Assess Wet Pine Savanna Response to Refuge Management

FY 2011

PROJECT DESCRIPTION

Restoration and maintenance of the unique, species-rich wet pine savannas on Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR) is a key objective of the 2007 Comprehensive Conservation Plan. Long-term vegetation monitoring stations were established in 1996 and the initial inventory completed 1997. This project was to complete the second comprehensive monitoring inventory and assess success of MCNWR habitat management.

OBJECTIVES AND ALTERNATIVES

Objectives include a comprehensive inventory of vegetation including species composition, community structure, and species frequency at eight monitoring stations. Contractor analyzed data to compare differences with original 1997 inventory event, especially to determine if site conditions changes at each station, is there evidence of recovery from disturbance, have changes occurred in plant species composition, abundance and community structure, and what caused changes in site conditions.

METHODS AND PROTOCOLS

The Contractor followed the protocol developed for the initial 1997 event: *Long-Term Vegetational Monitoring at the Mississippi Sandhill Crane National Wildlife Refuge, 1997 by A.F. Clewell, R.S. Beaman, and M.E. Lasley, 47 pp.* The Contractor took 8 digital photos along the boundaries of each station. For species composition, they identified and listed all vascular plants rooted within each station. For community structure, they assigned all plants touching sampling pole to life form (graminoid, forb, woody) and measured the tallest plant at each sampling point. They calculated cover by dividing # sampling points at which each life form was intercepted by the total. They measured species abundance in terms of species frequency as the # sampling points along a transect at which each species was recorded. There were 100 sampling points along each 200' transect.

DATA MANAGEMENT

Contractor recorded field data on data sheets and submitted copies to MSCNWR. They entered data in Excel.

DATA ANALYSIS / MODELS

Dr. Steve Brewer, University of Mississippi, performed the data analysis as subcontractor. He used multivariate statistical analysis to determine the effects of three variables on vegetation: year, time since, burn and site history. They used perMANOVA and principle component analysis to assess degree of similarity in species abundance across space and time. To calculate mean fidelity to general habitats, they followed *Brewer, J.S, D.J. Baker, A.S. Nero, A.L. Patterson, R.S. Roberts, and L.M. Turner. Carnivory in plants as a beneficial trait in wetlands. Aquatic Botany 94: 62-70.*

ACCOMPLISHMENTS AND MANAGEMENT IMPLICATIONS

One hundred thirty-six species were observed overall at the monitoring stations. At any given sampling point, from 2.4 to 6.9 plant species, on the average, were represented by one or more rooted plants. Greater numbers of species occurred per sampling point at stations where community structure was more fully recovered.

Four main points can be drawn from the composition data, based on multivariate and univariate analyses. First, many of the initial composition differences between disturbed and undisturbed sites in 1997 still persist today. That is reflected in the significant main effect of Site History in the perMANOVA and PCO Axis 1 (which accounts for 35% of the variation). Site history differences produce a woody-herb gradient and forest-wet prairie gradient.

Second, there is a significant site history x year interaction. Species composition changed overall

(the Year effect), and that was expected, regardless of whether these were "recovering" sites. We suspect that much of that change in composition was random. The more important result is the significant site history x year interaction. Having a significant site history x year interaction tells us that compositional changes at the undisturbed sites were not the same as the compositional changes at the disturbed sites and thus whether recovery is occurring. At the undisturbed sites, the changes were largely declines and losses of some wetland herbs (not just carnivores). Other herbs (e.g., *Scleria reticularis, Coreopsis linifolia*) also declined. This is reflected in the PCO by the change vectors for the undisturbed transects pointing to the left in Appendix C Figure 4, thus making the previously more herb-characterized undisturbed transects less herbaceous and thus more like the disturbed transects. Perhaps this was caused by the drought and the change will be short-lived and reversible and no cause for concern. At the disturbed sites, the situation is different. The most important change there was the increase in *Aristida stricta*. This is shown by the change vectors associated with G7 and G8 pointing downward in Figure 4. That clearly is not the result of the drought. We suggest the possibility that this indicates a general long-term trend of recovery of ecological function, which may have been precipitated by a favorable fire regime.

Third, frequent prescribed burning could help prevent the loss of some herbaceous species, but it does not have a dramatic effect on species composition (i.e., there was a significant time since fire x year interaction for species richness but not for species composition). This would indicate rare or uncommon species are missing from the long unburned sites and present at the recently burned sites. Because they are rare, they do not contribute substantially to differences in composition among sites.

Fourth, despite the occurrence of ruts at the disturbed sites, the weighted mean habitat fidelity calculations revealed no evidence of a greater abundance of ruderals or disturbance indicators at these sites. Instead, the disturbed sites have a more mesic forest character (and less of an open wet savanna character) than the undisturbed sites. Perhaps the reason is that longer fire suppression led to greater woody establishment, which in turn dried and shaded the soil. These woody plants, which were mostly mesophytic shrubs and vines, would have provided perches for birds that dispersed their seeds. Another contributing factor could be that disturbed sites tend to be more mesic than undisturbed sites (Appendix B Table 2).

In conclusion, while many of the initial composition differences between disturbed and undisturbed sites in 1997 still persist, a general long-term trend of recovery of ecological function can be seen in disturbed sites as for example with the increase in *Aristida stricta*. Frequent prescribed burning has undoubtedly contributed to this recovery and also helps to promote uncommon and rare species colonization. Current management to remove slash pines and ignite frequent prescribed fires has maintained and in some instances improved the character and quality of the wet prairies present at the Refuge and is beneficial to the recovery of wet prairie ecosystems. More attention is warranted to protect the soil from mechanical disturbance during logging operations.

PARTNERS

Contractor: Eco-Logic Restoration Services, 1004 Government St, Ocean Springs, MS 39564. James P. Kelly, jkelly@ecologic-restoration.com

MORE INFORMATION

Scott Hereford, Senior Wildlife Biologist, MS Sandhill Crane NWR, 7200 Crane Lane, Gautier MS 39553. scott_hereford@fws.gov 228.497.6322x109