

EVALUATION OF NUTRIENT SOURCES AND LOADING TO WATERBODIES IN THE UPPER ST. JOHNS RIVER BASIN

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St. Johns River Water Management District

UF Water Institute Symposium 2024



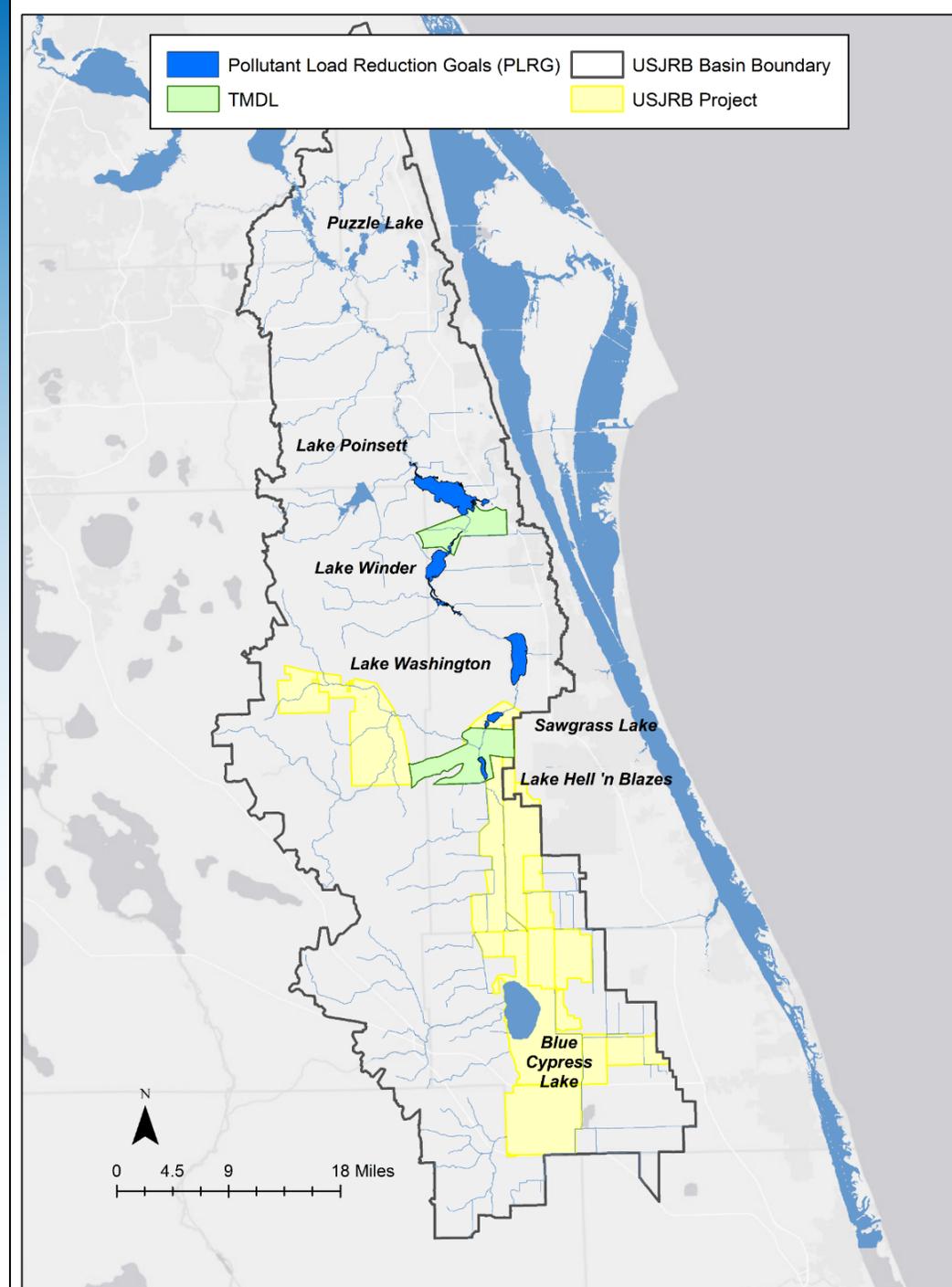
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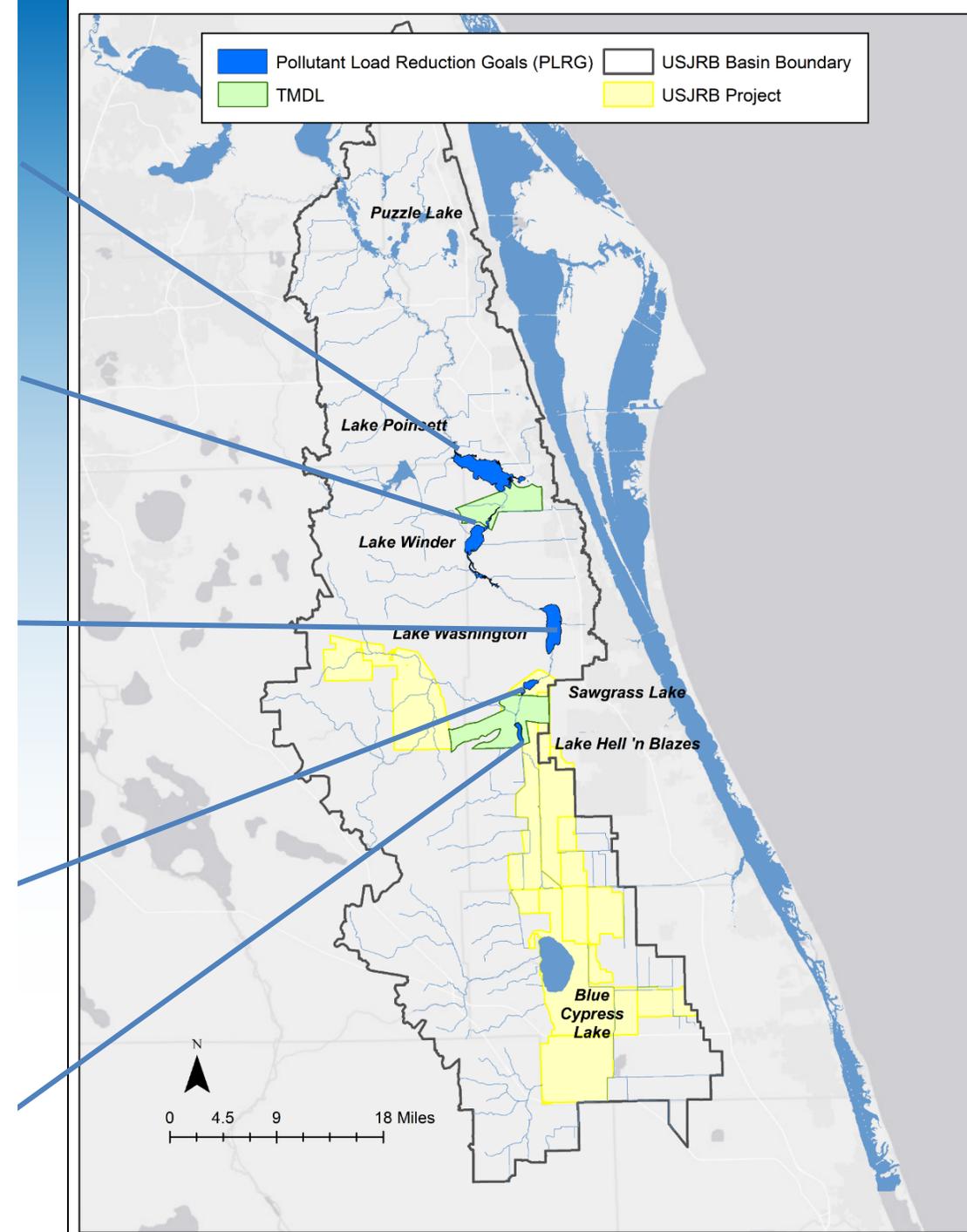
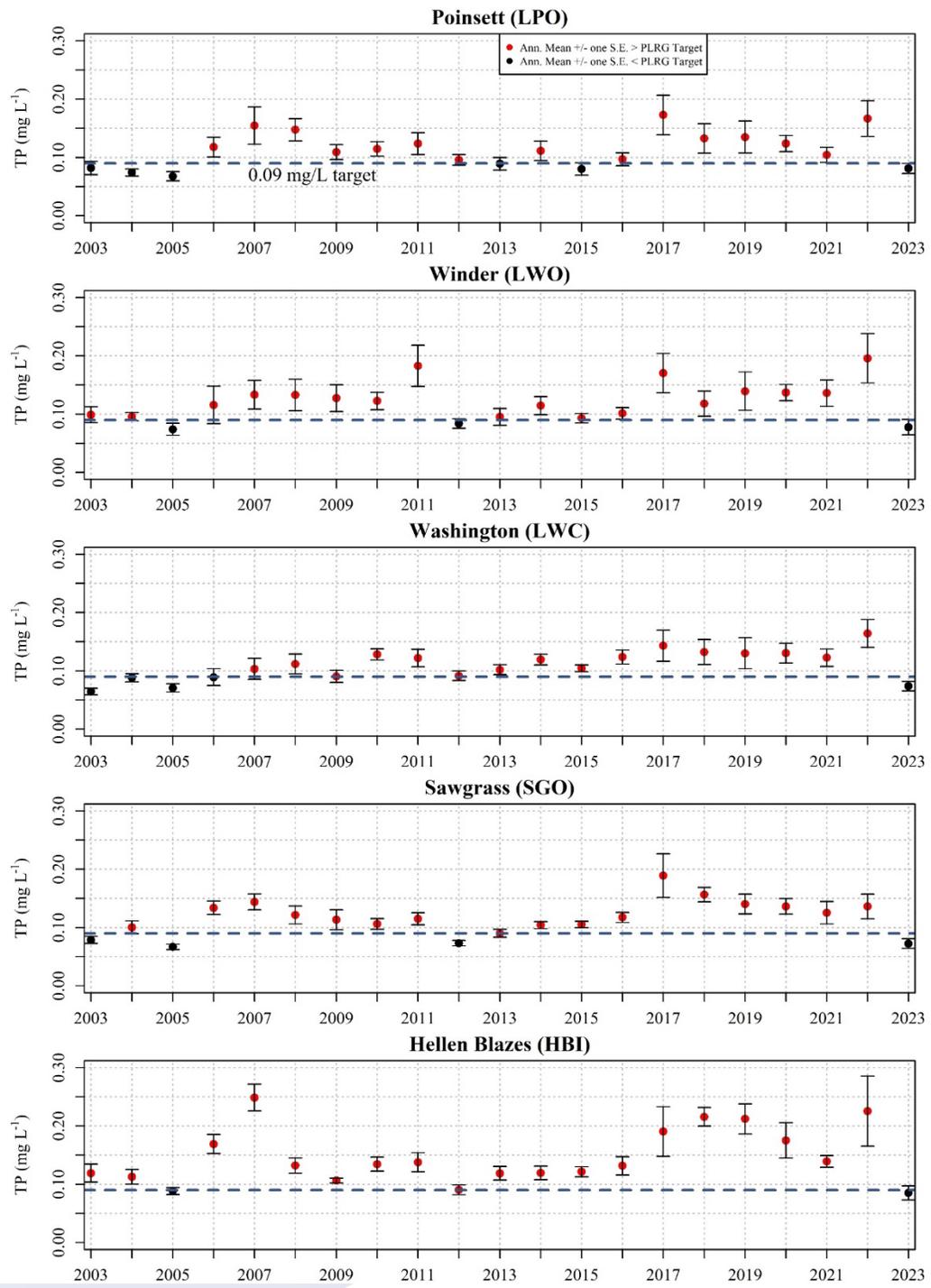
Water Quality in the Upper St. Johns River Basin

- 2003: District “Pollutant Load Reduction Goals” (PLRG)
- 0.09 mg L⁻¹ Total Phosphorus (TP) limit
- 2006: FDEP Total Maximum Daily Loads (TMDLs)



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Lake Washington, July 2019

120 $\mu\text{g L}^{-1}$ Chl-a

Dolichospermum circinale

Saxitoxins/Paralytic Shellfish Toxins = 0.11 $\mu\text{g L}^{-1}$

Lake Washington, Aug 2022

125 $\mu\text{g L}^{-1}$ Chl-a

Dolichospermum helicoideum

Lake Washington, June 2023

43 $\mu\text{g L}^{-1}$ Chl-a

Dolichospermum circinale

- USJRB Basin Boundary
- Existing TMDL
- Verified List TP
- Study List TP

Lake Washington, potable water supply



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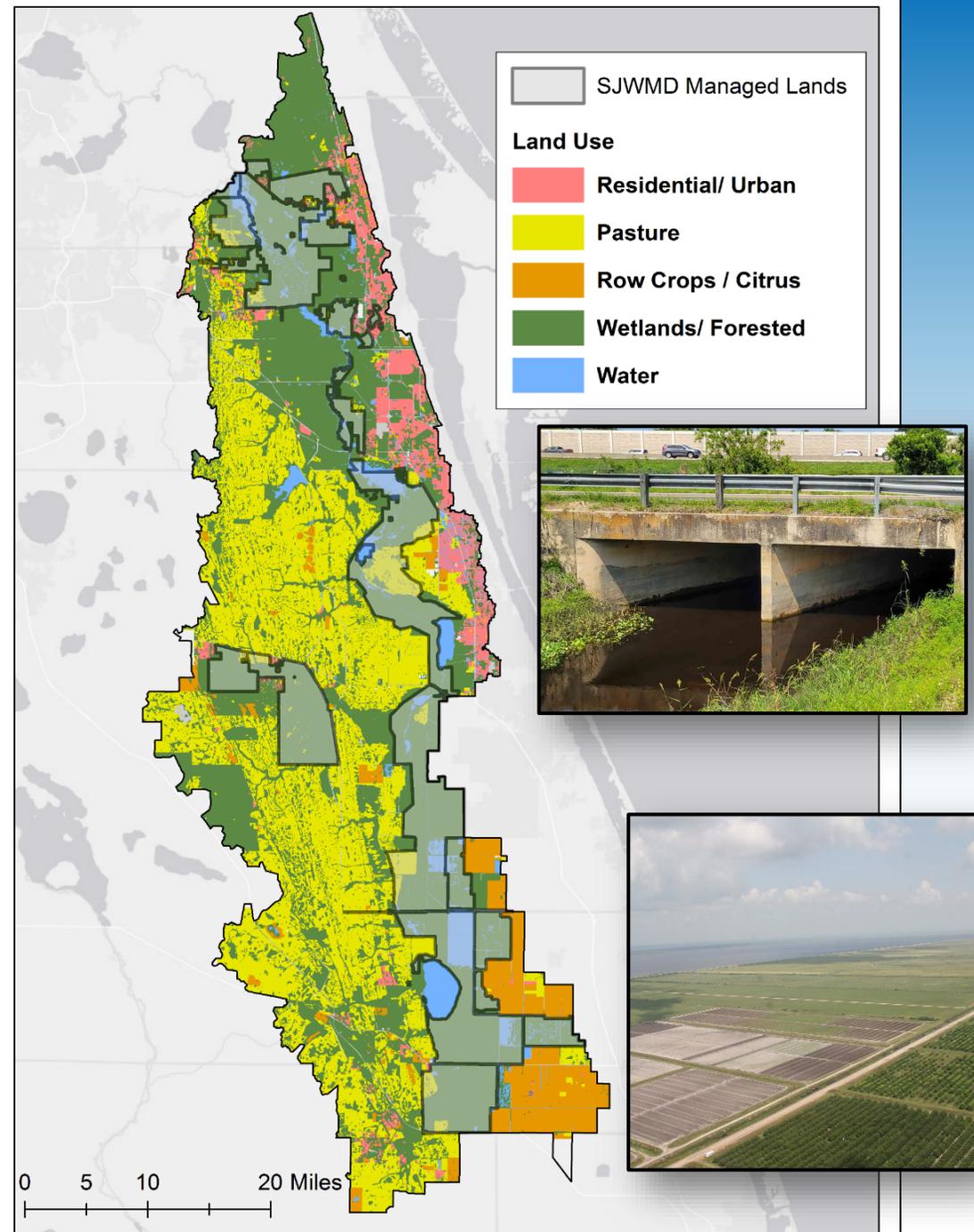
FDEP, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Phosphorus Sources in USJRB

- Eastern vs. western basin
- USJRB Project at headwaters

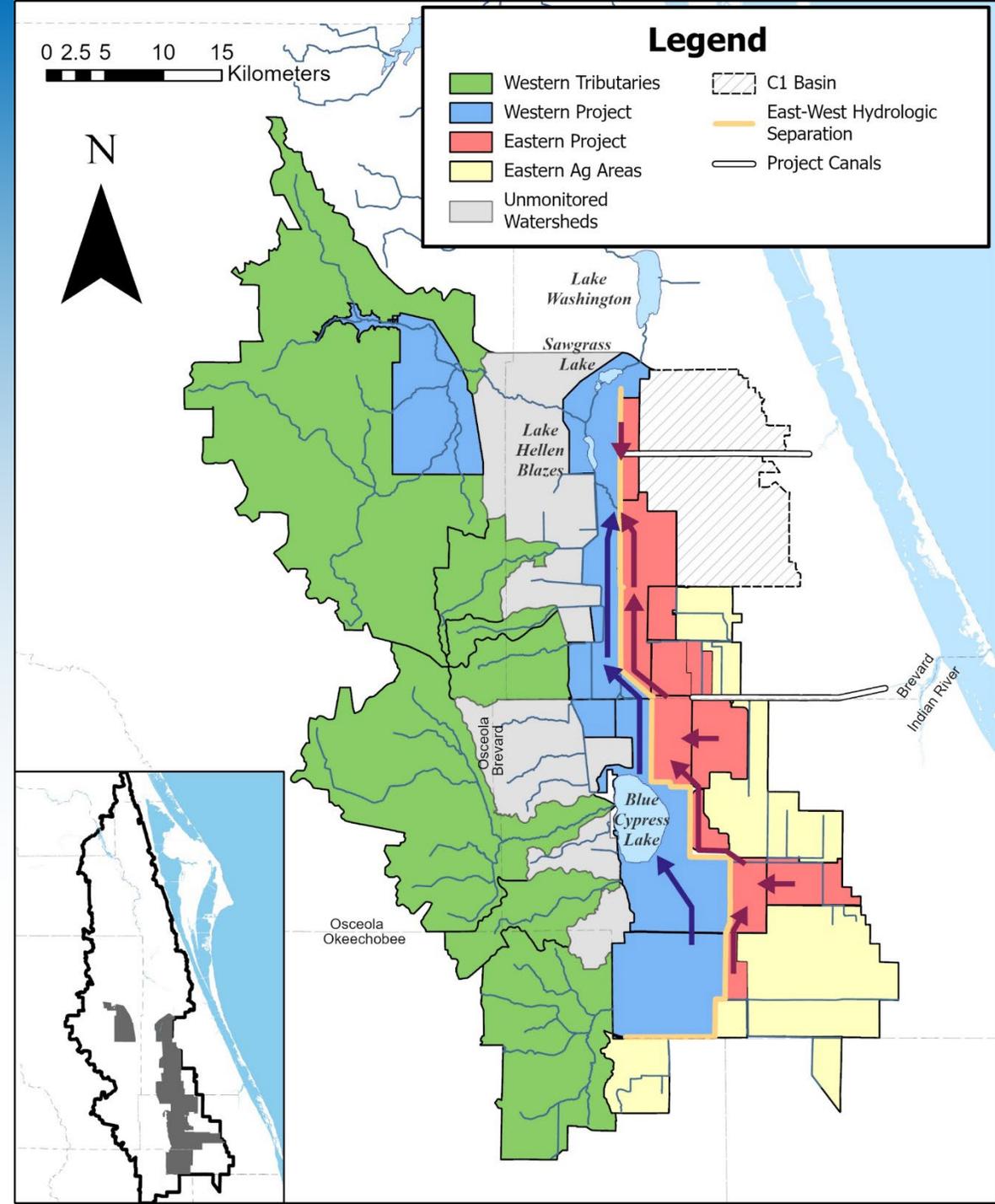


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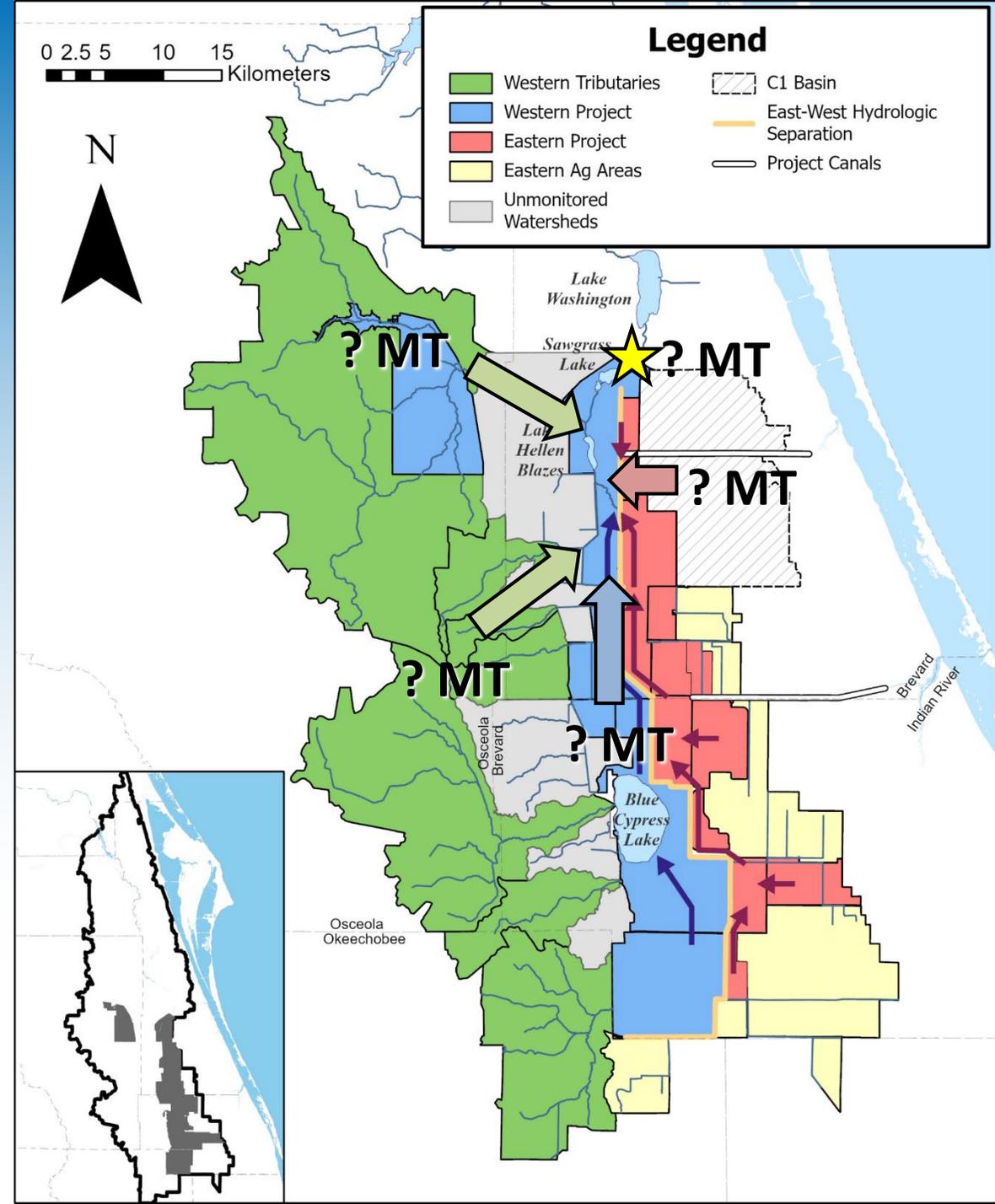
Upper Basin Project

- Hydrologic division
- Different inputs



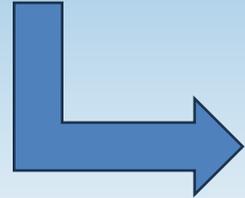
Upper Basin Project

- What is the Project's TP load to the river?
- What Project components contribute greatest TP load?
- Are TP loads changing over time?

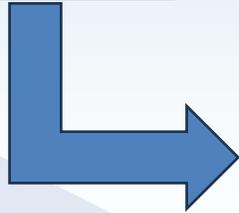


Evaluating Loading – Tribs and Mainstem

Daily USGS/HSPF Q data
Monthly District WQ data



Exploration and
Graphics for RivEr
Trends*

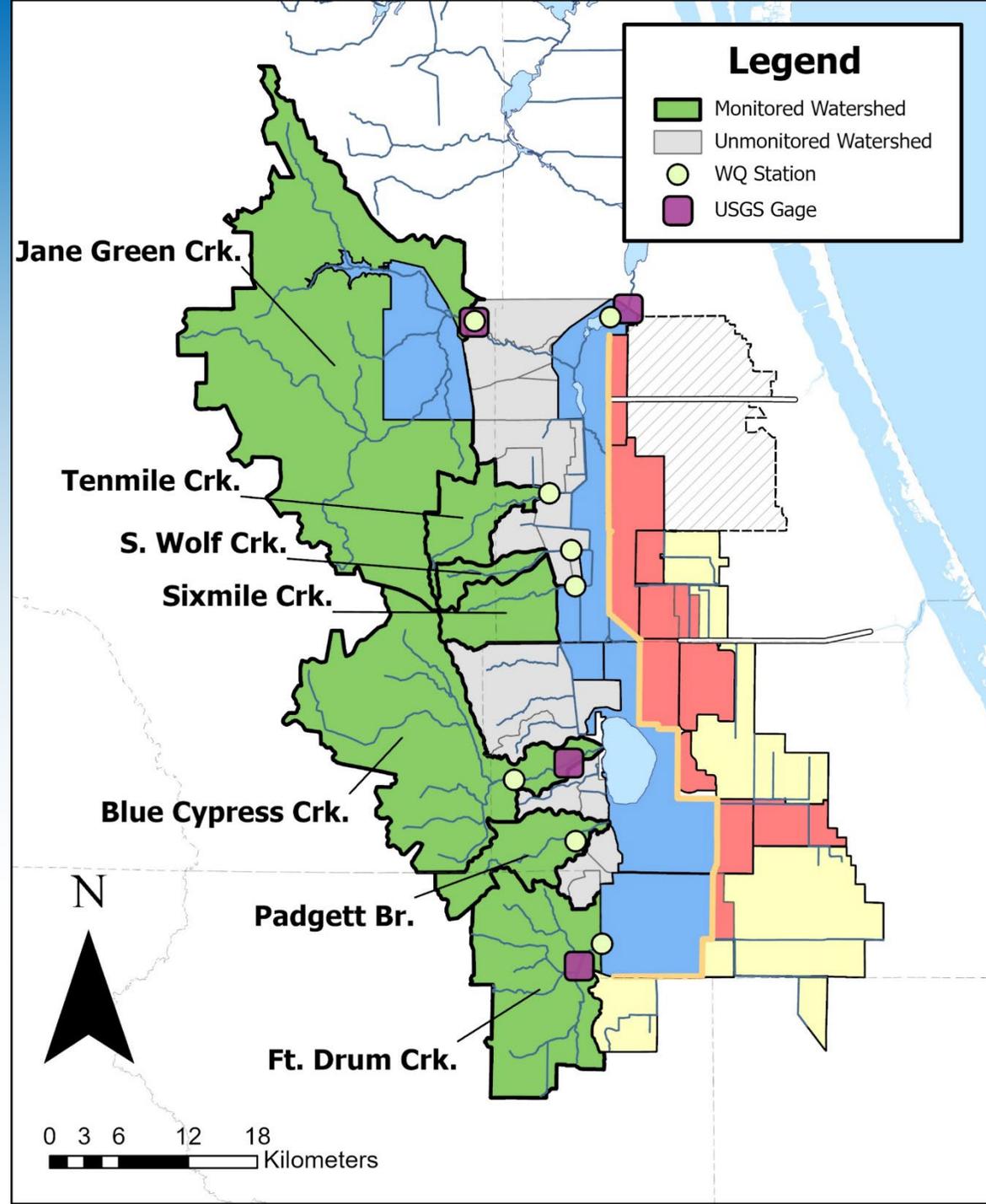


Daily conc./load
Daily FN conc./load

*Hirsch, Robert M, Stacey A Archfield, and Laura A De Cicco. 2015. "A Bootstrap Method for Estimating Uncertainty of Water Quality Trends." Environmental Modelling & Software 73: 148-66.

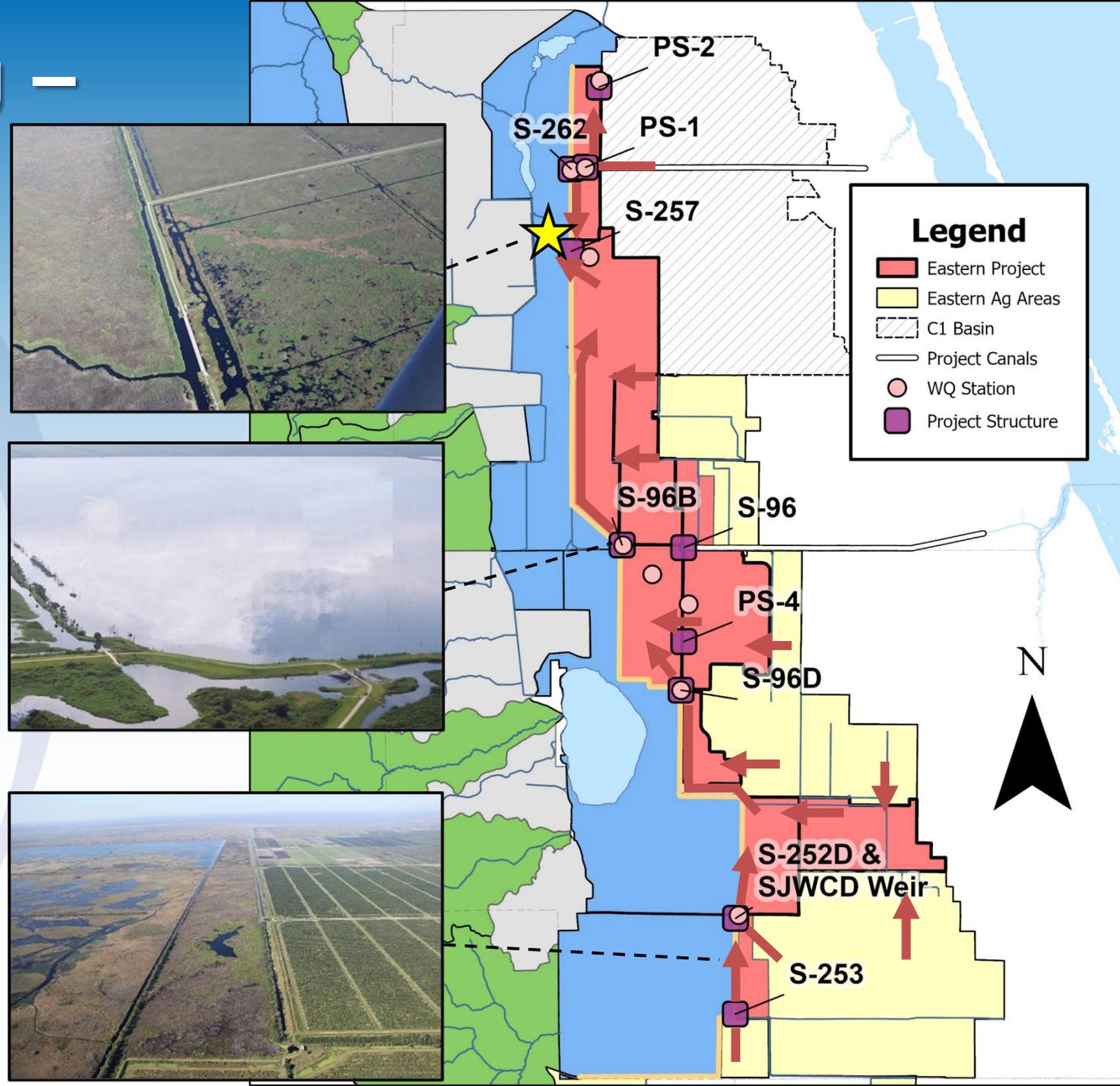


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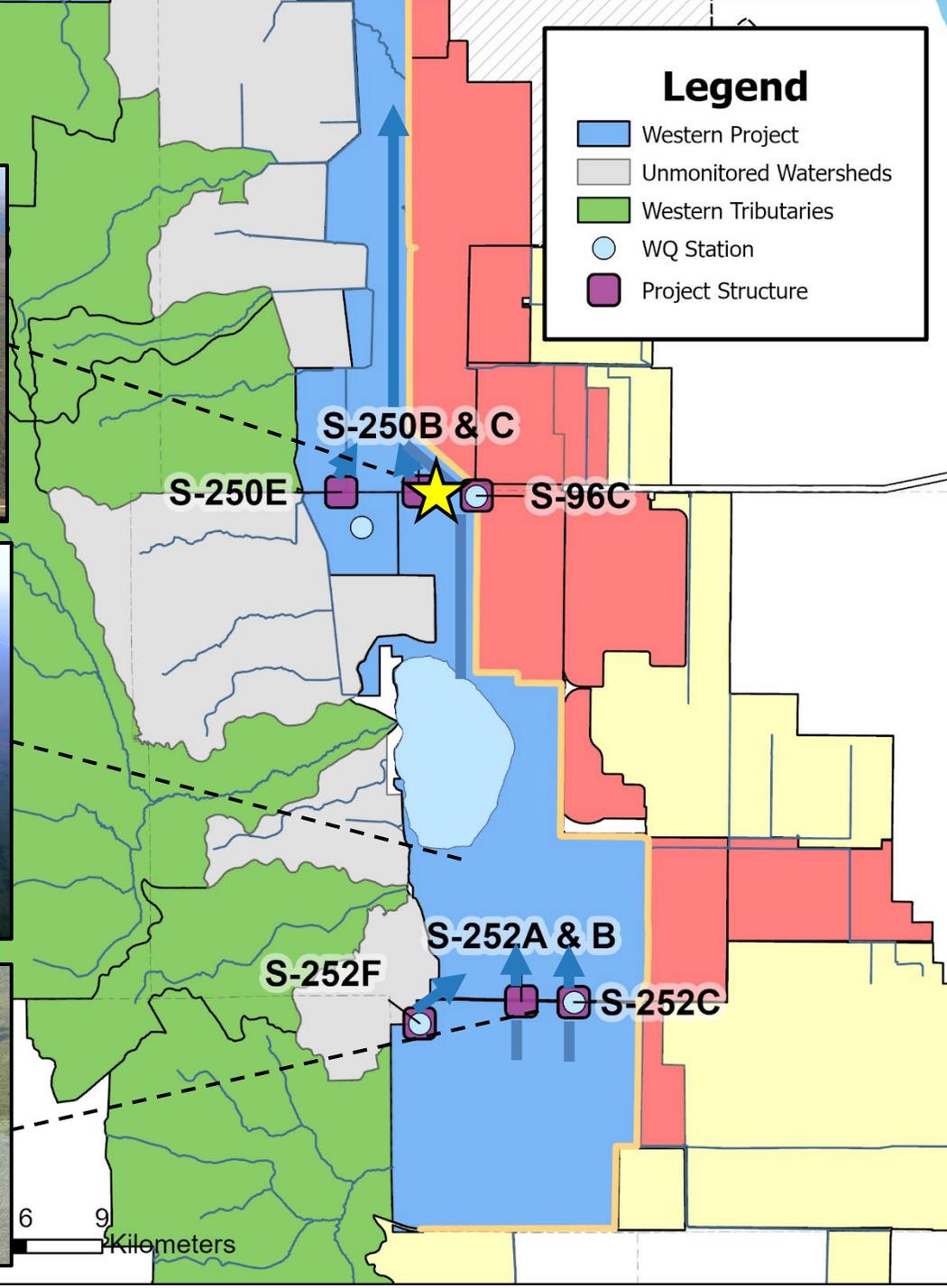
Evaluating Loading – Eastern Project

- Daily structure Q & Monthly WQ
- Load to river near S-257 weir



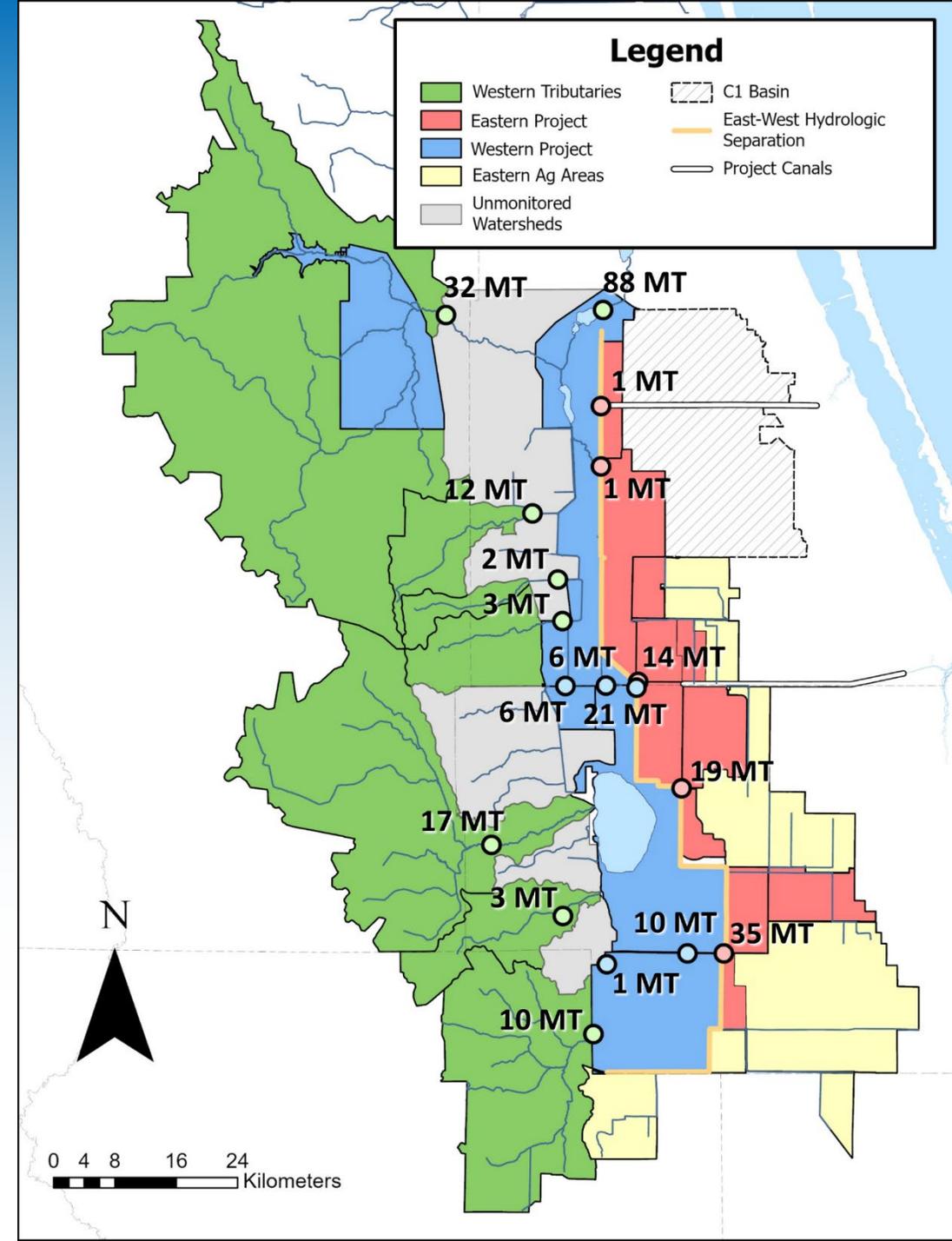
Evaluating Loading – Western Project

- Daily structure Q & Monthly WQ
- Load to river via C-40 canal



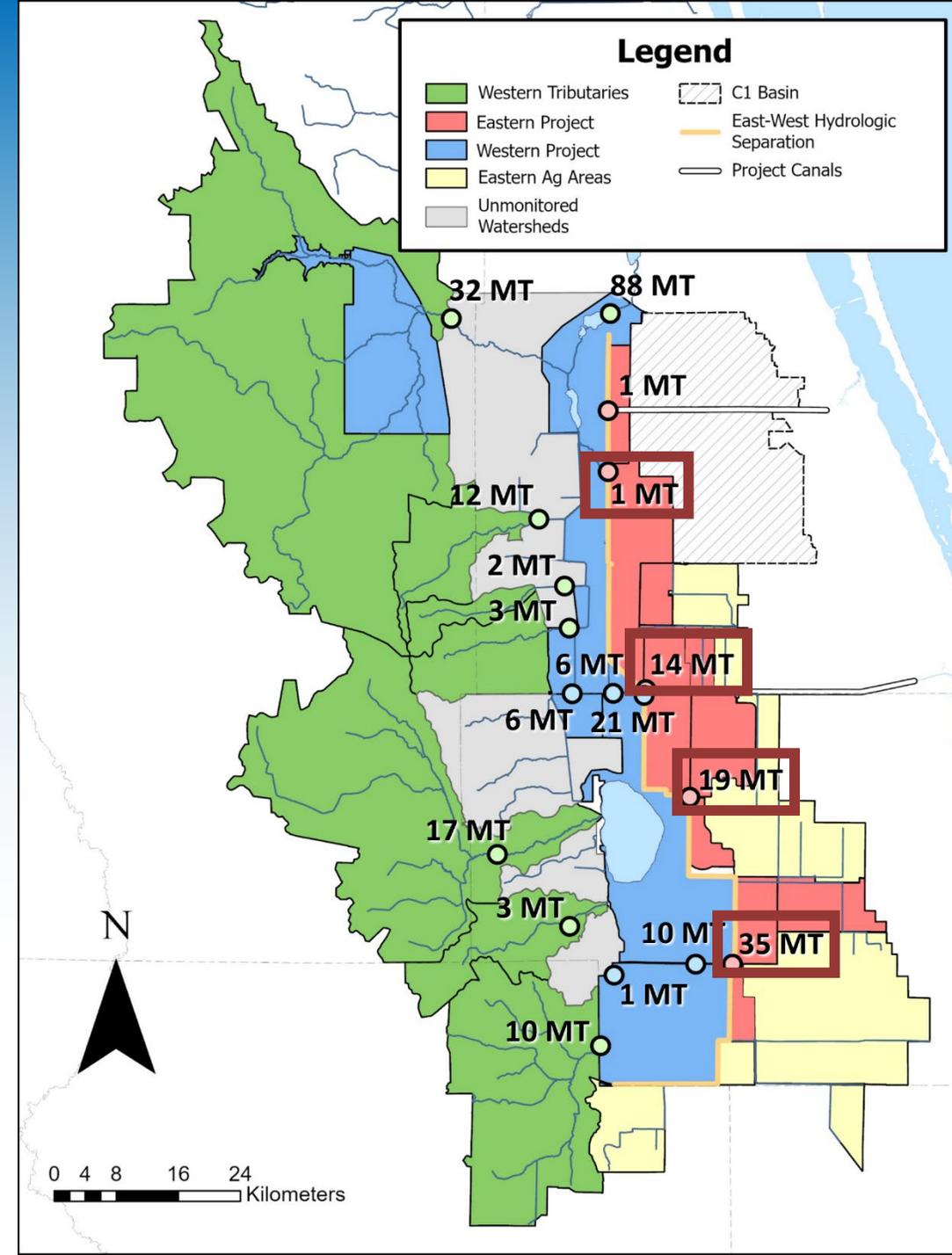
USJRBP TP Loading (2000-2020)

- ~88 MT yr⁻¹ TP loaded to river from Project (TMDL = 57 MT yr⁻¹)



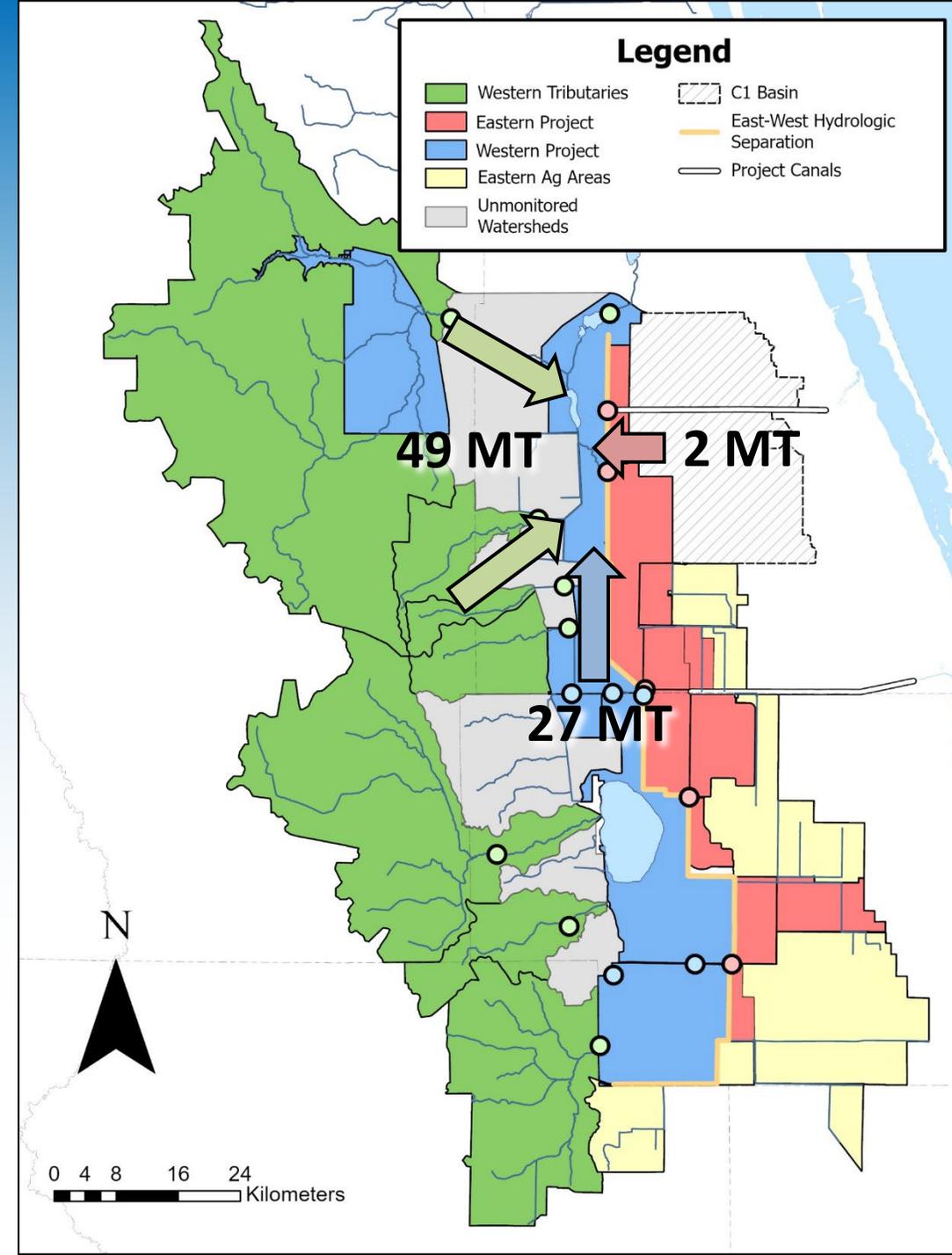
USJRBP TP Loading (2000-2020)

- ~88 MT yr⁻¹ TP loaded to river from Project (TMDL = 57 MT yr⁻¹)
- TP loads decrease along eastern “treatment train”



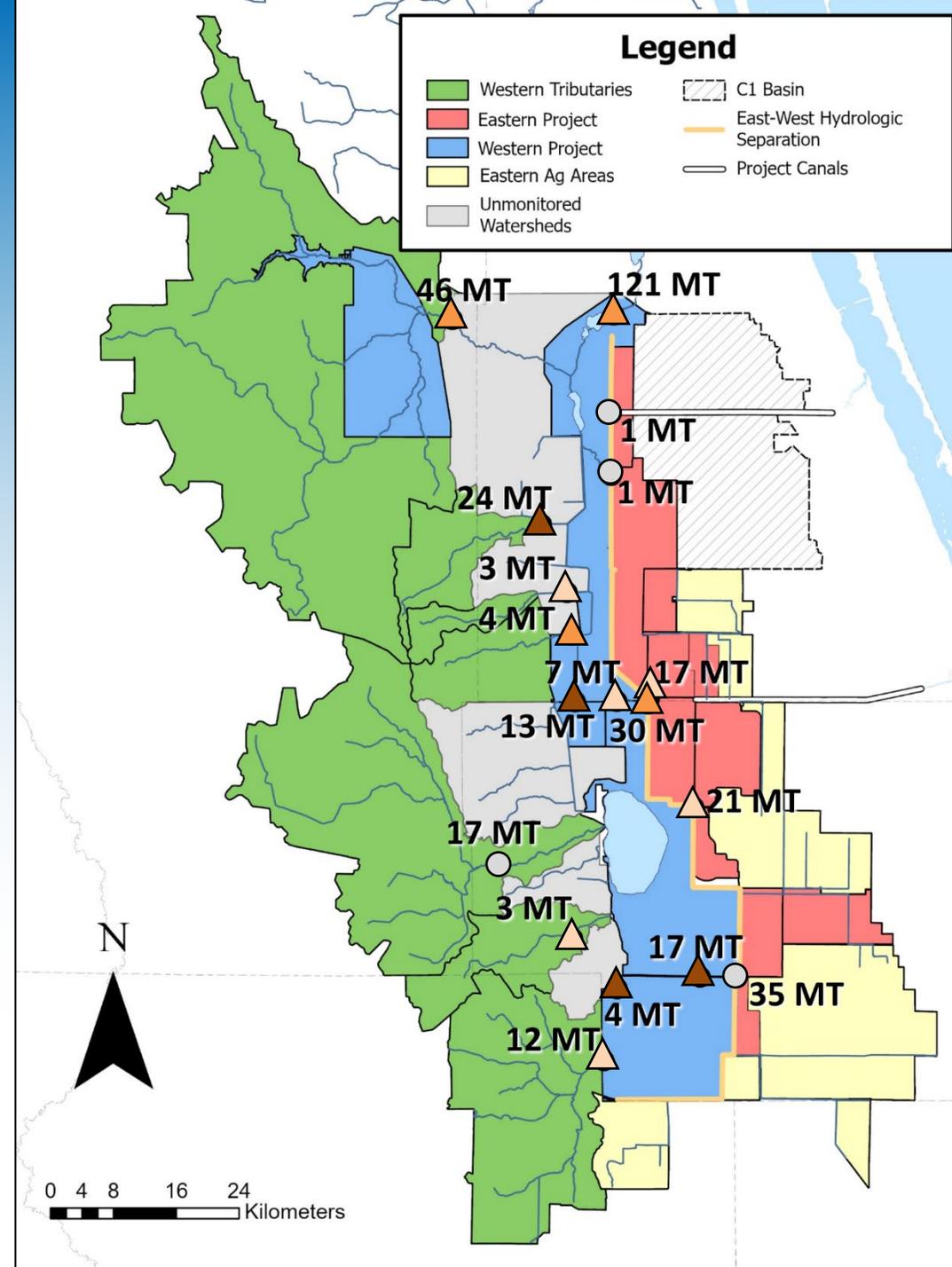
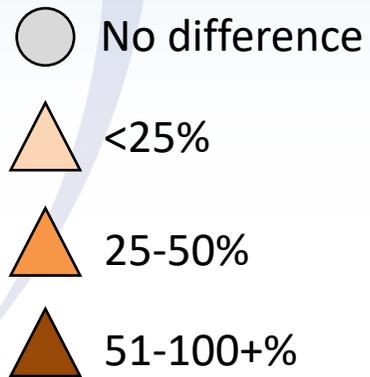
USJRBP TP Loading (2000-2020)

- ~88 MT yr⁻¹ TP loaded to river from Project (TMDL = 57 MT yr⁻¹)
- TP loads decrease along eastern “treatment train”
- Western trib > Western project > Eastern project



USJRBP TP Loading (2016-2020)

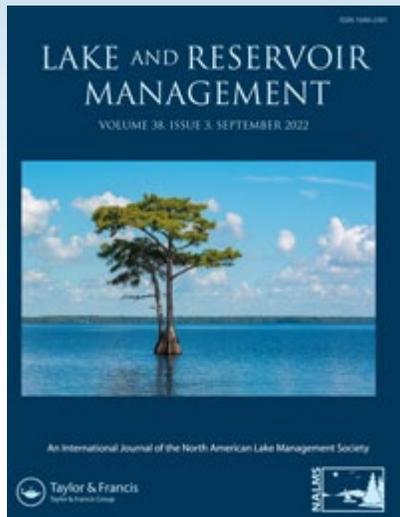
- ~121 MT yr⁻¹ TP loaded to river from Project
- Minor TP load increase along eastern “treatment train”
- Western trib & Western project more recent loading compared to long-term



USJRBP TP Loading (2016-2020)

Trends in phosphorus fluxes are driven by intensification of biosolids applications in the Upper St. Johns River Basin (Florida, United States)

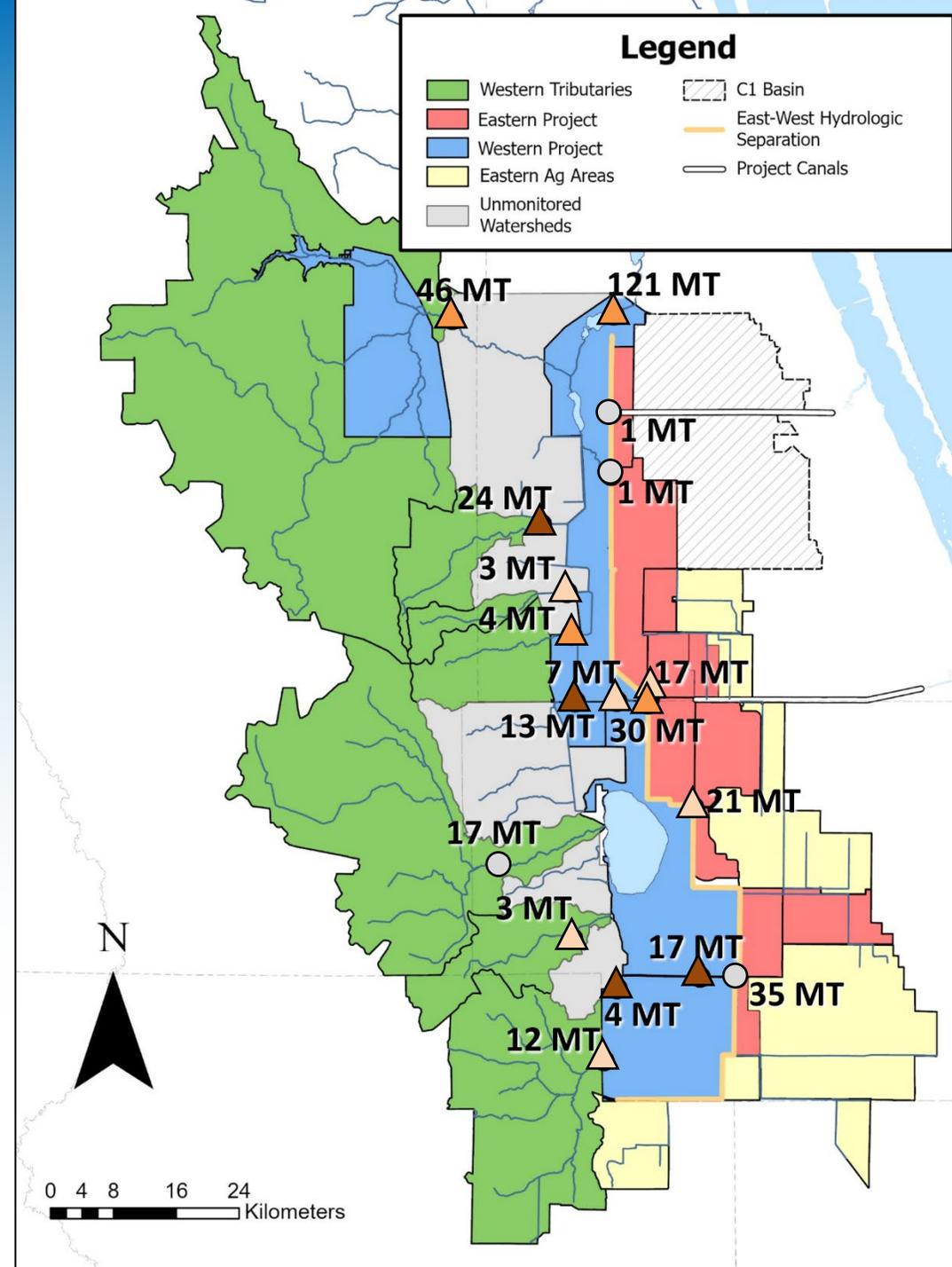
Andy Canion, Victoria Hoge, John Hendrickson, Thomas Jobses & Dean Dobberfuhl
 Pages 215-227 | Published online: 24 Jun 2022



- No difference
- △ <25%
- ▲ 25-50%
- ▲ 51-100+%



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Biosolids Investigation (FDEP Grant)

Expand Water Quality
Sampling

Environment
Consulting and
Technology

Field-scale
measurements

UF & FSU

Environmental
Remediation
Technologies Pilot

UF & FIU

Resource recovery
options

Janicki and
Black &
Veatch

Improve understanding of
where and how much can
be applied

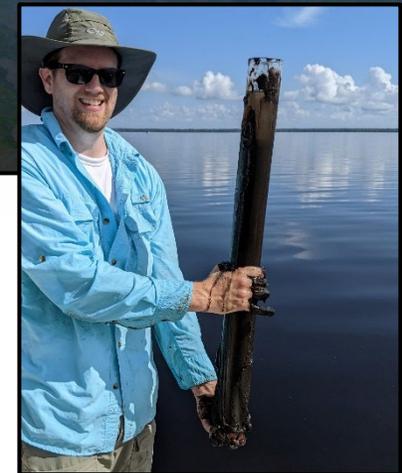
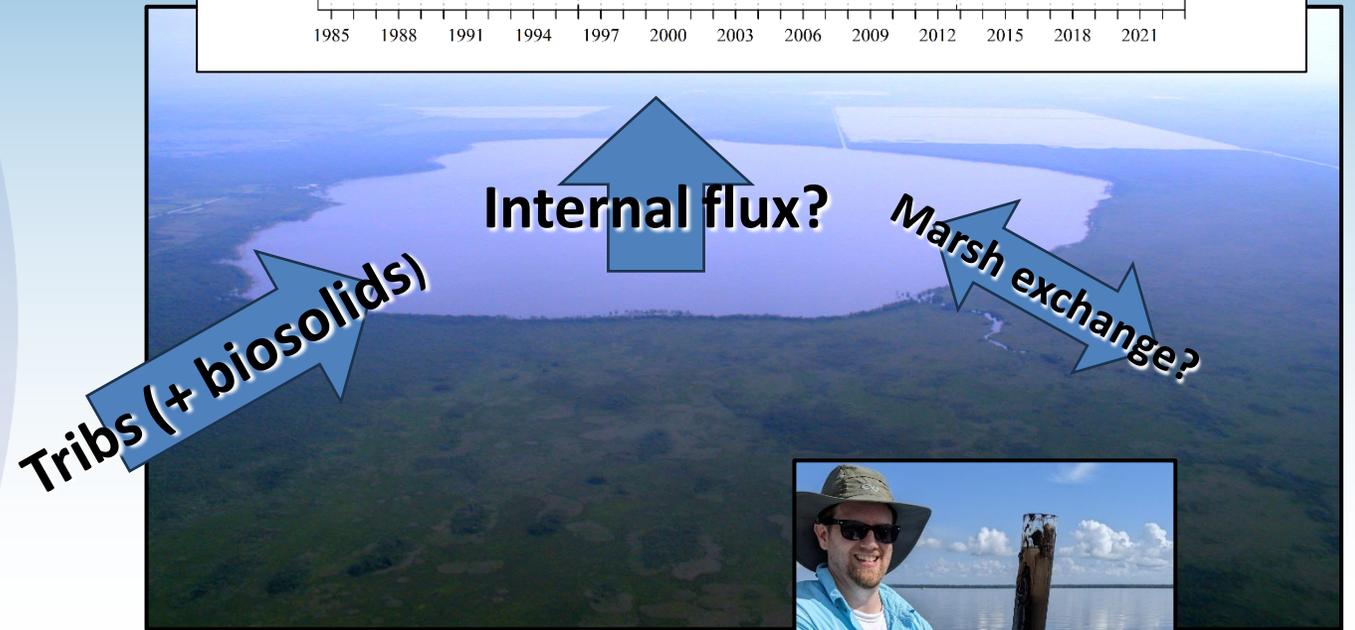
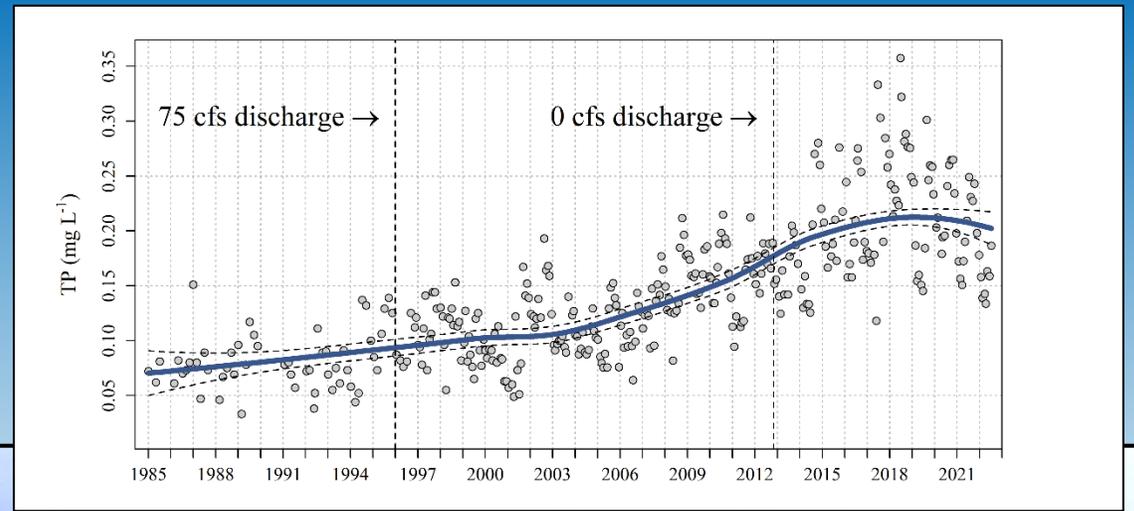
Reduce environmental
impacts and produce other
beneficial products

Management
Recommendations



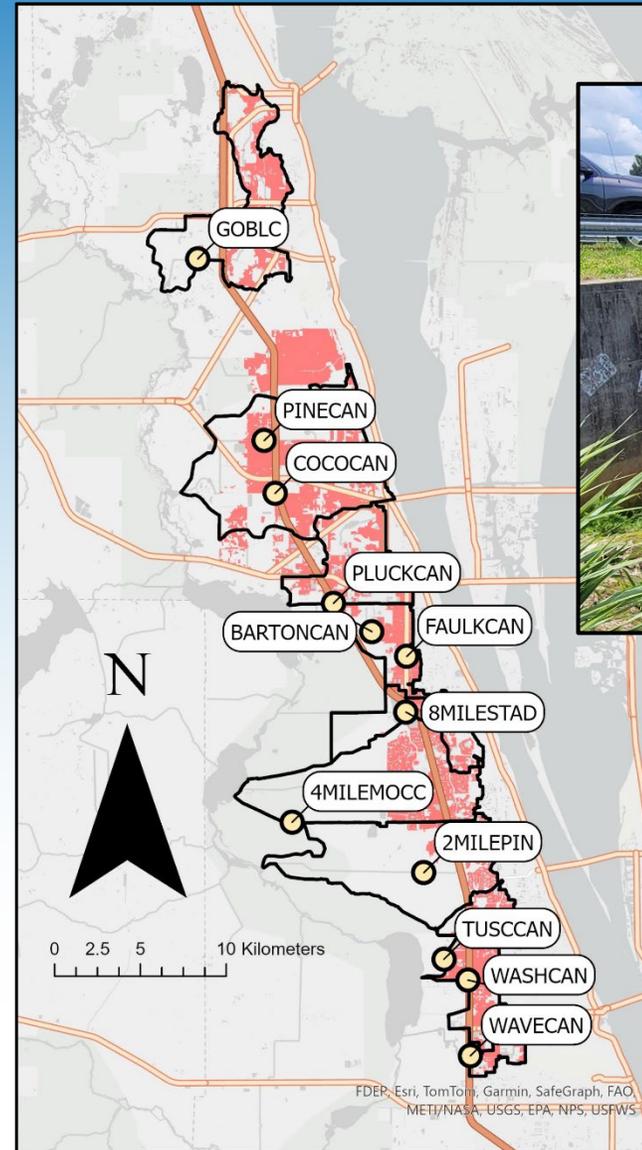
Addressing Data Gaps (FDEP Grant)

- Sediment P characterization & fluxes from USJRB Project marshes & lakes (University of Florida)



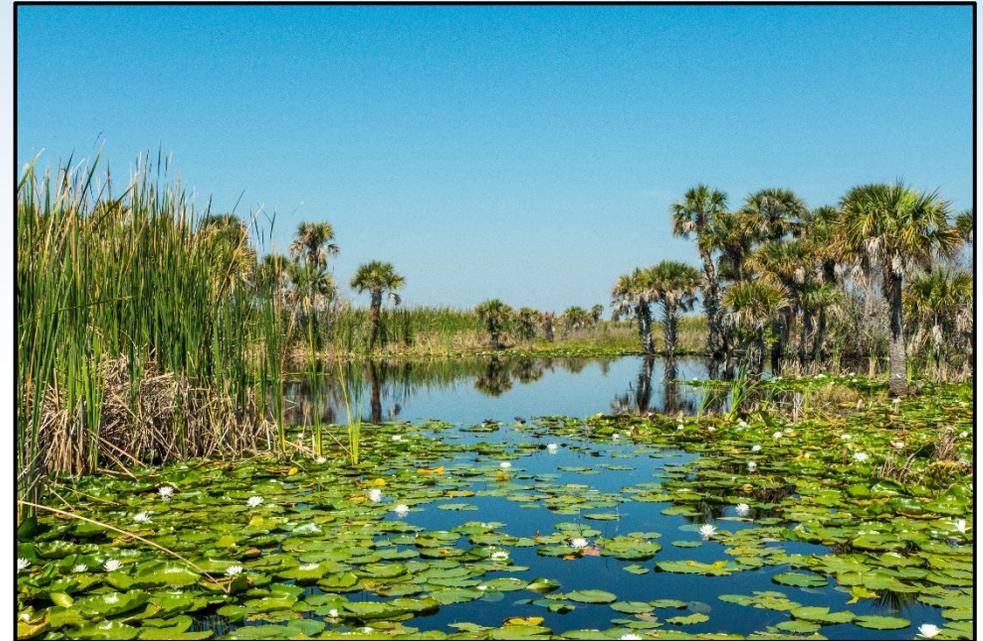
Addressing Data Gaps (FDEP Grant)

- Stormwater loads from urban canals to river-lakes (DB Environmental)



Wrap-Up

- USJRB lakes not consistently meeting water quality targets
- Significant TP load in western tribs & western Project compared to eastern Project
- Biosolids likely significant source in western basin
- Working to address data gaps in identifying & quantifying nutrient sources throughout USJRB



Questions?

- Thank you to staff in Bureau of Environmental Sciences, Bureau of Water Resource Information, Bureau of Watershed Management & Modeling, Bureau of Operations & Maintenance

