SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Management Measures for Sustaining Vegetation Health and Performance in Emergent Cells

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7th Annual Public Meeting on the Long-Term Plan for Achieving Water Quality Goals for the Everglades Protection Area Tributary Basins

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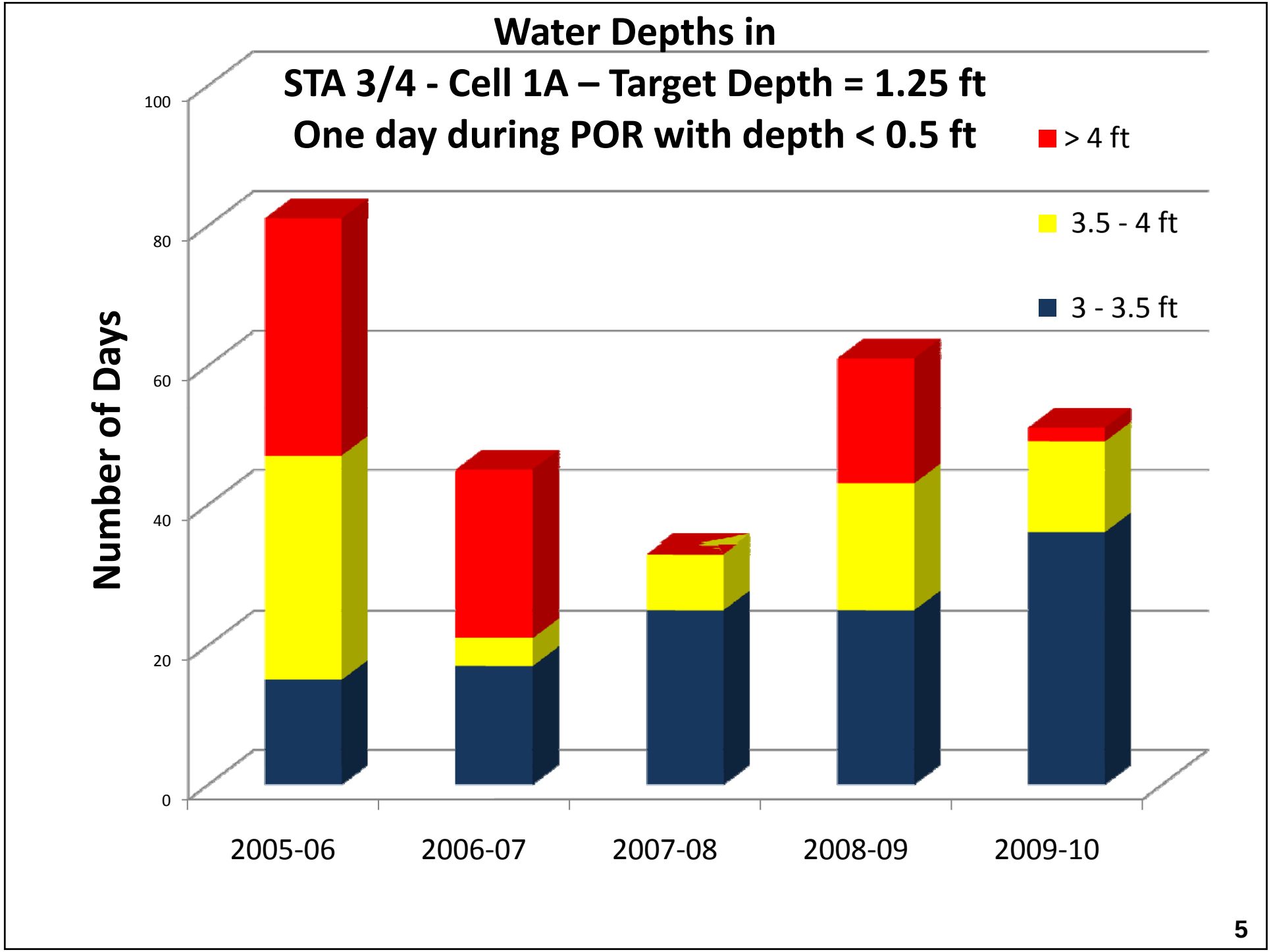
Maximize P Uptake

Maintain Sustainable Uptake Processes and Mechanisms

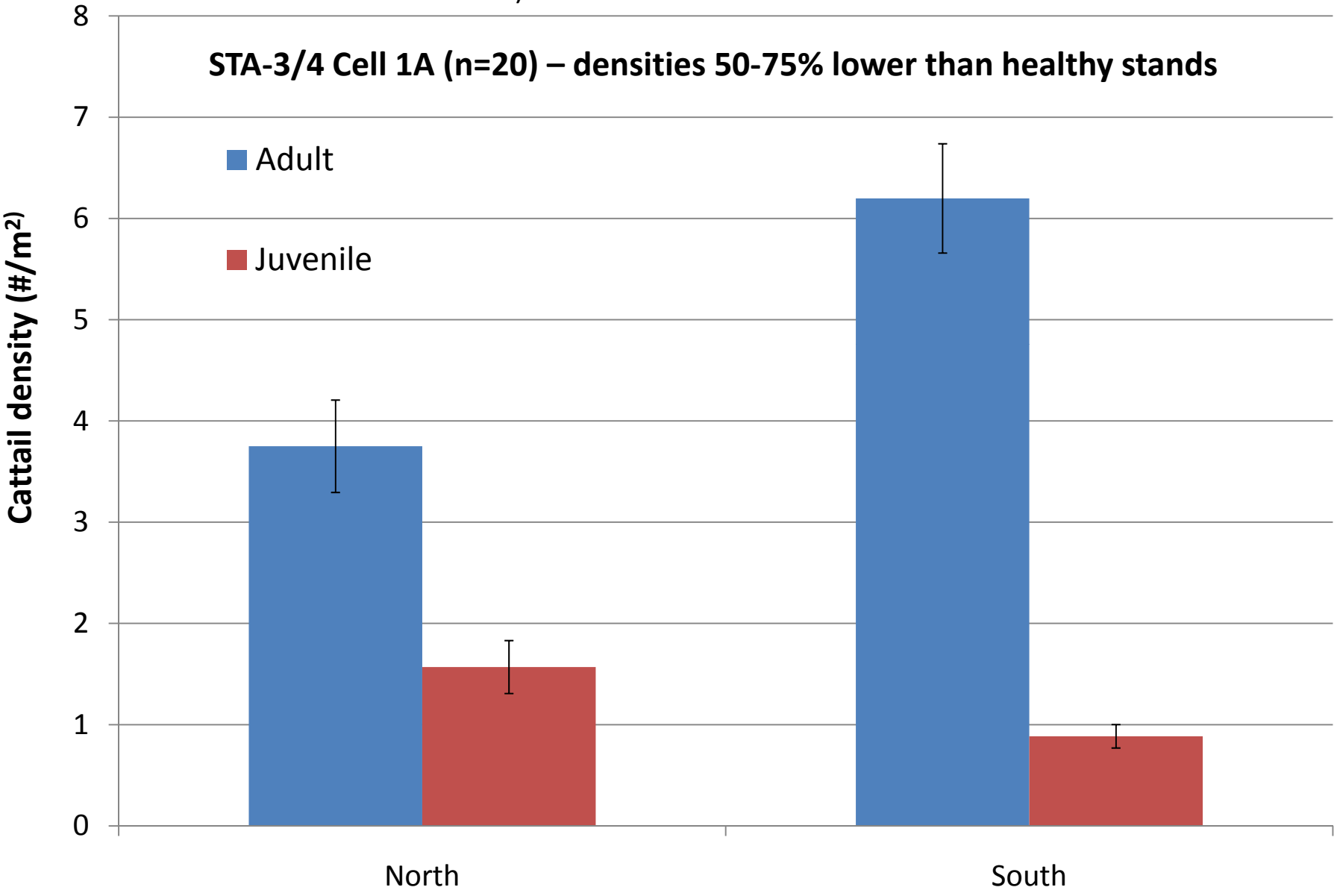
In emergent cells P uptake is provided primarily by dense cattail stands

In emergent cells P sequestration occurs primarily by microbial processes within the dead and decomposing litter layer. Healthy cattail stands provide constant production of the leaf litter that sustains these P uptake processes and leads to the eventual burial of the sequestered P


Water Depths in
STA 3/4 - Cell 1A – Target Depth = 1.25 ft
One day during POR with depth < 0.5 ft
> 4 ft
3.5 - 4 ft
3 - 3.5 ft
Number of Days
100
80
60
40
20
0
2005-06
2006-07
2007-08
2008-09
2009-10

Frequent deep water (> 3 ft) events such as these impact the health of cattail stands and lead to declining densities of live plants

Typical Cattail Densities in STAs – 12-15 ramets / m^2 (Toth and Galloway 2009), and are similar to impacted areas of WCA 2A (Miao and Sklar 1998, Weisner and Miao 2004)



Declining densities of live cattail culms will eventually eliminate the litter-related P uptake pathway and thereby impact performance.

Depth induced degradation can be prevented by providing favorable conditions for new growth

Revitalization of Cattail Stands in Cell 1A of STA 3/4

Dry season (March-May) Drawdown of Water Levels
-Establishment of new seedlings and clonal expansion

Managed Stage and Discharge Recovery Period (June)
-Slow increase of water levels will maximize survivorship and recruitment of new growth and
-Reestablish microbial uptake pathways

Online in July

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Extensive Scientific Literature on the Need for Drawdowns to Maintain Health of Wetland Plant Communities

Casanova, M.T. and M.A. Brock. 2000. How do depth, duration and frequency of flooding influence the establishment of wetland plant communities. Plant Ecology 147: 237-250.

Deegan, B.M., S.D. White and G.G. Ganf. 2007. The influence of water level fluctuations on the growth of four emergent macrophyte species. Aquatic Botany 86: 309-315.

Grace, J.B. 1987. The impact of preemption on the zonation of two Typha species along lakeshores. Ecological Monographs 57: 283-303.

Grace, J.B. 1989. Effects of water depth on Typha latifolia and Typha domingensis. American Journal of Botany 76: 762-768.

Eriksson, O. 1989. Seedling dynamics and life histories in clonal plants. Oikos 55: 231-238.

Gerritsen, J. and H.S. Greening. 1989. Marsh seed banks of the Okefenokee Swamp: effects of hydrologic regime and nutrients. Ecology 70: 750-763

Newman, S., J.B. Grace, and J.W. Koebel. 1996. Effects of nutrients and hydroperiod on Typha, Cladium and Eleocharis: Implications for Everglades restoration. Ecological Applications 6: 774-783.

Stewart, H., S.L. Miao, M.Colbert, and C.E. Carraher, Jr. 1997. Seed germination of two cattail (Typha) species as a function of Everglades nutrient levels. Wetlands 17: 116-122.

Smith, S.M., P.V. McCormick, J.A. Leeds and P.B. Garrett. 2002. Constraints of seed bank species composition and water depth for restoring vegetation in the Florida Everglades, U.S.A. Restoration Ecology 10: 138-145.

Robertson, H.A. and K.R. James. 2007. Plant establishment from the seed bank of a degraded floodplain wetland: a comparison of two alternative management scenarios. Plant Ecology 2007: 145-164.

ter Heerdt, G.N.J. and H.J. Drost. 1994. Potential for the development of marsh vegetation from the seed bank after a drawdown. Biological Conservation 6: 1-11.

Hydraulic short circuits preclude the sheet flow across the cell that is necessary to maximize P uptake

A bioengineering approach for reducing or possibly eliminating the impacts of these short circuits is to use bales of cattail to block and redistribute flow. Capitalize on the conditions provided by the dry season drawdown of Cell 1A of STA 3/4 to mow, harvest and bale 5-10 acres of cattail in the northeast end of the cell.

Use these bales to obstruct flow in nearby short circuit channels. If conditions permit, also pilot and evaluate cattail baling in cells in STA 1E and/or 1W.

Adaptive Management and Operation Strategies

Revitalization – proactive measures to maintain health and performance of treatment system

Bioengineering – innovative use of vegetation to address compromised performance

Functional Redundancy – promote additional P removal pathways

Compartmentalization – use of emergent vegetation to foster resilience and functional redundancy in SAV cells