Session # 39

Marl Prairie Landscape: Its Ecology and Importance in Everglades Restoration

April 20, 2017
(1:20 – 3:00 PM)

Organizers:
Jay P. Sah
Jesse Blanchard
Session # 39: Marl Prairies Landscape

- Flank both sides of Shark River and Taylor Sloughs
- Short to moderate hydroperiod
- Have thin calcitic soils underlain by limestone bedrock

**Habitat of** Cape Sable seaside sparrow (CSSS) (*Ammodramus maritimus mirabilis*): a federally listed endangered species.
Session # 39: Marl Prairies Landscape

Digitaria pauciflora

Periphyton mat

Muhly grass

Sinkhole

Fire & flooding
Session # 39: Marl Prairies Ecology

Jay Sah - Marl Prairie Landscape as the Cape Sable seaside sparrow Habitat: the Pivot of Hydrologic Restoration in Southern Everglades

James Snyder - The Response of Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), a Prairie Dominant, to Fire and Flooding

Thomas Virzi - Next Steps Towards Recovery of the Cape Sable Seaside Sparrow

Jesse Blanchard - Fish in Marl Prairies: Disturbance Severity, Invasions, Traits and Emergent Community Structure

Jimi Sadle - Someone has to Watch the Crabgrass Grow: A Survey of Potential Effects of Hydrologic Restoration on Marl Prairie Plant Species
MARL PRAIRIE LANDSCAPE AS THE CAPE SABLE SEASIDE SPARROW HABITAT: THE PIVOT OF WATER MANAGEMENT ACTIVITIES IN SOUTHERN EVERGLADES

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Marl prairie landscape

- Both sides of Shark River and Taylor Sloughs
- Short to moderate hydroperiod
- Have thin calcitic soils underlain by limestone bedrock
- Vegetation primarily of grasses and sedges from 0.5 to 1.5 m in height

Habitat of Cape Sable seaside sparrow (CSSS) (*Ammodramus maritimus mirabilis*): a federally listed endangered species.
CSSS habitat & Water management activities

Management/Restoration Activities

Hydrology

Marl Prairie Vegetation

Soil characteristics

CSSS in its habitat
Cape Sable seaside sparrow sub-populations

(A) Graph showing the number of sparrows over time for sub-population A.
(B) Graph showing the number of sparrows over time for sub-population B.
(C) Graph showing the number of sparrows over time for sub-population C.
(D) Graph showing the number of sparrows over time for sub-population D.
(E) Graph showing the number of sparrows over time for sub-population E.
(F) Graph showing the number of sparrows over time for sub-population F.

(Cape Sable seaside sparrow (Photo by David LaPuma))
CSSS habitat & Water Management Operations

To maintain NP205 < 6 ft for 60 consecutive days (March 1 and July 15)

Closing Schedules:
- S-343s, S344- Nov. 1 to July 15
- S12-A - Nov. 1 to July 15
- S12-B - Jan. 1 to July 15
- S12-C - Feb. 1 to July 15
- S12-D - no closure dates

Legend:
- Water Structures
- Stage recorders
- S332x pumps
- CSSS Sub-population
- Detention Areas

North направление

Kilometers

C-111 spreader canal
Between 2003 & 2009, vegetation change in Sub-population A was spatially differentiated responding to changes in hydrology.
## Hydrologic conditions

<table>
<thead>
<tr>
<th>Mean water depth (cm)</th>
<th>Water management period</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Annual</td>
<td>8.4 (± 8.7)</td>
<td>-3.2 (± 9.0)</td>
</tr>
<tr>
<td>Wet Season</td>
<td>15.8 (± 8.6)</td>
<td>9.9 (± 8.6)</td>
</tr>
<tr>
<td>Dry Season</td>
<td>2.8 (± 8.8)</td>
<td>-33.4 (± 8.9)</td>
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</tbody>
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Mean annual as well as dry and wet season water depth was consistently low in recent years than in 1990s.

Dry season water level was lower mainly due to restriction on water delivery through S343s S344, & S12s.
Bray-Curtis (BC) similarity matrix calculated.

The 2003-2005 census sites classified into two groups: 1) CSSS-P and 2) CSSS-0 sites.

BC similarity between a 2016-Census site and 2003-2005 sites was averaged separately for CSSS-P and CSSS-0 sites.

Mean difference in similarity of a 2016-site with CSSS-P and CSSS-0 sites calculated.

The difference valued standardized by the range of the differences and multiplied by 100.
CSSS occupies the sites that are mostly dominated by Marl Wet Prairie vegetation with hydroperiod ranging between 90 and 240 days.
After 2010, in NE portion of sub-population A, Sparrows were frequently recorded at wet-prairie sites with high Scaled SND Index.
Between 2003 and 2010, vegetation change, as indicated by inferred hydroperiod, in three eastern sub-populations (C, E & F) was spatially differentiated responding to changes in hydrology - possibly impacted by retention ponds.
Change in vegetation-inferred hydroperiod (2007-2013)

MP-S Gradient transect – M3

Relatively wet vegetation
In Project Period, sites within the CSSSS habitat (sub-population D) were wetter than in Pre-Project Period.
Since 2011, i.e. in Project Period, vegetation change was marked by a shift in species composition toward a vegetation type characteristic of wetter conditions.
Marl Prairie landscape & Fire

High proportion of C₄ plants:
- Muhly grass (*Muhlenbergia capillaris* var. *fillipes*),
- Blue stem (*Schizachyrium rhizomatum*),
- Bluejoint Panicgrass (*Panicum tenerum*)

Dominant C₃ species:
- Sawgrass (*Cladium jamaicense*)
- Black top sedge (*Schoenus nigricans*)

- A matrix of pyrogenic vegetation
- Fire frequency **up to** 3-4 fires/decade

Flammable biomass production

Dry environment

C₄-dominated Community

Based on fire-mediated process (Wilson & Agnew 1992)
Conclusions

- Vegetation in CSSS habitat tracks the spatial variation in changes in hydrologic conditions.

- In eastern part of sub-population A, change toward drier habitat conditions indicated an improvement in habitat suitability in recent years.

- Water management through the use of retention ponds is likely to cause vegetation in the eastern sub-populations (C, E and F) to be relatively wet – an improvement in over-dried habitat conditions.

- Changes in habitat conditions in response to restoration activities. Improvement – will sparrow occupy the improved area?
Acknowledgments

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Thank you