1.0 Performance Measure Title

Wetland Landscape Patterns - Marl Prairie Cape Sable Sparrow Habitat

Last Date Revised: March 2, 2007

2.0 Justification

The Cape Sable seaside sparrow lives only in the marl marshes of the southern Everglades. It is listed as an endangered species by both the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission. Potential tradeoffs exist between the restoration of pre-drainage hydrology in Shark River and Lostman's Sloughs and the Southern Marl Prairies, versus the persistence and extent of tussock-growth habitat that is required by the Cape Sable Seaside Sparrow for nesting in the Southern Marl Prairies. The sparrow's dependence on these short-hydroperiod marl prairies makes it an excellent indicator for healthy, marl-forming wetlands that support a diversity of plants.

Sparrow numbers and distributions have declined steeply. Shortened hydroperiods in the eastern marl prairies as a result of water management practices have altered sparrow habitat by leading to an increase in the number of fires and the expansion of woody plants. In the western marl prairies, increased hydroperiods and unnatural dry-season flooding, also caused by water management practices, have resulted in an increase in sawgrass-dominated areas and have caused the sparrow breeding season to be interrupted. Also, spatial extent of short-hydroperiod marl areas has been lost due to agricultural and urban development.

Due to the close proximity of Cape Sable seaside sparrow nests to the ground (17 cm average early season, 21 cm average late season) (Lockwood et al. 2001), one important hydrologic measure of the potential for Cape Sable seaside sparrow nesting success is to determine the number of consecutive days between March 1 and July 15 that water levels are below ground surface. This incorporates most of the timeframe when sparrows have been observed nesting (Lockwood et al. 1997, 2001) and is an indirect measure of the number of days potentially available for sparrow courtship and nesting (Van Lent et al. 1999, DOI 2001). The number of days required for the first nesting cycle of the year has been variously estimated as ranging from at least 31 to 49 days (Post undated); Post (undated) concludes that the first cycle is likely to take at least 35 days.

A formal American Ornithologists Union peer review of biological information on the sparrow conducted in 1999 (Walters et al. 1999) provided specific, peer-reviewed recommendations for number of nesting days necessary in subpopulation A that are used as our basis for comparison of the performance of alternatives for subpopulation A. These recommendations include a minimum of 50-60 consecutive nesting days, preferably 80 consecutive nesting days, in all years until subpopulation A numbers have increased to at least 1,000 individuals (Walters et al. 1999). Also applicable to subpopulation A is the Reasonable and Prudent Alternative requirement of 60 consecutive days below 6.0 feet at the hydrologic gage NP205 between March 1 and July 15. Once subpopulation A reaches 1,000 individuals, it will be evaluated similar to subpopulations B-F.

For evaluation of subpopulations B-F, modeling of sparrow reproductive potential (Pimm and Bass 2001, Walters et al. 1999) supports the following general recommendations for evaluation of nesting condition availability. Forty consecutive days for 8 out of 10 years is considered favorable for Cape Sable seaside sparrow population persistence, 40 days for 7 out of 10 years is considered borderline for persistence, 80 days for 7 out of 10 years is favorable, and 80 consecutive days for 8 out of 10 years is considered very favorable (S. Pimm, pers. comm., 1999).

3.0 Relationship to CEMs and Adaptive Assessment Hypotheses

Southern Marl Prairies Conceptual Ecological Model attribute (Davis et al. 2005)

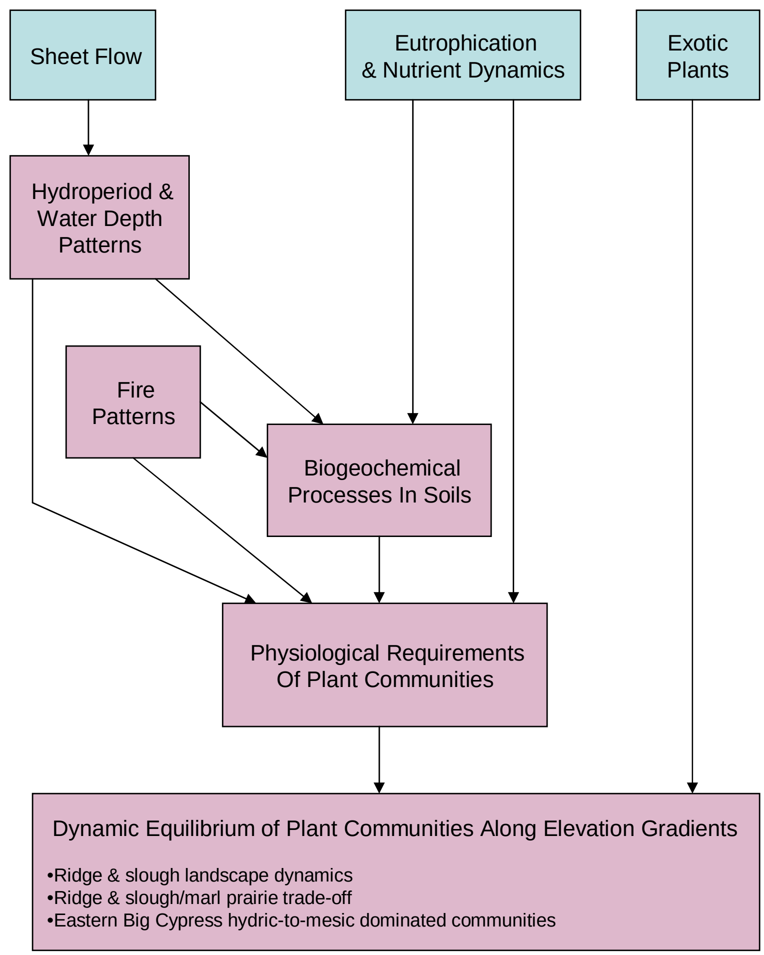
***Ecological Premise*:** The dynamic equilibrium of the vegetation mosaic in relation to elevation gradients is maintained if biogeochemical processes in the soil support the physiological requirements of the vegetation. The dynamic equilibrium is altered if water depths or hydroperiods decrease or increase. Anthropogenic disturbances (over the past 100+ years) of hydroperiods, water depths, eutrophication, fire patterns, land use change, and the spread of exotic plants and animals have shifted the vegetation mosaic away from the historic dynamic equilibrium. These hypotheses are designed to focus monitoring and modeling at the ecotone boundaries between vegetation types which may be an early location of change. Vegetation gradients between higher elevation marl prairies and lower elevation ridge and slough communities are of particular concern in the southern Everglades. Although a potential trade-off exists between ridge and slough habitat restoration and the extent and quality of habitat in adjacent marl prairies. It is thought that longer hydroperiods, greater water depths, and appropriate flow regimes will re-establish and sustain ridge and slough landscape patterns without significantly infringing on adjacent marl prairies, where short-hydroperiod, tussock growth habitats will persist. (RECOVER 2004)

9.2.5 Wetland Landscape and Plant Community Dynamics (RECOVER 2006)

Hypothesis 3: Plant Community Dynamics along Elevation Gradients

(See diagram to the right.)

Plant Communities/Elevation Gradients Conceptual Ecological Model



The composition and distribution of plant communities along elevation gradients are determined by patterns of hydroperiod, water depth, nutrient dynamics, and fire patterns throughout freshwater wetlands of the Greater Everglades.

Rationale: The dynamic equilibrium of the vegetation mosaic in relation to elevation gradients is maintained if biogeochemical processes in the soil support the physiological requirements of the vegetation. The dynamic equilibrium is altered if water depths or hydroperiods decrease or increase. Anthropogenic disturbances (i.e. past 100+ years) of hydroperiods, water depths, eutrophication, fire patterns, land use change, and the spread of exotic plants and animals have shifted the vegetation mosaic away from the historic dynamic equilibrium. These hypotheses are designed to focus monitoring and modeling at the ecotone boundaries between vegetation types which may be an early location of change.

In most of the greater Everglades wetlands where hydroperiods and water depths have decreased, the hydrologic tolerances of the surviving plant communities are adapted to greater hydroperiods and water depths than are currently maintained. For example, with regional drainage and altered fire regimes in the Big Cypress region there has been a gradual shift in landscape patterns, resulting in an increase in mesic rather than hydric-dominated communities.

Vegetation gradients between higher elevation marl prairies and lower elevation ridge and slough communities are of particular concern in the southern Everglades. Although a potential trade-off exists between ridge and slough habitat restoration and the extent and quality of habitat in adjacent marl prairies. It is thought that longer hydroperiods, greater water depths, and appropriate flow regimes will re-establish and sustain ridge and slough landscape patterns without significantly infringing on adjacent marl prairies, where short-hydroperiod, tussock growth habitats will persist.

4.0 Restoration Expectation

4.1 Predictive Metric and Target

Spatial extent of marl prairie habitat providing sufficient nesting condition availability to support three stable, self-sustaining, subpopulations averaging at least 1,000 individuals each. Habitat areas currently or recently supporting subpopulations of this size and stability include many contiguous 2x2-square mile grid cells of suitable nesting condition corresponding to 6-9 grid cells of the South Florida Water Management Model (SFWMM).

4.2 Assessment Parameter and Target

The target is to increase from one to three the number of stable subpopulations of the Cape Sable seaside sparrow, with one subpopulation west of Shark River Slough and two east of Shark River Slough. A subpopulation will be considered stable when it supports a minimum of 1,000 individuals, measured as a five-year running average. Because the one currently stable subpopulation typically supports from 1,800 to 2,400 individuals, the goal for the total number of Cape Sable seaside sparrows is a minimum of approximately 4,000 individuals, with a final restoration target of 6,000 individuals, measured as a five-year running average.

5.0 Evaluation Application

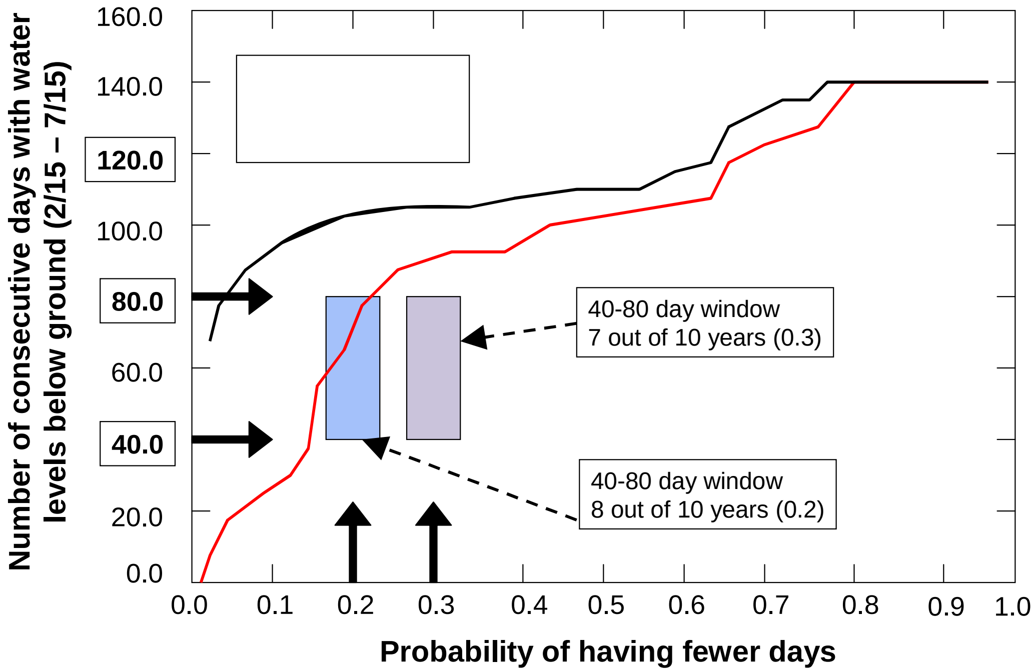
5.1 Evaluation Protocol

Initially, the SFWMM will be used to produce probability curves for number of consecutive days during the sparrow breeding season (March 1 to July 15) when water levels are below the ground surface within possible sparrow subpopulation indicator regions (IR 46, IRs 54-58). For possible habitat west of Shark Slough, the current indicator region for subpopulation A (IR 46; 8 grid cells) will be used since suitable habitat in this area cannot shift significantly due to topography. For possible habitat east of Shark Slough, shifts in suitable habitat area are possible and expected as flows are restored. Currently, the SFWMM utilizes a total of 20 grid cells east of Shark Slough. Subpopulation B (IR 54) is characterized by 9 grid cells, C (IR 55) is characterized by 2 grid cells, D (IR 56) is characterized by 2 grid cells, E (IR 57) is characterized by 5 grid cells, and F is characterized by 2 grid cells. A method to search for and display contiguous cells meeting the target criteria is being developed. Once developed, this method could be applied to the individual subpopulation habitat areas, allowing this new performance indicator to include the number of model cells in or near the existing subpopulation indicator regions that meet a certain criterion. Because small-scale topographic variation can significantly influence actual habitat suitability within SFWMM 2X2 cells, similar methodology for use with finer scale model outputs will be developed as soon as possible.

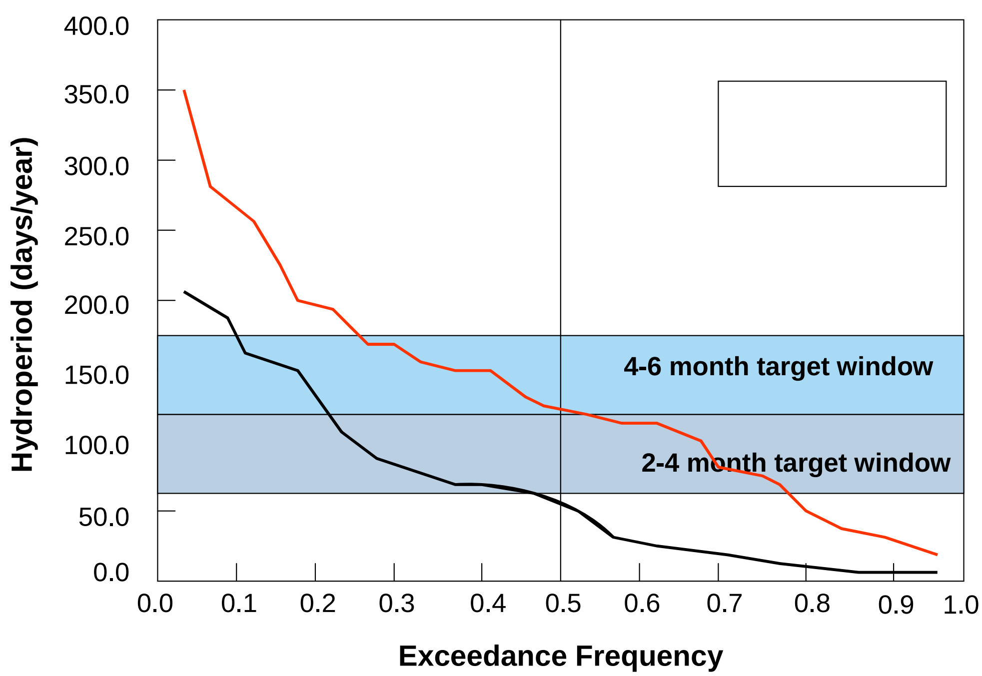
5.2 Normalized Performance Output

5.3 Model Output

Sub-population "F" Nesting Condition Availability (1965-1995)



Sub-population "F" habitat maintenance of short-hydroperiod, mixed-marl prairie vegetation



5.4 Uncertainty

Recognition of model uncertainty is needed when interpreting the ecological significance of model output. The Model Uncertainty Workshop Report provides guidance on the potential implications of uncertainty on model output interpretation (RECOVER 2002).

6.0 Monitoring Approach

See CERP Monitoring and Assessment Plan: Part 1 Monitoring and Supporting Research - Greater Everglades Wetlands Module section 3.1.3.5 (RECOVER 2004)

7.0 Future Tool Development Needed to Support Performance Measure

7.1 Evaluation Tools Needed

Predictive models to evaluate this performance measure are still under development and refinement.

7.2 Assessment Tools Needed

Accessibility to the various data sources through an integrated database is needed for the complete evaluation of these hypotheses and for parameter refinement.

8.0 Notes

The subteam recognizes that not all marl prairie habitat is suitable for the Cape Sable seaside sparrow. Current discussion is ongoing to provide more spatially and temporally explicit hydrologic targets for the marl prairie and Cape Sable seaside sparrow.

This performance measure supersedes and addresses GE-14 Wetland Landscape Patterns - Marl Prairie Cape Sable Sparrow Habitat (Last Date Revised: November 22, 2005).

9.0 Working Group Members

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10.0 Acceptance Status

GE Working Group	November 22, 2005
ET	
AT	
Public Review	
Final Acceptance Date	

11.0 References

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