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Clipping as a Substitute for Fire to Study Seasonal Fire Effects on Muhly Grass (*Muhlenbergia capillaris* var. *filipes*)

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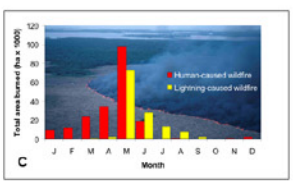
Background

The Cape Sable seaside sparrow **(A)** is a Federally listed endangered species whose range is almost entirely within Everglades National Park and Big Cypress National Preserve. Its preferred nesting habitat is the short-hydroperiod grassland known as marl or muhly prairie **(B)** (for *Muhlenbergia capillaris* var. *filipes*). Muhly is a perennial bunch grass with needle-like leaves generally less than one meter in height. Recent concerns about the survival of the sparrow result from population declines attributed to prolonged flooding in the sparrow range west of Shark River Slough during the 1990's.

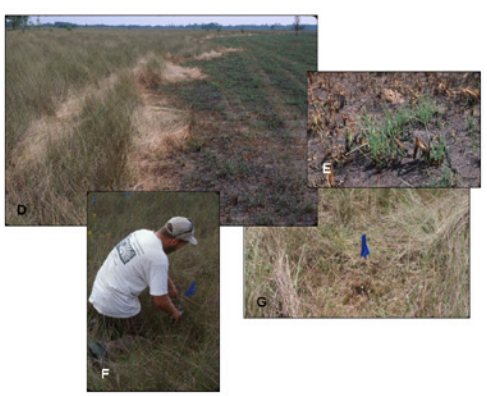
Muhly prairies can burn almost any time of the year. The area burned by wildfire is greatest during April, May, and June (**C**), which is the peak of the Cape Sable seaside sparrow breeding season (Nott et al. 1998). Prescribed burning is recommended to prevent large wildfires from denuding significant portions of the critical habitat. While fire is a natural and necessary phenomenon in muhly prairies, the interaction of fire and flooding can have profound effects on vegetation structure and composition. Fire followed by flooding can result in high mortality of plants that normally resprout vigorously (e.g., Herndon et al. 1991).



We are interested in experimentally studying the importance of season of burning on the response of muhly grass. Because prescribed burns are relatively expensive to conduct and are difficult to apply consistently over time, the clipping of muhly plants was proposed as a substitute for fire. There is ample evidence that clipping and removal of litter can result in responses similar to those observed following fire (e.g., Hulbert 1988) and clipping individual clumps of muhly would allow us to generate sufficient statistical replication. We conducted a preliminary experiment to compare the response of muhly to clipping and burning.

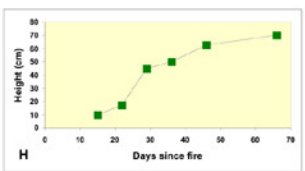
The Experiment

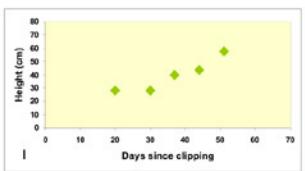
The experiment took advantage of a muhly prairie burned by a wildfire on May 7, 2001, along U.S. 41 in Big Cypress National Preserve (**D**). On May 22, 20 burned muhly clumps within 20 m of the fire edge were marked. The plants had resprouted about 10 cm since the fire (**E**). In the adjoining unburned area 80 unburned muhly clumps were marked. Ten randomly selected clumps were clipped about 2 cm above the ground (**F**), matching the amount of grass that remained after burning (**G**). Sets of 10 plants were clipped on 5 additional dates through July 12, when there was standing water in low spots. Twenty marked plants were not clipped and served as controls. The heights of the tallest leaves in the marked muhly clumps in the burned area were recorded each time plants were clipped. The heights of a few plants clipped at different times were measured on July 12 to compare rates of regrowth after clipping and burning.



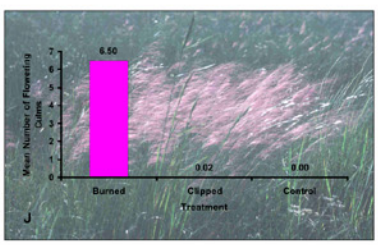
Results and Discussion

Figures **H** and **I** show regrowth of the burned and clipped plants, respectively. The figures cannot be compared directly because the growth of plants burned on May 7 was followed for up to 66 days; whereas plants were clipped at various times up to 51 days before July 12. Therefore, the period during which leaf growth was observed differs in the two situations. The most direct comparison is between plants clipped 15 days after the fire, which were slightly under 60 cm tall 50 days after clipping, to burned plants, which were slightly over 60 cm tall 50 days after burning. It therefore appears that growth is similar, but that burned plants may resprout more vigorously than clipped plants. It is possible that the ash fertilizes the grass after burning and enhances regrowth.





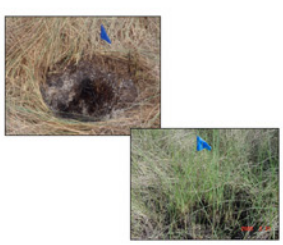
In October, the number of flowering culms in each clump was counted (**J**). In the unburned area, the 20 unclipped plants had no flowering culms. The burned plants showed substantial flowering. Only 17 of the 20 plants originally marked in the burned area were relocated and they had a mean of 6.5 flowering culms per plant, with a range of 0 to 15 culms per plant. In contrast, a single flowering culm was found on a plant clipped on June 22; the other 59 clipped plants had no flowers. A few possible reasons that flowering is not stimulated by clipping include the lack of a nutrient pulse, excess residual litter, or a lack of stimulation of belowground parts by heat.



Conclusion

Clipping as done in this experiment is not an adequate substitute for fire, even though vegetative regrowth was similar between burned and clipped plants.

As a consequence, a method to burn individual muhly clumps in the field relatively easily and safely has been developed. A 55-gallon drum with the ends removed is used as movable fire enclosure (**K**), allowing the burning of numerous muhly clumps in a safe and expeditious manner. Experimental burning treatments addressing the issue of season of burning and the response of muhly began in January 2003 and will continue through the early part of the wet season.



Literature Cited

Herndon, A., L. Gunderson, and J. Stenberg. 1991. Sawgrass (*Cladium jamaicense*) survival in a regime of fire and flooding. Wetlands 11:17-27.

Hulbert, L. C. 1988. Causes of fire effects in tallgrass prairie. Ecology 69: 46-58.

Nott, M. P., O. L. Bass, Jr., D. M. Fleming, S. E. Killeffer, N. Fraley, L. Manne, J. L. Curnutt, T. M. Brooks, R. Powell, and S. L. Pimm 1998. Water levels, rapid vegetational changes, and the endangered Cape Sable seaside-sparrow. Animal Conservation 1:23-32.

Acknowledgements

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