

THE EFFECTS OF FIRE ON VIRGIN NORTHERN MIXED GRASSLAND
AT CUSTER NATIONAL MONUMENT

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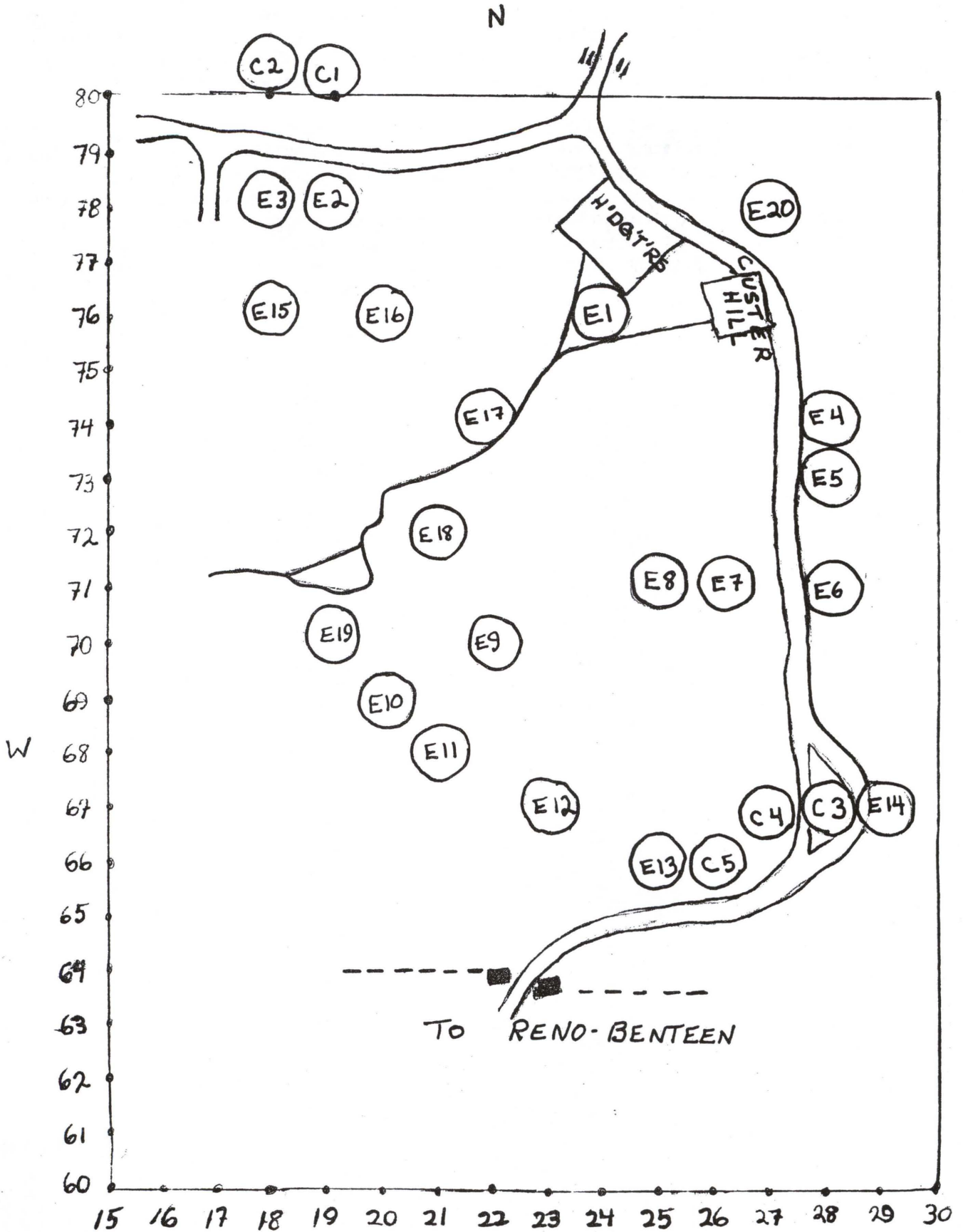
Our second season of field work at the Battlefield ended in July, 1985. During this second season, we resampled the 25 study plots we established in 1984 (see Eighth Annual Report). In the wildfire of August, 1983, 20 of our study plots were burned (the experimental plots), and 5 were not (the control plots). The study plots are indicated in the sketch map, Figure 1. An excavation, approximately 1 m², was made by the amateur archeologists visiting the site. No further incidents of this sort are anticipated for the duration of the study.

We sampled vegetation on all plots, by means of vegetation transects and quadrats. All plot measured 20 X 20m². Transects on the plots were spaced 5 m apart, and sampling was carried out at 0.5 m intervals. At each sampling point we recorded species identification, height of the plant, and phenological state of the plant. If no living plants were present, this was noted. Twenty 50 X 50 cm quadrats were located inside the borders of each plot at 4 m intervals. Within each quadrat, we recorded all species present, numbers of individuals of each species, and a cover-sociability index number for each species. Litter, bare ground, and dead grass also were given cover values. All woody species were censused on all study plots. All living woody plants were identified to species, their total heights and canopy widths recorded, their phenological states and general health noted. As in the first year, each study plot was photographed from the coordinate stake which gave that plot its name. The camera was aimed diagonally across the study plot in each case. On all 25 plots, two 0.2 m samples of above-ground vegetation were clipped as in 1985. Samples were processed at the C.U. laboratory.

Several dozen photos of the Battlefield have been examined. They were taken through the years since the Battle (1876). We have rephotographed exactly several sites used in more recent ones which are commercially available. The study of old photos has told us a great deal about the nature of the Battlefield at the time of the Battle and how it has changed since. We are concluding that (1) the 1983 fire changed the appearance of the Battlefield from its pre-burn condition. We also feel that it may now be less like the condition of the Battlefield at the time of the Battle in 1876 than it was prior to the 1983 fire. The Battlefield offers a fine example of Northern Mixed Grass Prairie, and its natural values, supplemental perhaps to its historic ones, should not be undervalued by the National Park Service.

Our work of the checklist of the Monument is progressing. We have found over

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 Figure 1. Sketch map of study plots at GBNM (circles).
 E=experimental plots. C=Control plots. Grid numbers
 are from the NPS survey.



one-hundred species, and we estimate that this represents at least 90% of the Monument's flora. The checklist (Figure 2) is to be considered tentative at present because all identifications have not been confirmed by the Herbarium staff at Montana State University where we are depositing our vouchers.

This year we initiated a study of bird responses to the burn. There appears to be a strong correlation between vegetation structure and bird distributions. The fire decimated big sage (*Artemisia tridentata*). The only bird which occurred in any abundance on the burned areas was the Western Meadowlark. Brewer's Sparrows, Lark Sparrows, Lark buntings, and Grasshopper Sparrows all chose unburned sites with dense stands of sagebrush. Because other workers have found sage bird communities to vary greatly from year to year, we will repeat the bird observations in 1986, the last year of the study.

Figure 2. Tentative checklist of the flora, Custer Battlefield National Monument

<u>Yucca glauca</u>	Yucca	Agavaceae
<u>Rhus trilobata</u>	Skunkbrush	Anacardiaceae
<u>Musineon divaricatum</u>		Apiaceae
<u>Toxicodendron rydbergii</u>	Poison Ivy	Apocynaceae
<u>Ascepias speciosa</u>	Showy Milkweed	Asclepidaceae
<u>Achillea millefolium</u>	Yarrow	Asteraceae
<u>Antennaria corymbosa</u>	Pussytoes	Asteraceae
<u>Antennaria parvifolia</u>	Pussytoes	Asteraceae
<u>Arnica sororia</u>		Asteraceae
<u>Artemisia cana</u>	Sweet Sage	Asteraceae
<u>Artemisia frigida</u>	Pasture Sage	Asteraceae
<u>Artemisia filifolia</u>	Silver worm wood	Asteraceae
<u>Artemisia tridentata</u>	Big Sagebrush	Asteraceae
<u>Aster scopulorum</u>		Asteraceae
<u>Centaura repens</u>	Star Thistle	Asteraceae
<u>Cirsium arvense</u>	Canada Thistle	Asteraceae
<u>Cirsium undulatum</u>	Wavy-leaved Thistle	Asteraceae
<u>Crepis occidentalis</u>	W. Hawksbeard	Asteraceae
<u>Echinacea angustifolia</u>	Purple Coneflower	Asteraceae
<u>Erigeron bellidiastrum</u>	Daisy Fleabane	Asteraceae
<u>Erigeron ochroleucus</u>		Asteraceae
<u>Grindelia squarrosa</u>	Gum weed	Asteraceae
<u>Haplopappus lanuginosus</u>		Asteraceae
<u>Helianthus sp.</u>	Sunflower	Asteraceae
<u>Heterotheca villosa</u>	Golden Aster	Asteraceae
<u>Lactuca serriola</u>	Prickly Lettuce	Asteraceae
<u>Lygodesmia junca</u>	Skeleton Plant	Asteraceae
<u>Machaeranthera pinnatifida</u>		Asteraceae
<u>Microseris nutans</u>	False Dandelion	Asteraceae
<u>Ratibida columnifera</u>	Coneflower	Asteraceae
<u>Senecio plattensis</u>	Groundsel	Asteraceae
<u>Solidago nemoralis</u>	Goldenrod	Asteraceae
<u>Taraxicum officinale</u>	Common Dandelion	Asteraceae
<u>Lappula redowski</u>	Beggars Tick	Boraginaceae
<u>Lithospermum incisum</u>	Cleft Gromwell	Boraginaceae
<u>Alyssum alyssoides</u>	Alyssum	Brassicaceae
<u>Alyssum desertorum</u>	Alyssum	Brassicaceae
<u>Draba brachycarpa</u>		Brassicaceae
<u>Erysimum asperum</u>	W. Wallflower	Brassicaceae
<u>Lepidium perfoliatum</u>	Clasping Peppergrass	Brassicaceae
<u>Lesquerella ludoviciana</u>	Bladderpod	Brassicaceae
<u>Sisymbrium altissimum</u>	Tumbling Mustard	Brassicaceae
<u>Thlaspi arvense</u>	Pennycress	Brassicaceae
<u>Corypanth sp.</u>	Puncushion Cactus	Cactaceae
<u>Opuntia polyacantha</u>	Prickly Pear	Cactaceae
<u>Lonicera tatarica</u>	Honeysuckle	Caprifoliaceae
<u>Symphoricarpos occidentalis</u>	Snowberry	Caprifoliaceae
<u>Seratoides lanata</u>	Winterfat	Chenopodiaceae

<u>Sarcobatus vermiculatus</u>	Greasewood	Chenopodiaceae
<u>Tradescantia bractata</u>	Spiderwort	Commelinaceae
<u>Carex filifolium</u>		Cyperaceae
<u>Scirpus acutus</u>	Bullrush	Cyperaceae
<u>Eleagnus commutata</u>	Silverberry	Eleagnaceae
<u>Shepherdia argentea</u>	Buffaloberry	Eleagnaceae
<u>Euphorbia robusta</u>		Euphorbiaceae
<u>Astragalus aboriginum</u>	Indian Milk Vetch	Fabaceae
<u>Astragalus agrestis</u>		Fabaceae
<u>Astragalus atropubescens</u>		Fabaceae
<u>Astragalus crassicaarpus</u>		Fabaceae
<u>Astragalus drummondii</u>		Fabaceae
<u>Astragalus hyalinus</u>		Fabaceae
<u>Glycyrriza lepidota</u>	Wild Licorice	Fabaceae
<u>Lupinus argenteous</u>	Lupine	Fabaceae
<u>Medicago sativa</u>	Alfalfa	Fabaceae
<u>Melilotus officinalis</u>	Yellow Sweet Clover	Fabaceae
<u>Oxytropis sericea</u>	White Locoweed	Fabaceae
<u>Petalostemon candidum</u>	Wt. Prairie Clover	Fabaceae
<u>Petalostemon purpureum</u>	Pl. Prairie Clover	Fabaceae
<u>Psoralea argophylla</u>		Fabaceae
<u>Psoralea esculenta</u>	Wild Turnip	Fabaceae
<u>Psoralea tenuiflora</u>		Fabaceae
<u>Thermopsis rhombifolia</u>	Golden Banner	Fabaceae
<u>Vicia americana</u>	American Vetch	Fabaceae
<u>Ribes aureum</u>	Wild Current	Grossulariaceae
<u>Phacelia linearis</u>		Hydrophyllaceae
<u>Hypericum perforatum</u>	St. Johns Wort	Hydrophyllaceae
<u>Allium textile</u>	Wild Onion	Liliaceae
<u>Calochortus nuttallii</u>	Mariposa Lily	Liliaceae
<u>Leucocrinum montanum</u>	Sand Lily	Liliaceae
<u>Smilacina stellata</u>		Liliaceae
<u>Zigadenus venenosus</u>	Death Camas	Liliaceae
<u>Linum perenne</u>	Blue Flax	Linaceae
<u>Linum sulcatum</u>	Yellow Flax	Linaceae
<u>Sphaeralcea coccinea</u>	Scarlet Mallow	Malvaceae
<u>Fraxinus pennsylvanica</u>	Green Ash	Oleaceae
<u>Epilobium sp.</u>		Onagraceae
<u>Gaura coccinea</u>	Scarlet Gaura	Onagraceae
<u>Oenothera laciniata</u>		Onagraceae
<u>Oenothera albicaulis</u>	Evening Primrose	Onagraceae
<u>Plantago patagonica</u>		Plantaginaceae
<u>Agrostis hyemalis</u>	Ticklegrass	Poaceae
<u>Agropyron dasystachyum</u>	Thickspike Wh. grass	Poaceae
<u>Agropyron desortorum</u>	Crested Wheatgrass	Poaceae
<u>Agropyron repens</u>	Quackgrass	Poaceae
<u>Agropyron smithii</u>	W. Wheatgrass	Poaceae
<u>Agropyron spicatum</u>	Bluebunch Wh. grass	Poaceae
<u>Aristida purpurea</u>	Purple Three-Awn	Poaceae
<u>Bouteloua curtipendula</u>	Side Oats Grama	Poaceae
<u>Bouteloua gracilis</u>	Blue Grama	Poaceae

<u>Bromus inermis</u>	Smooth Brome	Poaceae
<u>Bromus japonicus</u>	Japanese Brome	Poaceae
<u>Bromus tectorum</u>	Cheat Grass	Poaceae
<u>Calamagrostis inexpansa</u>	Northern Reedgrass	Poaceae
<u>Calamovilfa longifolia</u>	Prairie Sandreed	Poaceae
<u>Hordeum jubatum</u>	Foxtail Barley	Poaceae
<u>Koeleria macrantha</u>	Junegrass	Poaceae
<u>Poa compressa</u>	Canada Bluegrass	Poaceae
<u>Poa juncifolia</u>		Poaceae
<u>Poa pratensis</u>	Kentucky Bluegrass	Poaceae
<u>Stipa comata</u>	Needle & Thread Grass	Poaceae
<u>Stipa viridula</u>	Green Needlegrass	Poaceae
<u>Triticum aestivum</u>	Wheat	Poaceae
<u>Collomia linearis</u>		Polemoniaceae
<u>Phlox hoodii</u>	Phlox	Polemoniaceae
<u>Eriogonum pauciflorum</u>		Polygonaceae
<u>Rumex crispus</u>	Curly Dock	Polygonaceae
<u>Delphinium nuttallianum</u>	Larkspur	Ranunculaceae
<u>Rosa arkansana</u>	Wild Rose	Rosaceae
<u>Galium aparine</u>	Cleavers	Rubiaceae
<u>Galium obtusum</u>	Smooth Galium	Rubiaceae
<u>Populus deltoides</u>	Plains Cottonwood	Salicaceae
<u>Comandra umbellata</u>	Bastard Toadflax	Santalaceae
<u>Castilleja angustifolia</u>	Indian Paintbrush	Scrophulariaceae
<u>Orthocarpus luteus</u>	Owls Clover	Scrophulariaceae
<u>Penstemon albidus</u>	Penstemon	Scrophulariaceae
<u>Penstemon eriantherus</u>		Scrophulariaceae
<u>Penstemon nitidus</u>		Scrophulariaceae
<u>Typha latifolia</u>	Cat Tail	Typhaceae
<u>Viola nuttalli</u>	Nuttalls Violet	Violaceae