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MANITOBA'S TALL-GRASS PRAIRIE CONSERVATION PROJECT

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Abstract. Manitoba's tallgrass prairies mark the northernmost extent of that community in North America and historically comprised the most extensive area of tallgrass prairie in Canada. The Tall-Grass Prairie Conservation Project is Manitoba's first systematic inventory of this community. Potential sites were located using black-and-white aerial photography, land-use maps, and referrals from outside sources. Sites were systematically ground-checked and ranked using native species dominance, abundance and diversity, evidence of disturbance, and location. About 19% (116,600 ha) of the historic range of the true prairie was surveyed between May and October of 1987; an additional 23% (138,000 ha) was surveyed between May and July of 1988. The project has greatly heightened public awareness of the threat to Manitoba's tallgrass prairie and seeks to incorporate protection and management of prairie remnants with continued inventory.

Key Words. tallgrass prairie, inventory, prairie remnants, Manitoba

INTRODUCTION

The tallgrass prairie community in North America lies along the eastern edge of the Great Plains within the rain shadow of the Rocky Mountains (Transeau 1935) extending from Texas northward through the midwestern United States to southern Manitoba (Shelford 1963). Tallgrass prairie is bordered by the deciduous forest biome on the east, aspen parkland to the north, and mixed grass prairie to the west and south. It is the most productive and diverse of North America's grassland types, and it is the one with the richest black chernozemic soils.

Historically, Manitoba contained the largest area of tallgrass prairie in Canada with five times more than occurred in the next largest area in the azonal communities of southwestern Ontario (Johnson 1987). Manitoba's tallgrass prairie once occupied 6,000 km² of the south-central portion of the province (Watts 1969). Although there is some disagreement over its exact boundaries in Manitoba, this prairie is considered to have occupied the basin of ancient Glacial Lake Agassiz north of the United States border, west of the Red River, south of the Assiniboine River, and east of the Manitoba escarpment (Watts 1969, Weir 1983). Soil types, climate, and existing tallgrass prairie remnants indicate that the community comprised the dominant vegetation type for some distance east and north of the designated true tallgrass prairie zone of Manitoba (Figure 1).

Past surveys to locate remnant stands of tallgrass prairie included those of Ralston (1968), the International Biological Programme (Levin and Keleher 1969, Nero 1972), and Anderson (1986). These surveys were not systematic in nature. Documentation of sites was accomplished through random search and referrals from Department of Agriculture weed inspectors. The Manitoba Naturalists Society's Tall-Grass Prairie Conservation Project, reported in this paper, constitutes the province's first systematic inventory of the tallgrass prairie community in Manitoba.

METHODS

The inventory was conducted in the Red River Valley and its periphery in south-central Manitoba (Figure 1). The primary study area generally coincided with the basin of ancient Glacial Lake Agassiz. Topography is flat to rolling, and soils are black chernozems developed on clay and glacial till deposits. Land-use is intensive agriculture with cereal, oilseed, and domestic forage crops predominant. The secondary and tertiary (peripheral) study

areas were characterized by poorer, stonier soils and rolling topography. Land-use is primarily native hay and pasture. Climate over both areas is continental temperate, characterized by long, cold winters and short, warm summers. Mean daily temperature was -17.3 C for January and 20 C for July. Mean annual precipitation was 46-51 cm with two-thirds of that amount falling in the period between May and September. Over 65% of the province's one million people live within the study area, most within the city of Winnipeg.

Black-and white aerial photographs, at a scale of 1:15,840 were analyzed to locate potential tallgrass prairie remnants larger than 1 ha in size. Potential sites included farmsteads, abandoned and existing railway lines, cemeteries, undeveloped road allowances, native pasture and hayland, and areas difficult to access with farm machinery. Locations were transferred to same-scale land-use maps for field use. Potential prairie sites were systematically ground-checked on a township-by-township basis. Additional peripheral area sites were located through referral and by reviewing unpublished data from International Biological Programme files.

Each site was evaluated on location and ranked using native species dominance and diversity, cover/abundance and sociability, relative abundance of increasers and exotics, and physical disturbance to the site. *Dominance* refers to those species with the highest cover value in a site; *diversity* is an assessment based on a combination of the number of species (species richness) and the evenness with which individuals are distributed among the species. *Cover/Abundance* was measured using an index of frequency of occurrence or the number of individuals of a given plant species on a particular site. Specific categories were: r = single occurrence, + = occasional with cover < 5%, 1 = plentiful with cover < 5%, 2 = very numerous with cover 5-25%, 3 = any number of individuals but cover 25-50%, 4 = any number of individuals but with cover 50-75%, 5 = any number of individual with cover > 75%. *Sociability* was an index of the tendency of a given plant species to "clump": 1 = growing singly; 2 = grouped with few individuals; 3 = large group with many individuals; 4 = small colonies, extensive patches, or broken mat; 5 = extensive mat. *Increasers*, as used in this study, are native plants that greatly increase in abundance or cover as a result of heavy grazing or other disturbance. For example, pussy-toes (*Antennaria* Gaertn.), wolf-willow (*Elaeagnus commutata* Bernh.), and gumweed [*Grindelia squarrosa* (Pursh) Dun.] are considered increaser species in that they tend to be over-represented in heavily grazed native pastures. *Exotics* are defined as those plants not native to North America, most having been introduced from Europe or Asia.

Indicator species, as used later in the text, are native species that are confined to or occur regularly in tallgrass prairie. These may include big bluestem (*Andropogon gerardii* Vitman), indian-grass [*Sorghastrum nutans* (L.) Nash], switchgrass (*Panicum virgatum* L.), sideoats grama [*Bouteloua curtipendula* (Michx.) Torr.], western fringed orchid (*Platanthera praeclara*), western silvery aster (*Aster sericeus* Vent.), leadplant (*Amorpha canescens* Pursh), silverleaf psoralea (*Psoralea agrophylla* Pursh), and meadow blazingstar [*Liatris ligulistylis* (A. Nels.) K. Schum].

Only sites ranked C or better were considered suitable for conservation. Location, size, present land-use, and degree of threat were the major factors considered in efforts that were initiated to secure the site through voluntary protection or by other means. Landowners of sites were contacted for access permission and to

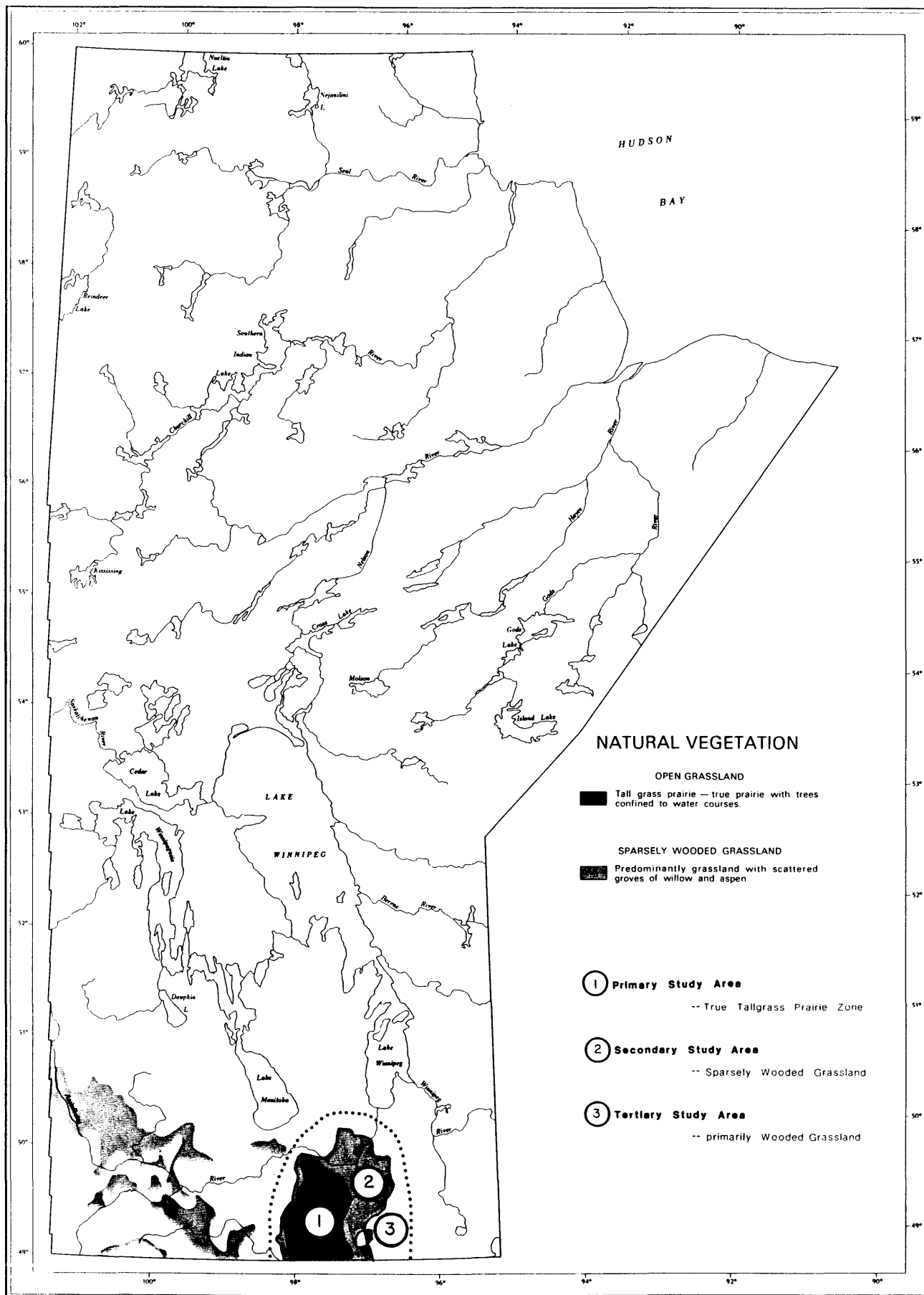


FIG. 1. Tall-Grass Prairie Conservation Project study area in Manitoba. Adapted from Weir (1983).

obtain information on site history, management, and present status. The project's purpose was explained in an effort to enlist their support for prairie conservation.

In 1988 the Tall-Grass Prairie Inventory was expanded and renamed the Tall-Grass Prairie Conservation Project. Field personnel were increased 2 to 3, and a cartographic technician and a project coordinator were hired for a year's duration. In addition, the inventory process was modified to increase inventory efficiency. All ranking criteria in 1988 were the same as those used in 1987, with the exception of cover/abundance and sociability parameters being reassigned to a later stage of the inventory. Instead, preliminary ranking of sites was based on the dominance and diversity of native indicator species. Increased emphasis was given to public education and the voluntary protection/management of prairie sites by landowners. A full-color brochure on Manitoba's tallgrass prairie was produced for distribution to landowners and the general public. A feature film on tallgrass prairie is presently in production. The narrative is being written for a wide audience in an effort to establish broad public support for tallgrass prairie conservation.

RESULTS

About 19% (116,000 ha) of the historical true prairie zone were ground-checked in the primary study area between May and October of 1987. Thirteen sites were prairies ranked between A and C (Table 1). An additional 23% (138,000 ha) of the primary area was surveyed between May and July of 1988 in which eight prairies were ranked A, B, or C. In the peripheral study areas, nine prairies were surveyed in 1987 of which all tended to be much larger than those in the primary study area. Consequently in 1988, a greater effort was directed to surveying the peripheral areas. Of the 983 peripheral sites surveyed as of 31 July 1988, ten were prairies ranked C or better.

The majority (63%) of prairie sites documented in the true prairie zone were found on railway rights-of-way (Table 2). Most of the sites located in the peripheral areas were harbored on undeveloped road allowances (32%) and pasture/hayland (32%).

Response of landowners to the prospect of site conservation has been good. Management plans are being drafted to assist both private and corporate landowners in improving or maintaining native prairies on their land, and funds have been raised through the project and its funding agencies to acquire highly threatened good-quality prairie where voluntary protection is not possible. The purchase of a 32 ha site in 1988 by the Manitoba Naturalists Society and two of its funding agencies has almost doubled the amount of protected and managed tallgrass prairie in the province.

Project findings and recommendations have stimulated the formation of two separate prairie conservation strategies recently initiated by World Wildlife Fund Canada and the Manitoba Department of Natural Resources. World Wildlife Fund's Prairie Conservation Action Plan is based on World Conservation Strategy objectives for the long-term maintenance of ecological systems and their biological diversity. It outlines specific steps to be taken by Canadian prairie provinces to protect and conserve endangered species and habitats. Data and recommendations of the Tall-Grass Prairie Conservation Project were used in the formulation of this broad strategy and in the design of specific action plans for the Manitoba Department of Natural Resources' Prairie Conservation Strategy. Both strategies are slated for implementation in late 1988. The project has raised the profile of tallgrass prairie, its value and its potential uses through tours and presentations for a variety of groups, contact with southern Manitoba landowners and widespread media attention.

DISCUSSION

This study has located less than 150 ha of tallgrass prairie in a portion of the true prairie zone where it once covered 252,000 ha. If this proportion is representative of what remains in the entire true prairie zone, tallgrass prairie now occupies an area in Manitoba 1/20 of 1% as large as it did in pre-settlement times. The majority of prairie remnants in this area occurred along railway rights-of-way which were broken for construction of the lines some 100 years ago. This fact alone attests to the extensive land-use of the area and the lack of any significant unbroken areas, even among those now dominated by native vegetation. In comparison, a greater proportion of the land in areas peripheral to the true prairie zone has been retained in its unbroken state. A high proportion of sites in these areas are found along undeveloped road allowances and on pasture and hayland.

Given that the main objective of the project is to identify and conserve as much tallgrass prairie as possible, the peripheral study areas hold the greatest potential for future work. Species diversity, which is crucial to maintenance of the prairie community, relies in part on the size of each piece conserved. Although they exist in azonal and on poor quality soils, peripheral area sites are larger and not so highly threatened as their true tallgrass zone counterparts and would be substantially less expensive to acquire. Thus, these peripheral areas present the best possibility for the establishment of a large prairie preserve. This does not lessen the importance of securing sites in the true prairie zone which are representative of a variety of conditions such as moisture regimes and soil types.

Table 1. Number and size (ha) of tallgrass prairie sites found within and adjacent to the historic range of tallgrass prairie in Manitoba.

Year	Sites surveyed		Number of TGPs		Site size	
	Primary	Secondary/ Tertiary	Primary	Secondary/ Tertiary	Primary	Secondary/ Tertiary
	-----number-----		----- ≥ C rank-----		----- ha -----	
1987	311	10	13	9	79	489
1988	1,087	983	8	10	49	174
TOTAL	1,398	993	21	19	128	663

Table 2. Land-use on tallgrass prairie sites surveyed in the true prairie zone of Manitoba and its periphery as of July, 1988.

Area surveyed	Railway right-of-way	Pasture/hayland	Cemetery	Road allowance	Other	Total
Primary	13	2	1	1	4	21
Secondary/tertiary	2	6	0	6	5	19

Because most of the province's tallgrass prairie was destroyed before it was ever documented or studied, maintenance of even the smallest remnant prairie is of high value for research and education, as habitat, and for the public good. The implementation of programs and policies that promote native prairie conservation in Manitoba is therefore of paramount importance. At present there is no public or private mechanism specific to the conservation and management of native prairies. Private landowner stewardship, management assistance, Crown land management, native prairie tax credits, and the integration of prairie maintenance into agricultural soil and water conservation initiatives are all facets of prairie conservation which should be implemented in Manitoba as soon as possible. In turn, these programs need support, wherever possible, by public education and new or amended legislation. The Tall-Grass Prairie Conservation Project will continue to strive to effect these changes towards conserving and managing Manitoba's part of a valuable national and international resource.

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