The Orlando Easterly Wetlands: Strategies for Prolonging Phosphorus Removal

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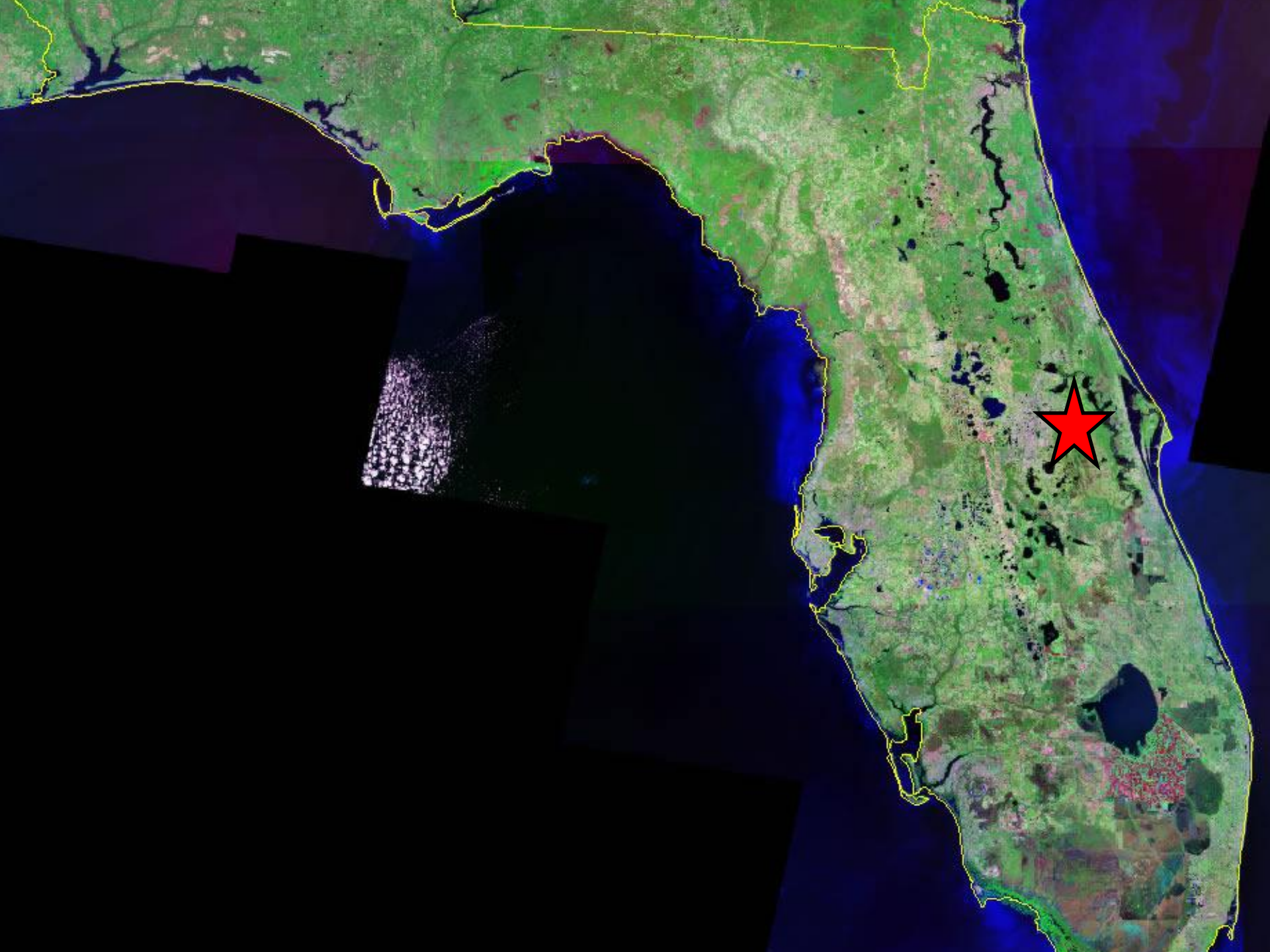
Wetlands Manager



Orlando Easterly Wetlands

Went on-line in July of 1987
Constructed on cattle pasture property.

Design Parameters

- 486 hectare (1,200 acre) surface water treatment wetlands
- 18 Treatment Cells
- Over 2,000,000 aquatic plants 200,000 trees were installed.
- 27 km (17 mile) 107 cm (42”) Transmission Pipeline
- 30-40 days detention time
- 3 meter (15 foot) drop in elevation across the OEW
- The system designed to treat 20 MGD
- Rerated to handle 35 MGD
- Soon to Rerate to 40 MGD and possibly higher

Primary Deep Marsh Species: Cattails and bulrush

Typha latifolia & domingensis

Schoenoplectus californicus

Mixed Marsh Habitat

Costs

Total Land Area: 667 hectares (1,650 acres)
Constructed Wetland Area: 486 hectares (1,200 acres)

Wetlands Development Costs (1986/87)

Total.....$21,525,000

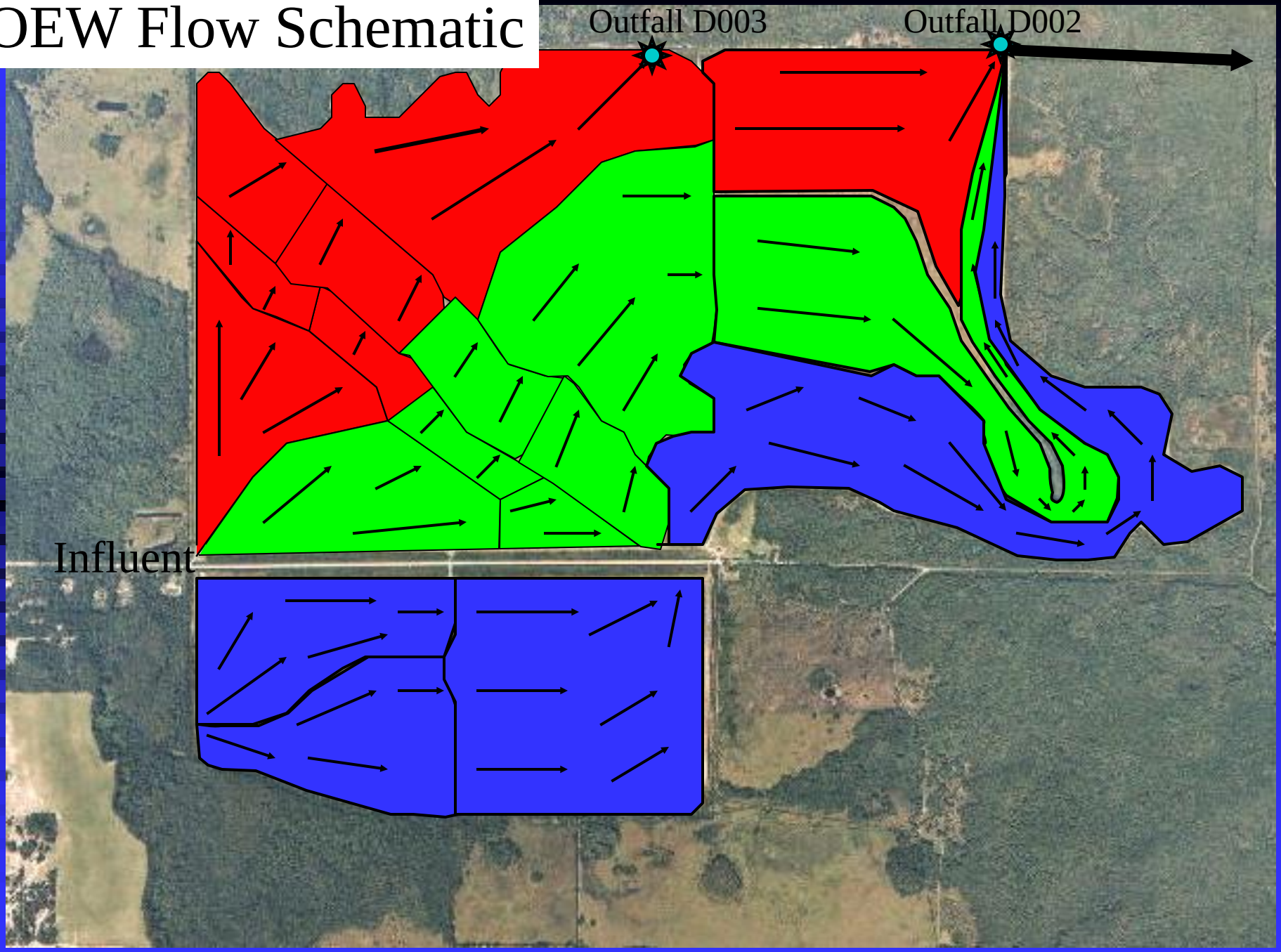
Wetlands Operational Costs (2011/12)

Total…….$430,214

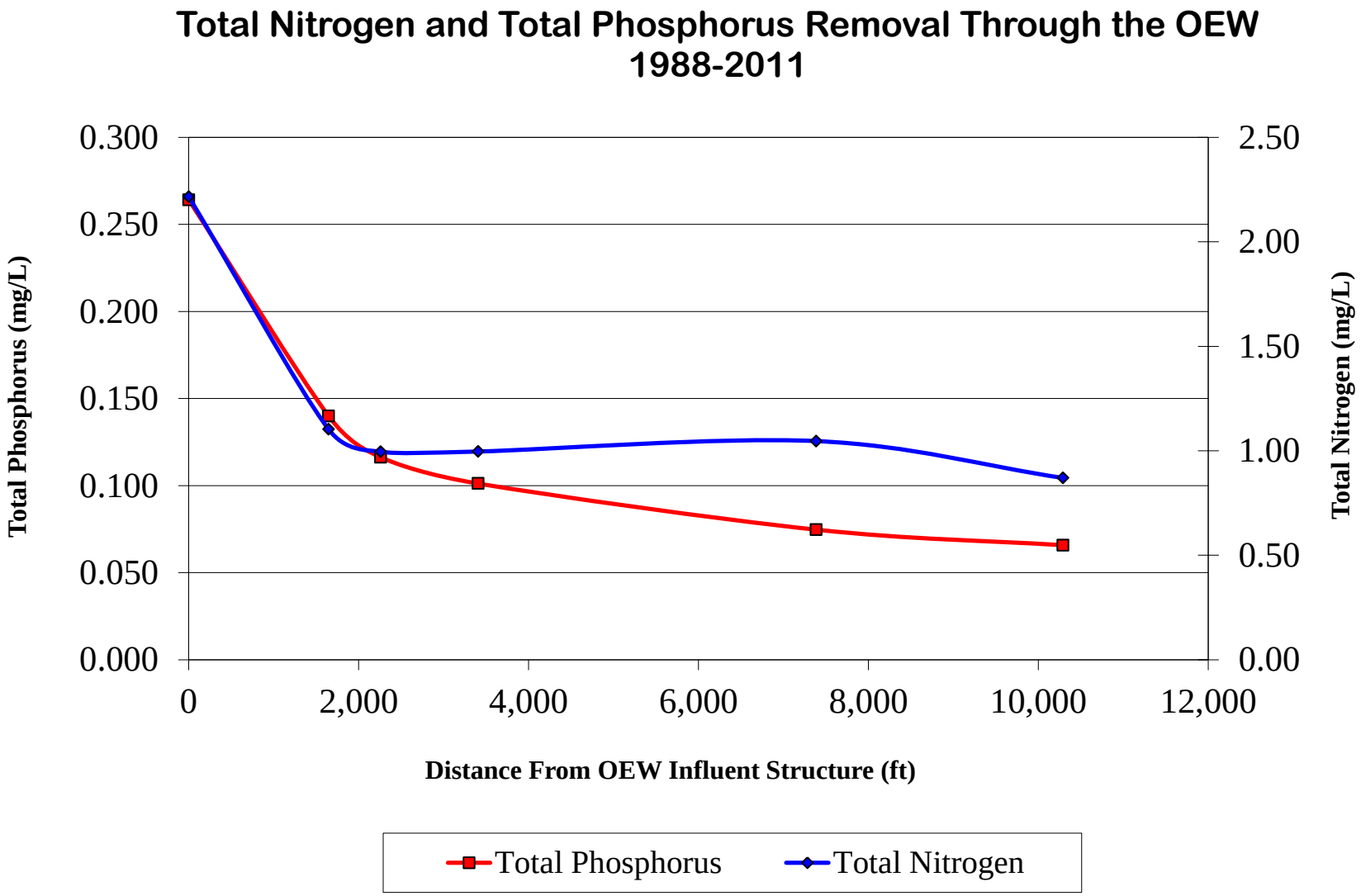
2012 Wetlands Treatment System Cost
(cost to treat reclaimed water within wetlands system) $0.08 per 1,000 gallons

2012 Iron Bridge Wastewater Treatment Facility Cost
(cost to treat raw wastewater at treatment plant) $1.34 per 1,000 gallons

OEW Flow Schematic



OEW Water Quality Performance Profile



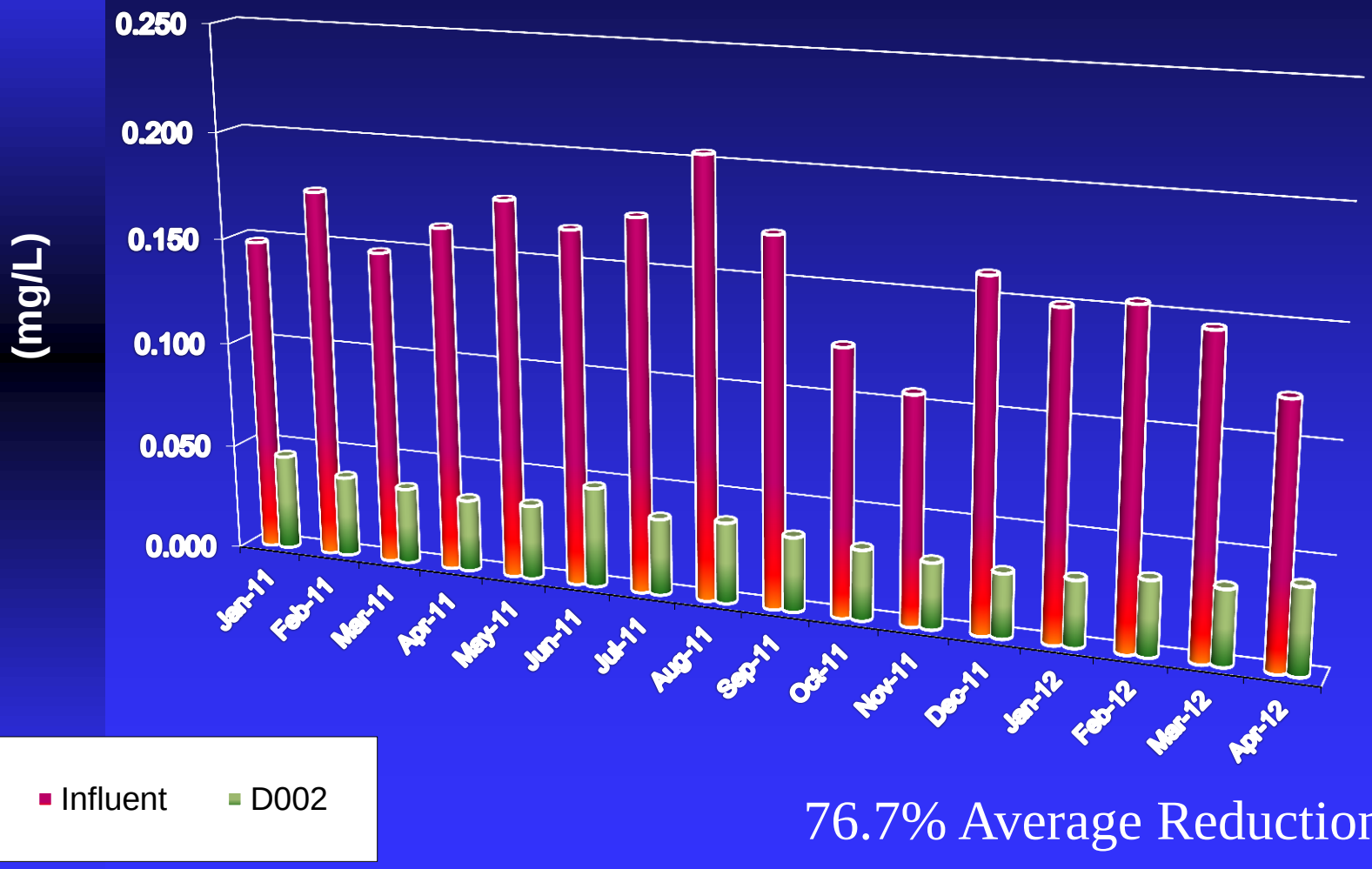
TP Loading Rates

$g/m^{-2}/yr$

1991	9.030	2001	10.965
1992	10.039	2002	6.759
1993	8.117	2003	6.126
1994	8.160	2004	7.106
1995	8.502	2005	8.754
1996	6.412	2006	5.857
1997	6.332	2007	8.419
1998	7.425	2008	7.856
1999	11.942	2009	7.708
2000	9.062	2010	8.510
		2011	9.009

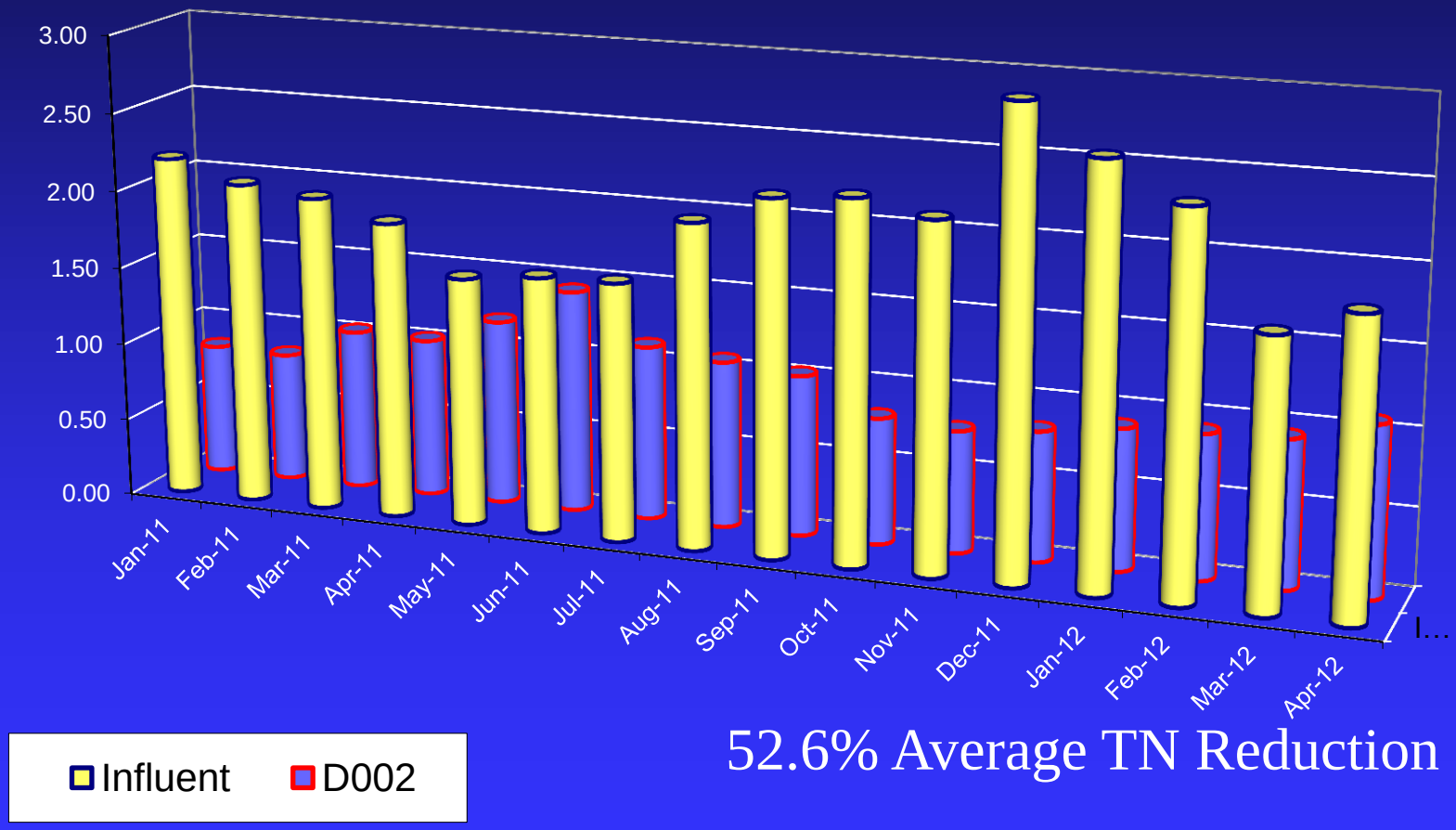
Average Loading = 8.338

Total Phosphorus



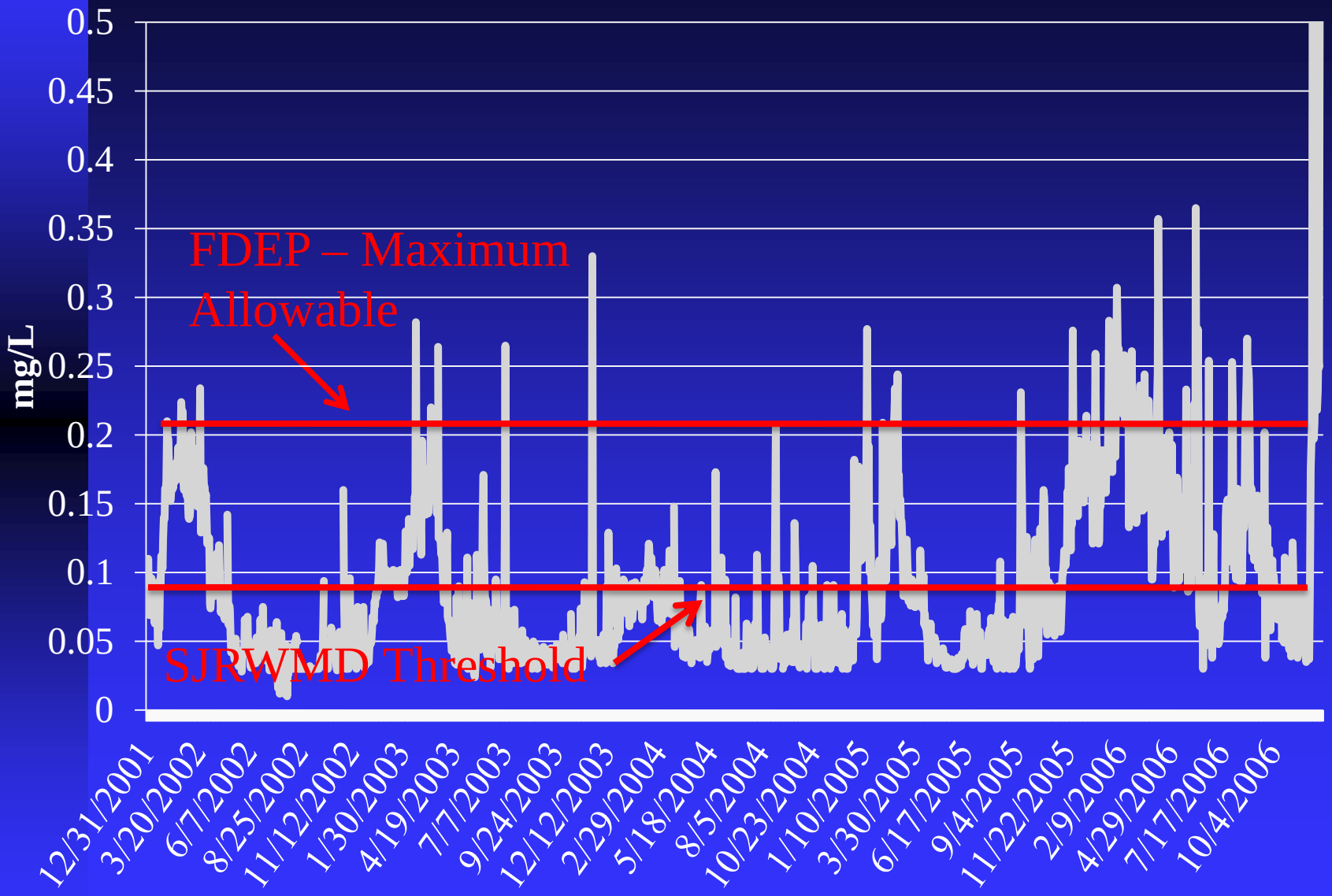
76.7% Average Reduction in TP

Total Nitrogen



52.6% Average TN Reduction

Historical Total Phosphorus at Wetlands Discharge

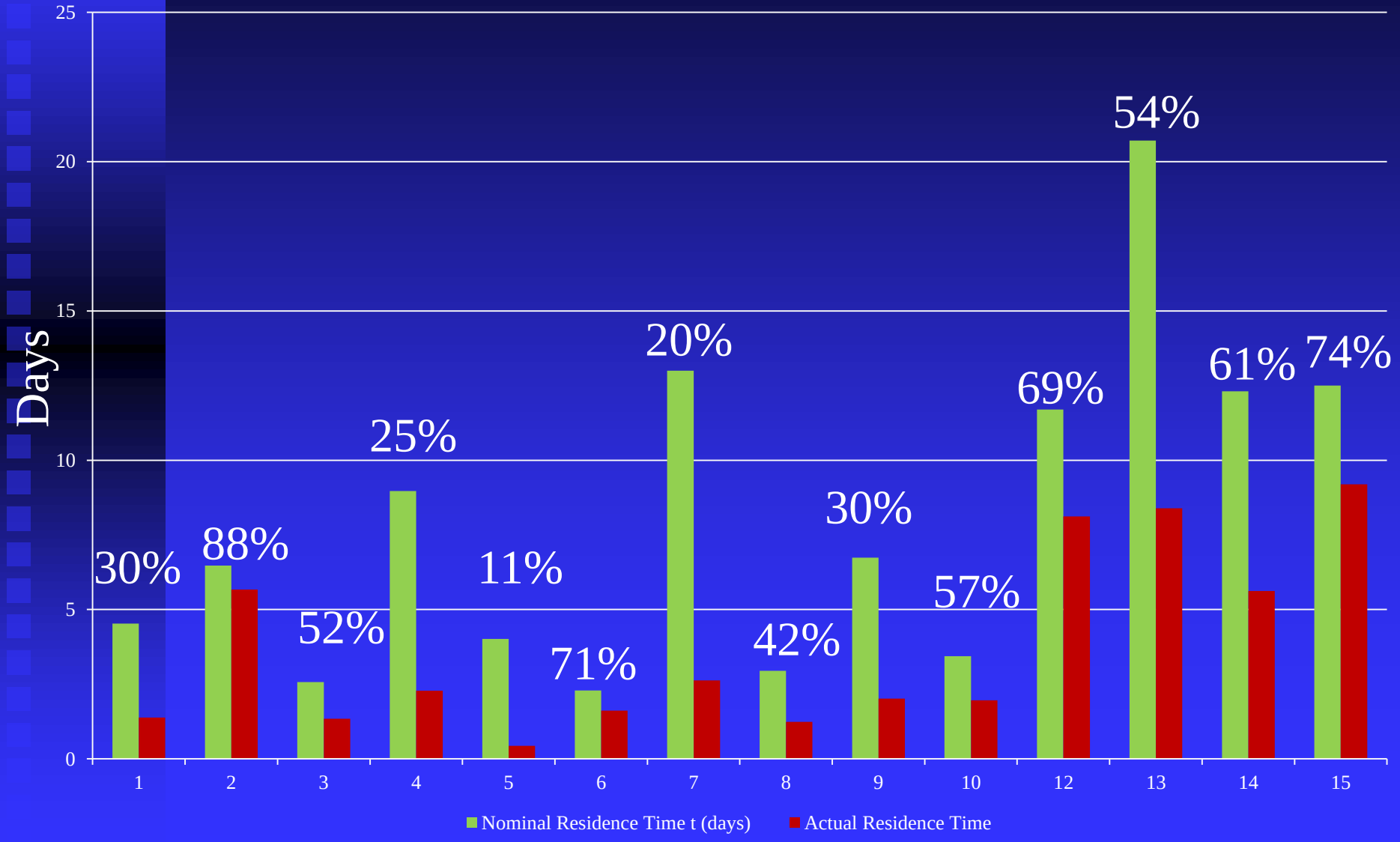


The Problem

- Phosphorus Buildup
- Organic Material
- Flow Channeling
- Rapid Deposition Rates

Hydraulic Efficiencies

Adapted from: ANALYSIS OF HYDRAULIC PERFORMANCE OF THE ORLANDO EASTERLY WETLAND CELLS: TRACER STUDY RESULTS - Final Summary Report, University of Florida, Christopher J. Martinez, William R. Wise



Management Techniques at the OEW

- Targeted Herbicide Applications
- Burning to Reduce Biomass
- Dry-Downs for Sediment Consolidation
- Muck / Sediment Removal
- Targeted Chemical Amendments for P Immobilization

Fire as a management tool in *Typha* dominated areas

- Removes dead biomass
- Improves wildlife habitat
- Discourages undesirable vegetation

Does it improve P removal from water??

Cell 8 – before burn

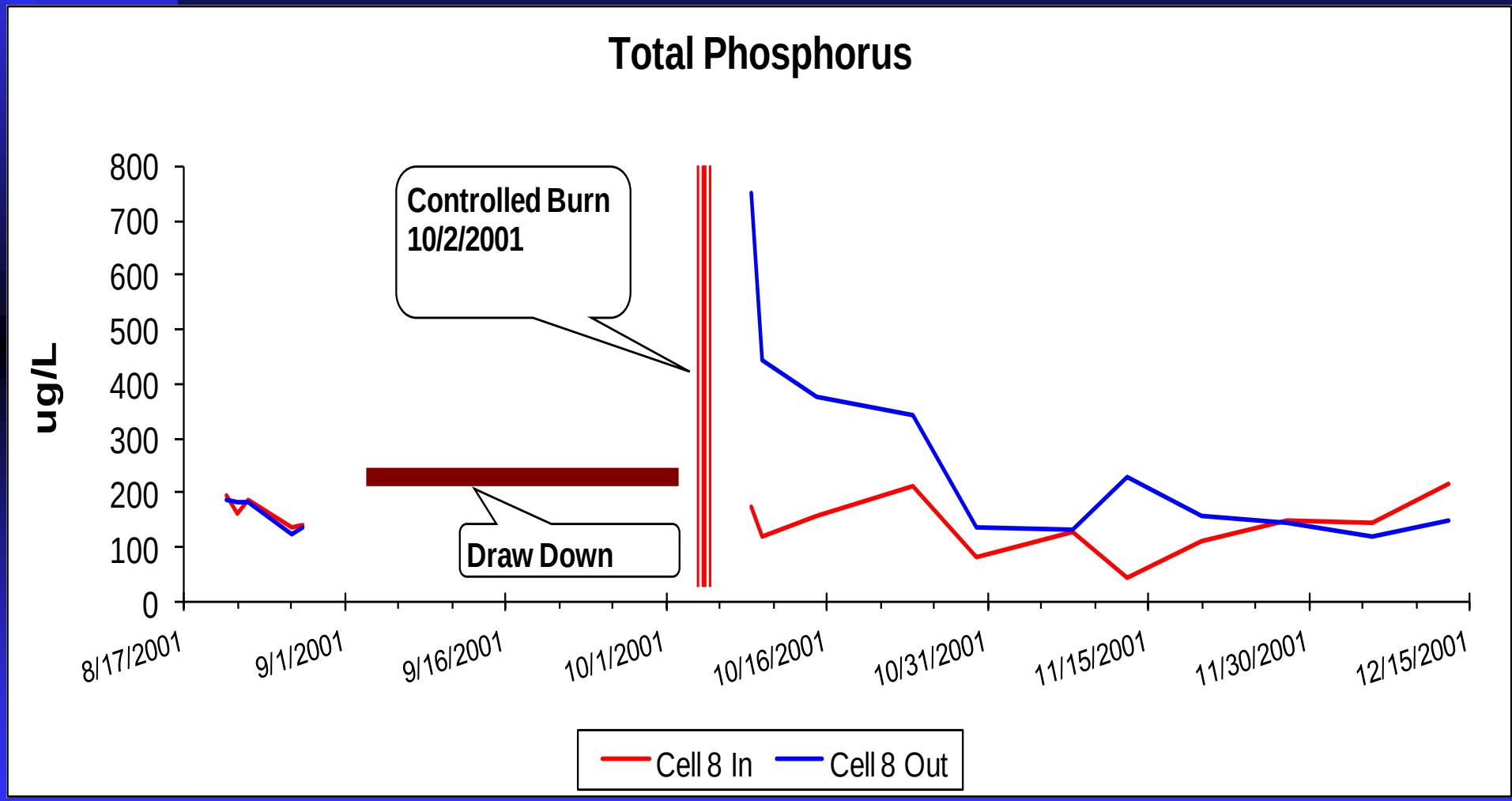
The Terra Torch is the “Nut”

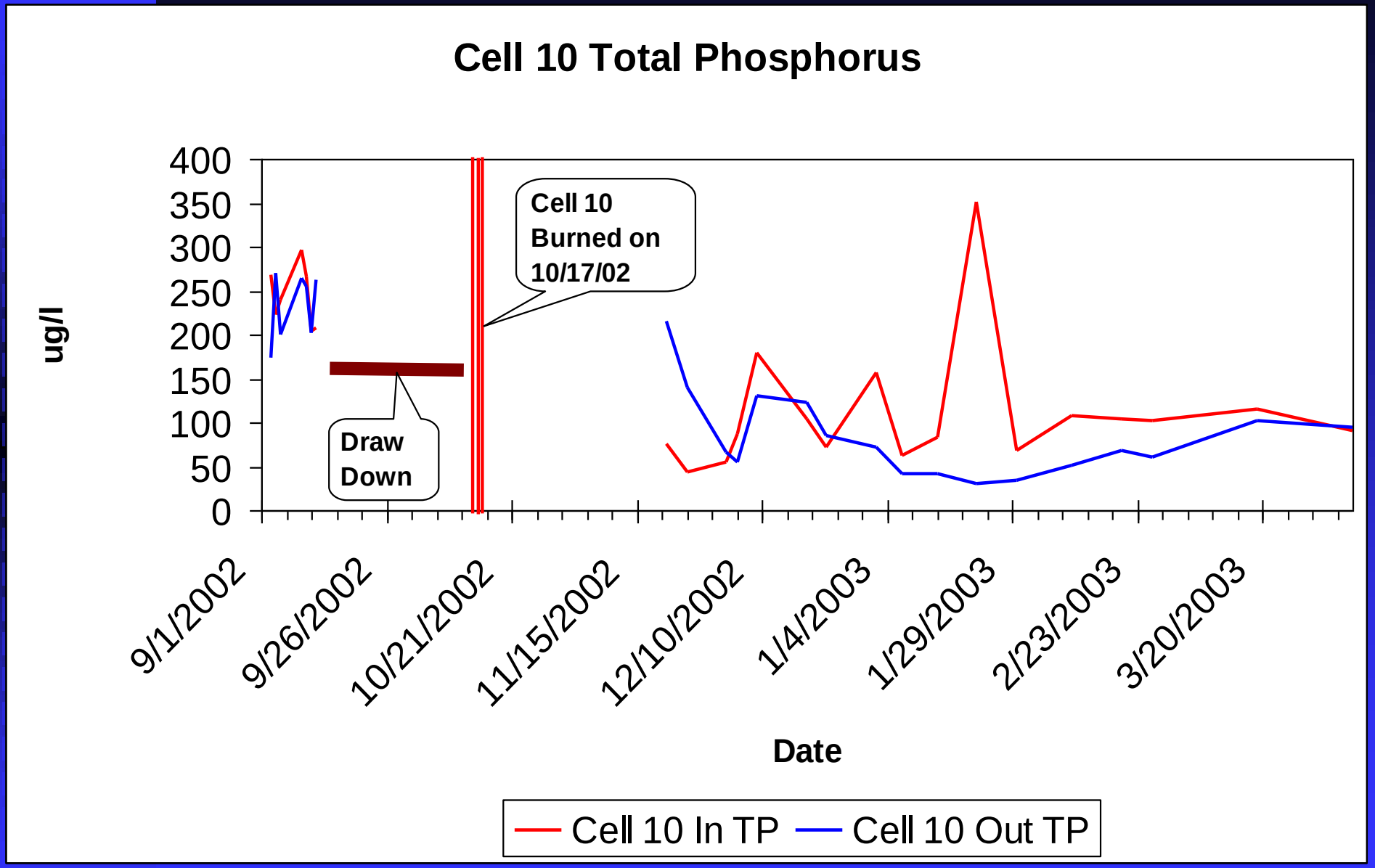

3 Days Post Burn
10. 5. 2001


10 Days Post Burn
10.15.2001

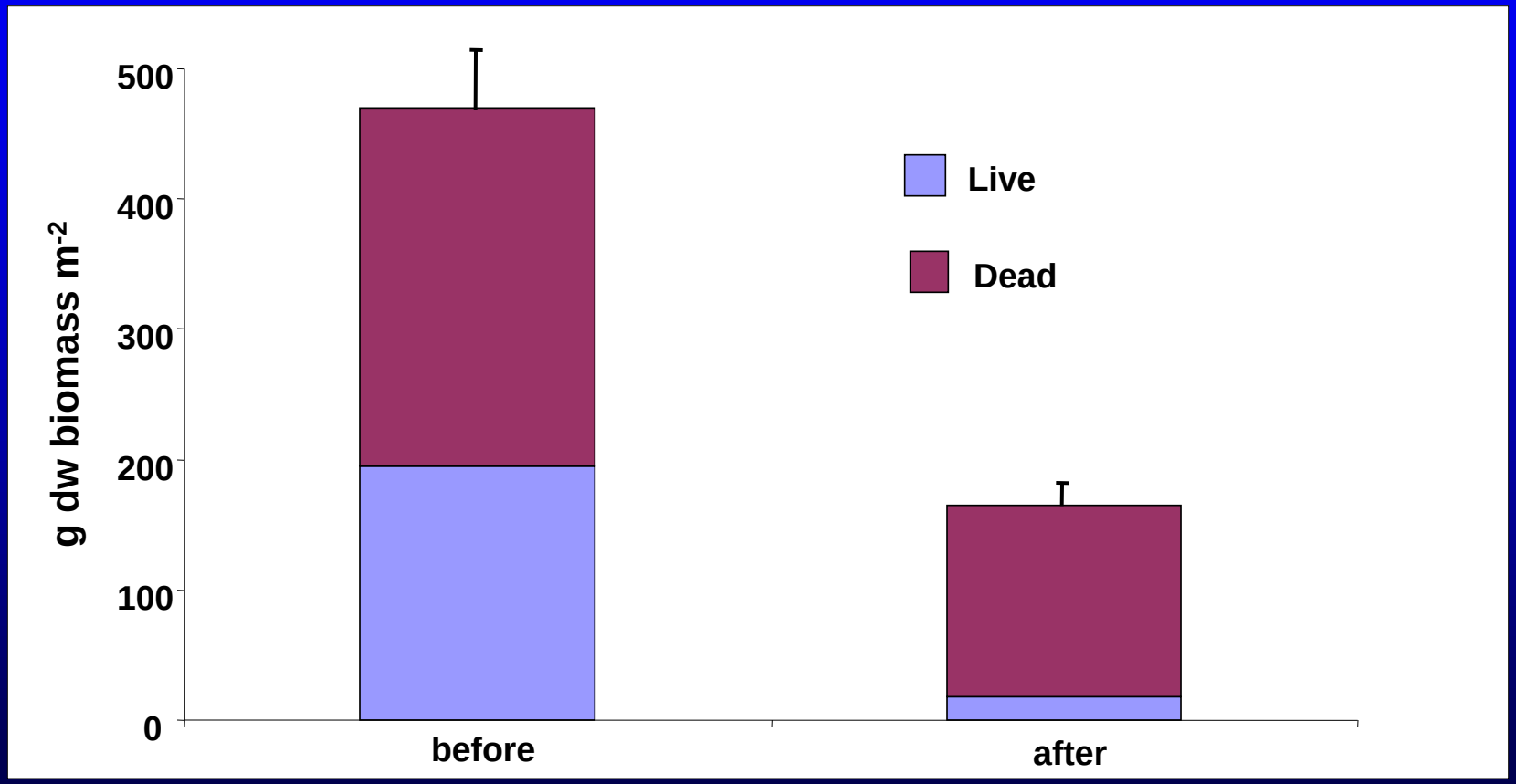
One Month Post Burn


2 Months Post Burn
11. 28. 2001


Total Phosphorus
ug/L
800
700
600
500
400
300
200
100
0
Controlled Burn
10/2/2001
Draw Down
8/17/2001
9/1/2001
9/16/2001
10/1/2001
10/16/2001
10/31/2001
11/15/2001
11/30/2001
12/15/2001
Cell 8 In
Cell 8 Out


Cell 10 Total Phosphorus
ug/l
400
350
300
250
200
150
100
50
0
Cell 10
Burned on
10/17/02
Draw
Down
9/1/2002
9/26/2002
10/21/2002
11/15/2002
12/10/2002
1/4/2003
1/29/2003
2/23/2003
3/20/2003
Date
Cell 10 In TP
Cell 10 Out TP

Above Ground Biomass Reductions



The Short-Term Eff ects of Prescribed Burning on Biomass Removal and the Release of Nitrogen and Phosphorus in a Treatment Wetland. **J. R. White, L. M. Gardner, M. Sees, R. Corstanje.** Published in J. Environ. Qual. 37:2386–2391 (2008).

When controlled burns are not effective……
When the wetlands have transitioned into woody vegetation…..Then it is time to DEMUCK!

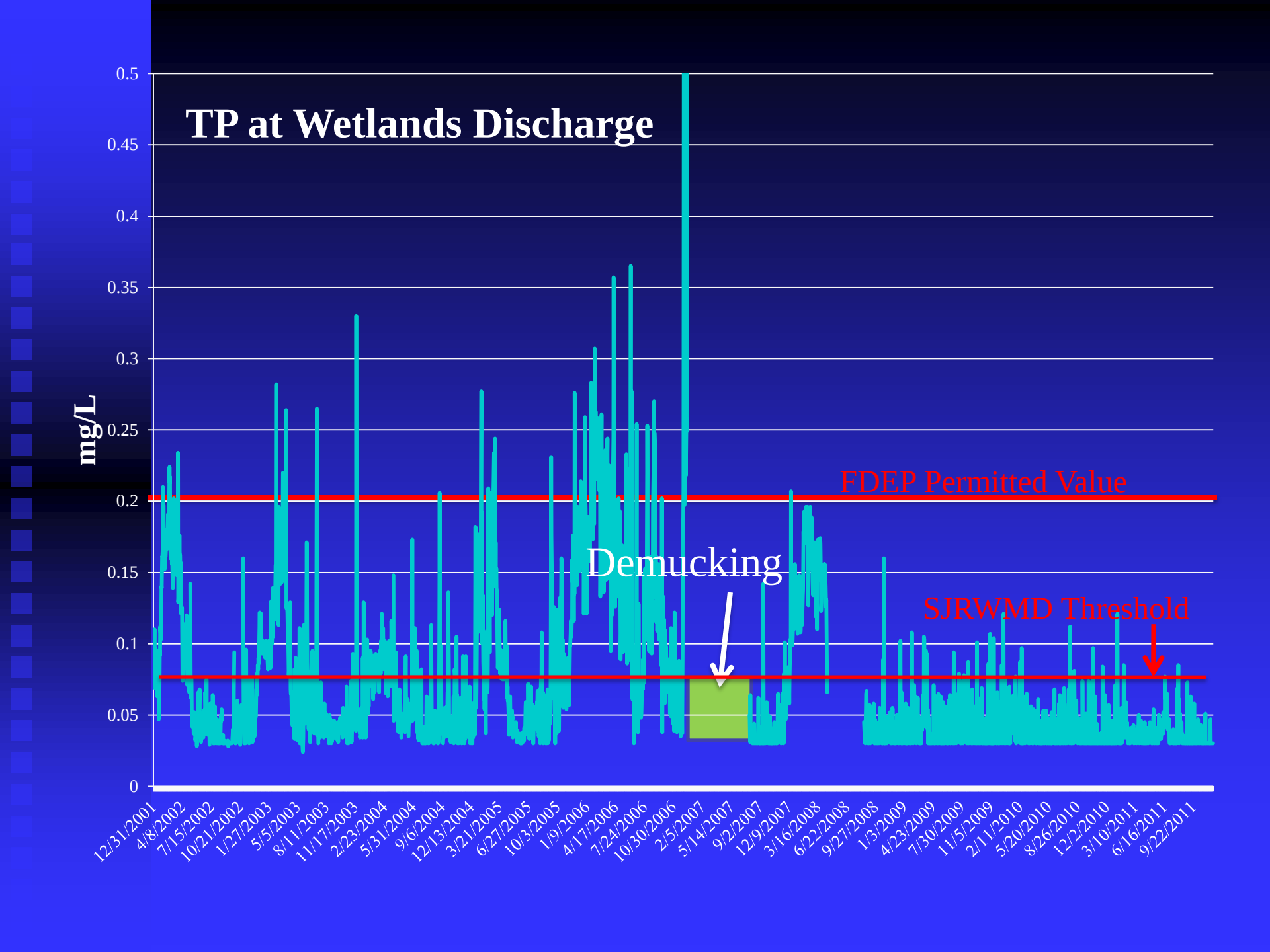
Muck Removal - Day 1


CAT
CAT

Muck Removal – 4 Treatment Ponds - 90 acres

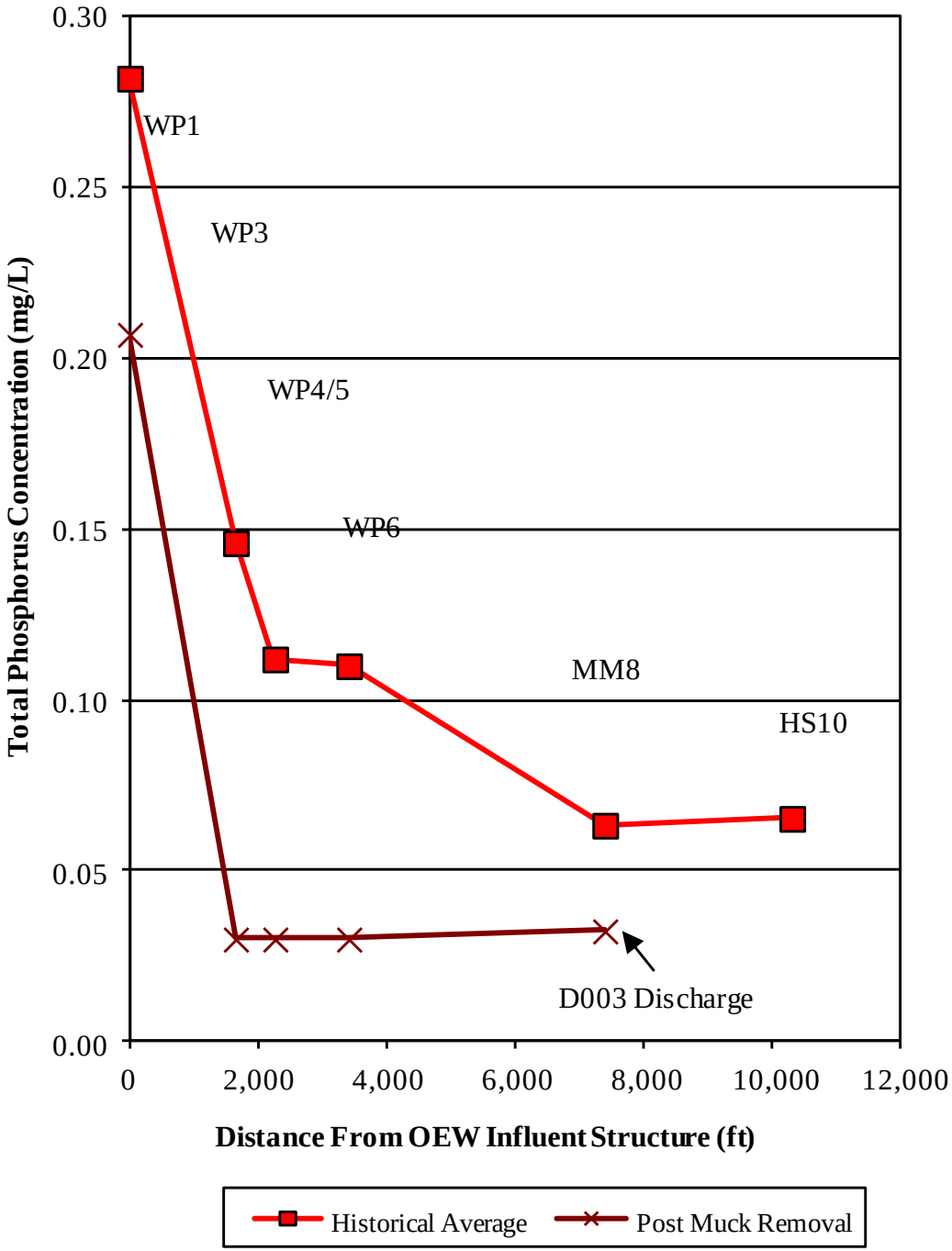
Muck Removal – Day 160

Demucking is Complete

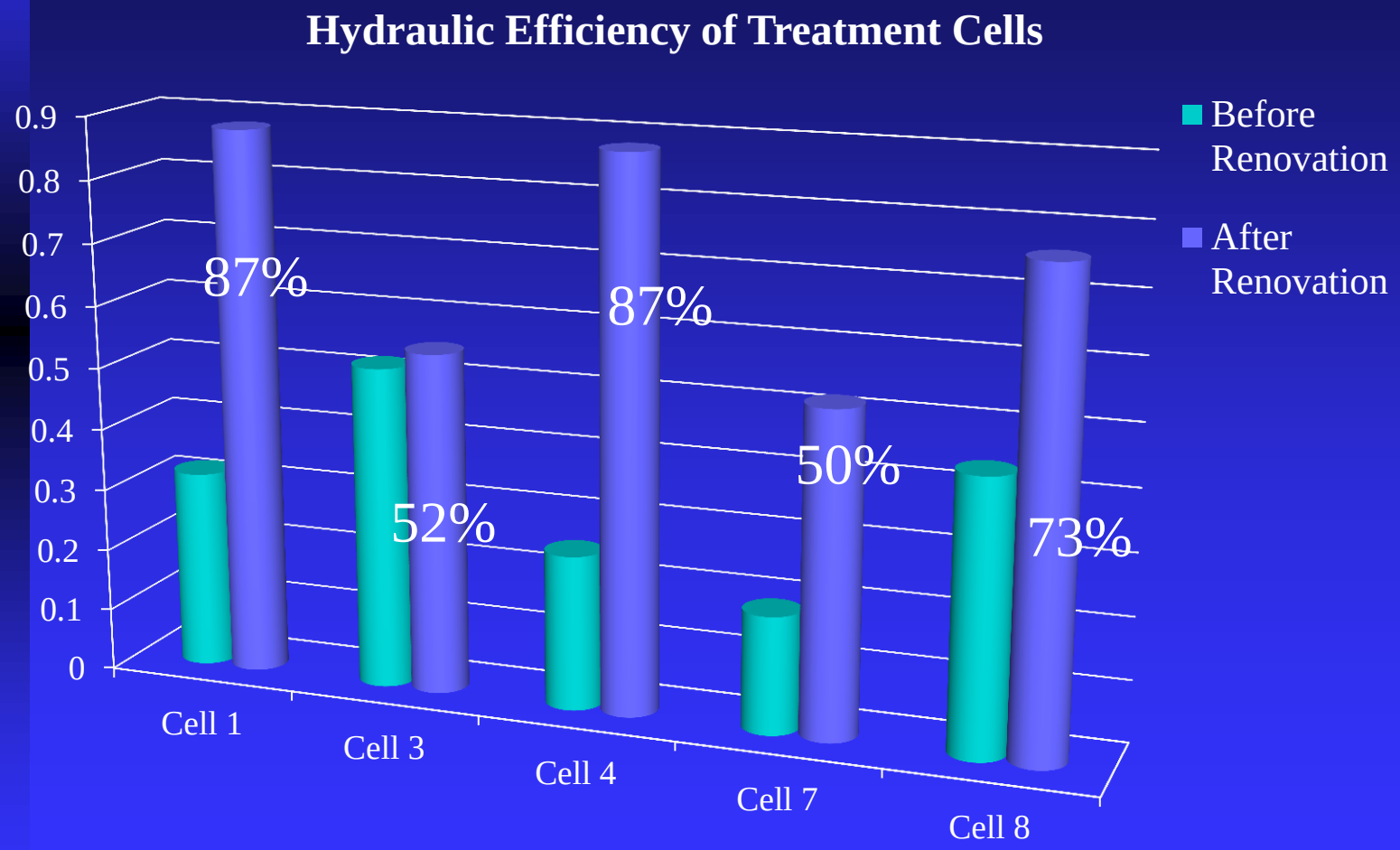

TP at Wetlands Discharge
mg/L
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
FDEP Permitted Value
Demucking
SJRWMD Threshold
12/31/2001
4/8/2002
7/15/2002
10/21/2002
1/27/2003
5/5/2003
8/11/2003
11/17/2003
2/23/2004
5/31/2004
9/6/2004
12/13/2004
3/21/2005
6/27/2005
10/3/2005
1/9/2006
4/17/2006
7/24/2006
10/30/2006
2/5/2007
5/14/2007
9/2/2007
12/9/2007
3/16/2008
6/22/2008
9/27/2008
1/3/2009
4/23/2009
7/30/2009
11/5/2009
2/11/2010
5/20/2010
8/26/2010
12/2/2010
3/10/2011
6/16/2011
9/22/2011

Muck Removal Performance

The Demucking has rejuvenated the cells and increased performance!



Demucking Substantially Increased the Effiency of the Cells.



Thank you for your attention!

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