Summary of STA Vegetation Management Practices

January 19, 2005
Gary Goforth, Inc.

Background

- The District
  - is managing 40,000 +/- acres of treatment wetlands in the STAs
  - has amassed a comprehensive experience and knowledge base of vegetation management in treatment wetlands
  - is converting over 10,000 acres from emergent vegetation to SAV
    - is evaluating the most effective ways to manage and convert these areas
- Summary of vegetation management (VM) activities was compiled to:
  - Begin documenting existing VM activities
  - Assist with evaluation of enhancements

Method

- **Focused on VM during the following phases:**
  1. **Design**
     From time of land acquisition until start of construction
  2. **Construction**
     From start of construction until initial flooding or start-up
  3. **Start-up**
     From initial inundation until flow-through operation
  4. **Normal operations**
     From flow-through until enhancement
  5. **STA enhancements**
     Activities described in *Long-Term Plan*

- **Interviewed staff, reviewed reports and other documents**

- **Intended that this summary be updated as new information is gained**

Goal: Target Vegetation

Emergent

Periphyton in association with SAV

Submerged aquatic vegetation

Vegetation management of potential future technologies?

PSTA Demonstration in STA-3/4

Corps planning PSTA demo in STA-1E

Design Phase

1. Leased back to previous farmer
2. Herbicide control of exotics
3. Flooded to promote wetland before construction

Construction Phase

1. Plugged existing canals
2. Backfilled existing canals (parallel to flow)
3. Cut and fill to level cell
4. Removed peat layer
5. Roller chopped existing vegetation
6. Left prior crop stubble
7. Disked/removed prior crop stubble
8. Planted
9. Dewatered on-site
10. Dewatered off-site
11. Mowed prior to inundation
12. Herbicide prior to inundation
13. Burned prior to inundation
14. Left emergent strips

Start-up Phase

1. Volunteer recruitment
2. Transplanted SAV from donor sites
3. Inundated to 2 to 3 feet for 60-90 days, then reduced to 0.5 to 1 ft
4. Inundated to 0.5 to 1 foot

Normal Operations Phase

1. Prescribed burn
2. Drawdown
3. Chopped floating mats
4. Chopped and harvested floating mats
5. Periodic mechanical harvesting
6. Large-scale herbicide application
7. Periodic gate openings to flush SAV
8. Maintain target water depths
9. Maintenance herbicide application

Enhancements Phase

- Combination of activities during Construction and Start-up:
  1. Mow prior to inundation
  2. Herbicide prior to inundation
  3. Burn prior to inundation
  4. Leave emergent strips
  5. Transplant SAV from donor sites
  6. Inundate to 2 to 3 feet for 60-90 days, then reduced to 0.5 to 1 ft
  7. Inundate to 0.5 to 1 foot

Summary of STA Vegetation Management

STA-1E

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STA-1E Observations

- Marked differences in vegetation as a result of Corps management vs. District management
  - Protracted grow-in phase
  - More terrestrial species (grasses and exotics)
- Noticeable effects of not leveling ground – variable vegetation

Summary of STA Vegetation Management

STA-1W

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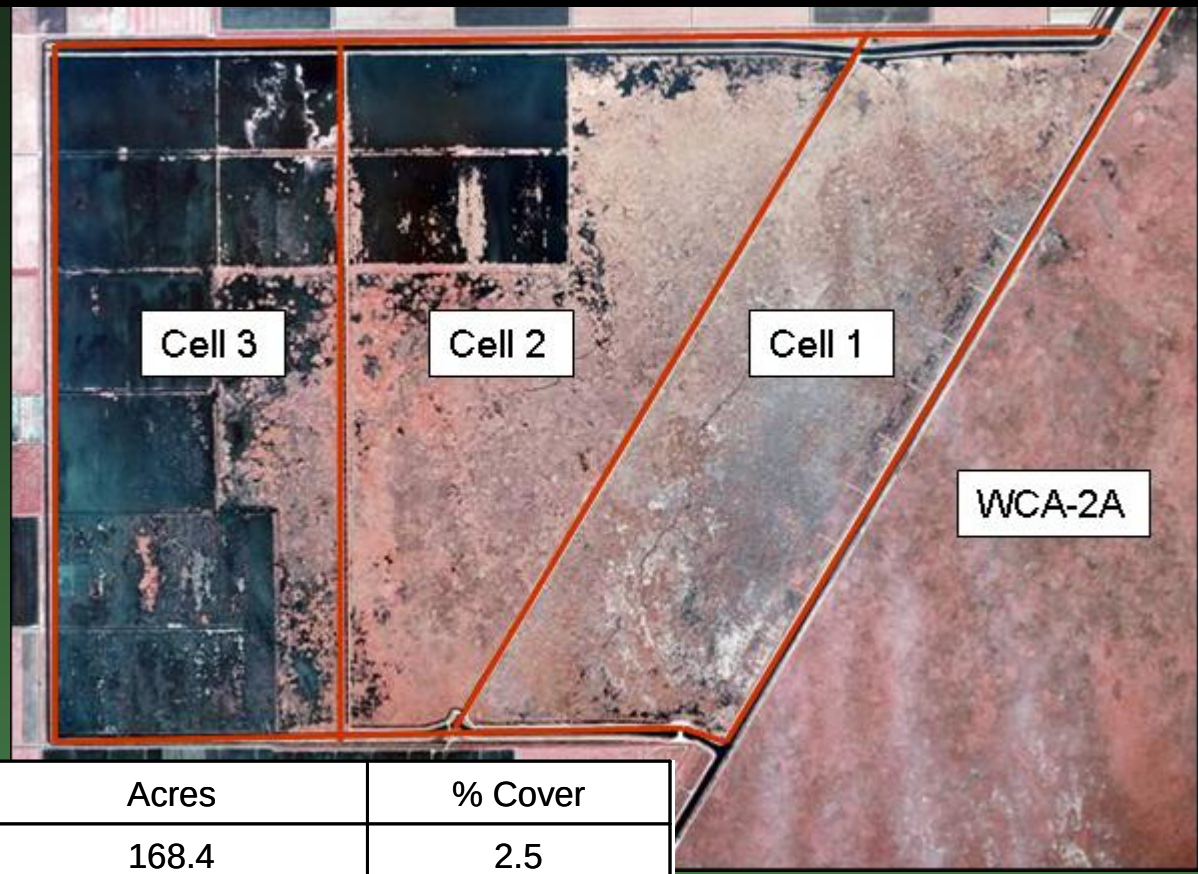
STA-1W Observations

- Imperative to prevent formation of tussocks
- Vegetation communities are dynamic, self-organizing; respond to hydraulic and nutrient conditions
- Monoculture of SAV suffered significantly from hurricanes; diversity = resiliency?

Summary of STA Vegetation Management

STA-2



Habitat	Acres	% Cover
Open water	168.4	2.5
Open water with SAV	2,141.2	32.0
Emergent with open water (50/50)	497.8	7.4
Emergent	3,873.9	57.8
Floating	12.7	0.2
Other	5.3	0.1
Total	6,699.2	100.0

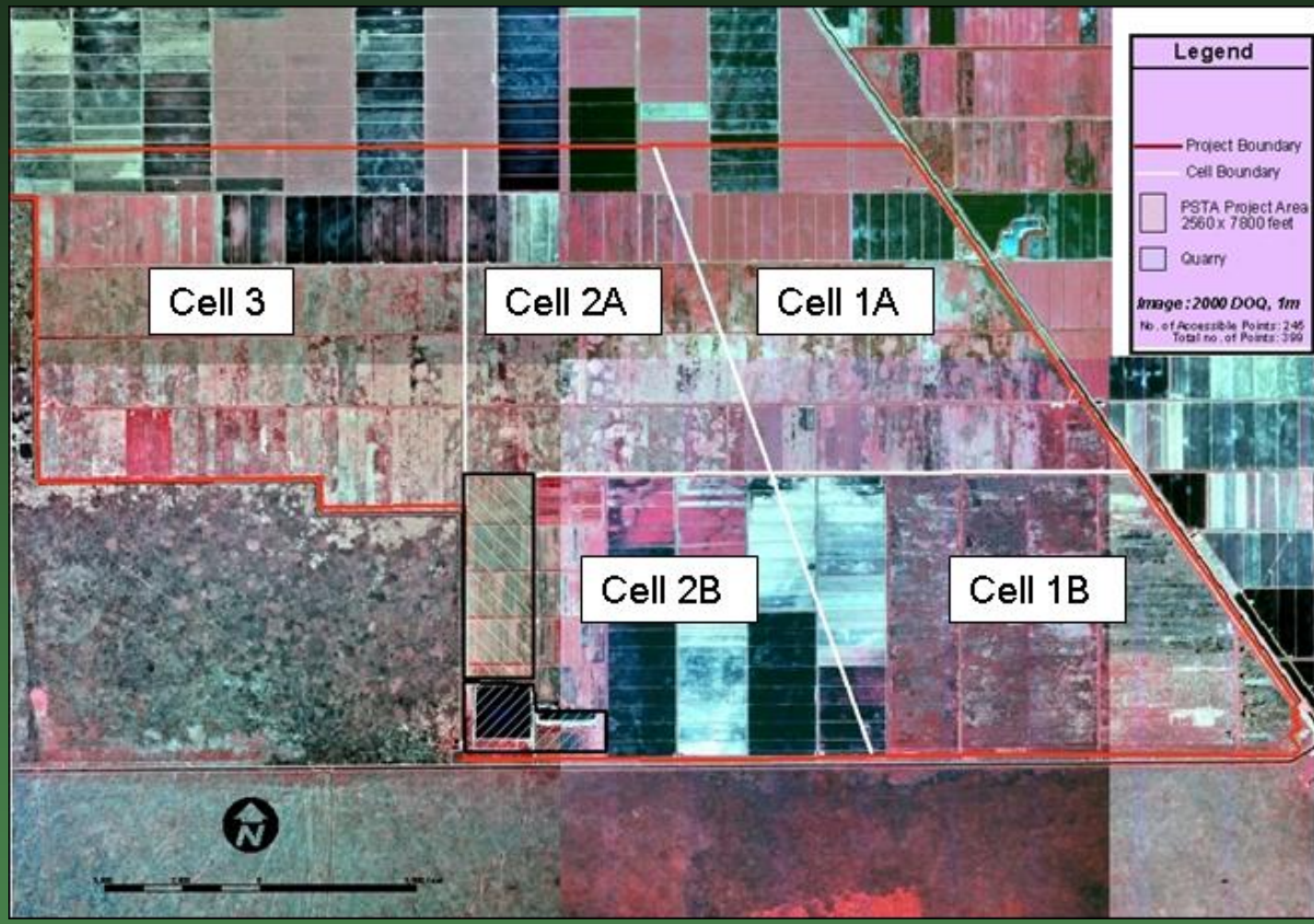
Source: SWMD 2004, Everglades Division

STA-2 Observations

- Cells with emergent vegetation (1 & 2) have sustained phosphorus discharges of 16 ppb
- Field-scale investigations of herbicide control of hydrilla: concentrations not effective
- Revising maintenance herbicide strategy – leave the cattails in Cell 3
- Prescribed burn scheduled for Cell 2

Summary of STA Vegetation Management

STA-3/4

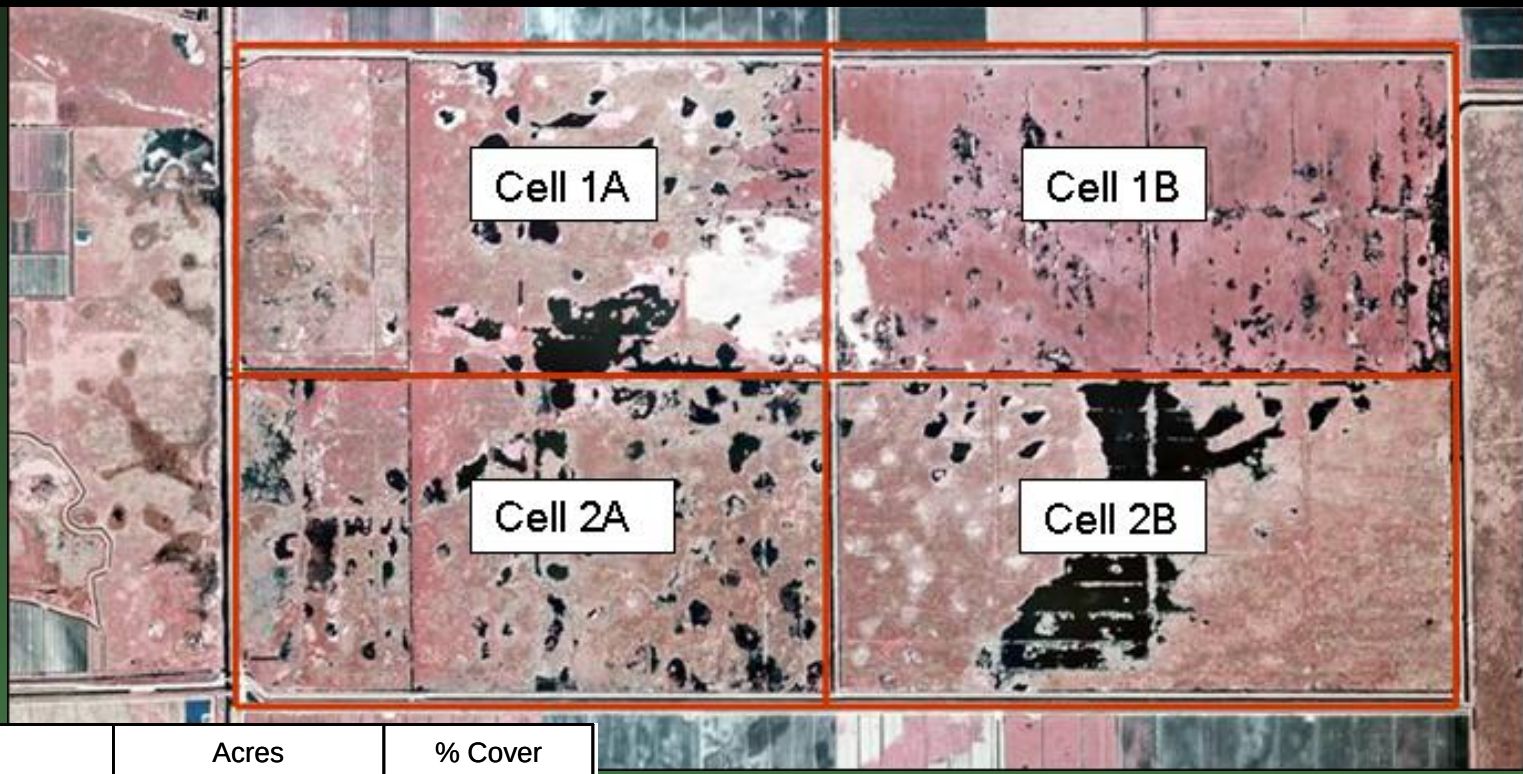


STA-3/4 Observations

- Exciting work underway by staff
  - Large-scale conversion
    - Aerial transplanting of SAV appears to accelerate grow-in: $0.65/lb plus labor
  - Torpedograss studies
- PSTA demonstration
- Removing litter through herbicide and fire opened up area for colonization by SAV and periphyton

Summary of STA Vegetation Management

STA-5



Habitat	Acres	% Cover
Open water	597.8	14.5
Open water with SAV	1277.8	30.9
Emergent with open water (50/50)	484.5	11.7
Emergent	1412.9	34.2
Floating	150.4	3.5
Shrub	205.8	5.0
Other	0.2	0.0
Total	4129.4	100.0

Source: SWMD 2004, Everglades Division

STA-5 Observations

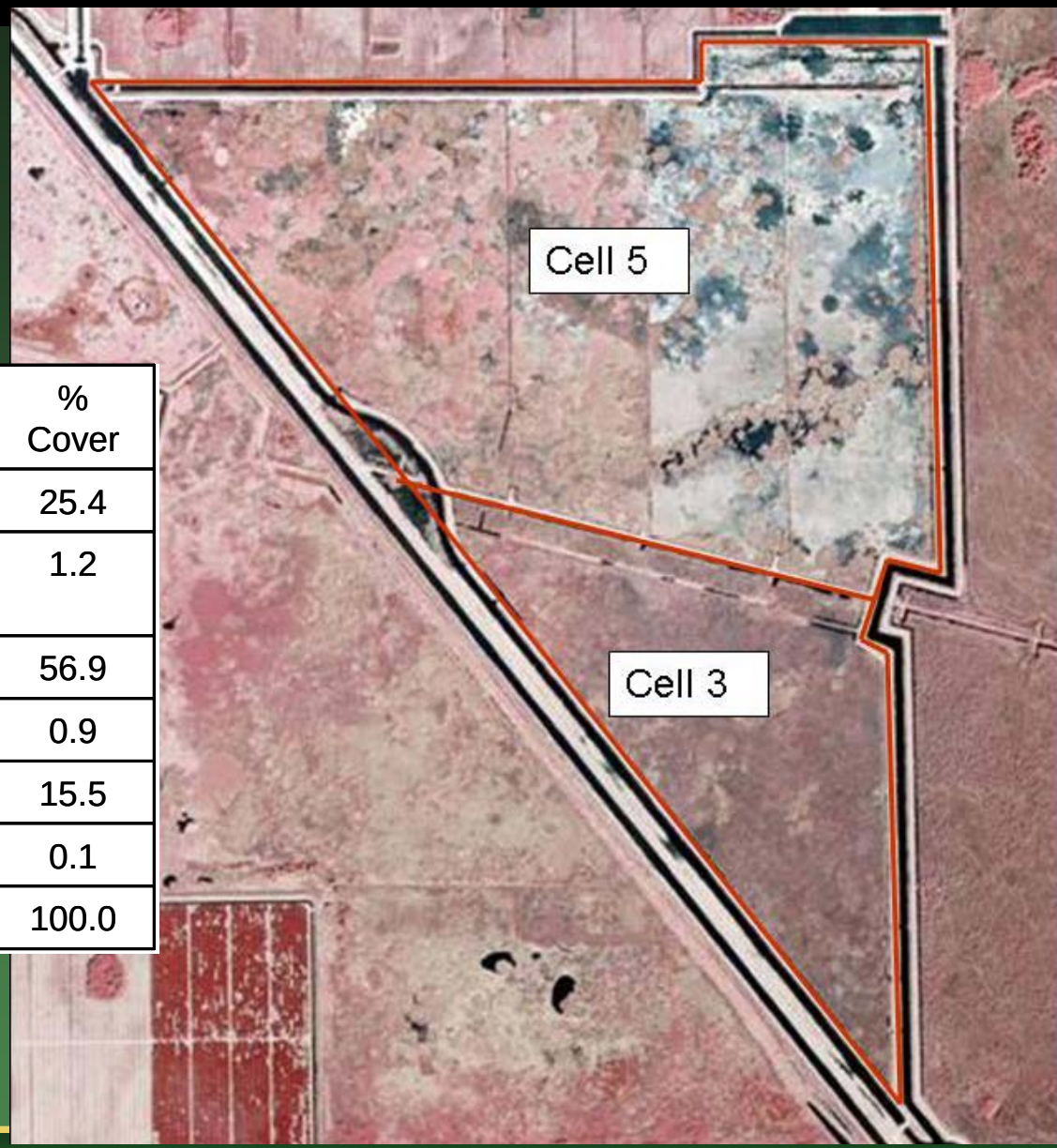
- Control of floating aquatic vegetation is critical
  - Mats can block water control structures
  - Long-term efflux of phosphorus
- Pockets of FAV in cattail may provide benefits
  - Question of scale : 5 acre? 50 acre?

Summary of STA Vegetation Management

STA-6

Habitat	Acres	% Cover
Open water	220.0	25.4
Emergent with open water (50/50)	10.6	1.2
Emergent	493.4	56.9
Floating	8.0	0.9
Shrub	134.4	15.5
Other	0.8	0.1
Total	867.2	100.0

Source: SWMD 2004, Everglades Division



STA-6 Observations

- Fairly stable vegetation mix over the last 7 years
  - Area dries out almost every year
  - Some cattail encroaching on periphyton area in Cell 5
  - Excellent sustained phosphorus removal (20 ppb)
- Prescribed burn scheduled for Cell 3

Summary (1 of 4)

- Most effective when vegetation management was explicitly considered during design
- Land preparation is critical
  - Characteristics of site dictate approach: antecedent land use; soil type
  - Combination of water control, herbicide, mowing, burning, canal/road degrading
- Containing dewatering flows during construction critical to accelerate vegetation grow-in

Summary (2 of 4)

- Proactive VM most effective
  - Prevent undesirable vegetation from getting out of control
  - Critical to operate cells within target depth ranges, e.g., avid tussock formation due to prolonged high water
- Updated vegetation management plans
  - STA-1E is good prototype
  - Incorporate work from Everglades division

Summary (3 of 4)

- Future directions of VM:
  - Disturbance management (fire, draw down for peat consolidation, etc.)
  - Mosaic vegetation landscape as opposed to monoculture (emergent strips, pockets of SAV in emergent cells, etc.)
  - Cautious evaluation prior to conversion to SAV in well-performing STA cells, e.g. STA-2 Cells 1 and 2, STA-6 Cell 5

Summary (4 of 4)

- Continuing need for additional scientific investigations – focused on addressing specific VM questions
  - Recent hydrilla study in STA-2 Cell 3 is a good example
  - Necessity and effectiveness for torpedograss and hydrilla control
- Hopefully this summary can serve as a foundation to build on

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