

Implications of grazing to management
of natural South Florida grasslands.

PRESENTATION TO SOCIETY FOR RANGE MANAGEMENT

FEBRUARY, 1978 AT SAN ANTONIO, TEXAS

MICHAEL J. DUEVER

The National Audubon Society's Corkscrew Swamp Sanctuary is a 4400 ha preserve located in southwest Florida. The swamp lies in a broad shallow channel in a pine flatwoods region and is dominated by marshes and cypress forests. Most of the 1400 mm annual precipitation falls from June through September, resulting in wet season water levels at or above the ground surface in even upland areas and reaching depths of 20 to 60 cm in marshes. By the end of the dry season water levels normally drop below ground and surface water may be completely absent over extensive areas.

Cattle grazing has been the most significant recent human activity in the Corkscrew marshes and upland habitats. Before Audubon purchased the land in 1954, it had been open range, and traditional grazing rights were continued. The cattle are primarily crossbreeds with varying amounts of Brahma blood. They are normally left to fend for themselves year-round with only occasional supplemental feeding.

Recent reassessments of National Audubon policies brought into question the grazing of cattle on lands purchased to be preserved in a natural state. We talked with range management experts and local cattlemen and found that little research had been done on the influence of cattle on wetland vegetation in South Florida. The general opinion was that grazing did not significantly modify plant communities and actually benefitted wildlife. However, we could see distinct boundaries

between vegetation communities along fence lines. We were particularly concerned because attempts to control-burn grazed areas had consistently failed. As a result, some parts of the sanctuary were rapidly being invaded by shrubs. These differences of opinion led us to conduct an enclosure study to resolve the issue. Funding and personnel limitations did not permit us to conduct a definitive study, but we were able to make some general statements about implications for natural grasslands.

During 1975-1976, we evaluated grazing impacts at 13 sites with fenced enclosures, most of which were in marshes and enclosed areas of 10 m². Larger plots of 25 m² were used on forested sites to assess effects on shrubs and trees, but these studies were inconclusive over the short period of our research. We sampled at least 2 sites representing each major habitat type (Table 1).

At each site we took 3 paired, 0.25 m², clip plot samples (3 inside, 3 outside) during each sampling period. Dry weight of biomass and litter standing crop, presence or absence of species, and height of vegetation were used to quantify grazing effects, while ground and aerial photos provided qualitative evaluations.

Simple T-tests (0.05 probability) indicated there were no significant differences between biomass or litter standing crops inside and outside the enclosures at the beginning of the study in August, 1975 (Table 2).

One site showed a significant difference in biomass by December, 1975, and the number of sites with significant differences increased to about 6 in August and November, 1976.

Measurability of differences was influenced by a variety of factors including within-site variability, intensity of grazing, and timing of

TABLE 1

HABITAT TYPES

PINE-PALM-OAK HAMMOCK

overstory: slash pine, sabal palm, live oak

shrub stratum: wax myrtle, palmetto

understory: mixed grasses & forbs

WET PRAIRIE - mixed grasses and forbs

SPARTINA BAKERI MARSH

BARE GROUND

SEDGE MARSH

MAIDENCANE-ARROWHEAD MARSH

TABLE 2

NUMBER OF SITES WITH SIGNIFICANTLY HIGHER STANDING CROP
INSIDE (N.S. OUTSIDE) ENCLOSURE

| | 1975 | | | 1976 | | |
|----------|--------|----------|-------|--------|----------|----------|
| | AUGUST | DECEMBER | MARCH | AUGUST | NOVEMBER | NOVEMBER |
| BIO MASS | 0 | 1 | 3 | 6 | 5 | 5 |
| LITTER | 0 | 0 | 0 | 3 | 3 | 3 |

vegetative production and its conversion to litter. The construction of exclosures in July, 1975 was late enough in the growing season that few differences in biomass were detectable until August, 1976 when production of the 1976 growing season was measured. There was no killing frost prior to November, 1976, when the study ended, so there were still few differences in litter standing crops at that time. At 3 of 4 sites with abnormally light grazing pressure in 1976, little effect was detected either quantitatively or qualitatively. Although we were unable to measure quantitative differences at the forested sites, the understory vegetation in open areas was taller and more dense inside the exclosure. At these sites, areas shaded by a dense canopy contained little understory vegetation and much overstory litter, and random sampling among the scattered clumps of trees and shrubs increased the variability enough to mask the obvious effects of grazing.

The 8 sites that did show significant differences in 1976 were on or in the vicinity of a relatively dry island in the generally marshy area, and there were several supplemental feeders in the vicinity. Both factors tended to concentrate cattle activity.

Since site variability and small sample size could have masked what actually were real differences in biomass and litter standing crop, we also plotted average values inside and outside of exclosures for each sampling date to detect any trends that developed during the course of the study. In almost every case there were greater average dry weights of both litter and biomass within the exclosures throughout 1976. At some sites this merely continued a pattern that had existed since the

beginning of the study (Figure 1A). Most sites developed a stabilized relationship from a previously erratic pattern (Figure 1B) or an increased divergence in average values (Figure 1C).

On our last sampling date in November 1976, we also measured average vegetation height at a number of points inside and outside exclosures (Table 3). These data indicated that vegetation structure in most of the heavily used areas appeared to be much more dramatically altered than was biomass or litter, but the same general pattern of differences prevailed.

In general, visual observations closely paralleled the quantitative analyses. Differences were most obvious in May, 1977 when a full season's production was still present within the exclosures, but had been removed outside by continued grazing during the winter.

The data indicated approximately 40-60 percent utilization of vegetation in late summer, 70-80 percent in late fall, and we estimated utilization was even greater by spring.

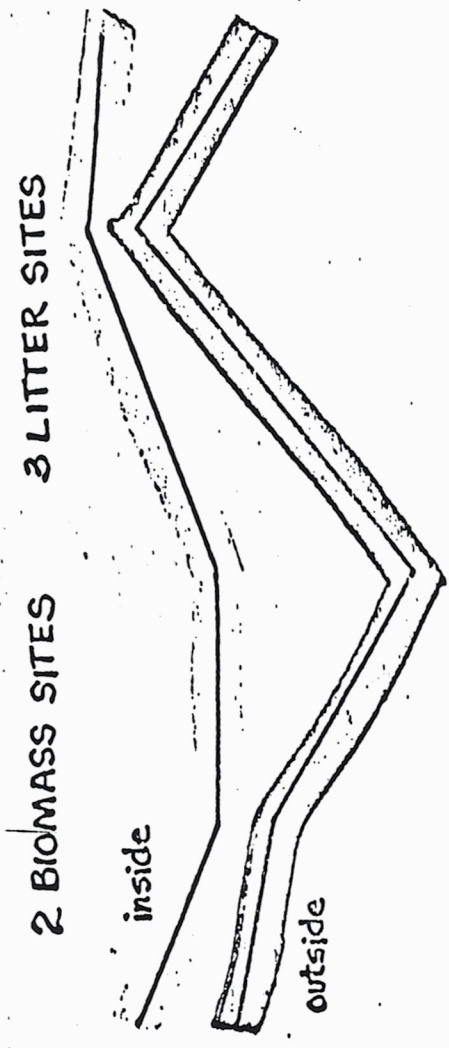
Dry weights of biomass within exclosures varied from about 250 to 5000 kg/ha by the end of the study. The highly disturbed bare ground marsh sites and the upland sites were generally below 1000 kg/ha, while most marshes were over 2000 kg/ha.

No dramatic differences in taxonomic composition inside and outside exclosures were detected, although the short duration of the study and use of presence or absence criteria could easily have missed them. Changes that did occur, took place both inside and outside the exclosures.

Thus, we feel certain that cattle do have definite effects on wetland plant communities in South Florida. We did not formally examine

FIGURE 1 A-C, SCHEMATIC PATTERNS OF RELATIVE BIOMASS
AND LITTER STANDING CROPS THAT DEVELOPED DURING THE STUDY.

FIGURE 1A



2 BIOMASS SITES 3 LITTER SITES

AUG NOV MAR AUG NOV

FIGURE 1B

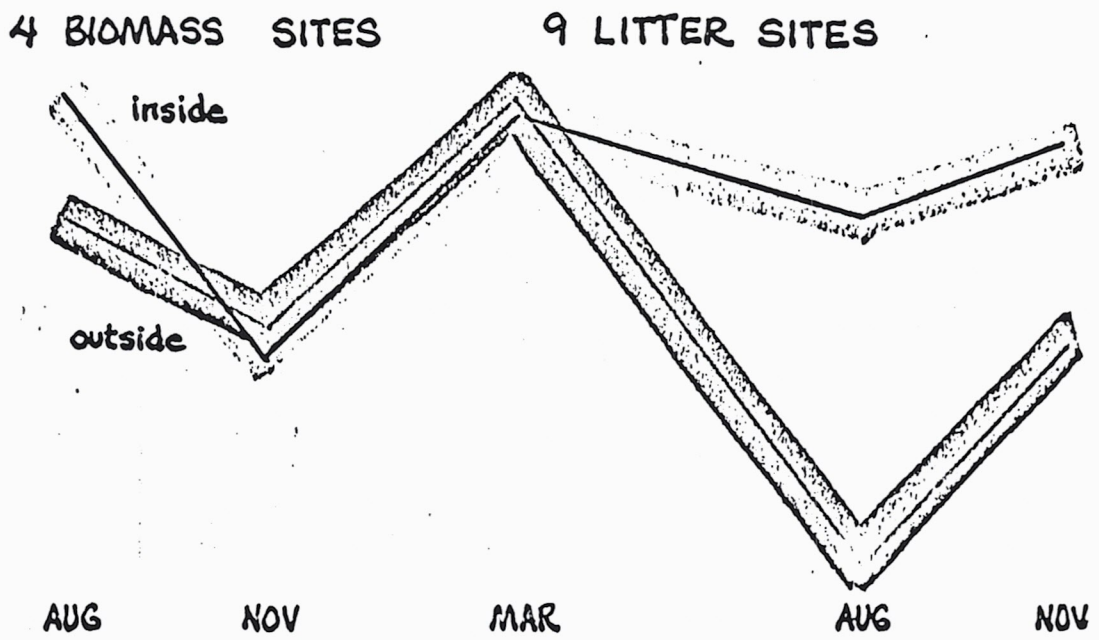


FIGURE 1C

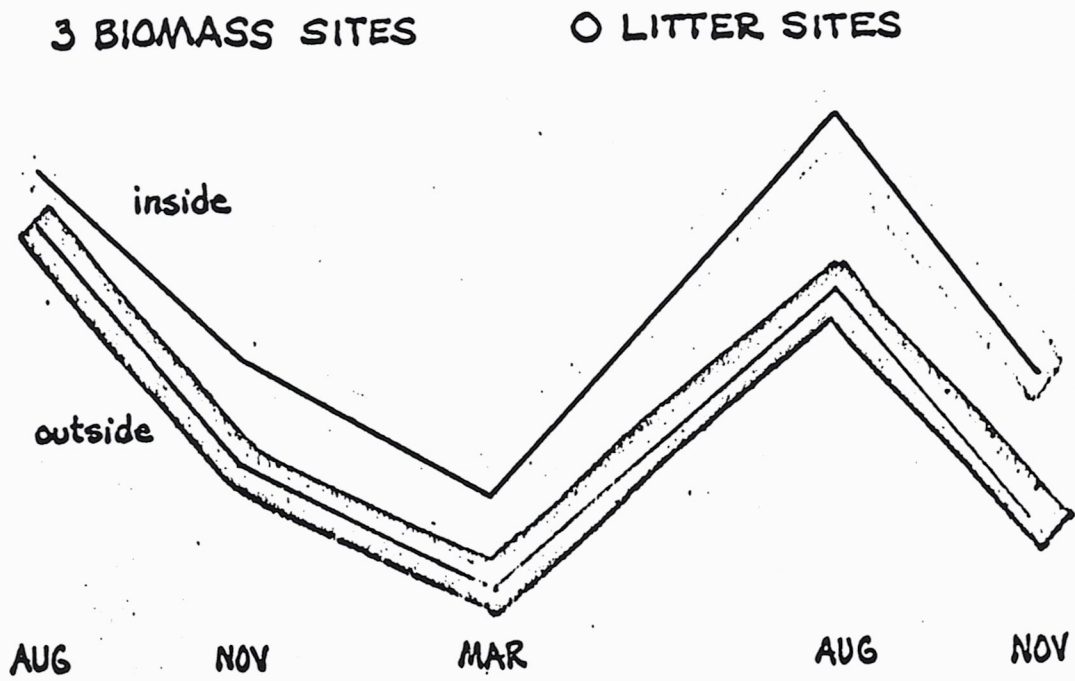


TABLE 3

PERCENT REDUCTION IN AVERAGE
VEGETATION HEIGHT OUTSIDE
(VS. INSIDE) ENCLOSURE

| percent range | number of sites |
|---------------|-----------------|
| -20 - 0 | 2 |
| 1 - 20 | 2 |
| 21 - 40 | 2 |
| 41 - 60 | 1 |
| 61 - 80 | 0 |
| 81 - 100 | 6 |

effects on hammocks, which are elevated, relatively dry hardwood tree islands, but our observations suggest that grazing results in an almost complete elimination of seedlings and a general thinning of the hammock interior vegetation; some trees up to 10 cm in diameter having been killed.

Since our objective at Corkscrew is to maintain a natural system, not to manage for the most productive or profitable system, we were interested in whether observed cattle effects were different in kind or degree from the natural processes operating in South Florida. Looking first at possible adjustments in grazing intensities, local cattlemen stated that they did not consider it economically feasible to either graze fewer cattle or to increase management efforts. Looking next at differences in kinds of effects, a literature search indicated that although bison were present in North and Central Florida during historic times, there is no evidence of a large grazing herbivore in South Florida during the last 5000 years when present plant communities evolved.

Thus, while cattle have a place in the South Florida economy, particularly on improved pastures, and are considered beneficial to wildlife on native range, we feel that they are not an appropriate component of the ecosystem in an area such as Corkscrew Swamp Sanctuary, which has as a primary purpose the maintenance of naturally functioning plant and animal communities.