

The STA-3/4 Periphyton Stormwater Treatment Facility

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by:

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STA-3/4 PSTA Implementation Project

- **PSTA = Periphyton-based Stormwater Treatment Area**
- **Periphyton = algal community attached to surfaces**
- **SAV = Submersed aquatic vegetation**
- **Project constructed in western portion of STA-3/4 Cell 2B**
- **Encompasses 400 acres (162 ha)**
 - **Upper SAV Cell = 200 acres (81 ha)**
 - **Adjacent Lower SAV and PSTA Cell = each 100 acres (40 ha)**
- **Removed soil down to caprock in the PSTA Cell, floor elevation ~ 2 feet lower in PSTA Cell => reduce P flux from old agricultural soil**

STA-3/4 PSTA Implementation Project

- **Project planning initiated - June 2003**
- **Design completed - December 2003**
- **Construction started - March 2004**
- **Infrastructure construction substantially complete - July 2005**
- **Outflow from PSTA Cell initiated - June 2006**
- **Cost ~ \$3.5M (capital items) + additional ongoing operating & monitoring costs**

District PSTA Platforms (1997 – 2010)

- Raceways (troughs @ 9 cm D x 1 ft W x 100 ft L)



- Mesocosms (tanks @ 10 – 60 cm D x 1 m W x 6 m L)



District PSTA Platforms (cont.)

- **ENRP Test Cells (each @ 0.5 ac)**



- **Field-scale Cells (each @ 5 ac)**



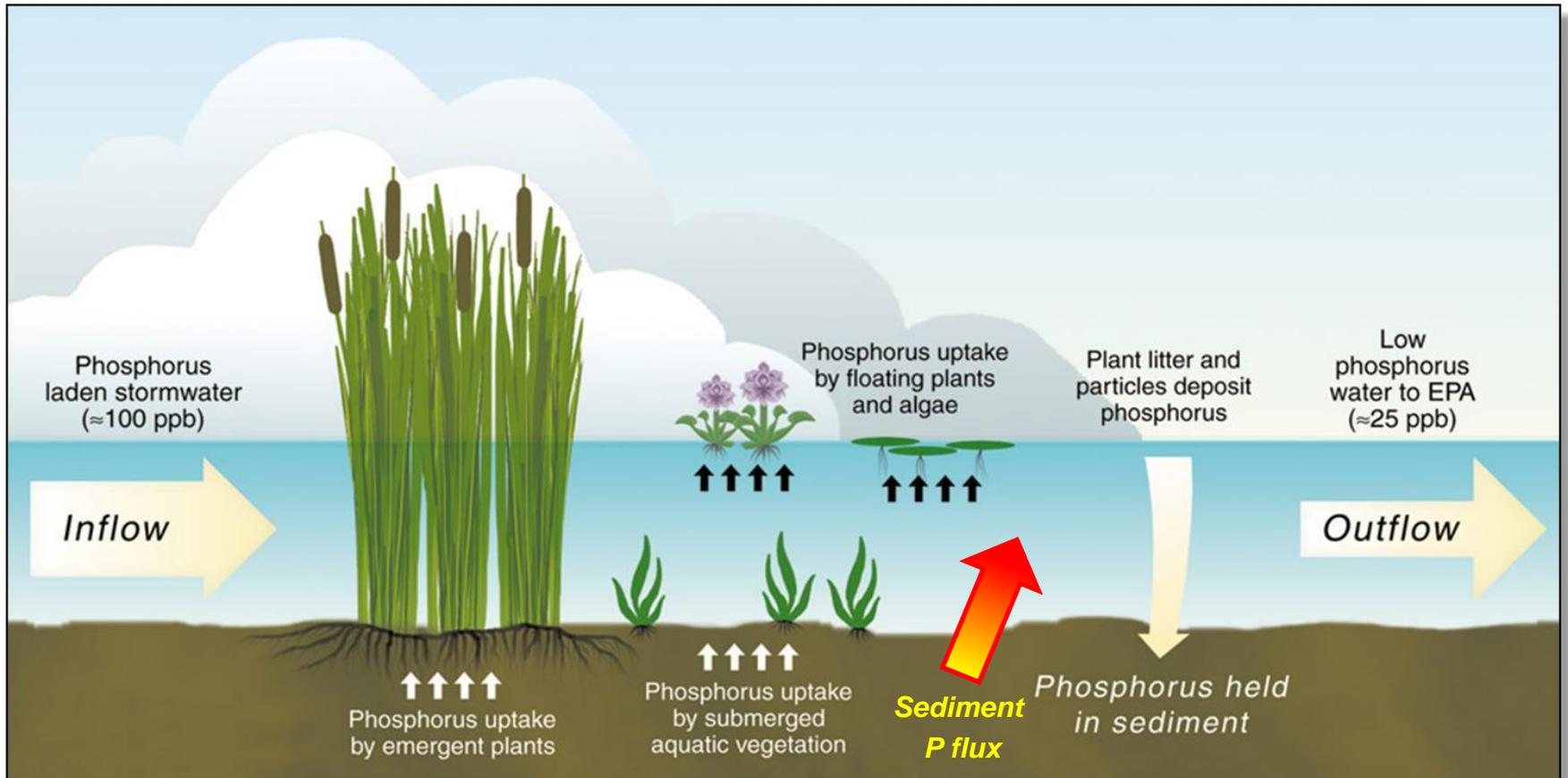
District PSTA Platforms (cont.)

- **STA-3/4 PSTA Cell (100 ac – a full scale project)**

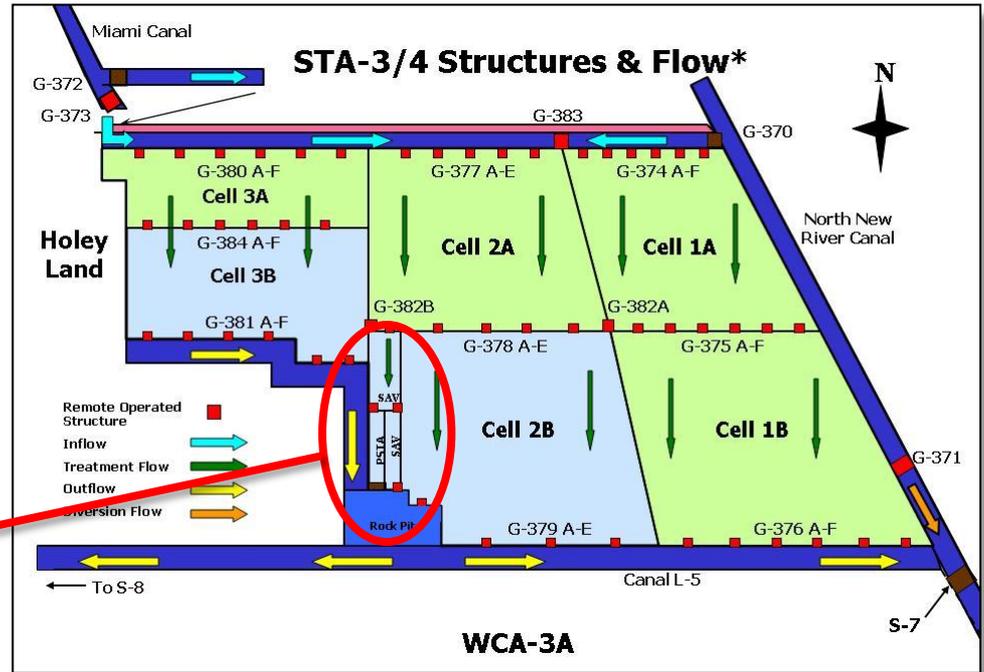
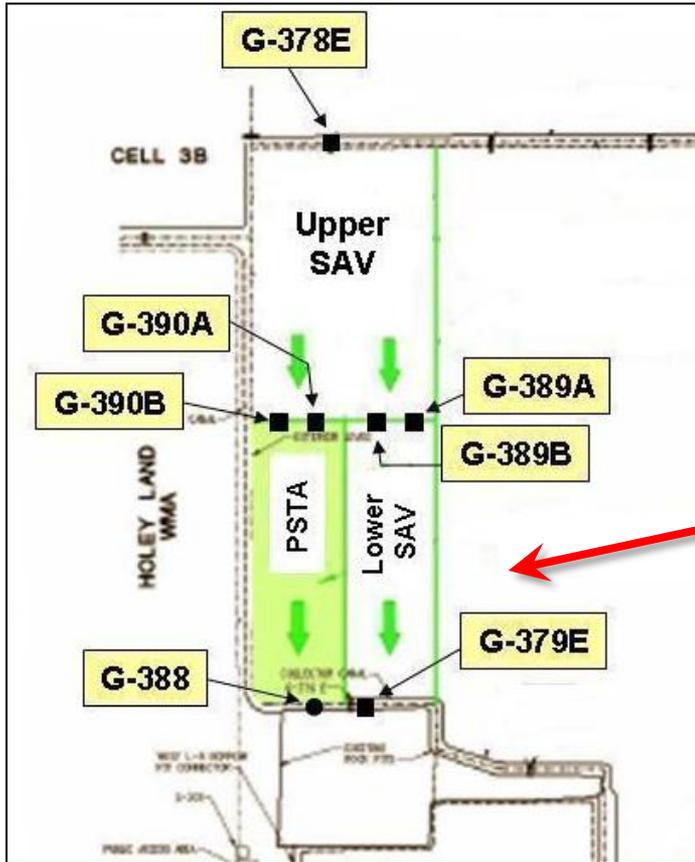


Stormwater Treatment Areas 101

- Physical, chemical and biological P removal processes
- Outflow TP equilibrium between P removal processes & sediment P flux back to water column



Location of STA-3/4 PSTA Implementation Project

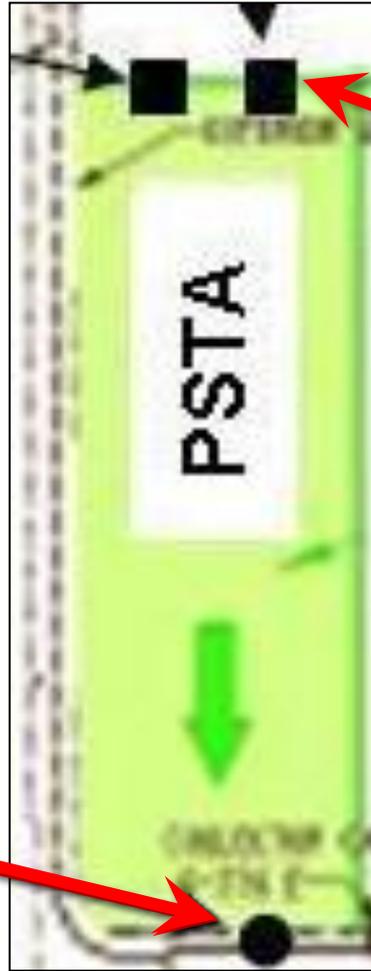


- Upper SAV Cell = 200 acres
- Lower SAV & PSTA Cell = 100 acres

PSTA Cell Water Control Structures

- Peat removed down to caprock
- Avg. depth ~ 2 ft
- Target HRT ~ 5 day

Outflow Pumps (G-388)



Inflow Gates (G-390A & B)

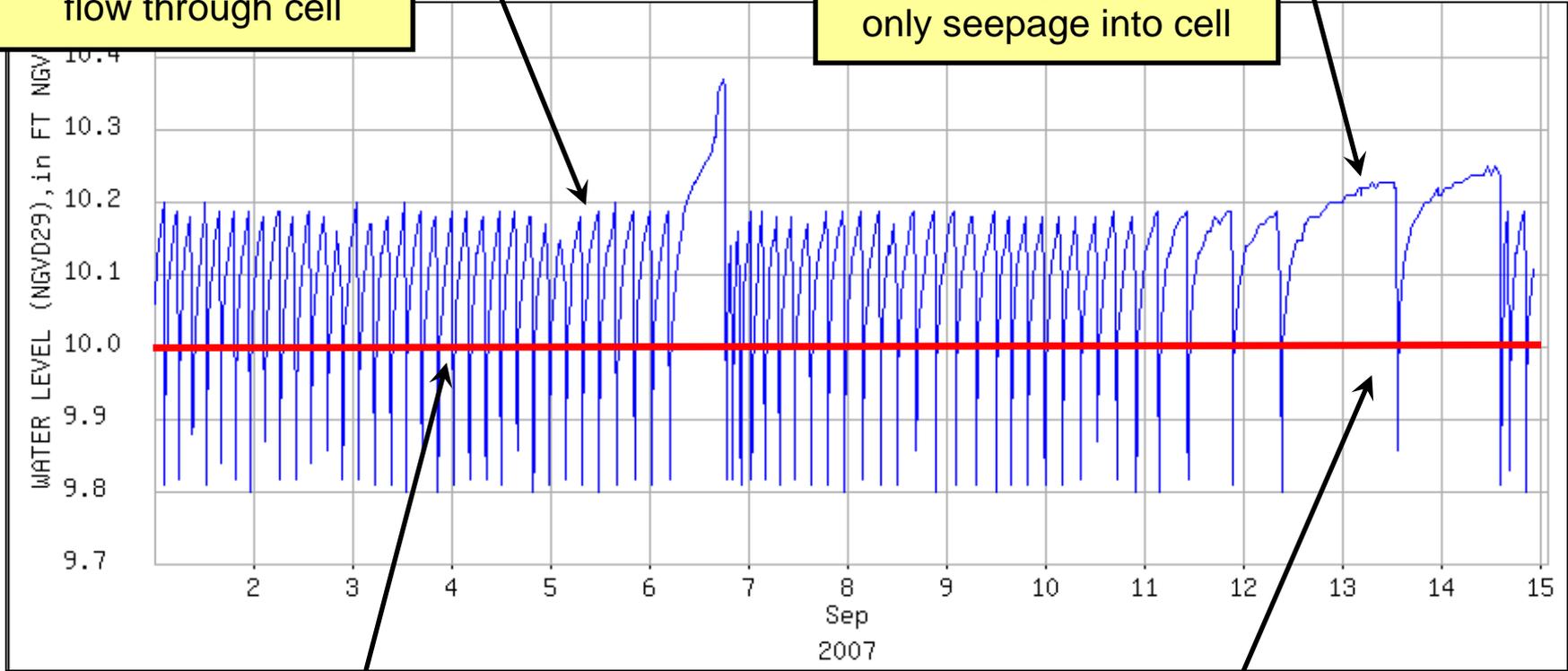
Outflow Pump Station Operation

- **Needed to maintain shallow depth in PSTA Cell**
- **Two 100 cfs electric pumps (42 inch diameter)**
- **Pumps operated in automatic mode, triggered by a float switch that tracks stage in PSTA Cell**
- **Pumps turn on at stage = 10.25 ft NGVD and off when stage = 9.75 ft NGVD, water depth oscillates**
- **Average cell depth ~ 2 feet**
- **Nominal hydraulic retention time in PSTA Cell: ~ 5 days**
 - **Controlled by adjusting inflow gate openings**

Outflow Pump Station Headwater Stage

G-390A&B gates open,
flow through cell

G-390A&B gates closed,
only seepage into cell



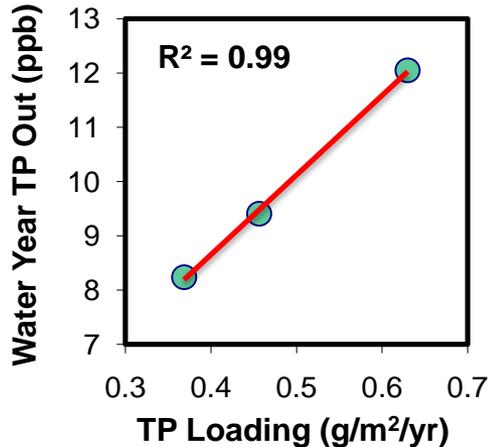
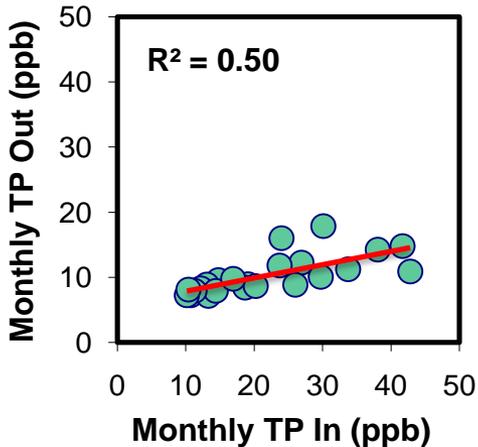
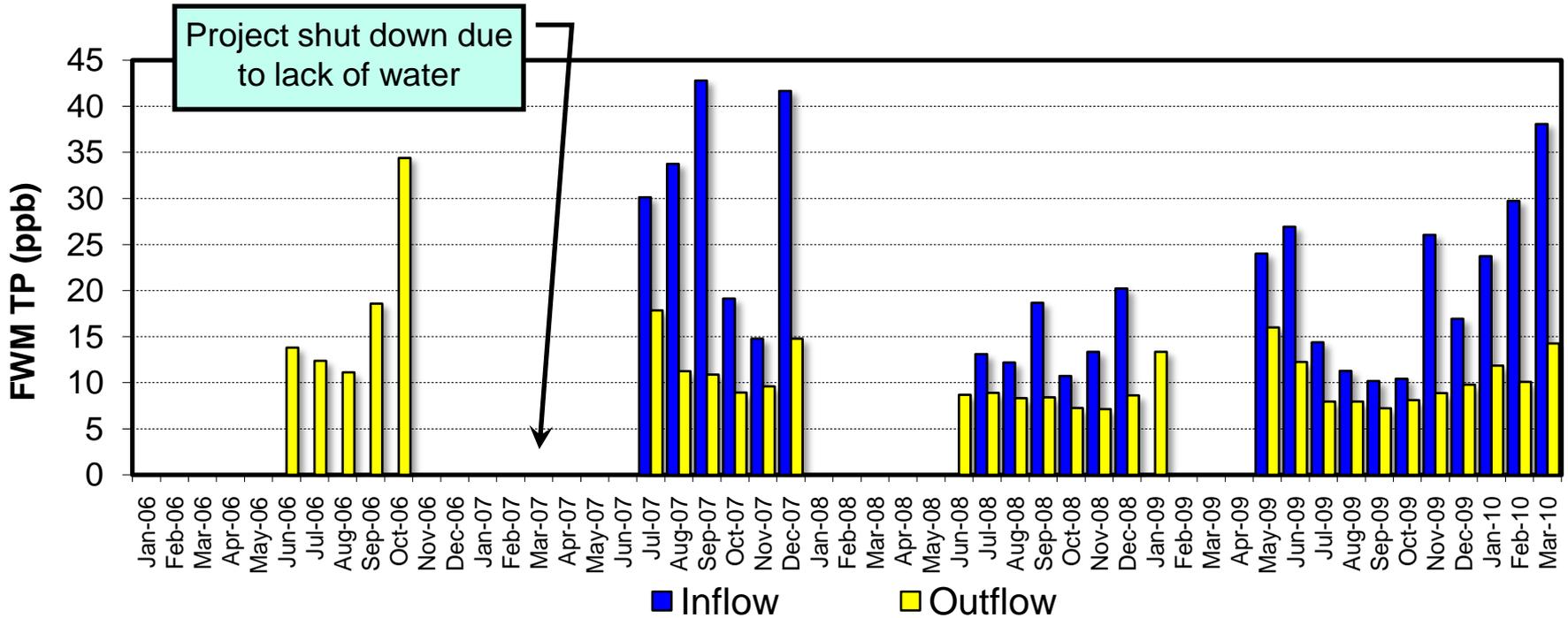
Cell ~ 2 ft deep
@ mean stage

Pump frequency varies with volume
of cell inflow from gates/seepage

Veg strips in lower SAV and PSTA Cells



Surface Inflow/Outflow POR TP



	Outflow FWM TP (ppb)	Surface TP Loading (g/m²/yr)	Outflow (ac-ft)
WY2007	16	-	2,203
WY2008	12	0.630	5,201
WY2009	8	0.368	6,583
WY2010*	9	0.456	9,682

* data for water year not complete

Next Steps

- **Analyze relevant water quality, hydraulic and operations data from all PSTA platforms**
- **Develop a consolidated report summarizing the current scientific understanding of PSTA and implementation options**
- **Pursue engineering and construction feasibility of large-scale implementation options**