

Deployment of a Hybrid Wetland Treatment Technology (HWTT) Facility at Trout Lake

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Google earth

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Historical data for Trout Lake / Hicks Ditch Stations TRTL and HICKDN (SJRWMD)

Station		TP µg/L	Alkalinity mg/L	pH units
Hicks Ditch	mean	179	12	5.7
	min	8	2	4.8
	max	4420	51	7.1
	median	61	10	5.7
Trout Lake	mean	268	34	7.7
	min	115	9	5.7
	max	568	93	9.9
	median	252	23	7.9

Trout Lake POR:
1996-2011

Hicks Ditch POR:
2004-2014

Hybrid Wetland Treatment Technology (HWTT)

- Consists of chemical treatment and wetland components
- Creates and exploits synergies between the wetland and chemical systems



Treatment Wetlands

Capabilities and Constraints

- Very effective for removing BOD, TSS and nitrogen, moderately effective for P removal
- Constraints to surface water treatment
 - Land requirement for effective P removal is high
 - Background outflow N levels may be high, due to soils and vegetation acting as source of dissolved organic N
 - For optimal P removal performance, wetlands must remain hydrated

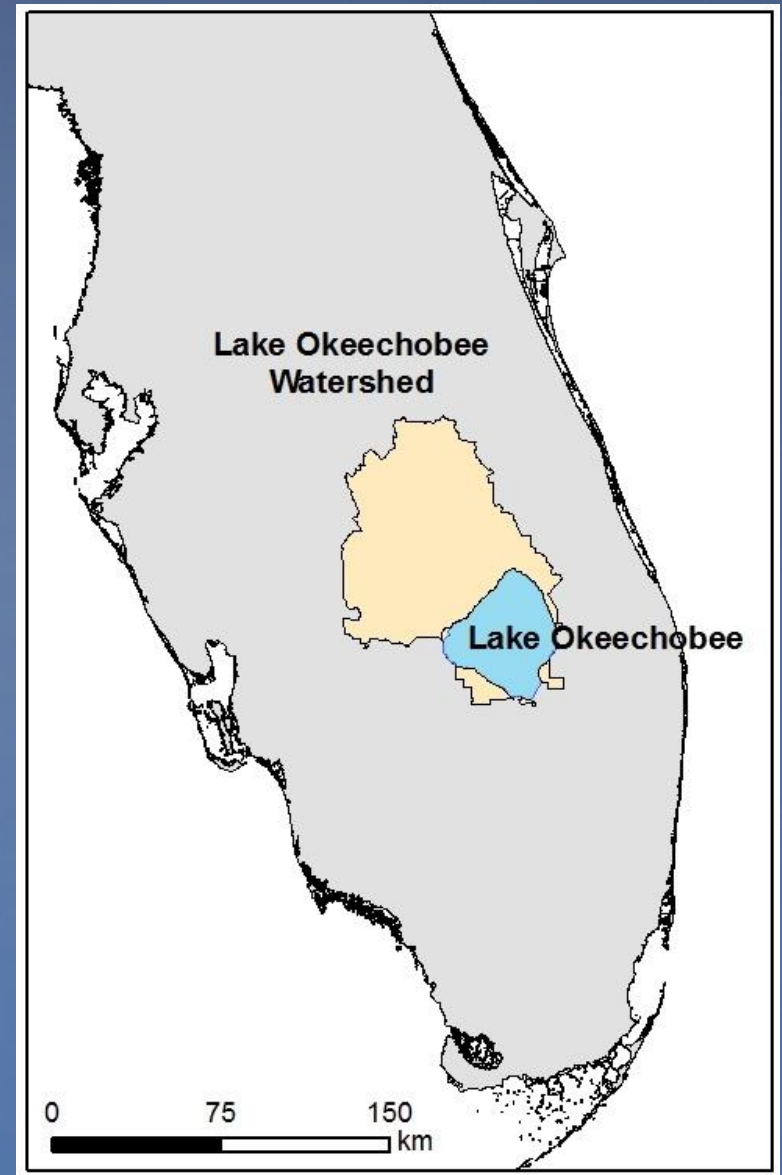
Chemical Treatment Systems

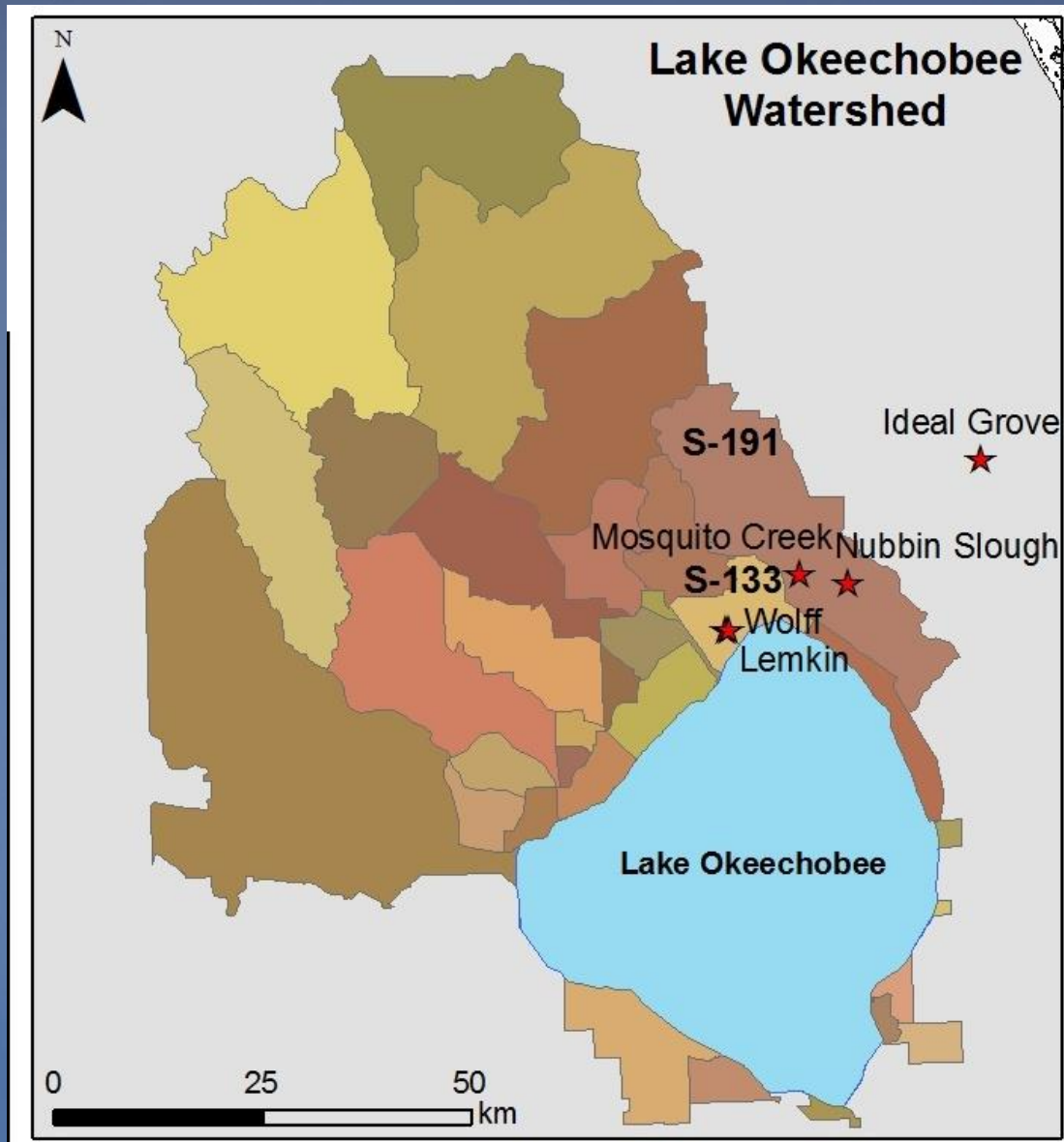
Capabilities and Constraints

- Can provide very effective P removal, and moderate N removal, depending on chemical speciation
- Constraints to surface water treatment
 - Coagulant (& buffer) costs are ongoing, and potentially are high
 - Temporal changes in water chemistry (rain event driven) can alter coagulant dose requirements
 - Effective downstream solids separation step required
 - Solid residuals (floc) must be utilized or disposed of
 - Concerns about impacts of coagulant residual ions (e.g. sulfate from alum)

HWTT systems were developed in part to deal with problematic watershed characteristics. For example, Lake Okeechobee (LO) receives a high P loading from improved pastures and dairies in the watershed

This represents a challenging situation for treatment wetlands, due to high P concentrations and loads, and pronounced dry season





HWT facility locations in the Lake Okeechobee watershed, funded by Florida Dept. of Agriculture and Consumer Services (FDACS)

Ideal Grove (1 cfs),
Lemkin Creek (5 cfs),
Nubbin Slough (6 cfs)
Mosquito Creek (6 cfs),
Wolff Ditch (20 cfs)
Grassy Island (30 cfs)



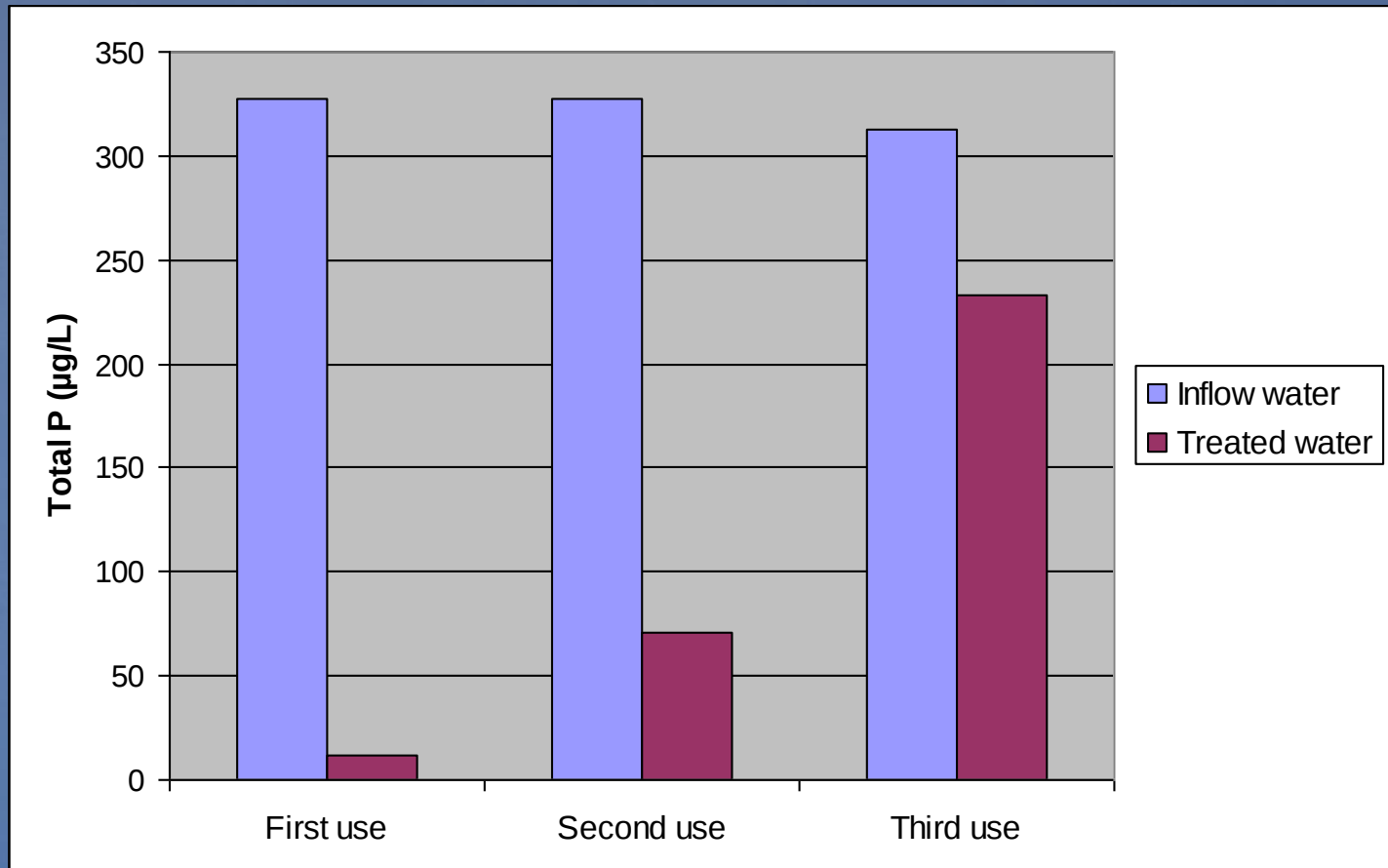
HWTT systems
utilize a chemical
treatment “front-
end”, followed by a
wetland unit process



Vegetation
provides:

- Attachment site for
“active flocs”
- Downstream
particle filtration

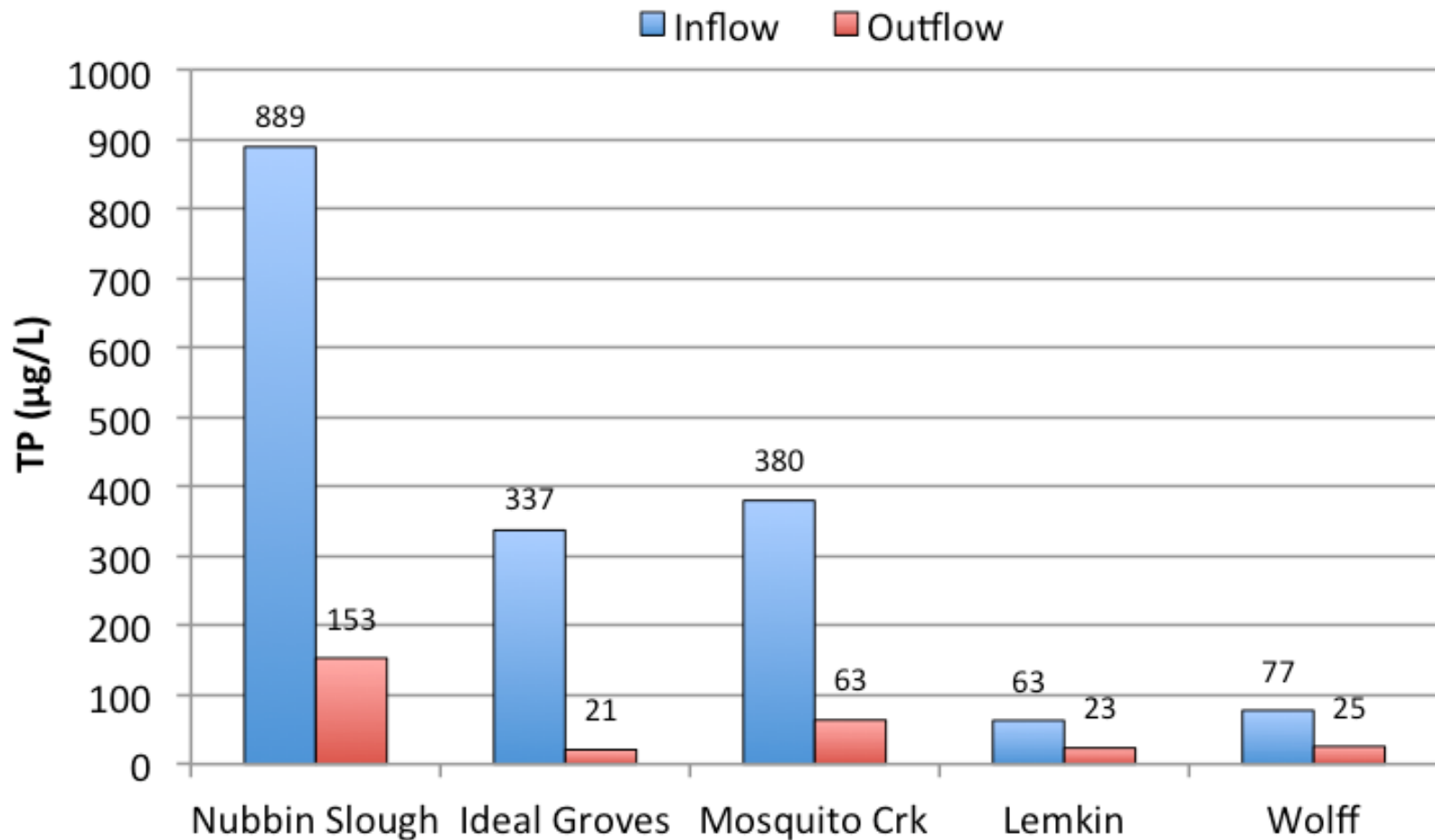
A prominent component of HWTT systems: exploiting the residual phosphorus removal capability of flocs



Several Design and Operational Factors Can be Adjusted to Optimize HWTT System Performance

- Optimization is accomplished by adjusting hydraulic retention time (area of wetland), vegetation type, and/or chemical dosing frequency/cycles
- Optimization may target minimizing outflow P concentrations and/or maximizing mass P removal rates
- Optimization also may focus on removal of other constituents (e.g., nitrogen)
- HWTT hydraulic retention time (and footprint) is much closer to that of a chemical treatment facility than a treatment wetland (i.e., HRT of days vs. weeks/months)

Mean inflow and outflow [TP] for selected HWT facilities



Proposed Approach for Trout Lake

- Trout Lake is on FDEP's verified list of impaired waters, with current total phosphorus loadings exceeding "allowable" loadings by approx. 2,000 lbs/yr
- Watershed Tech has been awarded funding from FDACS for establishing a HWTT facility at Trout Lake. The funding covers design, permitting, construction and initial operations.
- The City of Eustis is providing in-kind support in the form of a land parcel for establishing the facility. This will be a long-term lease between the local government and FDACS

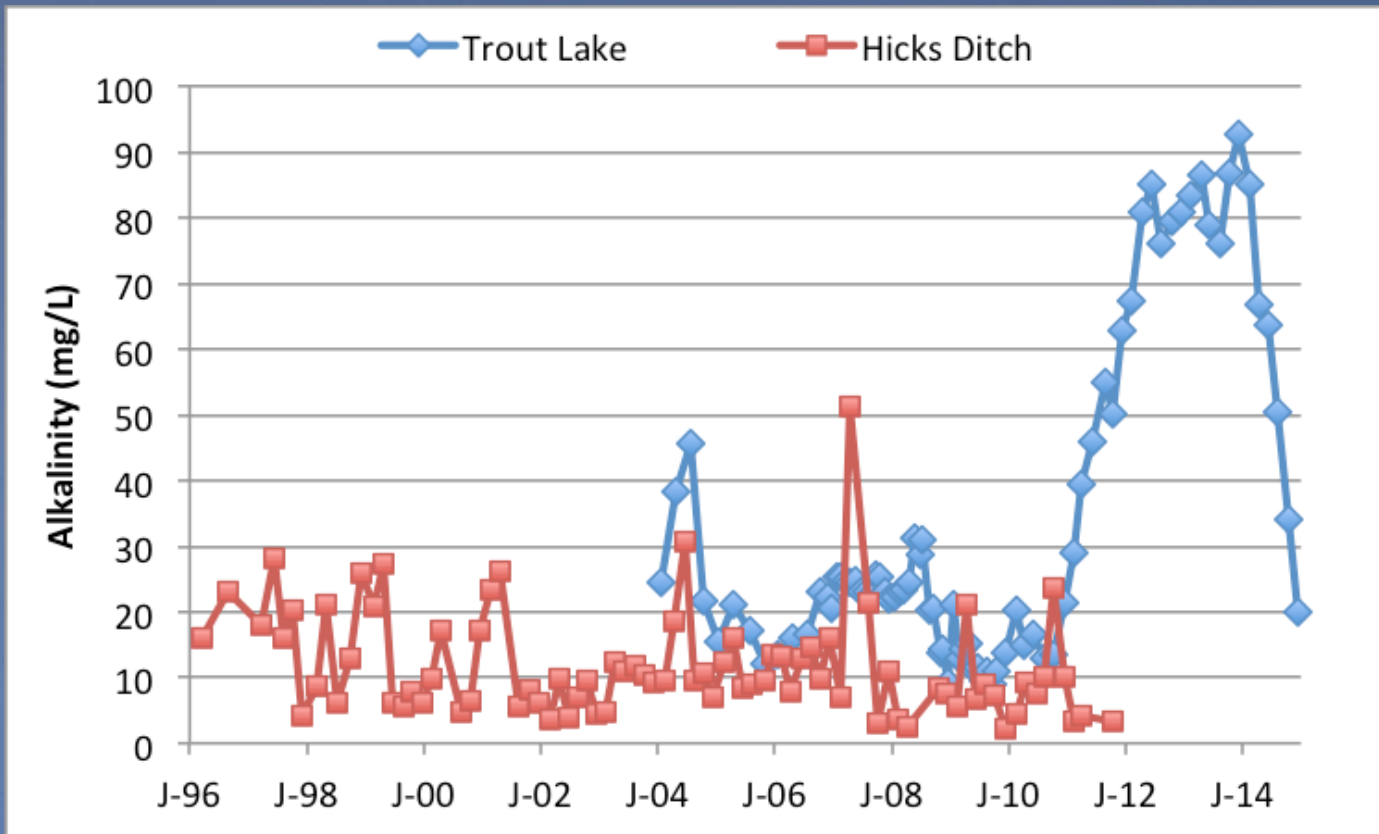
Proposed Location: Site of a former WWTP effluent storage pond. The facility would be designed to capture and treat wet season Hicks Ditch flows.



The facility also will treat Trout Lake waters during the dry season. Overall design/operations approach would be to remove > 2,000 lbs P/year, enabling Trout Lake to meet the TMDL target.

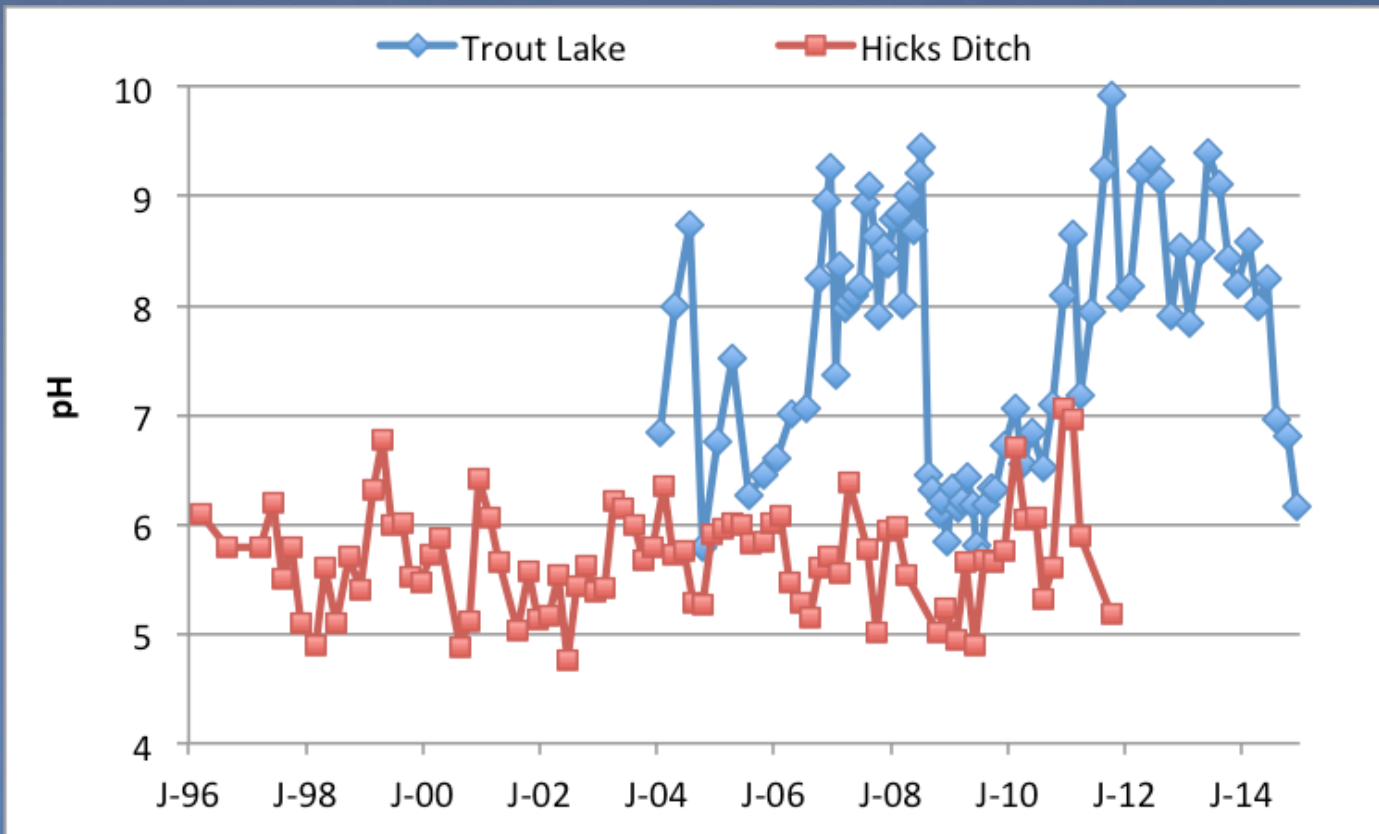


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Summary

- Benefits of deploying a HWT facility at Trout Lake:
 - Trout Lake should meet the phosphorus TMDL target and exhibit improved water quality
 - Reduced pollutant loadings to Lake Eustis
 - Effective partnership between Florida Department of Agriculture and Consumer Services, the City of Eustis, Watershed Technologies LLC and others (e.g., SJRWMD, LCWA, FDEP).