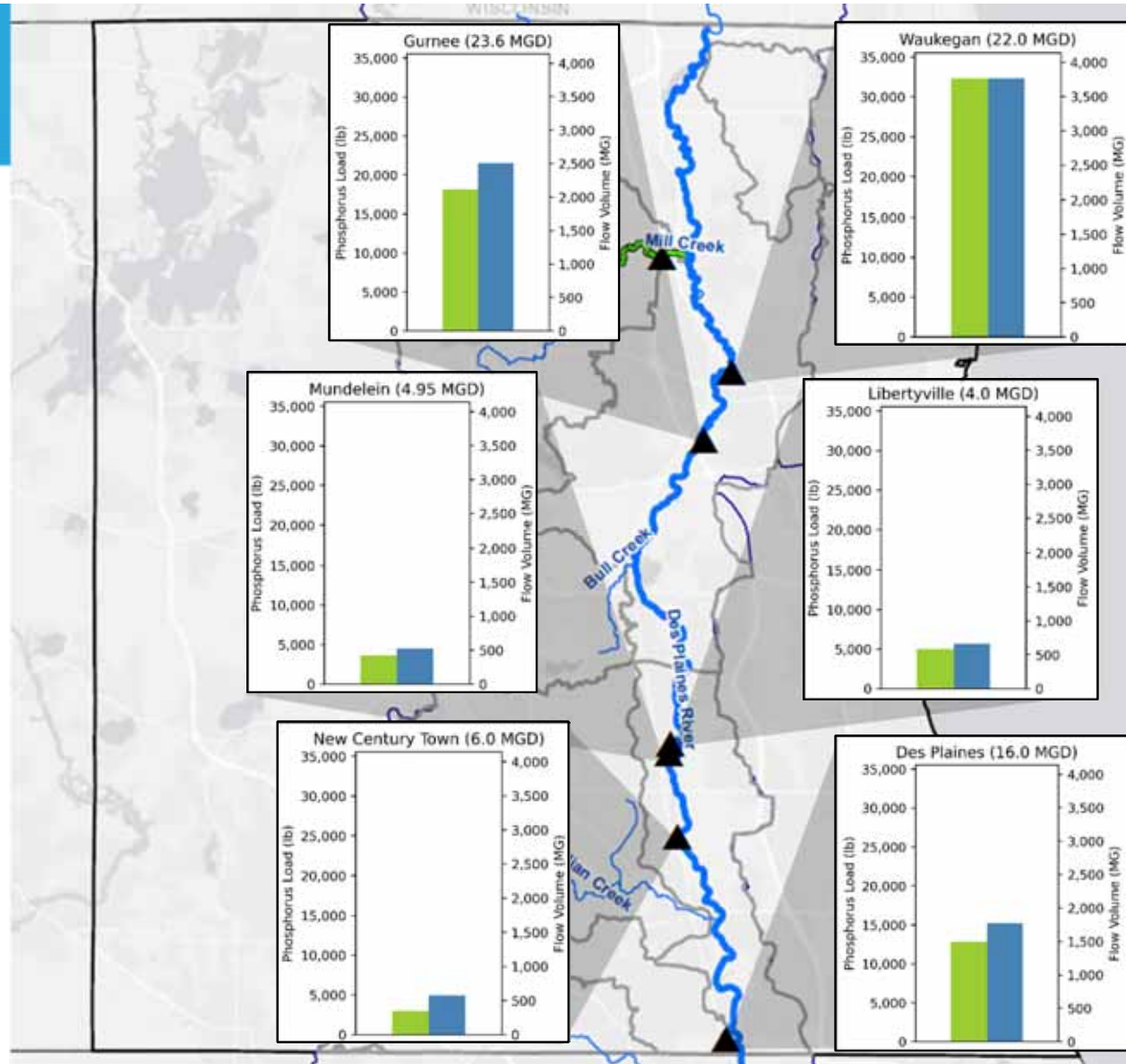
WWTPs Inputs

- Interpolated between measured data



WWTP TP Loading

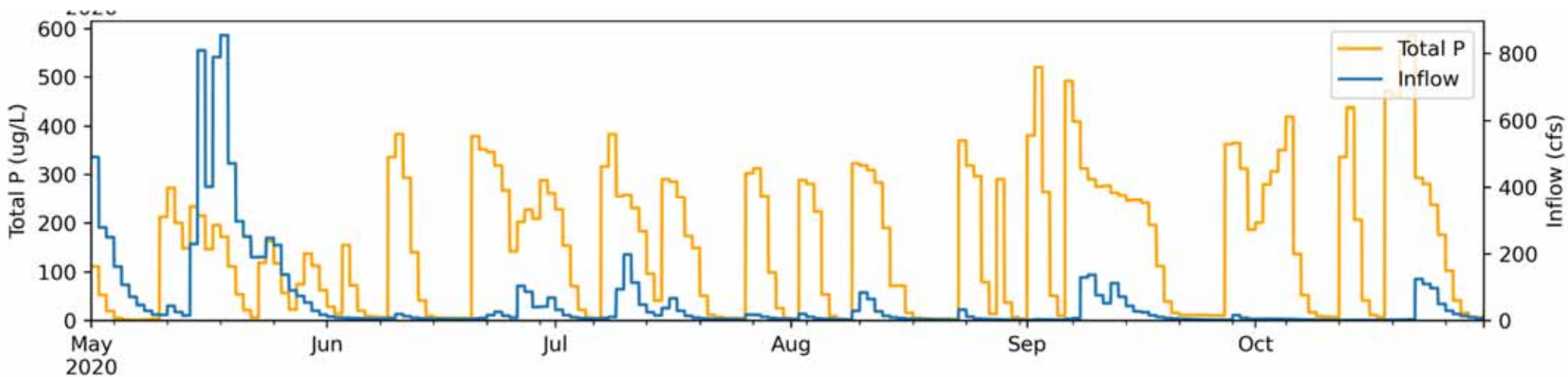
- May to October 2020 WWTPs Flow volumes and phosphorus loads.



Tributary Inputs

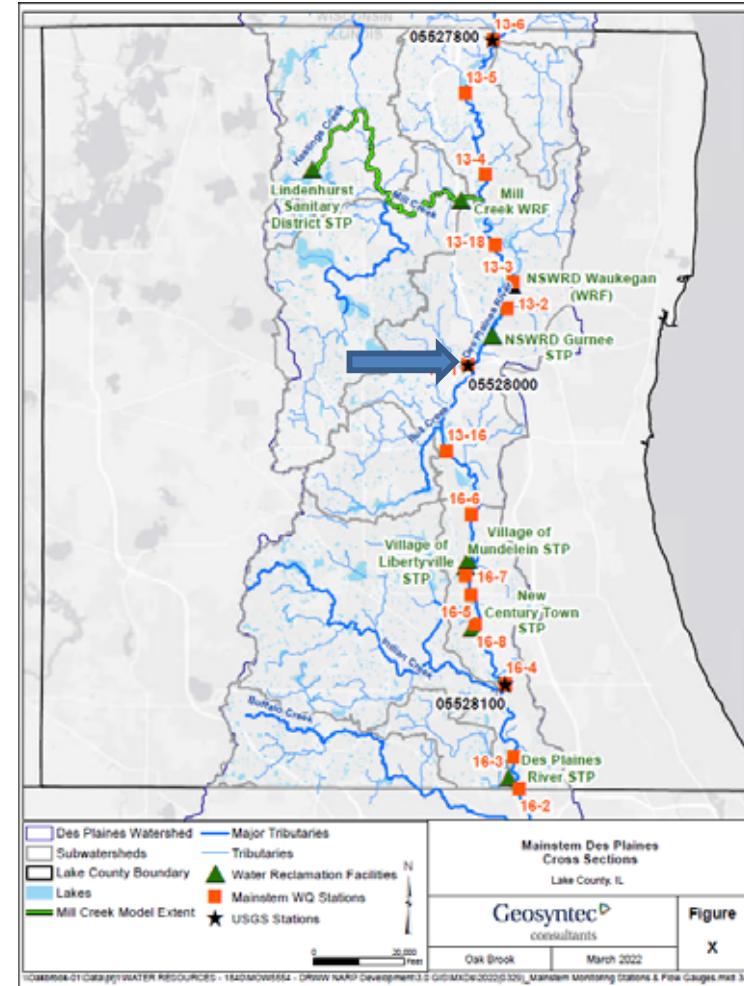
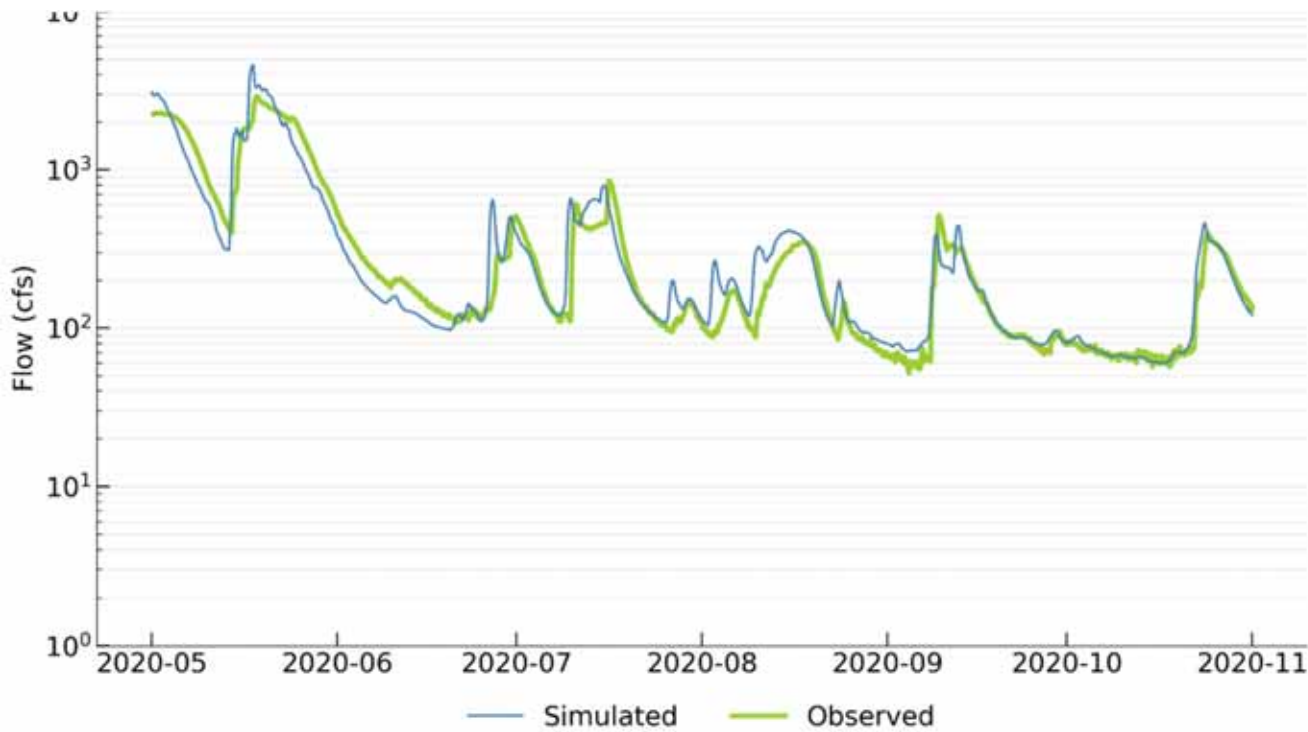
From SWAT Watershed Model

Indian Creek

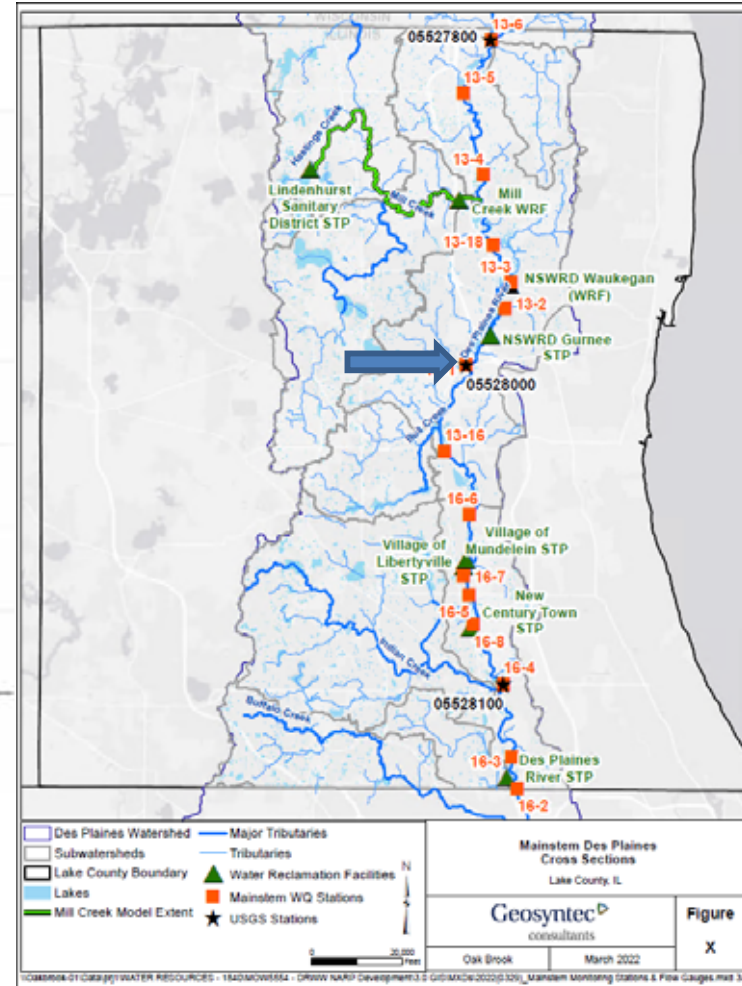
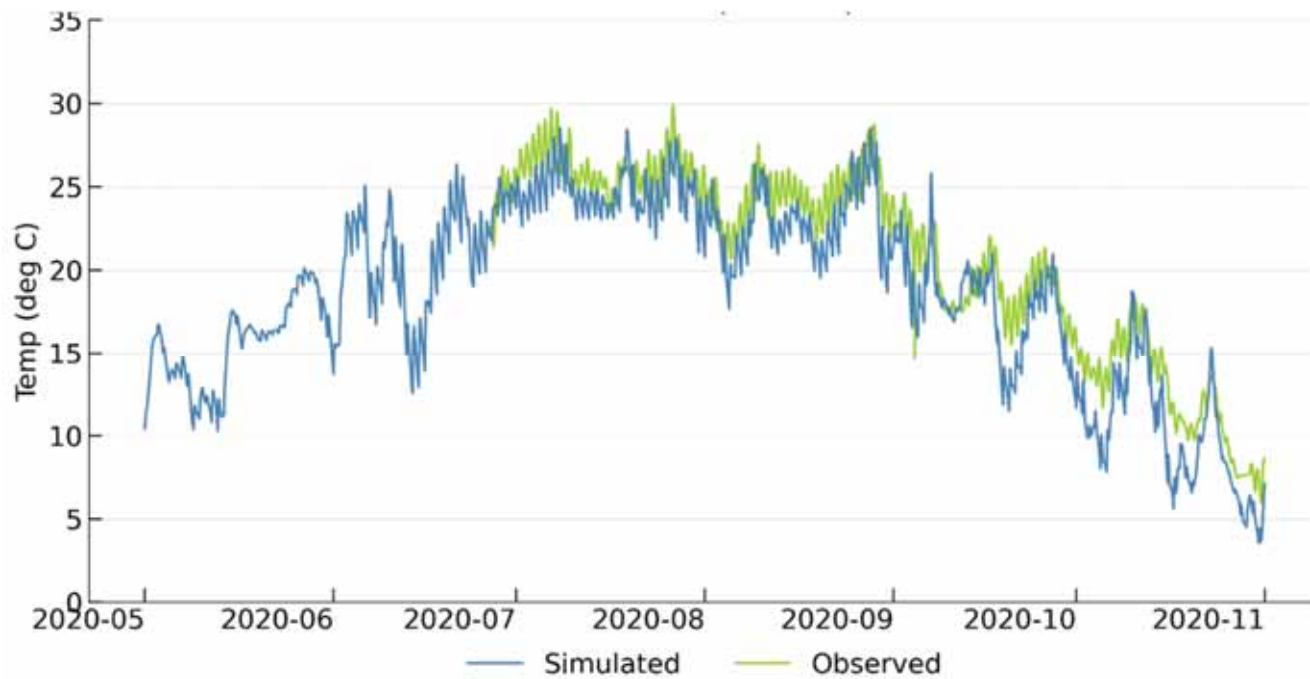


Flow Calibration

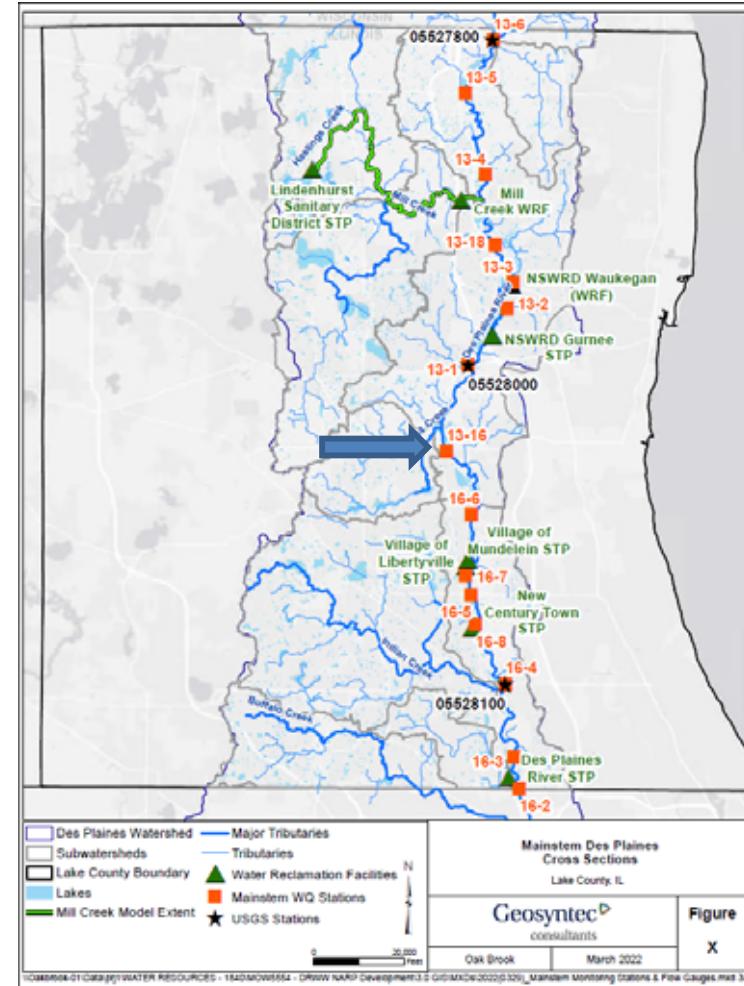
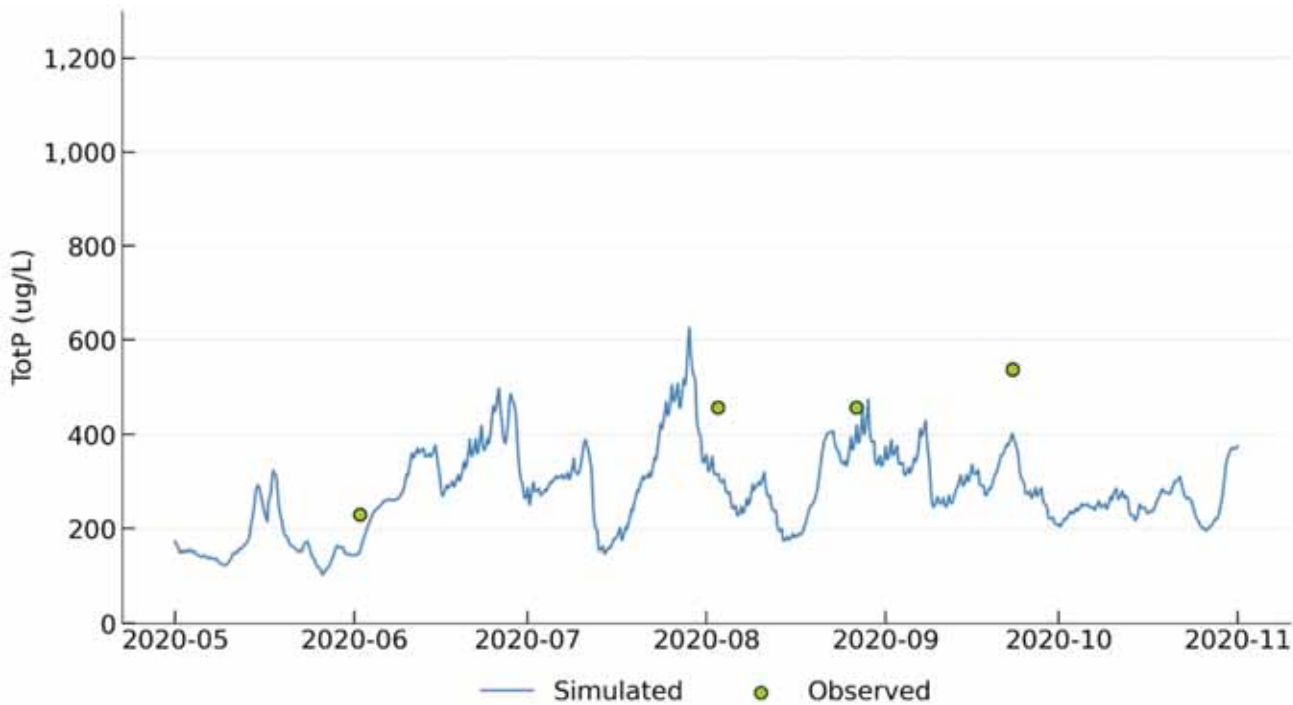
Des Plaines River Near Gurnee, IL (05528000)



Temperature Calibration



Total Phosphorus

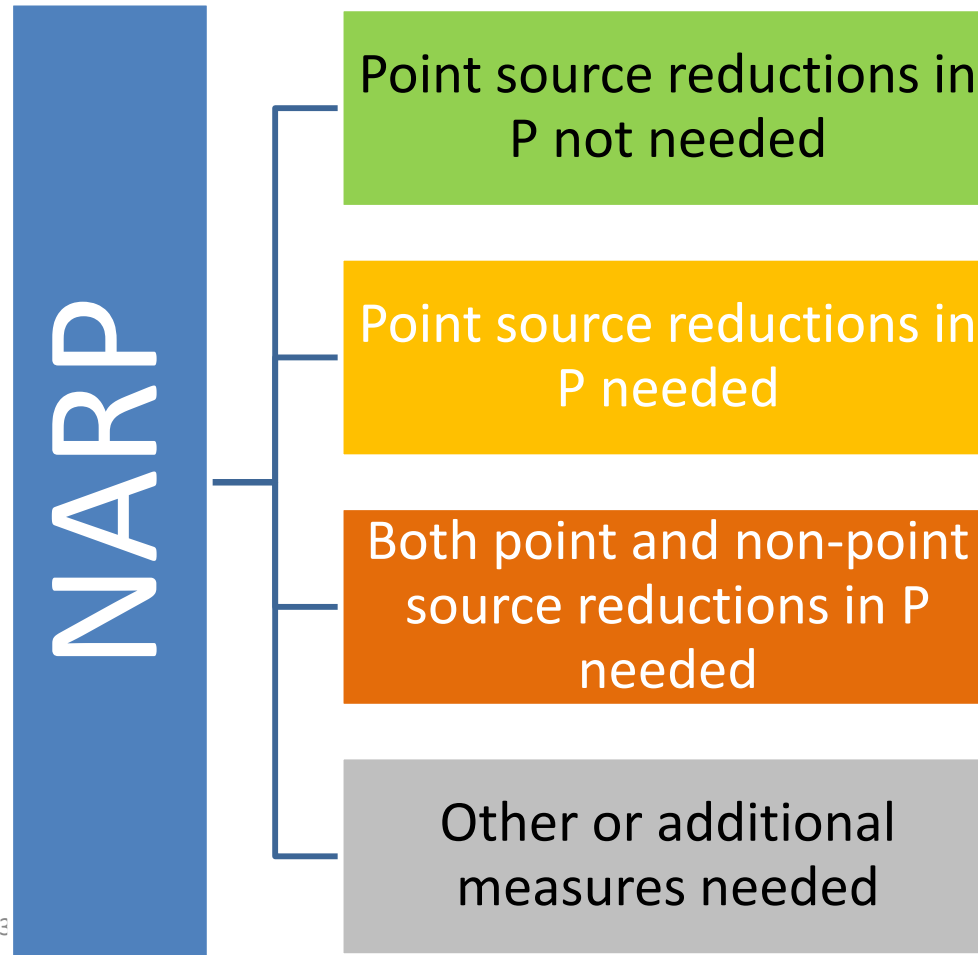


Next Steps

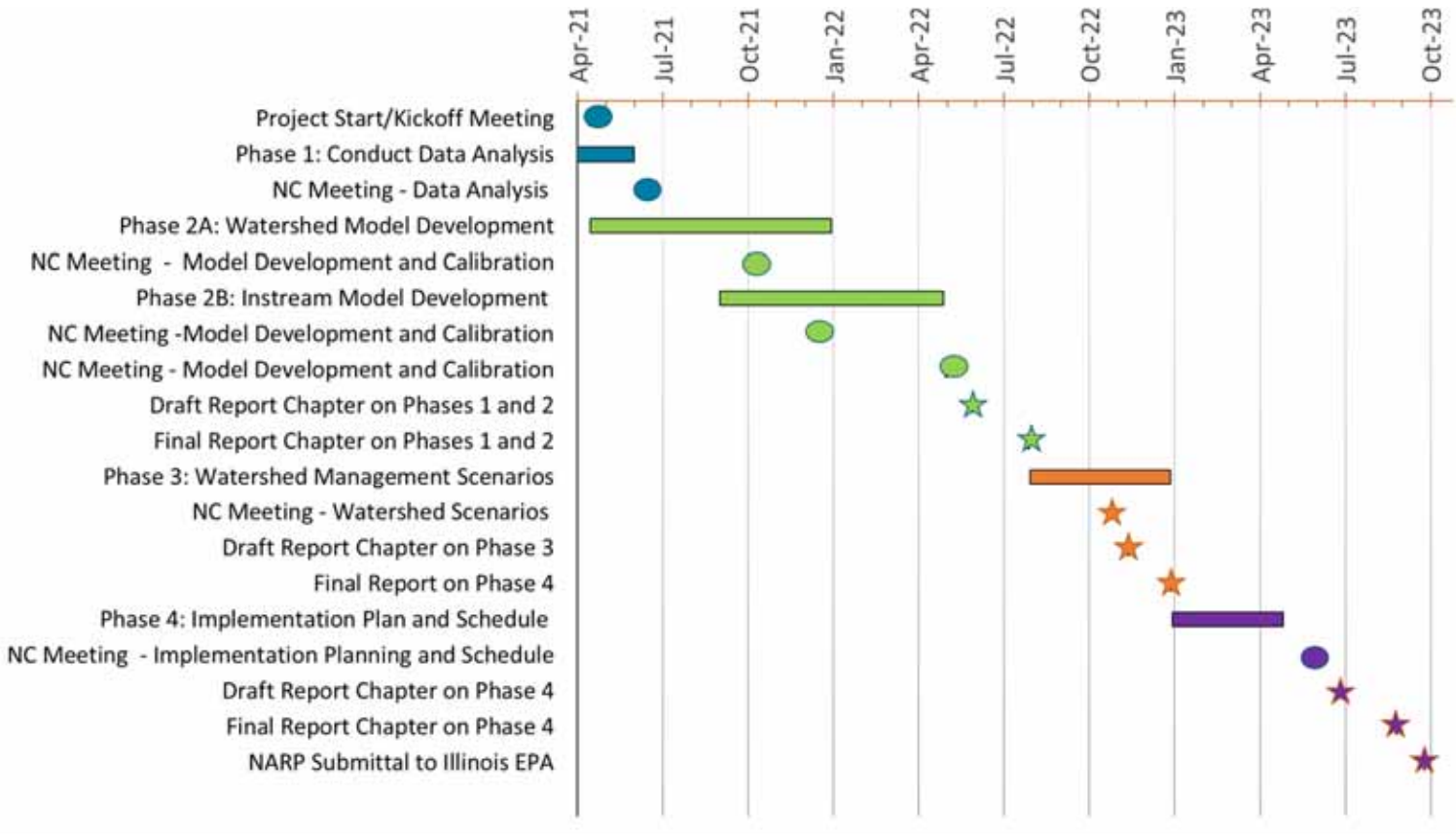
Next Steps

- Calibrate mainstem model for chlorophyll-a, benthic algae, and DO
- Calibrate Mill Creek model
- Run watershed management scenarios for evaluating management actions

Potential NARP Outcomes for DRWW



Project Schedule



● NARP Committee Meeting Tentative Date

★ Major Project Milestone

Thank You!

Geosyntec[▷]
consultants